NurseStaff

Version 1.1

"A comprehensive nurse staffing analysis package"

Designed by:
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Preface

This manual is for the PACU software package which was written for Cindy Christensen, the Head Nurse of the Post Anesthesia Care Unit (PACU) in the University of Michigan Hospital. It will compute the time average, maximum and minimum number of patients in the PACU for two different modes of processing which are explained herein. The software is intended for use with an IBM PS/2 or a compatible machine. The program was made especially user friendly so that a person without prior computer experience would have no problem operating it. We have spent many hours perfecting the operation of the software and entering the past data. We hope that this software package and User's Manual is of some help to the nurses of the PACU. Good luck using it!

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Ann Arbor, Michigan, April 1988

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How the Program Works

This program reads in data from past months and sums up patient hours in the Main recovery room of the PACU for a specified day of the week. Each patient that has passed thru the Main Recovery room is considered a record. Each of these records contain the following four attributes for the time the patient was in the Main: the day of the week the patient was in the Main, the week number of the month, the time the patient entered the Main (Time-In) and the time the patient left the Main (Time-Out). The program rounds the Time-In and Time-Out of each patient to the nearest half hour using the following rule:

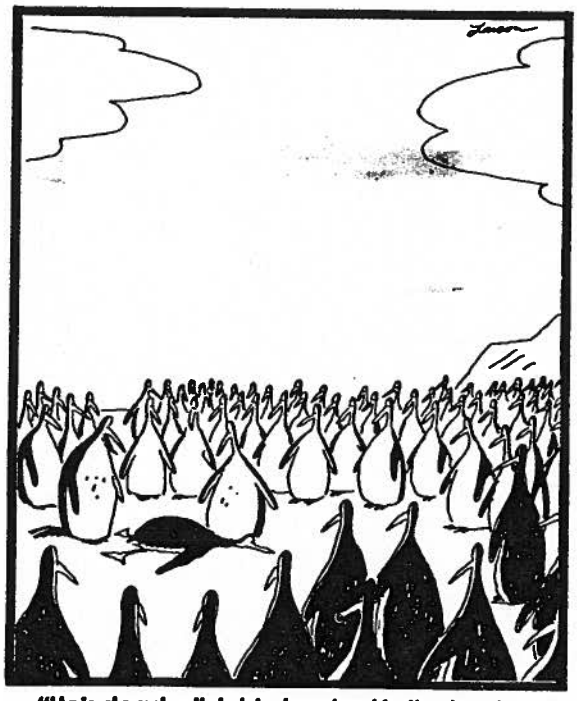
> *More than 44 minutes after the hour - rounds up to next hour*
>
> *Between 14 and 44 minutes after the hour - rounds to half hour*
>
> *Less than 14 minutes after the hour - rounds down to the hour*

The following examples are included to help explain how the rounding of time works:

> *If a patient entered the PACU at 10:12 a.m. and left at 1:48 p.m. the program would round these times to 10 a.m. and 2 p.m. (14:00) respectively.*
>
> *If a patient entered the PACU at 3:25 p.m. and left at 5:39 p.m. the program would round these times to 3:30 (15:30) and 5:30 (17:30) respectively.*

Because of this rounding rule there can be so many people in the PACU at a certain time. For example, if a patient leaves at 10:25 a.m. and another patient comes in at 10:35 a.m., both are counted as being in the PACU at 10:30 a.m.

After the data has been read in and the patient hours computed, the results are either listed in a file or sent to the screen (see pg. 8 for more details) . Listed in the results are the average number of patients, the maximum number of patients, the minimum number of patients and the average Nursing Staff required. Each of these columns are listed for each half hour interval between 8 a.m. and 12:30 a.m. (the regular hours of the Main). The 24 hour clock was used for computational convenience.



"He's dead, all right—beaked in the back ... and you know this won't be easy to solve."

How to run the Program

How to start up the Program

1.)Place the "PROGRAM" disk into Drive "A" (Leftmost slot).

2.) Place the "DATA" disk into Drive "B" (Rightmost slot).

