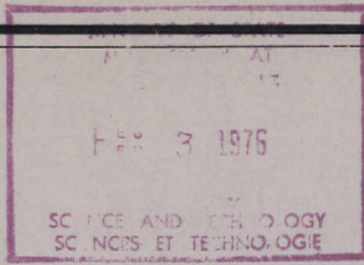


C. /



PROGRAM DOCUMENTATION FOR
SCIENCE DATA TABULATIONS
5 DECEMBER, 1975 report no. 107
rapport n°.



CANADA

Ministry of State Ministère d'État

Science and Technology Sciences et Technologie

Research and Information Services Services de recherche et d'information

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1 Ministry of State

Ministère d'État

2 for
Science and
Technology

Sciences et
Technologie

3
Research and
Information
Services

Services de
recherche et
d'information

PROGRAM DOCUMENTATION FOR
SCIENCE DATA TABULATIONS

15 DECEMBER, 1975

report no.
rapport n°: 107

*Documentation for BASIC-language/RSTS-E
programs used on the PDP 11/45 computer
system in connection with the preparation
of Report No. 100.*

prepared for
préparé pour

Internal Use

by
par

Alan Smith

approved by
approuvé par

M. Lipsett

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PROGRAM DOCUMENTATION FOR SCIENCE DATA TABULATION

Description of Tabulation

These programs produce tabularized summaries of the results of the Statistics Canada Survey of Federal Government Activities in the Natural and Human Sciences.

These programs tabularize the expenditure data using the format established for the "Green Book", and Report #100, published by MOSST.

General Description of Program

1. Data Editing Program

Statistics Canada Data Cards are edited by eliminating blanks and unnecessary fields, and translating alphabetic field into numeric codes. This phase is done by Mike Francis. See Data Formats #1, 2.

2. Science Data Matrices

The Number of departments and programs is determined by the program DEPTNO. The program CARRAY sorts the data into 3 files: 1) ARYVAL.COM, 2) ARYVAL.NAT, 3) ARYVAL.HUM; where the extension .COM indicates combined human and natural data. Each of the 3 data files contains a 13 x 7 matrix for each department or agency, for each of 3 years. See data formats 3, 4.

3. Summed and Ranked Data Matrices

Five programs: SUMRAC, SUMRAN, SUMRAH, SUMRAØ, and SUMRA6 produce a total of 48 data files with the prefix RSUM - table number - data type extension. For example, RSUM29.NAT is the data base for the table number 29, using natural science data. The data is stored in a format which corresponds to the print-out tabulation format. The data for table types 5, 6, and 9, the department totals are ranked by the last year. The grouping for the programs or activities of table types 6 is regulated by data statements contained in the source program : SUMRA6

4. Printout Programs

Five programs: TABLEØ, TABLE2, TABLE5, TABLE6 and TABLE9 print out the tables according to the type of tabulation. Each program provides the option for user's terminal printout or print file formation (for eventual transfer to line printer) TABLEØ provides no other options. TABLE2 allows for regrouping and re-ordering performers and activities by changing the source program data statements 130 to 147.

TABLE5, and TABLE9 require input for number of departments listed. TABLE6 requires input for number of departments but allows for changing the number of departments for each performer or activity.

5. Utility Program

The program TITLEU allows creation and update of table titles used in printout programs. Option 99 lists the titles and option 84 allows for updating the year numbers.

Operation Procedures

1. Production of Summed and Ranked Data Matrices

The BATCH control program SUBACH.CTL causes the execution of DEPTNO, CARRAY, and all SUMRA programs. No input is required. These matrices may be produced singly.

2. Production of Tables

The tables are originally run by cycling through each of 5 TABLE programs. Manual input is required for table number, terminal or file output, and number of departments. The statements

```
PIP DUM.LIS < T.*
QUE/Q LPØ:/MODE:128 = DUM.LIS
```

will cause all print files to be transferred to print. MODE:128 causes Ø to print as 0

Listing individual tables:

Using Tabulation Index, determine tabulation type (0, 2, 5, 6, or 9), run appropriate TABLE program and respond to the question "WHICH TABLE" by inputting appropriate table number.

PROGRAM TYPE BASIC SCIENCE DATA MATRIX PROGRAM
NAME DEPTNO.BAS SIZE 3K
PURPOSE Counts the no. of departments for each data type

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	CONTENT	VIRTUAL DIMENSIONS
STATS.DAT	I	Edited version of Statistics Canada Science Data (see Data Format #2)	
DEPTAB.DAT	I	Contains 102 abbreviations corresponding to department/ program numbers in STATS.DAT file	
DEPTNO.DAT	O	Contains the number of departments for each of the 3 data types	

PROGRAM VARIABLES

D% = Dept/Program number (1-102)
Y% = Year number (00-99)
Y1% = Current year number (00-99)
N% = Activity number (1-13)
A\$,K\$,D\$ = Dept/Program abbreviation
K% = Dept/Agency counter
M%(2) = Number of departments/programs per data type

PROGRAM FUNCTION

This program cycles through the STATS.DAT and DEPT.AB files 3 times to count the number of department/programs for each of combined, natural, and human data types. This allows the CARRAY.BAS program to set up data files with correct number of arrays.

```

10 *****THIS PROGRAM COUNTS DEPARATMENT AND PROGRAMS*****
20 DIM K1%(110%),T%(14%)
30 OPEN "DEPTNO.DAT" AS FILE 3
40 M%(0%)=2496:M%(1%)=832:M%(2%)=64%
50 DEF FNF%(I1%,I2%)
60 FNF%=D%
70 FNF%=I% IF K1%(I%)<>0% FOR I%=I1% TO I2%
80 FNEND
110 FOR A%=0% TO 2%
120 K1%=0% FOR I%=0% TO 110%
130 OPEN "STATS.DAT" AS FILE 1
140 OPEN "DEPTAB.DAT" AS FILE 2
150 DIM#2,A$(110)
240 K%=0% : K$="BEGIN"
250 INPUT LINE#1,C$
255 ON ERROR GOTO 540
260 GOTO 250 IF MID(C$,4%,1%)="2" IF A%=1%
270 GOTO 250 IF MID(C$,4%,1%)="1" IF A%=2%
280 C$=C\T$(C$,4%)
290 D%=VAL(LEFT(C$,3%))
300 Y%=VAL(MID(C$,5%,2%))
310 Y1%=Y% IF Y1%<Y%
320 N%=VAL(MID(C$,7%,2%))
330 GOTO 540 IF N%=99%
340 PRINT "ERROR,D,Y,N",D%,Y%,N% IF N%=5%
350 IF D%=16% THEN D%=FNF%(6%,6%):GOTO 450 IF D%=6%
360 IF D%=59% OR D%=60% THEN D%=FNF%(42%,42%):GOTO 450 IF D%=42%
370 IF D%=62% THEN D%=FNF%(23%,26%):GOTO 450 IF D%<>62%
380 IF A$(D%)=K$ THEN K1%(D%)=K%:GOTO 450
390 K%=K%+1%
410 K1%(D%)=K%
420 L%=K%*13%
430 K$=A$(D%)
450 GOTO 250
540 PRINT"D,K,K1(D),I,L,K$",D%,K%,K1%(D%),I%,L%,K$
550 M%(0%)=L%*3%:M%(1%)=L%:M%(2%)=K%:M%(3%)=Y1%
570 PRINT "M":I%,M%(I%) FOR I%=0% TO 3%
580 CLOSE 1,2
585 PRINT#3,M%(3%) IF A%=0%
587 PRINT#3,M%(2%)
590 NEXT A%
595 CLOSE 3
600 END

```

PROGRAM TYPE Basic Science Data Matrix Program
 NAME CARRY.BAS SIZE 4K
 PURPOSE Creates 3 Data File Types: 1 Human & Natural 2. Natural 3. Human

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	CONTENT	VIRTUAL DIMENSIONS
STATS.DAT	I	Edited version of Statistics Canada Science Data (see Data Format #2)	
DEPTAB.DAT	I	Contains 102 abbreviations corresponding to department/program number in STATS.DAT file	A\$(110)
DEPTNO.DAT	I	Contains the number of departments for each data type	
ARYVAL.COM } ARYVAL.NAT } ARYVAL.HUM }	0	Basic data files for each of the 3 types of data (see Data Format #3, 4)	M%(3), D\$(64), V(2496,6)

PROGRAM VARIABLES

D% = Dept/Program number (1-102)
 Y% = Year number (00-99)
 Y1% = Current year number (00-99)
 N% = Activity Number (1-13)
 A\$,K\$,D\$ = Dept/Agency abbreviation
 K% = Dept/Agency counter
 I = Data array row counter
 J1 = Data array column
 M% (0) = # rows in V matrix
 M% (1) = # rows/year
 M% (2) = # departments per data type
 M% (3) = current year number
 J3 = card image column

PROGRAM FUNCTION

FNF% (Function): Ensures that only one matrix per year is set up for departments which are not listed together in the card file.

The program function is to translate the data from the edited card images to each of the 3 data file. Types the column containing data for "Intramural: without non-program" costs" is excluded. The activities are arranged so that "administration of extramural programs" is grouped by R&D and RSA. A 13 x 6 matrix is formed for each department/agency for each year. See Data Format #2, 3, 4.


```

10 1**THIS PROGRAM CREATES THE BASIC DATA MATRICES FOR COMBINED, FOR NATURAL,
20 DIM K1%(110%), T%(14%)
25 OPEN "DEPTNO.DAT" AS FILE 4 AND FOR HUMAN SCIENCE*****
27 INPUT#4, M3%
30 READ T%(N%) FOR N%=1% TO 14%
40 DATA 1, 2, 3, 4, 99, 6, 7, 8, 9, 10, 11, 13, 5, 12
50 DEF FNF%(I1%, I2%)
60 FNF%=D%
70 FNF%=I% IF K1%(I%)<>0% FOR I%=I1% TO I2%
80 FNEND
110 FOR A%=0% TO 2%
120 K1%=0% FOR I%=0% TO 110%
130 OPEN "STATS.DAT" AS FILE 1
140 OPEN "DEPTAB.DAT" AS FILE 2
150 OPEN "ARYVAL.COM" AS FILE 3 IF A%=0%
160 OPEN "ARYVAL.NAT" AS FILE 3 IF A%=1%
170 OPEN "ARYVAL.HUM" AS FILE 3 IF A%=2%
180 DIM#2, A$(110%)
190 DIM#3, M%(3%), D$(64%), V(2496%, 6%)
200 INPUT#4, M%(2%)
210 M%(0%)=M%(2%)*39:M%(1%)=M%(2%)*13%
220 PRINT "M( "; I% ; " ) = ", M%(I%) FOR I%=0% TO 2%
230 V(I%, J%)=0 FOR J%=0% TO 6% FOR I%=0% TO M%(0%)
240 K%=0% : K$="BEGIN"
250 INPUT LINE#1, C$
260 GOTO 250 IF MID(C$, 4%, 1%)="2" IF A%=1%
270 GOTO 250 IF MID(C$, 4%, 1%)="1" IF A%=2%
280 C$=C/TT$(C$, 4%)
290 D%=VAL(LEFT(C$, 3%))
300 Y%=VAL(MID(C$, 5%, 2%))
310 Y1%=Y% IF Y1%<Y%
320 N%=VAL(MID(C$, 7%, 2%))
330 GOTO 540 IF N%=99%
340 PRINT "ERROR, D, Y, N", D%, Y%, N% IF N%=5%
350 IF D%=16% THEN D%=FNF%(6%, 6%):GOTO 450 IF D%=6%
360 IF D%=59% OR D%=60% THEN D%=FNF%(42%, 42%):GOTO 450 IF D%=42%
370 IF D%=62% THEN D%=FNF%(23%, 26%):GOTO 450 IF D%<>62%
380 IF A$(D%)=K$ THEN K1%(D%)=K% :GOTO 450
390 K%=K%+1%
400 PRINT D%, K%, A$(D%)
410 K1%(D%)=K%
420 L%=K%*13%
430 K$=A$(D%)
440 D$(K%)=A$(D%)
450 I%=(K1%(D%)-1%)*13%+T%(N%)+(2%-(M3%-Y%))*M%(1%)
470 FOR J%=0% TO 7%
480 J1%=J%
490 J1%=J%-1% IF J%>1%
500 J3%=J%*9%+9%
510 V(I%, J1%)=V(I%, J1%)+VAL(MID(C$, J3%, 8%))UNLESS J%=1%
520 NEXT J%
530 GOTO 250
540 PRINT "D, K, K1(D), I, L, K$", D%, K%, K1%(D%), I%, L%, K$
550 M%(0%)=L%*3%:M%(1%)=L%:M%(2%)=K%:M%(3%)=Y1%
570 PRINT "M( "; I% ; " ) = ", M%(I%) FOR I%=0% TO 3%
580 CLOSE 1, 2, 3
590 NEXT A%
595 CLOSE 4
600 END