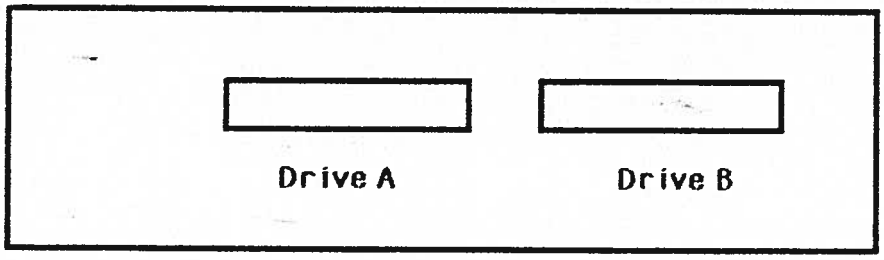


Figure 1. Disk Drives

3.)Turn on the Computer and Monitor.

4.) Wait for the "A>" to appear, then hit the CAPS LOCK key on the Keyboard.

5.) Punch in the word "PACU" after the "A>" and hit return from here the following should appear:

```
This program was designed for Cindy Christensen, the Head Nurse
of the  Post-Anesthesia Care Unit (PACU)  in the  University of
Michigan Hospital.   It will compute the time average number of
patients in the PACU  for different  modes of  processing which
will be  determined  by the user  (see the users  manual  for a
description  of the modes).

(Hit return to continue)
?
```

Figure 2.

If Figure 2. does not appear on the screen repeat step 5. If step 5 does not work turn off the computer and go back to step 1.

It is not necessary to use the remainder of this section of the User's Manual to operate the program. It is present for those who might wish to learn how to operate the program with out the use of a computer.

6.) After RETURN is hit, the following will appear on the screen:

```
If you would like the results to be  printed to  a  FILE,  type in a 1

If you would like the results to be printed on the SCREEN, type in a 2

Remember to hit the RETURN key after your entry.
?
```

Figure 3.

If something besides a 1 or a 2 is entered, the program will automatically go back to figure 3. and ask the user to choose again.

<u>REMEMBER TO HAVE THE CAPS LOCK BUTTON ON</u> - The program will not work if this button is not on.

7.)After a 1 or 2 and the RETURN is hit, the following will appear on the screen:

```
If you would like DAY-IN-MONTH processing, please type in a 1

If you would like DAY-IN-YEAR  processing, please type in a 2

Remember to hit the RETURN key after your entry.
```

Figure 4.

The two types of processing are explained in the next section.

8.) Again, a 1 or 2 must be entered and the RETURN hit. If a 1 is entered, DAY-IN-MONTH processing is chosen and the following will appear on the screen:

```
You picked DAY-IN-MONTH processing.  Please type in the
abbreviated name of the month you would like to consider.
Do not forget to hit the RETURN key after your entry.

                    January   = JAN
                    February  = FEB
                    March     = MAR
                    April     = APR
                    May       = MAY
                    June      = JUN
                    July      = JUL
                    August    = AUG
                    September = SEP
                    October   = OCT
                    November  = NOV
                    December  = DEC
?
```

Figure 5.

After inputting the desired Month's abbreviated name and hitting RETURN, the following will appear on the screen:

```
Please type in the abbreviation corresponding to the day of
week you would like to consider.  Do not forget to hit the
RETURN key after your entry.

                    Monday    = MO
                    Tuesday   = TU
                    Wednesday = WE
                    Thursday  = TH
                    Friday    = FR
?
```

Figure 6.

If a 2 is entered, DAY-IN-YEAR processing is chosen and the following will appear on the screen:

```
You picked DAY-IN-YEAR processing.  Please type in the
abbreviation corresponding to the day of the week you would
like to consider.  Do not forget to hit the RETURN key after
your entry.

                Monday    = MO
                Tuesday   = TU
                Wednesday = WE
                Thursday  = TH
                Friday    = FR
?
```

Figure 7.

Choosing the day of the week to be considered is the last decision the User will have to make, unless a wrong abbreviation has been entered along the line. If this is so, a self explanatory error message will appear on the screen and the program will ask the user for the correct input.

MODES OF PROCESSING

DAY-IN-MONTH

This mode of processing takes only one month of data into account when figuring statistics. The month is chosen by the user during the operation of the program. The day of the week (Monday thru Friday) which is to be considered is chosen in the same manner. For example, if you would like to acquire results for the Mondays in March, You would choose DAY-IN-MONTH processing by entering a 1 when Figure 4 appears. The month is chosen by entering the appropriate three letter month abbreviation. Don't forget the CAPS LOCK key! To choose the day, enter the two letter abbreviation for the appropriate day.