```

PROGRAM TYPE SUMMED & RANKED DATA MATRIX PROGRAM
 NAME SUMRAC.BAS SIZE 7K
 PURPOSE Creates the data files for Table Types 2, 5, 9

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	CONTENT	VIRTUAL DIMENSIONS
ARYVAL.COM	I	Basic Science Data, Combined Natural & Human	M%(3), D\$(64), V(2496, 6)
RSUM10.COM	0	Matrix format used in printout program	M%(3), A1%(10), S\$(8,65), SI(520,2)
RSUM11.COM			
RSUM12.COM			
RSUM13.COM			
RSUM15.COM			
RSUM16.COM			
RSUM17.COM			
RSUM18.COM			
RSUM23.COM			
RSUM24.COM			

PROGRAM VARIABLES

- S(65,8) = summation, ranking matrix
- N% = Table type indicator
- O% = Table type calculation indicators
- Y% = Year index
- D% = Department index
- A% = Activity Index
- P% = Performer Index
- C%,C1%,J% = Output matrix column indicator
- I%,I3% = Output matrix row indicator

PROGRAM FUNCTION

This program converts the basic data into the format required for table types 2, 5, and 9. Ranking is performed for table types 5 and 9 where tabulation is by department. The ranking and grouping of performers and activities in table type 2 is done at the printout stage. Each file is listed on the terminal as it printed on the output file. Required Input The table number to be calculated (L%). The program may be terminated by typing a number greater than 24.

```

10 !THIS PROGRAM PREPARES THE PRINT MATRIX FOR ACT/PERF & DEPT/PERF*****
20 OPEN"ARVPAL.COM" AS FILE 1
25 DIM#1,M%(3%),D%(64%),V%(2496%,6%)
35 DIM S(65%,8%),R(64%),E%(64%)
36 S(I%,J%)=0.FOR J%=0% TO 8% FOR I%=0% TO 65%
40 READ N%(I%) FOR I%=0% TO 10%
50 DATA 10,11,12,13,14,15,16,17,18,23,24
60 PRINT USING"\ \",N%(I%);FOR I%=0% TO 10%;PRINT
65 PRINT
70 PRINT USING"### \",I%;FOR I%=0% TO 10%
71 PRINT
75 INPUT"WHICH TABLE (0 TO 10)",L%
76 IF L%>10% THEN CLOSE 1:GOTO 2000
77 READ N1%(I%) FOR I%=0% TO 10%
78 DATA 1,1,1,3,3,1,2,2,2,4,4
79 N%=N1%(L%)
120 READ O%(I%,J%) FOR J%=0% TO 10% FOR I%=1% TO 5%
121 DATA 1,1,1,1,1,3,3,3,3,2,2
122 DATA 0,0,6,0,6,0;0,0,6,1,1
123 DATA 12,5,12,5,12,12,12,5,12,1,1
124 DATA 0,0,0,1,0,1,1,1;1,1,1
125 DATA 8,8,8,8,9,8,0,0,0,0
130 C1%=O%(1%,L%);D1%=O%(2%,L%);D2%=O%(3%,L%);Y1%=O%(4%,L%)
135 T%=O%(5%,L%);T%=M%(2%)+1% IF L%>5%
150 F%(I%)="RSUM"+N%(I%)+".COM" FOR I%=0% TO 10%
170 OPEN F%(L%) AS FILE 2
180 DIM#2,S1(9%,8%)
185 DIM#2,S6(65%,8%),E%(64%),M1%(3%)
190 DIM#2,S7(9%,8%)
195 M3%=M%(2%)+1%;E%(M3%)="TOTAL"
197 M1%(J%)=N%(J%) FOR J%=0% TO 3%
200 !***FORM THE UNRANKED PRINT OUT MATRIX***
210 C%=-C1%
220 FOR Y%=1% TO M%(0%) STEP M%(1%)
230 C%=C%+C1%
240 I%=0%
250 FOR D%=Y% TO (Y%+M%(1%)-1%) STEP 13%
260 I%=I%+Y1%
270 FOR A%=D%+D1% TO D%+D2%
280 J%=C%
290 GOTO 330 IF N%=1%
300 GOTO 350 IF N%=2%
310 GOTO 500 IF N%=3%
315 GOTO 565
330 A1%=A%-D%
340 J%=C%+1% IF A1%>5%
345 J%=C% IF C1%=1%
350 FOR P%=0% TO 6%
360 I%=P%+1% IF N%=1%
370 J%=C%+1% IF P%>0% IF N%=2%
380 S(I%,J%)=S(I%,J%)+V(A%,P%)
390 S(T%,J%)=S(T%,J%)+V(A%,P%)
400 GOTO 430 IF C1%=1%
410 S(I%,C%+2%)=S(I%,C%+2%)+V(A%,P%)
420 S(T%,C%+2%)=S(T%,C%+2%)+V(A%,P%)

```

```

430                               NEXT P%
440       GOTO 590
450                               FOR P%=0% TO 6%
460       I3%=A%-(D%+D1%)+2%
470       S(1%,J%)=S(1%,J%)+V(A%,P%) IF I3%<T%-1%
480       S(I3%,J%)=S(I3%,J%)+V(A%,P%)
490       S(T%,J%)=S(T%,J%)+V(A%,P%)
500                               NEXT P%
510 GOTO 590
520       S(I%,C%)=V(A%+1%,1%) IF L%=10%
530       S(I%,C%+1%)=V(A%,1%) IF L%=10%
540 GOTO 580 IF L%=10
550       S(I%,C%)=V(A%+1%,2%)+V(A%+1%,3%)
560       S(I%,C%+1%)=V(A%,2%)+V(A%,3%)
570       S(T%,C%)=S(T%,C%)+S(I%,C%)
580       S(T%,C%+1%)=S(T%,C%+1%)+S(I%,C%+1%)
590       NEXT A%:NEXT D%:NEXT Y%
600 *****RANK TABLES NOS.4,5,6,8*****
610       IF N%=1% OR N%=3% THEN 800
620       C%=8%:C%+5% IF N%=4%
630 FOR I%=1% TO M%(2%)
640       E%(I%)=I%:R(I%)=S(I%,C%)
650       R(I%)=S(I%,C%-1%)+S(I%,C%) IF N%=4%
660 NEXT I%
670 FOR I%=1% TO M%(2%)
680       FOR K%=1% TO M%(2%)-I%
690         IF R(K%)>R(K%+1%) THEN 720
700         R1=R(K%): E1=E%(K%)
710         R(K%+1%)=R(K%): E%(K%+1%)=E1
720       NEXT K%:NEXT I%
730 FOR I%=1% TO M%(2%)
740       E1=E%(I%)
750       E$(I%)=D$(E1%)
760       FOR J%=0% TO C%
770         S6(I%,J%)=S(E1%,J%)
780 NEXT J%:NEXT I%
795       S6(T%,J%)=S(T%,J%) FOR J%=0% TO C%
800 GOTO 820
810       C%=8% IF L%=5%
820 FOR I%=1% TO T%:FOR J%=0% TO C%
830       S1(I%,J%)=S(I%,J%) IF L%=5%
840       S7(I%,J%)=S(I%,J%) IF L%<5%
850 NEXT J%:NEXT I%
860 PRINT#Q
870 *****PRINT THEM ON THE TERMINAL AND ON THE FILE*****
880 FOR I%=1% TO T%
890       IF N%=2% OR N%=4% THEN PRINT#Q,E$(I%);TAB(6%);
900       FOR J%=0% TO C%
910         X=S1(I%,J%) IF L%=5%
920         X=S6(I%,J%) IF L%>5%
930         X=S7(I%,J%) IF L%<5%
940       PRINT#Q,USING"*****.#";X/1000;
950 NEXT J%:PRINT#Q:NEXT I%
960 PRINT#Q
1000 CLOSE 1,2
1500 RESTORE:GOTO 10
2000 END

```

PROGRAM TYPE

NAME SUMRAN.BAS SIZE 7K

PURPOSE

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	CONTENT	VIRTUAL DIMENSIONS
ARYVAL.NAT	I	Basic Science Data Natural Sciences	
RSUM30.NAT	}	Matrix format used in printout program	M%(3), A1%(10), S\$(8,65), S1(520,2)
RSUM31.NAT			
RSUM32.NAT			
RSUM33.NAT			
RSUM34.NAT			
RSUM35.NAT			
RSUM36.NAT			
RSUM37.NAT			
RSUM38.NAT			
RSUM43.NAT			
RSUM44.NAT			

PROGRAM VARIABLES

- S(65,8) = summation, ranking matrix
- N% = Table type indicator
- O% = Table type calculation indicators
- Y% = Year index
- D% = Department index
- A% = Activity Index
- P% = Performer index
- C%, C1%, J% = Output matrix column indicator
- I%, I3% = Output matrix row indicator

PROGRAM FUNCTION

This program converts the basic data into the format required for table types 2, 5, and 9. Ranking is performed for table types 5 and 9 where tabulation is by department. The ranking and grouping of performers and activities in table type 2 is done at the printout stage. Each file is listed on the terminal as it printed on the output file. Required Input The table number to be calculated (L%). The program may be terminated by typing a number greater than 44.

```

10 !THIS PROGRAM PREPARES THE PRINT MATRIX FOR ACT/PERF & DEPT/PERF*****
20 OPEN"ARYVAL.NAT" AS FILE 1
30 DIM#1,M%(3%),D$(64%),V(2496%,6%)
35 DIM S(65%,8%),R(64),E$(64%)
36 S(I%,J%)=0 FOR J%=0% TO 8% FOR I%=0% TO 65%
40 READ N$(I%) FOR I%=0% TO 10%
50 DATA 30,31,32,33,34,35,36,37,38,43,44
60 PRINT USING"\      \",N$(I%);FOR I%=0% TO 10%;PRINT
65 PRINT
70 PRINT USING"###      ",I%;FOR I%=0% TO 10%
71 PRINT
75 INPUT"WHICH TABLE (0 TO 10)",L%
76 IF L%>10% THEN CLOSE 1: GOTO 2000
77 READ N1%(I%) FOR I%=0% TO 10%
78 DATA 1,1,1,3,3,1,2,2,2,4,4
79 N%=N1%(L%)
120 READ O%(I%,J%) FOR J%=0% TO 10% FOR I%=1% TO 5%
121 DATA 1,1,1,1,1,3,3,3,3,2,2
122 DATA 0,0,6,0,6,0,0,0,6,1,1
123 DATA 12,5,12,5,12,12,12,5,12,1,1
124 DATA 0,0,0,1,0,1,1,1,1,1,1
125 DATA 8,8,8,8,9,8,0,0,0,0,0
130 C1%=O%(I%,L%);D1%=O%(2%,L%);D2%=O%(3%,L%);Y1%=O%(4%,L%)
135 T%=O%(5%,L%);TX=M%(2%)+1% IF L%>5%
150 F$(I%)="RSUM"+N$(I%)+".NAT" FOR I%=0% TO 10%
170 OPEN F$(L%) AS FILE 2
180 DIM#2,S1(9%,8%)
185 DIM#2,S6(65%,8%),E$(64%),M1%(3%)
190 DIM#2,S7(9%,8%)
195 M3%=M%(2%)+1%;E$(M3%)="TOTAL"
197 M1%(J%)=M%(J%) FOR J%=0% TO 3%
200 !***FORM THE UNRANKED PRINT OUT MATRIX*****
210 CX=-C1%
220 FOR Y%=1% TO M%(0%) STEP M%(1%)
230   CX=CX+C1%
240   I%=0%
250   FOR DX=Y% TO (Y%+M%(1%)-1%) STEP 13%
260     I%=I%+Y1%
270     FOR AX=DX+D1% TO DX+D2%
280       J%=CX
290       GOTO 330 IF N%=1%
300       GOTO 350 IF N%=2%
310       GOTO 500 IF N%=3%
315     GOTO 565
330     A1%=AX-D%
340     J%=CX+1% IF A1%>5%
345     J%=CX IF C1%=1%
350     FOR P%=0% TO 6%
360       I%=P%+1% IF N%=1%
370       J%=CX+1% IF P%>0% IF N%=2%
380       S(I%,J%)=S(I%,J%)+V(AX,P%)
390       S(T%,J%)=S(T%,J%)+V(AX,P%)
400     GOTO 430 IF C1%=1%
410     S(I%,CX+2%)=S(I%,CX+2%)+V(AX,P%)
420     S(T%,CX+2%)=S(T%,CX+2%)+V(AX,P%)
430     NEXT P%
440   GOTO 590
500   FOR P%=0% TO 6%
510     I3%=AX-(DX+D1%)+2%
520     S(I%,J%)=S(I%,J%)+V(AX,P%) IF I3%<T%-1%

```

```

530      S(I3%,J%)=S(I3%,J%)+V(A%,P%)
540      S(T%,J%)=S(T%,J%)+V(A%,P%)
550      NEXT P%
555 GOTO 590
565      S(I%,C%)=V(A%+1%,1%) IF L%=10%
570      S(I%,C%+1%)=V(A%,1%) IF L%=10%
572 GOTO 580 IF L%=10
575      S(I%,C%)=V(A%+1%,2%)+V(A%+1%,3%)
577      S(I%,C%+1%)=V(A%,2%)+V(A%,3%)
580      S(T%,C%)=S(T%,C%)+S(I%,C%)
585      S(T%,C%+1%)=S(T%,C%+1%)+S(I%,C%+1%)
590      NEXT A%:NEXT D%:NEXT Y%
600 *****RANK TABLES NOS.4,5,6,8*****
610      IF N%=1% OR N%=3% THEN 800
620      C%=8%:C%=5% IF N%=4%
630 FOR I%=1% TO M%(2%)
640      E%(I%)=I%:R(I%)=S(I%,C%)
645      R(I%)=S(I%,C%-1%)+S(I%,C%) IF N%=4%
650 NEXT I%
660 FOR I%=1% TO M%(2%)
670      FOR K%=1% TO M%(2%)-I%
680          IF R(K%)>R(K%+1%) THEN 720
690          R1=R(K%): E1%=E%(K%)
700          R(K%)=R(K%+1%): E%(K%)=E%(K%+1%)
710          R(K%+1%)=R1: E%(K%+1%)=E1%
720 NEXT K%:NEXT I%
730 FOR I%=1% TO M%(2%)
740      E1%=E%(I%)
750      E$(I%)=D$(E1%)
760      FOR J%=0% TO C%
770          S6(I%,J%)=S(E1%,J%)
790 NEXT J%:NEXT I%
795      S6(T%,J%)=S(T%,J%) FOR J%=0% TO C%
797      C%=5% IF N%=4%
799 GOTO 820
800      C%=8% IF L%=5%
803 FOR I%=1% TO T%:FOR J%=0% TO C%
805      S1(I%,J%)=S(I%,J%) IF L%=5%
812      S7(I%,J%)=S(I%,J%) IF L%<5%
815 NEXT J%:NEXT I%
818 PRINT#Q
820 ***** PRINT THEM ON THE TERMINAL AND ON THE FILE*****
824 FOR I%=1% TO T%
825     IF N%=2% OR N%=4% THEN PRINT#Q,E$(I%);TAB(6%);
830     FOR J%=0% TO C%
840         X=S1(I%,J%) IF L%=5%
860         X=S6(I%,J%) IF L%>5%
870         X=S7(I%,J%) IF L%<5%
900     PRINT#Q,USING"#####.#",X/1000;
910 NEXT J%:PRINT#Q:NEXT I%
950 PRINT#Q
1000 CLOSE 1,2
1500 RESTORE:GOTO 10
2000 END

```

PROGRAM TYPE

NAME SUMRAH.BAS

SIZE 7K

PURPOSE

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	CONTENT	VIRTUAL DIMENSIONS
ARYVAL.HUM	I	Basic Science Data Human Sciences	M%(3), D\$(64), V(2496,6)
RSUM50.HUM	0	Matrix format used in printout program	M1%(3), A1%(10), S\$(8,65), S1(520,2)
RSUM51.HUM			
RSUM52.HUM			
RSUM53.HUM			
RSUM54.HUM			
RSUM55.HUM			
RSUM56.HUM			
RSUM57.HUM			
RSUM58.HUM			
RSUM63.HUM			
RSUM64.HUM			

PROGRAM VARIABLES

S(65,8) = summation, ranking matrix
 N% = Table type indicator
 O% = Table type calculation indicators
 Y% = Year index
 D% = Department index
 A% = Activity Index
 P% = Performer Index
 C%,C1%,J% = Output matrix column indicator
 I%,I3% = Output matrix row indicator

PROGRAM FUNCTION

This program converts the basic data into the format required for table types 2, 5, and 9. Ranking is performed for table types 5 and 9 where tabulation is by department. The ranking and grouping of performers and activities in table type 2 is done at the printout stage. Each file is listed on the terminal as it printed on the output file. Required Input The table number to be calculated (L%). The program may be terminated by typing a number greater than 64.


```

10 !THIS PROGRAM PREPARES THE PRINT MATRIX FOR ACT/PERF & DEPT/PERF*****
20 OPEN "ARYVAL.HUM" AS FILE 1
30 DIM#1, M$(3%), D$(64%), V(2496%, 6%)
35 DIM S(65%, 8%), R(65%), E$(65%)
36 S(I%, J%)=0 FOR J%=0% TO 8% FOR I%=0% TO 65%
40 READ N$(I%) FOR I%=0% TO 10%
50 DATA 50, 51, 52, 53, 54, 55, 56, 57, 58, 63, 64
60 PRINT USING "\      \" N$(I%); FOR I%=0% TO 10%; PRINT
65 PRINT
70 PRINT USING "##      ", I%; FOR I%=0% TO 10%
71 PRINT
75 INPUT "WHICH TABLE (0 TO 10)", L%
76 IF L%>10% THEN CLOSE 1: GOTO 2000
77 READ N1%(I%) FOR I%=0% TO 10%
78 DATA 1, 1, 1, 3, 3, 1, 2, 2, 2, 4, 4
79 N% = N1%(L%)
120 READ O%(I%, J%) FOR J%=0% TO 10% FOR I%=1% TO 5%
121 DATA 1, 1, 1, 1, 1, 3, 3, 3, 3, 2, 2
122 DATA 0, 0, 6, 0, 6, 0, 0, 0, 6, 1, 1
123 DATA 12, 5, 12, 5, 12, 12, 12, 5, 12, 1, 1
124 DATA 0, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1
125 DATA 8, 8, 8, 8, 9, 8, 0, 0, 0, 0, 0
130 C1%=O%(1%, L%); D1%=O%(2%, L%); D2%=O%(3%, L%); Y1%=O%(4%, L%)
135 T% = O%(5%, L%); TX = M$(2%) + 1% IF L%>5%
150 F$(I%) = "RSUM" + N$(I%) + ".HUM" FOR I%=0% TO 10%
170 OPEN F$(L%) AS FILE 2
180 DIM#2, S1(9%, 8%)
185 DIM#2, S6(65%, 8%), E$(64%), M1$(3%)
190 DIM#2, S7(9%, 8%)
195 M2% = M$(2%) + 1%; E$(M2%) = "TOTAL"
197 M1%(J%) = M$(J%) FOR J%=0% TO 3%
200 !***FORM THE UNRANKED PRINT OUT MATRIX***
210 C% = -C1%
220 FOR Y% = 1% TO M$(0%) STEP M$(1%)
230   C% = C% + C1%
240   I% = 0%
250   FOR D% = Y% TO (Y% + M$(1%) - 1%) STEP 13%
260     I% = I% + Y1%
270     FOR A% = D% + D1% TO D% + D2%
280       J% = C%
290       GOTO 330 IF N% = 1%
300       GOTO 350 IF N% = 2%
310       GOTO 500 IF N% = 3%
315      GOTO 560 IF N% = 4%
330       A1% = A% - D%
340       J% = C% + 1% IF A1%>5%
345      J% = C% IF C1% = 1%
350       FOR P% = 0% TO 6%
360         I% = P% + 1% IF N% = 1%
370         J% = C% + 1% IF P%>0% IF N% = 2%
380         S(I%, J%) = S(I%, J%) + V(A%, P%)
390         S(T%, J%) = S(T%, J%) + V(A%, P%)
400       GOTO 430 IF C1% = 1%
410         S(I%, C% + 2%) = S(I%, C% + 2%) + V(A%, P%)
420         S(T%, C% + 2%) = S(T%, C% + 2%) + V(A%, P%)
430       NEXT P%
440     GOTO 590
500     FOR P% = 0% TO 6%
510       I3% = A% - (D% + D1%) + 2%
520       S(I%, J%) = S(I%, J%) + V(A%, P%) IF I3%<T% - 1%
530       S(I3%, J%) = S(I3%, J%) + V(A%, P%)
540       S(T%, J%) = S(T%, J%) + V(A%, P%)
550     NEXT P%
555 GOTO 590

```

```

560 !THIS PART DOES TABLES 9
565 S(I%,C%)=V(A%+1%,1%) IF L%=10%
570 S(I%,C%+1%)=V(A%,1%) IF L%=10%
571 IF L%=10% THEN 580
574 S(I%,C%)=V(A%+1%,2%)+V(A%+1%,3%)
575 S(I%,C%+1%)=V(A%,2%)+V(A%,3%)
580 S(T%,C%)=S(T%,C%)+S(I%,C%)
585 S(T%,C%+1%)=S(T%,C%+1%)+S(I%,C%+1%)
590 NEXT A%:NEXT D%:NEXT Y%
600 !*****RANK TABLES NOS.4,5,6,8*****
610 IF N%=1% OR N%=3% THEN 800
620 C%=8%:C%=5% IF N%=4%
630 FOR I%=1% TO M%(2%)
640 E%(I%)=I%:R(I%)=S(I%,C%)
645 R(I%)=S(I%,C%-1%)+S(I%,C%) IF N%=4%
650 NEXT I%
660 FOR I%=1% TO M%(2%)
670 FOR K%=1% TO M%(2%)-I%
680 IF R(K%)*R(K%+1%) THEN 720
690 R1=R(K%): E1=E%(K%)
700 R(K%)=R(K%+1%): E%(K%)=E%(K%+1%)
710 R(K%+1%)=R1: E%(K%+1%)=E1%
720 NEXT K%:NEXT I%
730 FOR I%=1% TO M%(2%)
740 E1%=E%(I%)
750 E$(I%)=D$(E1%)
760 FOR J%=0% TO C%
770 S6(I%,J%)=S(E1%,J%)
790 NEXT J%:NEXT I%
795 S6(T%,J%)=S(T%,J%) FOR J%=0% TO C%
800 ) 820
803 C%=8% IF L%=5%
803 FOR I%=1% TO T%:FOR J%=0% TO C%
805 S1(I%,J%)=S(I%,J%) IF L%=5%
812 S7(I%,J%)=S(I%,J%) IF L%<5%
815 NEXT J%:NEXT I%
818 PRINT#Q
820 !*****PRINT THEM ON THE TERMINAL AND ON THE FILE*****
824 FOR I%=1% TO T%
825 IF N%=2% OR N%=4% THEN PRINT#Q,E$(I%);TAB(6%);
830 FOR J%=0% TO C%
840 X=S1(I%,J%) IF L%=5%
860 X=S6(I%,J%) IF L%>5%
870 X=S7(I%,J%) IF L%<5%
900 PRINT#Q,USING"#####.#",X/1000;
910 NEXT J%:PRINT#Q:NEXT I%
950 PRINT#Q
1000 CLOSE 1,2
1500 RESTORE:GOTO 10
2000 END

```

PROGRAM TYPE Summed and Ranked Data Matrix Program

NAME SUMRAØ.BAS

SIZE 6K

PURPOSE This program creates data for tables 2, 22, 42, 62

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	CONTENT	VIRTUAL DIMENSIONS
ARYVAL.COM ARYVAL.NAT ARYVAL.HUM	I	Basic science data	M%(3), D\$(64), V(2496,6)
RSUM16.COM RSUM36.NAT RSUM56.HUM	I	Summed and ranked data	S2(65,8), D2\$(64), M2%(3) S3(65,8), D3\$(64), M3%(3) S4(65,8), D4\$(64), M3%(3)
RSUM02.COM RSUM22.COM RSUM42.NAT RSUM62.HUM	0	Summed and ranked data	S1(65,8), D1\$(64), M1%(3)