As stated above, **this mode only takes into account the data from the day of the week specified in the one month which is chosen.**

DAY-IN-YEAR

This mode is similar to the DAY-IN-MONTH mode except it uses data from the whole year. When the day of the week (Monday thru Friday) is chosen in the DAY-IN-YEAR mode, every day in every month is taken into account when computing the output statistics. For example, if DAY-IN-YEAR mode is chosen and Monday is chosen as the day of the week to be considered, every Monday in the whole year is taken into consideration during output calculations. This mode enables you to look at daily trends throughout the whole year, instead of just the daily trends for a given month, which the DAY-IN-MONTH mode gives.

WHERE THE RESULTS GO

This program enables you to choose where you want the output results to go. The two choices offered are the screen or a file by the name of OUTPUT.BAS. When the output is sent to the file a message appears telling the User where the output has gone. However, this file will only be useful until the program is operated again and more output sent to the file. In this case, the old OUTPUT.BAS file is erased and replaced by the new one. It is recommended that if you wish to keep the old file, you should recopy the file OUTPUT.BAS into a new file. A good way to remember what is in the particular copied output file is to name it by day and month. For example, a good name for the copied output file from the Mondays in June would be MON.JUN, or something of the sort.

HOW TO PRINT THE RESULTS

To print the results from a job, first send the results to the screen when asked by the program (see Figure 3.). After the program is run, and the first half of the day is displayed on the screen, go to your key board and hit the SHIFT and PRT SC (print screen) buttons simultaneously. This will cause what is displayed on the screen to be printed on the printer connected to the computer you are using.

NOTE: the computer which you are working on must have a printer connected to it for this to work. The power for the printer must also be ON and the printer must be in the ON LINE mode. If any problems arise with your printer, consult your printer manual.

To print out the second half of the day's results, just hit the RETURN key after you've printed up the first half of the day and repeat the SHIFT and PRT SC key sequence when the results for the second half of the day appear on the screen. Pretty simple, huh?

SEE THE APPENDIX FOR A SAMPLE OF THE FIRST AND SECOND HALVES OF A DAY'S OUTPUT.

Data Files

Aside from running the program, you will constantly find the need to enter more data. Clearly this will provide the most up to date information regarding the staffing requirements. The task of data entry will be time consuming and very tedious to say the least. In light of this, it is strongly recommended that data entry be done on a weekly, or if possible, daily basis.

Set-Up of Data Records

Each patient who enters the PACU will be assigned a record in the data file which corresponds to the month in which he/she was in the hospital. For this program, a record is merely an amount of disk memory allocated to storing the data relevant to the patient which is used by the program. In turn, each of these patient records will have four attributes. The term attribute corresponds to a section of the record which contains a specific type of information. The four attributes which correspond to each record are:

1) day of the week
2) number corresponding to the number of the week
3) time the patient entered the PACU
4) time the patient left the PACU

All four of these records must be entered for each patient. Omission of one or more will cause the program to malfunction. When entering data into the computer, each patient's data will be entered on a separate line. Thus, there will be four pieces of information on each line. For example, if a patient was in the PACU on Tuesday, April 12, 1988 from 10:25 a.m. until 1:55 p.m., the data line would appear as follows:

TU,2,10.25,13.55

A carriage return is entered at the end of each line. The data records must be entered in this exact manner for the program to properly function. It is important to note several things with respect to the data files.

- the day of the week must be entered in capital letters
- the number 2 in this case, corresponds to the second Tuesday of the month, and not necessarily the second week in the month.
- the time of entry and time of departure must be entered in 24 hour (European) format.
- the colon in the time of entry and departure are represented by a decimal point. The digits to the right do, however, correspond to one minute apiece. Thus, 10:55 a.m. is entered as 10.55.
- Commas must be entered between the separate records, however, no comma may be placed at the end of a line.

Although the program only accounts for the hours between 8:30 a.m. and 12:30 a.m., the entry and departure time of a patient can be outside of this range. For example if a patient enters at 11:15 p.m. and departs at 2:30 a.m., then the times can be entered as 23.15,26.3. A sample of a data file can be seen below:

```
TU,2,15.3,19.0
TU,2,17.35,20.0
TU,2,18.0,20.0
TU,2,19.45,21.2
TU,2,19.45,21.45
TU,2,21.4,23.15
TU,2,23.3,24.3
WE,3,9.05,10.0
WE,3,11.3,12.3
WE,3,9.05,9.35
WE,3,9.5,12.0
WE,3,10.1,12.0
WE,3,10.1,15.2
```

When the last record of a given file is entered, no carriage return should be made. Thus, do not push return at the end of the data file.