PROGRAM VARIABLES

- N% = table number to be produced
- F1\$ = output file names
- F2\$, F3\$, F4\$, F5\$ = input file names
- K% = index of dept. names in "COM" files
- H% = index used to search "NAT" & "HUM" files
- Y% = year
- D% = department
- A% = activity
- P% = performer

PROGRAM FUNCTION

The Table 02 segment searches the "NAT" and "HUM" files for the department totals that match the ranked totals in the "COM" file. The outcome is a list of the totals for the three data types, ranked by the "COM" column. The tables 22, 42, 62 segment performs 3 summation for each of the 3 data types. The output file contain totals for each department for R&D, RSA, TOTAL with the department ranked by TOTAL of the last year.

```

10|*****THIS PROGRAM SUMS & RANKS TABLES 0,8*****
20   READ T%(J%)FOR J%=0% TO 3%
22 DATA 02,22,42,62
29 PRINT"THIS PROGRAM PRINTS THESE TABLES---"
30 PRINT:PRINT USING"#####",T%(J%);FORJ%=0%TO3%
40 PRINT
50 PRINT:PRINT USING"#####",J%;FORJ%=0% TO 3%
55 PRINT
60 PRINT"WHICH TABLE (0 TO 3) ",:INPUT N%
65 IF N%>3% THEN GOTO 1000
70 T0%=T%(N%):T1%=T0%/10%:T2%=T0%-T1%*10
80 T$=CHR$(48%+T1%)+CHR$(48%+T2%)
90 E$=".COM":E$=".NAT" IF T1%>2%:E$=".HUM" IF T1%>4%
100   F1$="RSUM"+T$+E$
110   F2$="RSUM16.COM": F3$="RSUM36.NAT": F4$="RSUM56.HUM"
120   F5$="ARRAYAL"+E$
130 OPEN F1$ AS FILE 1
140   DIM#1,S1(65%,8%),D1$(64%),M1%(3%)
145   DIM S(65%,8%),D$(64%)
146   S(I%,J%)=0 FOR J%=0% TO 8% FOR I%=0% TO 65%
147 DIM E(65%),E$(65%)
150 GOTO 500 IF T1%>0%
195| THIS SEGMENT PRODUCES TABLE 02 *****
200 OPEN F2$ AS FILE 2
205   DIM#2,S2(65%,8%),D2$(64%),M2%(3%)
210 OPEN F3$ AS FILE 3
220   DIM#3,S3(65%,8%),D3$(64%),M3%(3%)
230 OPEN F4$ AS FILE 4
235   DIM#4,S4(65%,8%),D4$(64%),M4%(3%)
240   K3%=M3%(2%)+1%:K4%=M4%(2%)+1%
250 FOR K%=1% TO M2%(2%)+1%
260   GOTO 350 IF K%=M2%(2%)+1%
265   D$(J%)=D3$(J%)FORJ%=1% TO M3%(2%)
270 FOR H%=1% TO M3%(2%)
280   IF D2$(K%)=D$(H%) THEN H1%=H%:GOTO 300
290 NEXT H%
295   S(K%,J%)=0 FORJ%=0%TO6% STEP 3%
296   GOTO 305
300   S(K%,J%)=S3(H1%,J%+2%)FORJ%=0% TO 6% STEP 3%
305   D$(J%)=D4$(J%)FORJ%=1% TO M4%(2%)
310 FOR H%=1%TO M4%(2%)
320   IF D2$(K%)=D$(H%) THEN H1%=H%:GOTO 390
330 NEXT H%
340   S(K%,J%)=0 FOR J%=1% TO 7% STEP 3%
345   GOTO400
350   FOR J%=0% TO 6% STEP 3%
355     S(K%,J%)=S3(K3%,J%+2%):S(K%,J%+1%)=S4(K4%,J%+2%)
360   NEXT J%:GOTO 400
390   S(K%,J%)=S4(H1%,J%+1%) FOR J%=1% TO 7% STEP 3%
400   S(K%,J%)=S2(K%,J%) FOR J%=2% TO 8% STEP 3%
405   NEXT K%
410 FOR I%=1% TO M2%(2%)+1%
420   D1$(I%)=D2$(I%)
430   PRINT D1$(I%);TAB(8%);
440 FOR J%=0% TO 8%
450   S1(I%,J%)=S(I%,J%)
460   PRINT USING"#####.#",S1(I%,J%)/1000;
470 NEXT J%:PRINT: NEXT I%
475 M1%(J%)=M2%(J%) FOR J%=0% TO 3%
480   GOTO 990

```

```

500 !***THIS SEGMENT SUMS TABLES 8 ( 22,42,62 )*****
510 OPEN F5# 05 FILE 5
520 DIM#5, N%(3%), E%(64%), V(2496%, 6%)
540 L%=N%(0%) : L1%=N%(1%) : L2%=N%(2%)
550 IF N%=2% THEN L%=N2%(0%):L1%=N2%(1%):L2%=N2%(2%)
560 IF N%=3% THEN L%=N3%(0%):L1%=N3%(1%):L2%=N3%(2%)
570 J%=-3%
600 FOR Y%=1% TO L% STEP L1%
610     J%=J%+3%:D1%=0%
620 FOR D%=Y% TO Y%+L1%-1% STEP 13%
630     D1%=D1%+1%:A1%=0%
640 FOR A%=D% TO D%+12%
650     A1%=A1%+1%
660     J1%=J%:J1%=J%+1% IF A1%>6%
670 FOR P%=0% TO 6%
690     X=V(A%, P%)
700     S(D1%, J1%)=S(D1%, J1%)+X
710     S(L2%+1%, J1%)=S(L2%+1%, J1%)+X
720     S(D1%, J%+2%)=S(D1%, J%+2%)+X
730     S(L2%+1%, J%+2%)=S(L2%+1%, J%+2%)+X
750 NEXT P%
760 NEXT A%:NEXT D%:NEXT Y%
800 FOR I%=1% TO L2%
810     E%(I%)=I%:E(I%)=S(I%, 8%)
820 NEXT I%
830 FOR K%=1% TO L2%
840     FOR I%=1% TO L2%-K%
850         GOTO 900 IF E(I%)>E(I%+1%)
860         E1=E(I%) : E1%=E%(I%)
870         E(I%)=E(I%+1%) : E%(I%)=E%(I%+1%)
890         E(I%+1%)=E1 : E%(I%+1%)=E1%
900 NEXT I%:NEXT K%
910 FOR I%=1% TO L2%+1%
920     E1%=E%(I%)
930     D1$(I%)=E$(E1%)
940     D1$(I%)="TOTAL" IF I%=L2%+1%
950 PRINT D1$(I%):TAB(8%);
960 FOR J%=0% TO 8%
965     S1(I%, J%)=S(E1%, J%)
967     S1(I%, J%)=S(I%, J%) IF I%=L2%+1%
970     PRINT USING "#####.#", S1(I%, J%)/1000;
980 NEXT J%:PRINT:NEXT I%
985 M1%(J%)=N%(J%) FOR J%=0% TO 3%
990 CLOSE 1,2,3,4,5
995 RESTORE: GOTO 10
1000 END

```

PROGRAM TYPE	Summed and Ranked Data Matrix Program		
NAME	SUMRA6.BAS	SIZE	7K
PURPOSE	Create data files for Table type 6		

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	CONTENT	VIRTUAL DIMENSIONS
ARYVAL.COM ARYVAL.NAT ARYVAL.HUM	I	Basic science data matrix	M%(3), D\$(64), V(2496, 6)
RSUM19.COM RSUM20.COM RSUM39.NAT RSUM40.NAT RSUM41.NAT RSUM59.HUM RSUM60.HUM RSUM61.HUM	O	Matrix format used in printout program	M1%(3), A1%(10), S\$(8, 65) S1(520, 2)

PROGRAM VARIABLES

T090 = Table number
S(520, 2) = matrix used for summation 4 ranking
E(64), E%(64) = exchange matrices used for ranking
A%(8, 9) = each row indicates ordering of activity or performer
for output file
K% = activity or performer group count
Y% = year count
D% = department count
A% = activity count
J% = performer count
L% = indicate which table to be produced. (Requires Manual Input)

PROGRAM FUNCTION

This program converts the basic data into the format required for table type 6. The departments are ranked by the last year total for each performer or activity. The performer/Activities are ranked and/or grouped using the A%(8, 9) matrix where each row corresponds to a table number. The values, rounded to millions, are displayed as they are transferred to the output file.

```

10 *****THIS PROGRAM SUMS & RANKS DATA FOR TABLE TYPE 6*****
20 DIM S(520,2),E(64),EX(64)
30 READ A(I,J) FOR J=0 TO 9 FOR I=0 TO 8
40 DATA 1,3,2,2,5,5,4,6,0,12
41 DATA 1,2,3,3,5,5,4,6,0,5
42 DATA 1,2,3,4,5,6,0,7,0,0
43 DATA 1,2,3,3,5,5,4,6,0,12
44 DATA 1,2,3,3,5,5,4,6,0,5
45 DATA 1,2,3,4,5,6,0,7,0,0
46 DATA 1,5,2,4,6,6,3,7,0,12
47 DATA 1,5,2,4,6,6,3,7,0,5
48 DATA 4,1,3,5,2,6,0,7,0,0
110 READ T(J) FOR J=0 TO 8
120 DATA 19,20,21,39,40,41,59,60,61
130 FOR N=0 TO 8
140 GOTO 895 IF N=2
150 T0=T(N)
160 T1=INT(T0/10):T2=T0-T1*10
170 T$=CHR$(48+T1)+CHR$(48+T2)
180 E$=".COM":E$=".NAT" IF T1>2:E$=".HUM" IF T1>4
190 F1$="ARIVAL"+E$
200 F2$="RSUM"+T$+E$
210 OPEN F1$ AS FILE 1
220 OPEN F2$ AS FILE 2
225 DIM#1,M(3),D$(64),V(2496,9)
230 DIM#2,M1(3),A1(10),S$(8,65),S1(520,2)
240 M1(J)=M(J) FOR J=0 TO 3
245 S(I,J)=0 FOR J=0 TO 2 FOR I=0 TO 520
250 A1(J)=A(N,J) FOR J=0 TO 7
260 A0=A(N,7)
270 A1=A(N,8):A2=A(N,9)
280 ***** THE CALCULATIONS BEGIN*****
290 FOR K=0 TO 6
300 R=A(N,K):GOTO 540 IF R=0
310 V1=V1
320 F(2)=R*(M(2)+1)
330 F(4)=A0*(M(2)+1)
340 FOR Y=1 TO M(0) STEP M(1)
350 V1=V1+1
360 F(1)=(R-1)*(M(2)+1)
370 F(3)=(A0-1)*(M(2)+1)
380 FOR D=Y TO Y+M(1)-1 STEP 13
390 F(1)=F(1)+1
400 F(3)=F(3)+1
410 GOTO 490 IF T2<>1
420 D2=D+K+6
430 FOR J=0 TO 6
440 FOR L=1 TO 4
450 D1=F(L)
460 S(D1,V1)=S(D1,V1)+V(D2,J)
470 NEXT L:NEXT J
480 GOTO 540
490 FOR B=D+A1 TO D+A2
500 FOR L=1 TO 4
510 D1=F(L)
520 S(D1,V1)=S(D1,V1)+V(B,K)
530 NEXT L:NEXT B
540 NEXT D:NEXT Y:NEXT K
550 *****THEN COMES THE RANKING*****
560 D2=0
570 FOR K=1 TO A(N,7)
580 PRINT:PRINT"GROUP -";
590 FOR J=0 TO 7:PRINT J:IF A(N,J)=K:NEXT J
600 PRINT
610 D1=D2+1
620 D2=K*(M(2)+1)
630 FOR I=D1 TO D2-1
640 D3=I-D1+1
650 E(D3)=S(I,2)
660 EX(D3)=D3
670 NEXT I
680 FOR I=1 TO M(2)
690 FOR H=1 TO M(2)-I
700 IF E(H)>E(H+1) THEN 740
710 E1=E(H) :E1=EX(H)
720 E(H)=E(H+1) :EX(H)=EX(H+1)
730 E(H+1)=E1 :EX(H+1)=E1
740 NEXT H:NEXT I
750 *****MAKE THE FILE AND PRINT IT*****
760 FOR I=D1 TO D2

```

```
770      D3%=I%-D1%+1%
780      E1%=E*(D3%)
790      D4%=E1%+D1%-1%
800      S$(K%,D3%)=D$(E1%) IF I%<D2%
810      S$(K%,D3%)="TOTAL" IF I%=D2%
820      PRINT S$(K%,D3%),
830      FOR J%=0% TO 2%
840      S1(I%,J%)=S(D4%,J%) IF I%<D2%
850      S1(I%,J%)=S(I%,J%) IF I%=D2%
860      PRINT USING"#####.#",S1(I%,J%)/1000;
870 NEXT J%:PRINT:NEXT I%
880 NEXT K%
890 CLOSE 1,2
895 NEXT N%
900 END
```


PROGRAM TYPE Printout Program
 NAME TABLEØ.BAS SIZE 3K
 PURPOSE Prints Tables 01, 03 on terminal or print file

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	CONTENT	VIRTUAL DIMENSIONS
RSUMØ2.COM	I	Natural, Human, Combined by Dept.	V(65, 8), D\$(64), M%(3)
RSUM22.COM	I	R&D, RSA, TOTAL by Dept.	V(65, 8), D\$(64), M%(3)
TITLEØ	I	Title file	T\$(15) = 128
T.01 } T.03 }	0	Table in printable format	

PROGRAM VARIABLES

A%(3,15) = list of titles for each table
 W%, W1% = Tab variables
 L% = Total row indicator
 P2 = Percent figure
 N% = Table number

PROGRAM FUNCTION

FNP (I%): Calculates the average annual increase

This program prints two tables. The Titles are formulated and printed. The values and per cent figures follow. The table number and print option must be entered manually. The program recycles until N% > 3
Required terminal input: 1. Table number (N%)
 2. Terminal or Print File (Q%) (0,3)

Table widths = 95 characters

```

5!*****TABLE TYPE @*****
10 PRINT:PRINT"THIS PROGRAM PRINTS":PRINT"THESE TABLES-- 01 03":PRINT
20 INPUT"INDICATE WHICH TABLE",N%
25 GOTO 1000 IF N%>3%
30 DIM A%(3%,15%)
40 READ A%(1%,J%) FOR J%=0% TO 11% FOR I%=1% TO 3% STEP 2%
41 DATA 1,0,2,0,4,0,5,6,7,9,5,0
43 DATA 1,0,3,0,4,0,5,6,8,9,5,0
50 OPEN"RSUM02.COM" AS FILE 1% IF N%=1%
60 OPEN"RSUM22.COM" AS FILE 1% IF N%=3%
70 DIM#1%,V(65%,8%),D$(64%),M%(3%)
75!*****PRINT THE TITLES*****
80 OPEN"TITLE0" AS FILE 2
90 DIM#2%,T$(15%)=128%
100 INPUT"TERMINAL 0 * PRINT FILE 3",Q%
110 OPEN"T.0"+CHR$(48%+N%) AS FILE 3 IF Q%=3%
120 W%=0%:W%=18% IF Q%=3%
125 W1%=W%+26%
127 PRINT#Q%,CHR$(12%)
130 PRINT#Q%,TAB(W%);"TABLE ";N%
135 PRINT#Q%,CHR$(18%)
140 PRINT#Q%,TAB(W%);"NATURAL AND HUMAN SCIENCES"
145 PRINT#Q%,STRING$(5%,18%)
150 FOR J%=0% TO 11%
160 B%=A%(N%,J%)
170 P#=T$(B%)
180 P#=CHR$(10%) IF B%=0%
190 P#=" " IF J%=1%
195 PRINT#Q%,TAB(W%);P#
200 NEXT J%
205 F$="#.###.# (###.#) "
207 F1$=" ###.# %"
210 L%=M%(2%)+1%
220 DEF FNP(I%)=100*(SQRT(V(L%,I%+6%)/V(L%,I%))-1)
225!*****PRINT THE VALUES*****
230 FOR I%=0% TO 2%
240 PRINT#Q%,TAB(W%);T$(9%+N%+I%);TAB(W1%);IF I%<2%
250 IF I%=2% THEN PRINT#Q%,TAB(W%);T$(5%):PRINT#Q%:
PRINT#Q%,TAB(W%);"TOTAL";TAB(W1%);
260 FOR J%=0% TO 6% STEP 3%
270 P1=V(L%,J%+1%)/1000
272 P2=V(L%,J%+1%)/V(L%,J%+2%)*100
275 PRINT#Q%,USING F$,P1;P2;
280 NEXT J%
290 PRINT#Q%,USING F1$,FNP(I%):PRINT#Q%
300 NEXT I%
310 PRINT#Q%,TAB(W%);T$(5%)
990 CLOSE 1%,2%,3%
995 RESTORE:GOTO 10
1000 END

```

PROGRAM TYPE Printout Program
 NAME TABLE2.BAS SIZE 10K
 PURPOSE Prints table type 2 on terminal or print file

FILE DESCRIPTIONS

NAME	INPUT	OUTPUT	VIRTUAL DIMENSIONS
RSUM10.COM RSUM30.NAT RSUM50.HUM	I		V (9, 8)
RSUM11.COM RSUM31.NAT RSUM51.HUM			
RSUM12.COM RSUM32.NAT RSUM52.HUM			
RSUM13.COM RSUM33.NAT RSUM53.HUM			
RSUM15.COM RSUM34.NAT RSUM54.HUM			
RSUM35.NAT RSUM55.HUM			
TITLE2	I		I\$(25) = 128
T.10 T.31 T.51	0		
T.11 T.32 T.52			
T.12 T.33 T.53			
T.13 T.34 T.54			
T.15 T.35 T.55			
T.30 T.50			

PROGRAM VARIABLES

A\$, B\$, C\$, D\$ = Titles for performers or activities
 E\$ = table numbers for report #100 (mini green book)
 W%, W1%, W2% = TAB variables
 T\$ = Print string for titles
 P\$ = Print string for performer/activity titles
 P(9, 8) = Print matrix for re-arranged performer/activity groups
 A(17, 8) = ranking and grouping matrix

PROGRAM FUNCTION

This program prints 17 tables. Table 14 is omitted. The program repeats itself until a table number greater than 17 input. The DATA statements for A(17, 8) matrix indicate the ranking and grouping for each performer or activity list. Example - For Table 10, "Universities" and "Non-Profit Institutions" are grouped together and rank 2nd. Re-order the groups by changing the appropriate data statement. Required Terminal Input: 1. Table number (N%) (0-17); 2. Terminal or Print File (Q%) (0, 2)

Table width: = 87 characters

```

101***THIS PROGRAM PRINTS TABLE TYPE 2*****
20 DIM T$(15%), TX(17%), P(9%, 8%)
25 DIM A$(10%), B$(10%), C$(10%), D$(10%), E$(20%)
26 DIM AX(17%, 8%), BX(14%), CX(6%, 17%)
30 READ TX(J%) FOR J%=0% TO 17%
40 DATA 10, 11, 12, 13, 14, 15, 30, 31, 32, 33, 34, 35, 50, 51, 52, 53, 54, 55
42 PRINT
45 PRINT"THIS PROGRAM PRINTS THESE TABLES -----":PRINT
50 PRINT USING"###", TX(N%); FOR N%=0% TO 17%
55 PRINT:PRINT
60 PRINT USING"###", N%;FOR N%=0% TO 17%
65 PRINT
70 INPUT"WHICH TABLE (0 TO 17)", N%
71 GOTO 1000 IF N%>17%
75 OPEN"TITLE2" AS FILE 1
77 DIM#1, I$(25%)=128%
80 T1%=INT(TX(N%)/10%)
90 T2%=TX(N%)-T1%*10%
95 T0$=CHR$(48%+T1%)+CHR$(48%+T2%)
97 F$="T."+T0$
99!***DETERMINE PERFORMER OR ACTIVITY LIST FOR EACH TABLE***
100 READ A$(J%) FOR J%=1% TO 8%
110 DATA INTRAMURAL, INDUSTRY, UNIVERSITIES, "NON-PROFIT INSTITUTIONS"
111 DATA "PROV. & MUNIC. GOV.", "OTHER CANADIAN", FOREIGN, TOTAL
115 A$(4%)="NON-PROFIT INS" IF T2%=5%
120 READ AX(I%, J%) FOR J%=1% TO 8% FOR I%=0% TO 17%
130 DATA 1, 3, 2, 2, 5, 5, 4, 6
131 DATA 1, 2, 3, 3, 5, 5, 4, 6
132 DATA 1, 4, 2, 2, 5, 5, 3, 6
133 DATA 1, 2, 4, 3, 5, 6, 7, 8
134 DATA 1, 2, 3, 4, 5, 6, 7, 8
135 DATA 1, 3, 2, 2, 5, 5, 4, 6
136 DATA 1, 2, 3, 3, 5, 5, 4, 6
137 DATA 1, 2, 3, 3, 5, 5, 4, 6
138 DATA 1, 4, 3, 3, 5, 5, 2, 6
139 DATA 1, 2, 4, 3, 5, 6, 7, 8
140 DATA 1, 2, 3, 4, 5, 6, 7, 8
141 DATA 1, 2, 3, 3, 5, 5, 4, 6
142 DATA 1, 5, 2, 4, 6, 6, 3, 7
143 DATA 1, 5, 2, 4, 6, 6, 3, 7
144 DATA 1, 4, 2, 5, 6, 6, 3, 7
145 DATA 1, 2, 4, 3, 5, 6, 7, 8
146 DATA 1, 5, 2, 4, 6, 6, 3, 7
147 DATA 1, 5, 2, 4, 6, 6, 3, 7
150 READ B$(J%) FOR J%=1% TO 8%
151 DATA CURRENT, " IN-HOUSE R&D", " R&D CONTRACTS", " R&D GRANTS"
152 DATA " RESEARCH FELLOWSHIPS", " ADMIN. OF EXTRAMURAL PROGRAMS"
153 DATA "CAPITAL EXPENDITURES", TOTAL
160 READ C$(J%) FOR J%=1% TO 9%
161 DATA CURRENT, " SCI. DATA COLLECTION", " SCI. INFORMATION"
162 DATA " TESTING & STANDARDIZATION", " FEASIBILITY STUDIES"
163 DATA " EDUCATIONAL SUPPORT", " ADMIN. OF EXTRAMURAL PROG."
164 DATA CAPITAL, TOTAL
170 READ D$(J%) FOR J%=1% TO 9%
171 DATA CURRENT, " EDUCATIONAL SUPPORT", " DATA COLLECTION"
172 DATA " INFORMATION SERVICES", " ECONOMIC & FEASIBILITY STUDIES"
173 DATA " OPERATIONS & POLICY STUDIES", " ADMIN. OF EXTRAMURAL PROGRAMS"
174 DATA CAPITAL, TOTAL
175!***DETERMINE WHICH TITLES*****
180 READ BX(I%) FOR I%=1% TO 14%
181 DATA 0, 1, 0, 2, 0, 3, 0, 8, 0, 10, 4, 5, 6, 14
190 READ CX(I%, J%) FOR J%=0% TO 17% FOR I%=1% TO 6%
191 DATA 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3
192 DATA 4, 5, 6, 5, 6, 4, 4, 5, 6, 5, 6, 4, 4, 5, 6, 5, 6, 4
193 DATA 7, 7, 7, 20, 9, 11, 7, 7, 7, 20, 9, 11, 7, 7, 7, 20, 9, 11
194 DATA 12, 12, 12, 12, 12, 13, 12, 12, 12, 12, 13, 12, 12, 12, 12, 12, 13
195 DATA 15, 15, 15, 21, 16, 17, 15, 15, 15, 21, 16, 17, 15, 15, 15, 21, 16, 17
196 DATA 18, 18, 18, 18, 18, 19, 18, 18, 18, 18, 18, 19, 18, 18, 18, 18, 19