Using WordStar for Data Files

First, place the WordStar disk in drive A and the data disk in drive B. Turn on the computer. You will be told to enter the date and time. Following this, the computer will automatically enter the WordStar program. A menu will appear on the screen which will look like the one shown below:

```
N          not editing
                < < <  O P E N I N G   M E N U  > > >
  ---Preliminary  Commands---   | --File  Commands-- | -System  Commands-
L  Change logged disk drive     |                    |  R  Run a program
F  File directory     now ON    |  P  PRINT a file   |  X  EXIT to system
H  Set help level               |                    |
 ---Commands to open a file---  |  E  RENAME a file  | -WordStar Options-
   D  Open a  document  file    |  O  COPY   a file  |  M  Run MailMerge
   N  Open a non-document file  |  Y  DELETE a file  |  S  Run SpellStar

directory of disk A:
 AUTOEXEC.BAT WSCOLOR.BAS  COMMAND.COM  DIGGER.COM   NICE.COM     WS.COM
 MAILMRGE.OVR WSMSGS.OVR   WSOVLY1.OVR
```

Next type the letter "N" corresponding to nondocument mode. The computer will ask which document you wish to edit. The command which needs to be given is B:XXX where XXX corresponds to the abbreviation of the month which you wish to edit. The screen, at this point, will look like the display below.

```
 Use this command to create and alter program source files
   and other non-documents.  Word wrap defaults off;
   tabbing defaults to fixed (TAB chars in file; 8-col stops);
   page breaks not shown; hi bit flags not used in file.
 For normal word processing uses, use the "D" command instead.

    A file name is 1-8 letters/digits, a period,
    and an optional 0-3 character type.
    File name may be preceded by disk drive letter A-D
    and colon, otherwise current logged disk is used.

    NAME OF FILE TO EDIT? B:FEB

 directory of disk A:
  AUTOEXEC.BAT WSCOLOR.BAS  COMMAND.COM  DIGGER.COM   NICE.COM     WS.COM
  MAILMRGE.OVR WSMSGS.OVR   WSOVLY1.OVR
```

If the data being entered is the first records of the given month, WordStar will show a line of dummy data which looks like the following:

```
EMPTY,0,4,4
```

Prior to entering data for this month, this line of dummy data must be deleted from the document. This is done by positioning the cursor to the right of the last character of the line (which will be 0) and pressing the delete key until the entire line has been fully removed. Now one can begin to enter data. Remember to turn the CAPS LOCK key on. Also, remember to push return at the end of each line, but not at the end of the last line.

The arrow keys can be used to move the cursor around the document to look back at previous entries. In addition the delete key can be to remove unwanted characters from the screen. For example, if by accident, two commas were entered when only one was needed. One can be removed by using the arrow keys to place the cursor to the right of one of them and striking the delete key. Then the arrow keys can be use to replace the cursor to where it was prior to the detection of the error.

WordStar also provides a simple way to insert data into the text. This is done with the insert function. Suppose, for example that a data record looked like this:

TU,2,9.35,1045

Clearly a decimal point is missing in the departure time. In order to correct this error, use the arrow keys to place the cursor on the 4. Strike the INSERT key. Notice that an "Insert On" message lights up in the upper right side of the screen. Next type the decimal point. You will notice that the 45 moves to the right one space and a decimal point is inserted in the number. Now, strike the INSERT key again and notice that the Insert On message disappears from the

screen. Once again, reposition the cursor so that it is in place where you left off. It's that easy.

If you are adding more data to a file which already has a number of real records in it, simply use the arrow keys to move the cursor to the end of the document, strike the RETURN key and carry on with data entry. The same methods can be used to edit this file.

At the end of the data entry session, you need to save your work. First, make sure that there are no blank lines at the end of the file. This can be done by placing the cursor at the end of the last attribute entered for the last record. Strike the delete key several times to remove any blank lines. Now, strike the CTRL key simultaneously with the "K" key. Next strike the "D" key. WordStar will now save your document on the disk in the B drive and return you to the main menu. Type an "X" to exit WordStar and return to the system.

Hints on Entering Data

Data entry is clearly the most boring, time consuming task in the analysis. Unfortunately, there is no easier way to do it. For this reason, we suggest the following "helpful hints."

- First and foremost, do not try to enter more than one or two weeks of dada at a time. Our experience (which is very extensive) suggests that many more errors will be made in this manner. Nothing is worse than searching through 900 lines of data to find a misplaced comma. Do yourself a big, big favor and enter data on a daily, every other day or at least weekly basis.