```

```

200 *****FORM THE TITLES*****
205 READ E$(J%) FOR J%=0% TO 17%
210 DATA 4, 9, 15, 10, 0, 5, 17, 22, 28, 23, 29, 18, 32, 37, 43, 38, 44, 33
220 T1%=E$(N%)
230 INPUT"TERMINAL 0 FILE 2",Q%
240 OPEN F% AS FILE 2% IF Q%=2%
245 W%=0%:W2%=22% IF Q%=2%
247 W1%=W%+31%:W2%=W%+14%
249 W1%=W%+32% IF N%=16%
250 PRINT#Q%,CHR$(12%)
260 PRINT#Q%,TAB(W%);"TABLE "+T1%:PRINT#Q%
270 FOR I%=1% TO 14%
280 B1%=B$(I%)
285 IF B1%<7% THEN C1%=C$(B1%,N%):T$(I%)=I$(C1%)
290 T$(I%)=CHR$(10%) IF B1%=0%
300 T$(I%)=" " IF I%=5%
310 T$(I%)=I$(I%) IF B1%>6%
320 PRINT#Q%,TAB(W%);T$(I%)
340 NEXT I%
345 *****SELECT INPUT TITLES*****
350 E$=".COM":E$=".NAT" IF N%>5%
360 E$=".HUM" IF N%>11%
370 F$="RSM"+T0%+E$
380 OPEN F% AS FILE 3%
390 DIM#3,V(9%,8%)
395 A0%=8%
397 IF T2%=4% THEN A0%=9%:A%(N%,9%)=9%
398 C1%=CHR$(10%)+CHR$(13%)+TAB(W%)
400 A$(10%)="UNIVERSITIES &"+C1%+"NON-PROFIT INSTITUTIONS"
405 A$(10%)="UNIVERSITIES &"+C1%+"NON-PROFIT INS" IF T2%=5%
410 IF A%(N%,3%)=A%(N%,4%) THEN A$(4%)=A$(1%)
420 IF A%(N%,5%)=A%(N%,6%) THEN A$(5%)=A$(6%)
425 *****GROUP THE PERFORMER / ACTIVITY VALUES**
430 FOR I%=1% TO A0%
440 K%=A%(N%,I%)
450 P$(K%)=A$(I%)
460 P$(K%)=B$(I%) IF T2%=3%
470 P$(K%)=C$(I%) IF T1%=3% IF T2%=4%
480 P$(K%)=D$(I%) IF T1%=5% IF T2%=4%
490 IF T2%=5 THEN P(K%,J%)=P(K%,J%)+V(I%,J%) FOR J%=0% TO 8%: GOTO 600
500 L%=-1%:FOR J%=0% TO 4% STEP 2%
510 L%=L%+1%
520 P(K%,J%)=P(K%,J%)+V(I%,L%)
540 NEXT J%
600 NEXT I%
605 *****PRINT THEM OUT*****
610 GOTO 800 IF T2%=5%
620 F0$="#.###.# (###.#)"
622 F0$="####.# (###.#)" IF N%=16%
625 A0%=A%(N%,A0%)
630 FOR I%=1% TO A0%
647 PRINT#Q%

650 PRINT#Q%,TAB(W%);T$(14%),CHR$(10%) IF I%=A0%
660 PRINT#Q%,TAB(W%);P$(I%);TAB(W1%);
670 FOR J%=1% TO 5% STEP 2%
675 P1=P(I%,J%-1%):P2=P(A0%,J%-1%)
680 P(I%,J%)=(P1/P2)*100
690 PRINT#Q%,USING F0$,P(I%,J%-1%)/1000;P(I%,J%);
700 NEXT J%:PRINT#Q%:NEXT I%
710 GOTO 900
800 F0$="###.# ###.# #.###.#"
805 A0%=A%(N%,A0%)
810 FOR I%=1% TO A0%
820 PRINT#Q%
830 PRINT#Q%,TAB(W%);T$(14%),CHR$(10%) IF I%=A0%
840 PRINT#Q%,TAB(W%);P$(I%);TAB(W2%);
850 FOR J%=0% TO 8% STEP 3%
860 PRINT#Q%,USING F0$,P(I%,J%)/1000;P(I%,J%+1%)/1000;P(I%,J%+2%)/1000;
870 NEXT J%:PRINT#Q%:NEXT I%
900 PRINT#Q%:PRINT#Q%,TAB(W%);T$(14%)
990 CLOSE 1%,2%,3%
993 P(I%,J%)=0 FOR J%=0% TO 8% FOR I%=0% TO 9%
995 RESTORE
997 GOTO 30
1000 END

```

PROGRAM TYPE Printout Program

NAME TABLE5.BAS SIZE 6K

PURPOSE Prints tables with departments ranked by last year

FILE DESCRIPTIONS

NAME			INPUT OUTPUT	VIRTUAL DIMENSIONS
RSUM02.COM	RSUM36.NAT	RSUM56.HUM	I	T(65, 8), D\$(64), M%(3)
RSUM16.COM	RSUM37.NAT	RSUM57.HUM		
RSUM17.COM	RSUM38.NAT	RSUM58.HUM		
RSUM18.COM	RSUM42.NAT	RSUM62.HUM		
RSUM22.COM				
TITLE5			I	C\$(30) = 128
T.02	T.36	T.56	0	
T.16	T.37	T.57		
T.17	T.38	T.58		
T.18	T.42	T.62		
T.22				

PROGRAM VARIABLES

A%(12,15) = data matrix which determines the titles for each table.
W%, W1% = TAB variables
B\$(15) = conversion list for minigreen book table numbers.
D% = number of departments to be listed
O = row matrix for calculation of "other"
D6% = Line counter

PROGRAM FUNCTION

This program prints 13 tables. Table 02 is Natural and Human by Department, tables 22, 42, 62 are R&D and RSA by Department, and the others are Intramural and Extramural by Department. Required terminal input is 1. Table number (N%) (0 to 12), 2. Terminal or Print File (Q%) (0, 1), 3. No. of Departments (D%) (0 to 64)

Table width = 93

```

10!***THIS PROGRAM PRINTS DEPT/PERFORMER & DEPT/ACTIVITY TABLES***
20 DIM A$(12%,15%),I$(15%),B$(15%)
30 READ I$(J%) FOR J%=0% TO 12%
40 DATA 02,16,17,18,22,36,37,38,42,56,57,58,62
50 PRINT:PRINT"THIS PROGRAM PRINTS THESE TABLES----"
60 PRINT USING"\ \",I$(J%);FORJ%=0% TO 12%
70 PRINT
80 PRINT USING"## \",J%:FOR J%=0% TO 12
90 PRINT
100 INPUT"WHICH TAELE (0 TO 8)",N%
110 GOTO 810 IF N%>12%
120 INPUT "TERMINAL=0 * PRINT FILE=1",Q
130 OPEN"TTILES" AS FILE 2
140 DIM#2,C$(30%)=128%
150 INPUT"LIST HOW MANY DEPARTMENTS",D%
160 F$=I$(N%):F0$="T."+F$
170 OPEN F0$ AS FILE 1 IF Q=1
180 E$=".COM":E$=".NAT" IF N%>4%:E$=".HUM" IF N%>8%
190 F2$="RSUM"+I$(N%)+E$
200 OPEN F2$ AS FILE 3
210 DIM#3,T(65%,8%),D$(64%),M$(3%)
220 READ A$(I%,J%) FOR J%=1% TO 15% FOR I%=0% TO 12%
230 DATA 0,0,3,0,20,22,0,8,0,10,24,25,26,10,9
240 DATA 0,0,3,0,5,6,0,8,0,10,11,12,13,14,15
250 DATA 0,0,3,0,18,6,0,8,0,10,11,12,13,14,15
260 DATA 0,0,3,0,19,6,0,8,0,10,11,12,13,14,15
270 DATA 0,0,3,0,20,21,0,8,0,10,24,25,27,10,9
280 DATA 0,0,16,0,5,6,0,8,0,10,11,12,13,14,15
290 DATA 0,0,16,0,18,6,0,8,0,10,11,12,13,14,15
300 DATA 0,0,16,0,19,6,0,8,0,10,11,12,13,14,15
310 DATA 0,0,16,0,20,21,0,8,0,10,24,25,27,10,9
320 DATA 0,0,17,0,5,6,0,8,0,10,11,12,13,14,15
330 DATA 0,0,17,0,18,6,0,8,0,10,11,12,13,14,15
340 DATA 0,0,17,0,19,6,0,8,0,10,11,12,13,14,15
350 DATA 0,0,17,0,20,21,0,8,0,10,24,25,27,10,9
360 READ B$(J%) FOR J%=0% TO 12%
370 DATA 2,7,11,16,6,20,24,30,19,35,39,45,34
380 W%=0%:W%=20% IF Q=1
390 W1%=W%+8%
400!***PRINT THE TITLES*****
410 T1$=B$(N%)
420 PRINT#Q,CHR$(12)
430 PRINT#Q:PRINT#Q,TAB(W%);"TABLE "+T1$
440 PRINT#Q,CHR$(10)
450 FOR J%=3% TO 15%
460 A1%=A$(N%,J%)
470 GOTO 530 IF A1%=9%
480 T$=C$(A1%)
490 T$=C$(10%) IF A1%=15%
500 T$=" " IF A1%=0%
510 PRINT#Q,TAB(W%);T$
520 PRINT#Q IF J%=5%
530 NEXT J%
540!***FORM THE OTHER ROW AND PRINT***
550 Z%=M$(2%)+1%
560 O$=CHR$(79%)+CHR$(116%)+CHR$(104%)+CHR$(101%)+CHR$(114%)
570 O(J%)=T(Z%,J%) FOR J%=0% TO 8%
580 O(J%)=O(J%)-T(I%,J%) FOR J%=0% TO 8% FOR I%=1% TO D%
590 D6%=20% :D7%=60%
600 FOR I%=1% TO D%+2%
610 PRINT#Q,TAB(W%);
620 IF I%=D%+2% THEN PRINT#Q,TAB(W%);C$(10):PRINT#Q,TAB(W%);"TOTAL ";
630 PRINT#Q,D$(I%);IF I%<D%+1%
640 PRINT#Q,O$;IF I%=D%+1%
650 PRINT#Q," ";TAB(W1%);
660 FOR J%=0% TO 8%
670 X=T(I%,J%)/1000
680 X=O(J%)/1000 IF I%=D%+1%
690 X=T(Z%,J%)/1000 IF I%=D%+2%
700 PRINT#Q,USING"###,###.#",X;IF X>0.04999
710 PRINT#Q," - ";IF X<0.050 IF X<>0
720 PRINT#Q," ---";IF X=0
730 IF J%=2% OR J%=5% THEN PRINT#Q," ";
740 NEXT J%:PRINT#Q
750 D6%=D6%+1%:IF D6%>D7% THEN PRINT#Q,CHR$(12%):D7%=D7%+60%
760 NEXT I%
770 PRINT#Q,TAB(W%);C$(10%)
780 CLOSE 1,2,3
790 RESTORE
800 GOTO 30
810 END

```

PROGRAM TYPE Printout Program
 NAME TABLE6.BAS SIZE 7K
 PURPOSE Prints table type 6 - performer or activity by depts. ranked by last year

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	VIRTUAL DIMENSIONS
RSUM19.COM RSUM39.NAT RSUM59.HUM RSUM20.COM RSUM40.NAT RSUM60.HUM RSUM41.NAT RSUM61.HUM	I	M%(3), A1%(10), S\$(8,65), S(5W, 2)
TITLE6	I	I\$(15) = 128, G\$(30) = 64
T.19 T.39 T.59 T.20 T.40 T.60 T.41 T.61	0	

PROGRAM VARIABLES

A1%(10) = row matrix which determines grouping of performer/activities
 M\$(10) = performer/activity heading matrix
 W%, W1%, W2% = TAB variables
 T1\$ = conversion matrix for green book table numbers
 D6 = line count
 P1, P2 = value and percent variables for printout
 K% = index for each performer/activity group

PROGRAM FUNCTION

Using the grouping established in the SUMRA6.BAS program, this program list the department totals and percents for each performer/activity group. The user may specify the number of departments to be listed for each group. The number for each group may be changed by entering the group number and the revised number of departments. A group may be eliminated by entering 0 departments.

Required Terminal Input 1. Table number (N%) (0-8); 2. Terminal or print file (Q) (0, 3); 3. Number of departments (N1%) (0-64); 4. changes for specific group (F%) (1 - 107) (0 if none)

Table width: 72 characters

TABLE 6

```

10!*****THIS PROGRAM PRINTS TABLE TYPE 6*****
20 READ T0%(J%) FOR J%=0% TO 8%
30 DATA 19,20,21,39,40,41,59,60,61
40 PRINT
50 PRINT"THIS PROGRAM PRINTS THESE TABLES-----":PRINT
60 PRINT USING"####",T0%(J%);FORJ%=0% TO 8%;PRINT
70 PRINT
80 PRINT USING"####",J%;FOR J%=0% TO 8%;PRINT
90 PRINT:PRINT"WHICH TABLE ( 0 TO 8 )",:INPUT N%
95 GOTO 1000 IF N%>8%
100 T%=T0%(N%):T1%=INT(T%/10%):T2%=T%-T1%*10
110 T$=CHR$(48%+T1%)+CHR$(48%+T2%)
120 E$=".COM":E$=".NAT" IF T1%>2%: E$=".HUM" IF T1%>4%
130 F1$="RSUM"+T$+E$
140 F3$="T."+T$
150 INPUT"TERMINAL=0 * PRINTER=3 ",Q
160 OPEN F1$ AS FILE 1
170 OPEN "TITLE6" AS FILE 2
180 OPEN F3$ AS FILE 3 IF Q=3
190 DIM#1,M%(3%),A1%(10%),S$(8%,65%),S(520%,2%)
195 DIM#2,I$(15%)=128%,G$(30%)=64%
200 DIM M$(10%),A%(2%,17%)
205!*****DETERMINE TITLES AND HEADINGS*****
210 FOR K%=0% TO 7%
220 A2%=A1%(K%)
230 A3%=10% IF T1%>2%
240 A3%=17% IF T1%>4%
250 A3%=1% IF T2%<>1%
260 M$(A2%)=G$(A3%+K%)
270 NEXT K%
280 IF T2%=1% THEN M$(7%)=G$(16%):GOTO 300
290 IF A1%(2%)=A1%(3%) THEN A2%=A1%(3%):M$(A2%)=G$(9%)
295 IF A1%(4%)=A1%(5%) THEN A2%=A1%(5%):M$(A2%)=G$(6%)
297 M$(2%)="EXTRAMURAL *****"+M$(2%)
300 INPUT"FOR EACH PERF/ACT LIST HOW MANY DEPTS.",N1%
310 D%(J%)=N1% FOR J%=1% TO A1%(7%)
320 INPUT"CHANGE NO.DEPTS FOR WHICH PERF/ACT ( 0=NONE )",F%
330 IF F%=0% THEN 400
340 PRINT"HOW MANY DEPTS. FOR ---":M$(F%):INPUT G%
345 D%(F%)=G%
350 GOTO 320
400!*****PRINT THE TITLES*****
405 W%=0%:W%=30% IF Q=3
406 W1%=W%+14%:W2%=W%+20%
410 READ A%(I%,J%) FOR J%=0% TO 16% FOR I%=0% TO 2%
419 DATA 0,0,0,0,13,0,1,4,0,6,0,7,8,9,11,7,12
420 DATA 0,0,0,0,13,0,2,4,0,6,0,7,8,9,11,7,12
421 DATA 0,0,0,0,13,0,3,5,0,6,0,7,8,10,11,7,12
430 I%=0%:I%=1% IF T2%=0%:I%=2% IF T2%=1%
435 READ T1$(J%) FOR J%=0 TO 8%
436 DATA 8,12,0,21,25,31,36,40,46
437 T2%=T1$(N%)
440 FOR K%=0% TO 16%
450 A0%=A%(I%,K%)
460 F$=I$(A0%)
465 P$="" IF A0%=0%
470 P$=CHR$(12%) IF K%=0%
475 P$="TABLE "+T2$ IF K%=2%
480 P$=I$(14%) IF T1%>2% IF K%=4%
485 P$=I$(15%) IF T1%>4% IF K%=4%
490 PRINT#Q,TAB(W%):P$ IF K%<16%
495 PRINT#Q IF K%=6%
500 NEXT K%
505 PRINT#Q
510!*****PRINT THE VALUES*****

```

```

515 F0$="#,###.# (###.#) "
516 F1$="  -- (  --) "
517 F2$="  --- (  ---) "
518 O$=CHR$(79%)+CHR$(116%)+CHR$(104%)+CHR$(101%)+CHR$(114%)
520      D2%=0%
525 D6%=22%+D%(1%)
526 D7%=60%
530 FOR K%=1% TO A1%(7%)
535 GOTO 850 IF D%(K%)=0%      REM TOTALS OPTION
550      D2%=D%(K%)+2%
560      D3%=(K%-1%)*(M%(2%)+1%)+1%
570      D4%=K%*(M%(2%)+1%)
580      P(J%)=S(D4%,J%) FOR J%=0% TO 2%
600      FOR I%=1% TO D2%
610          I1%=I%
620          D5%=D3%+I1%-1%
625          I2%=(I1%-1%)*I2%+1%
630      PRINT#Q, TAB(W%);
640      PRINT#Q, LEFT(M$(K%), I2%); IF I1%=1%
645      PRINT#Q, TAB(W1%); IF K%<3% IF I1%=1%
650      PRINT#Q, MID(M$(K%), I2%, I2%); IF I1%>1 IF I1%<6%
675      PRINT#Q, TAB(W1%); O$; TAB(W2%); IF I%=D2%-1%
680      PRINT#Q, TAB(W1%); I$(I2%) IF I%=D2%
685      PRINT#Q, TAB(W1%); S$(K%, D4%/K%); TAB(W2%); IF I%=D2%
690      PRINT#Q, TAB(W1%); S$(K%, I1%); TAB(W2%); IF I%>D2%-1%
710          FOR J%=0% TO 2%
715      P(J%)=P(J%)-S(D5%,J%) IF I%<D2%-1%
720      P1=S(D5%,J%)
725      P1=P(J%) IF I%=D2%-1%
730      P2=S(D4%,J%)
735      P1=P2 IF I%=D2%
740      P3=P1/P2*100
750      PRINT#Q, USING F0$, P1/1000; P3; IF P1>49.99
760      PRINT#Q, F1$; IF P1<50 IF P1<>0
770      PRINT#Q, F2$; IF P1=0
780      NEXT J%; PRINT#Q; NEXT I%
790      PRINT#Q, TAB(W1%); I$(I2%)
800      PRINT#Q, CHR$(10%)
810      D6%=D6%+D%(K%+1%)+6%
830 IF D6%>D7% THEN PRINT#Q, CHR$(12%); D6%=D%(K%+1%)+6%
850 NEXT K%
860      PRINT#Q, TAB(W%); I$(7%)
950 CLOSE 1,2,3
960 RESTORE
970 GOTO 20
1000 END

```

PROGRAM TYPE Utility Program
 NAME TITLEU.BAS SIZE 4K
 PURPOSE To create and update TITLE files

FILE DESCRIPTIONS		INPUT	OUTPUT	VIRTUAL DIMENSIONS
NAME				
TITLE0	15 titles, 95 characters wide	I/O	T\$(15)	= 128
TITLE2	25 titles, 87 characters wide	I/O	T\$(25)	= 128
TITLE5	30 titles, 93 characters wide	I/O	T\$(30)	= 128
TITLE6	15 titles, 72 characters wide	I/O	T\$(15)	= 128, G\$(30)= 64
TITLE9	20 titles, 72 characters wide	I/O	T\$(20)	= 72

PROGRAM VARIABLES

D%(I, J) = matrix used to describe title parameters
 F% = number appended to "TITLE" to create file names
 corresponds to TABLE_n program which prints titles
 L% = length of title
 N% = width of title

PROGRAM FUNCTION

FNR\$: function to centre title on line when input specification ="C"
 FNY\$: function to create string from numeric values
 FNE\$: creates new string with revised year numbers.

```

10 *****THIS PROGRAM CREATES AND UPDATES TITLE FILES*****
20 DEF FNR$(B$)
30 L1%=(N%-LEN(B$))/2%
40 FNR$=STRING$(L1%,32%)+B$
50 FNEND
60 DEF FNY$(Y%)
70 Y0%=Y%/10%
80 Y1%=Y%-Y0%*10%
90 FNY$=CHR$(48%+Y0%)+CHR$(48%+Y1%)
100 FNEND
110 DEF FNE$(C$,Y1%,Y2%)
120 FNE$=LEFT$(C$,JX+1%)+FNY$(Y1%)+"-"+FNY$(Y2%)+RIGHT$(C$,JX+7%)
130 FNEND
210 READ D$(I%,J%) FOR JX=0% TO 2% FOR I%=1% TO 5%
220 DATA 0,15,95
230 DATA 2,25,87
240 DATA 5,30,93
250 DATA 6,15,72
260 DATA 9,20,72
270 &
280 INPUT"OPEN WHICH TITLE FILE",F%
285 IF F%>9% THEN PRINT"F% TOO LARGE":GOTO 1000
290 &
300 FOR I%=1% TO 6%
310 I1%=I%
320 IF D$(I%,0%)=F% THEN 350
330 NEXT I%
340 INPUT"TITLE NO.,LENGTH, WIDTH",F%,D$(I1%,1%),D$(I1%,2%)
350 I$="TITLE"+CHR$(48%+F%)
360 IF F%>9% THEN PRINT"F% MUST NOT BE > 9%":GOTO 900
370 LX=D$(I1%,1%)
380 NX=D$(I1%,2%)
390 PRINT"MAX. LENGTH = ";LX
400 OPEN I$ AS FILE 1
410 DIM#1,T$(30%)=128%
470 T$(0%)=" "
480 T$(0%)=T$(0%)+STRING$(9%,45%)+CHR$(I%+48%) FOR I%=1% TO 7%
490 INPUT"WHICH LINE [ 0=END 84=YEAR UPDATE 99=LIST ]",I%
500 IF I%=0 GOTO 890
510 IF I%=84 GOTO 630
520 IF I%=99 GOTO 610
530 PRINT T$(I%)
540 INPUT"KEEP(K) NEW(N) CENTRE(C) DELETE(D)",A$
550 GOTO 490 IF A$="K"
560 IF A$="D" THEN T$(I%)=T$(0%):GOTO 490
570 INPUT LINE C$
580 T$(I%)=C\T$(C$,4%)
590 IF A$="C" THEN T$(I%)=FNR$(T$(I%))
600 GOTO 490
610 PRINT I%;T$(I%) FOR I%=1% TO LX
620 GOTO 490
630 *****THIS SEGMENT UPDATES THE YEAR*****
640 INPUT"LAST YEAR IS ( 76 TO 99)",M3%
730 FOR I%=1% TO LX
740 N$=T$(I%)
750 W%=LEN(N$)-2%
760 FOR JX=1% TO W%
770 IF MID$(N$,JX,2%)<>"19" THEN 840
780 A%=VAL(MID$(N$,JX+2%,2%))
790 B%=VAL(MID$(N$,JX+5%,2%))
800 C%=B%-A%
810 IF C%=1% THEN K%=KX+1%;A%=M3%-(4%-K%);B%=A%+1%
820 IF C%=3% THEN A%=M3%-3%;B%=M3%
830 N$=FNE$(N$,A%,B%)
840 NEXT JX
850 KX=0%
860 T$(I%)=N$
870 NEXT I%
880 GOTO 490
890 CLOSE 1
900 RESTORE:GOTO 210
1000 END

```

PROGRAM TYPE Printout Program
NAME TABLE9.BAS SIZE 5K
PURPOSE Prints table type 9 - type of funding by department

FILE DESCRIPTIONS

NAME	INPUT OUTPUT	CONTENT	VIRTUAL DIMENSIONS
RSUM23.COM RSUM24.COM RSUM43.NAT RSUM44.NAT RSUM63.HUM RSUM64.HUM	I	Data matrix for printout	P(65,8), D\$(64), M%(3)
TITLE9	I	Titles and headings	I\$(20) = 128
T.23 T.44 T.24 T.63 T.43 T.64	0	Printout file	

PROGRAM VARIABLES

B\$(20) = selection matrix for titles
T1\$ = conversion list for mini-green book numbers
W% = TAB variable
M%(2) = number of departments for data type
T\$(20) = actual titles to be printed

PROGRAM FUNCTION

This program prints 6 tables. The departments listed are ranked by the total of contracts and grants for the last year.

Required input: 1. Table number (N%), (0 to 5); 2. Terminal or line printer (Q) (0, 3); 3. List no. of departments (N1%) (0-64)

Table width: 72 characters

```

20 ! THIS PROGRAM PRINTS TABLES 9:*****
30 DIM T$(20),B$(20)
40 READ A$(J%) FOR J%=0% TO 5%
50 DATA 23,24,43,44,63,64
60 PRINT:PRINT "THIS PROGRAM PRINTS THESE TABLES":PRINT
70 PRINT USING"###",A$(J%);FOR J%=0% TO 5%
80 PRINT
90 PRINT:PRINT USING"###",J%;FOR J%=0% TO 5%
100 PRINT:PRINT:PRINT"WHICH TABLE ( 0 TO 5 ) ",
110 INPUT N%
115 GOTO 1100 IF N%>5%
120 T%=A$(N%)
130 T1%=INT(T%/10%):T2%=T%-T1%*10
140 T$=CHR$(48%+T1%)+CHR$(49%+T2%)
150 E$=".COM":E$=".NAT" IF T1%>2%:E$=".HUM" IF T1%>4%
160 F1$="RSUM"+T$+E$
170 F2$="T."+T$
180 OPEN F1$ AS FILE 1
190 DIM#1,P(65%,B%),D$(64%),M$(3%)
200 OPEN "TITLE9" AS FILE 2
210 DIM#2,I$(20%)=128%
220 INPUT"TERMINAL = 0 * PRINTER = 3".Q
230 OPEN F2$ AS FILE 3 IF Q=3
240 INPUT"LIST HOW MANY DEPARTMENTS",N1%
250 READ B$(J%) FOR J%=1% TO 17%
260 DATA 0,0,0,0,13,0,1,2,3,0,5,0,8,9,10,11,12
265 !***PRINT THE TITLES*****
270 I$(0%)=CHR$(10%)
280 B$(5%)=14% IF T1%>2%:B$(5%)=15% IF T1%>4%
290 B$(8%)=7% IF T2%=4%
294 READ T1$(J%) FOR J%=0% TO 5%
295 DATA 13,14,26,27,41,42
296 T2%=T1$(N%)
299 N%=N1%
300 FOR J%=1% TO 17%
310 K%=B$(J%)
320 T$(J%)=I$(K%)
330 NEXT J%
340 T$(1%)=CHR$(12%)
360 T$(3%)="TABLE "+T2$
370 W%=0%
380 W%=30% IF Q=3
390 FOR I%=1% TO 17%
400 IF I%=8% OR I%=9% THEN PRINT#Q
410 PRINT#Q,TAB(W%);T$(I%)
420 NEXT I%
430 M2%=M$(2%)+1%
440 O(J%)=P(M2%,J%) FOR J%=0% TO 5%
450 O(J%)=O(J%)-P(I%,J%) FOR J%=0% TO 5% FOR I%=1% TO N%
460 U$="###.#"
461 U1$=" --"
462 U2$=" ---"
470 O$=CHR$(79%)+CHR$(116%)+CHR$(104%)+CHR$(101%)+CHR$(114%)
475 !***PRINT THE VALUES*****
480 FOR I%=1% TO N%+2%
490 P$=D$(I%)
500 P$=O$ IF I%=N%+1%:P$="TOTAL" IF I%=N%+2%
510 IF I%=N%+2% THEN PRINT#Q,TAB(W%);T$(17%)
520 PRINT#Q,TAB(W%);P$;TAB(W%+13%);
530 FOR J%=0% TO 5%
540 X=P(I%,J%)/1000:Y=O(J%)/1000 IF I%=N%+1%
545 X=P(M2%,J%)/1000 IF I%=N%+2%
550 PRINT#Q,USING U$,X; IF X>0.04999
560 PRINT#Q,U1$; IF X<0.05 IF X<>0
570 PRINT#Q,U2$; IF X=0
580 IF J%=1% OR J%=3% THEN PRINT#Q," ";
590 NEXT J%:PRINT#Q
600 NEXT I%
610 PRINT#Q,TAB(W%);T$(17%)
620 CLOSE 1,2,3
630 RESTORE
650 GOTO 40
1100 END

```

\$JOB/NAME=SUBACH
\$BASIC/RUN DEFTNO
\$BASIC/RUN CARRAY
\$BASIC/RUN SUMRAC
\$DATA

0
1
2
3
4
5
6
7
8
9
10
99

\$EOD
\$BASIC/RUN SUMRAN
\$DATA

0
1
2
3
4
5
6
7
8
9
10
99

\$EOD
\$BASIC/RUN SUMRAH
\$DATA

0
1
2
3
4
5
6
7
8
9
10
99

\$EOD
\$BASIC/RUN SUMRA0
\$DATA

2
22
42
62
99

\$EOD
\$BASIC/RUN SUMRAG
\$EOD

TABULATION INDEX

Type of Tabulation	A	NAT & HUM		NATURAL		HUMAN	
		B	C	B	C	B	C
0.							
Totals, Human and Natural	SA	1	1				
Totals, Human and Natural, by Dept.	SA	2	2*				
Totals, by Activity	SA	3	3				
Totals, by Activity, by Dept.	SA	22	6*	42	19	62	34
2.							
Performer, % of Total	SA	10	4	30	17	50	32
Performer, % of Total	R&D	11	9	31	22	51	37
Performer, % of Total	RSA	12	15	32	28	52	43
Activity, % of Total	R&D	13	10	33	23	53	38
Activity, % of Total	RSA	14	-	34	29	54	44
Activity, % of Total	SA	15	5	35	18	55	33
5.							
Intramural & Extramural							
Performers by Department	SA	16	7	36	20	56	35
Performers by Department	R&D	17	11	37	24	57	39
Performers by Department	RSA	18	16	38	30	58	45
6.							
Performers by Department	SA	19	8	39	21	59	36
Performers by Department	R&D	20	12	40	25	60	40
Activity by Department	RSA	21	-	41	31	61	46
9.							
Performers (U&N-PI), by Type of							
Funding, by Department	R&D	23	13	43	26	63	41
Performers (Industry), by Type of							
Funding, by Department	R&D	24	14	44	27	64	42

- A - Type of Activity
 - SA - Scientific Activities = R&D + RSA
 - R&D - Research and Development
 - RSA - Related Scientific Activities
- B - Number system used by system programs
- C - Numbers used in Report 100 (mini Green Book)
- - Not Available
- * - Type 0 for RSUM file, Type 5 for print out

ABINDEX.DAT

1 Agr Agriculture-Administration
2 Agr Agriculture-research
3 Agr Agriculture-Production & Marketing Board
4 Agr Agriculture-Health of Animals
5 Agr Agriculture-Canadian Grains Group
6 CDC Canadian Dairy Commission
7 CLFB Canadian Livestock Feed Board
8 DOC Communications
9 CRTC Canadian Radio Television Commission
10 CCA Consumer and Corporate Affairs-Administration
11 CCA Consumer and Corporate Affairs-Consumer Affairs
12 CCA Consumer and Corporate Affairs-Corporate Affairs
13 CCA Consumer and Corporate Affairs - Combines Investigations
14 CCA Consumer and Corporate Affairs-Intellectual Property
15 BofC Bank of Canada
16 CDC Canadian Dairy Commission
17 EMR Energy
18 EMR Energy
19 AECS Atomic Energy Control Board
20 AECL Atomic Energy of Canada Limited
21 FPRB Food Prices Review Board
22 CAL Canadian Arsenal
23 DOE Environment-Fisheries and Marine Service
24 DOE Environment-Environmental Protection Service
25 DOE Environment-Atmospheric Environment Service
26 DOE Environment-Environmental Management Service
27 EA External Affairs
28 CIDA Canadian International Development Agency
29 Fin Finance
30 IDRC International Development Research Centre
31 INA Indian and Northern Affairs-Indian & Eskimo Affairs
32 INA Indian and Northern Affairs-Northern Affairs
33 INA Indian and Northern Affairs- Parks Canada
34 ITC Industry
35 ITC Industry
36 ITC Industry
37 SC Statistics Canada
38 Jus Justice-Administration
39 Jus Justice-LRC
40 Lab Labour
41 IC Information Canada
42 M&I Manpower and Immigration-Policy & Res.
43 DND National Defence-Defence Service
44 DND National Defence-Defence Research
45 NHW National Health & Welfare-Administration
46
47 NHW National Health & Welfare-Health Care
48 NHW National Health & Welfare-Medical Services
49 NHW National Health & Welfare-Health Protection
50 NHW National Health & Welfare-Income Security and Social Assistance
51 NHW National Health & Welfare-Fitness and Amateur Sport
52 MRC Medical Research Council
53 CPDL Canada Patent Development Corporation
54 NR National Revenue-Taxation
55 PO Post Office
56 PCO Privy Council Office
57 COL Commissioner of Official Languages
58 ECC Economics Council of Canada
59 M&I Manpower and Immigration-Administration
60 M&I Manpower and Immigration-Manpower Utilization

ABINDX.DAT

61 DPW Public Works-Professional and Technical Services
62 DOE Environment-Marine Service
63
64 DREE Regional & Economic Expansion
65 MSST Ministry of State for Science and Technology
66 ScC Science Council
67 SoFS Secretary of State-Translation
68 SoFS Secretary of State-Bilingualism
69 SoFS Secretary of State-Citizenship
70 SoFS Secretary of State-Arts and Culture
71 SoFS Secretary of State-Policy Div.
72
73 CC Canada Council
74 CBC Canadian Broadcasting Corporation
75 NFB National Film Board
76 NL National Library
77 NM National Museum
78 PA Public Archives
79 PSC Public Service Commission
80 SG Solicitor General
81
82
83 DSS Supply and Services
84
85
86 MOT Ministry of Transport-Marine
87 MOT Ministry of Transport-Air
88 MOT Ministry of Transport-Surface
89 MOT Ministry of Transport-TDA
90 CTC Ministry of Transport-CTC
91 NHB Ministry of Transport-National Harbours
92 SLSA St. Lawrence Seaway Authority
93 TBS Treasury Board Secretariate
94 UIC Unemployment Insurance Commission
95 MUA Ministry of State for Urban Affairs
96 CMHC Central Mortgage and Housing Corporation
97 NCC National Capital Commission
98 DVA Veterans Affairs
99
100 NRC NRC-Engineering and National Science
101 NRC NRC-Scientific and Technical Information
102 NRC NRC-Universities
103 EOF ***e o f***

DATA Layout # 1 - STATISTICS CANADA SCIENCE SURVEY CARD LAYOUT

DEPT.	PROGRAM	YEAR	DATA TYPE	ACTIVITY VAL		Intramural with non-program costs	Intramural without non-program costs	Canadian Business Enterprises	Canadian Universities	Canadian Non-Profit Institutions	Provincial & Municipal Governments	Other Canadian	Foreign
5	8	10	14			24	32	40	48	56	64	72	80

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DATA Layout #2 - STATS.DAT File

Prog. Number	Data Type	Year	Act. Val	Intramural with non-program costs	Intramural without non-program costs	Canadian Business Enterprises	Canadian Universities	Canadian Non-Profit Institutions	Provincial & Municipal Governments	Other Canadian	Foreign
3	6	8	16	24	32	40	48	56	64	72	

Program numbers - see List #1
 Data Type 1 = natural sciences
 2 = human science
 Activity value 1-14 (see Data Layouts 3, 4)

DATA Layout #3 - ARYVAL.NAT File

Natural Sciences

COLUMN CONTENT

ROW CONTENT

	Activity Values	ARYVAL Matrix Row Number	Intramural with non program costs	Canadian Business Enterprises	Canadian Universities	Canadian Non-Profit Institutions	Provincial & Municipal Gov'ts	Other Canadian	Foreign
			0	1	2	3	4	5	6
Current In-House R&D	1	1							
Current R&D Contracts	2	2							
Current R&D Grants	3	3							
Current Research Fellowships	4	4							
Admin. of Extramural Prog. (R&D)	13	5							
Capital (R&D)	6	6							
Scientific Data Collection	7	7							
Scientific Information	8	8							
Testing & Standardization	9	9							
Feasibility Studies	10	10							
Educational Support	11	11							
Admin. of Extramural Prog. (RSA)	14	12							
Capital (RSA)	12	13							

13 x 9' ARYVAL.NAT Matrix

DATA Layout #4 - ARYVAL.HUM File

Human Sciences

COLUMN CONTENT

ROW CONTENT

	Activity Values	ARYVAL Matrix Row Number	Intramural with non program costs	Canadian Business Enterprises	Canadian Universities	Canadian Non-Profit Institutions	Provincial & Municipal Gov'ts	Other Canadian	Foreign
			0	1	2	3	4	5	6
Current In-House R&D	1	1							
Current R&D Contracts	2	2							
Current R&D Grants	3	3							
Current Research Fellowships	4	4							
Admin. of Extramural Prog. (R&D)	13	5							
Capital (R&D)	6	6							
Educational Support	7	7							
Data Collection	8	8							
Information Services	9	9							
Economic & Feasibility Studies	10	10							
Operations & Policy Studies	11	11							
Admin. of Extramural Prog. (RSA)	14	12							
Capital (RSA)	12	13							

13 x 9 ARYVAL.HUM Matrix