- Train several people in data entry and try to have them responsible for the data entry each week. This will facilitate the learning curve associated with the word processor and also, as more data entry is done by a particular person, the better they get at it.

- Insist that the logs be kept as neat as possible and in 24 hour time format. This will greatly simplify the task of entering data. More than one error was caused by an error in the mental conversion from 12 hour to 24 hour time.

- It may be effective to assign the task of data entry to one of the more junior nurses who have fewer collateral duties and responsibilities. Also, we recommend some sort of incentive (i.e. extra coffee break etc.) since this clearly is a taxing, repetitious task.

- Ensure, on a managerial level, that the data entry is kept up to date. The only way for the information provided to be of any use, it must be kept current. Particularly, it may be wise to make sure that the data is updated prior to the development of the PACU nursing schedule every two weeks. This will enable you to punch up the current or last month and notice any new or significant trends.

- If the program won't run, chances are very good the reason is that one of the data files contains an error. We suggest the program be run every time new data is entered so the area in which the error occurs will be limited to the set of data most recently entered. This is a very effective troubleshooting method.

- Finally, the most common error in data entry is two commas where only one is needed. The only way to find this occurance is through visual inspection. It may be convenient to print out the data file and search for the error on paper. To do this, from the main WordStar menu, type P rather than N. When asked which file to print type B:XXX, where XXX corresponds to the current month abbreviation being entered. When prompted by the next question, type ESC. Also, make sure the printer is on and on-line prior to this invocation.

APPENDIX

USE FOR MOTT HOSPITAL RECOVERY ROOM

The PACU Software package is adaptable to any recovery room or similar situation. All that need be done is to enter the appropriate data in their monthly files as explained in Section - C of this manual.

Even if Mott's hours vary from those of the University Hospital's PACU, results will still be calculated between the hours of 8 a.m. and 12:30 a.m. ONLY. If the hours of operation vary from those mentioned, above results will still be calculated between the mentioned hours. It is possible however, to alter the program to handle earlier starting or ending hours. This possibility is explored in the next sub section.

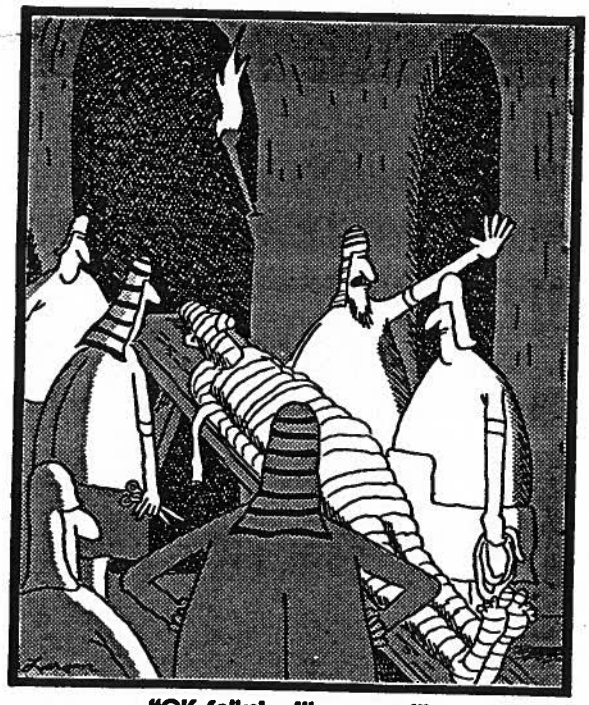
POSSIBLE ALTERATIONS OF THE PROGRAM

NOTE: Any altering of the program should only be attempted by a person with extensive computer programming and logic knowledge.

The actual program is written in the BASICA language and is therefore fairly easy to understand. It can be found under the names PACU.BAS or HOSPITAL.BAS on the PACUBACKUP disk. the PACU.EXE and HOSPITAL.EXE files are self executable files compiled in TURBO BASIC and can therefore not be altered. If the program is altered it is highly recommended that it be renamed and also made into an executable (.EXE) program. John Gialanella of Management Information Systems (MIS) has the necessary software and knowledge to complete this task. It is advised that Mr. Gialanella be contacted if any alteration of the program is to be made.

PROBLEMS ?

If any problems arise with the running or operation of this software package that are not covered in this manual, the person to contact is John Gialanella of MIS. He knows almost everything!



"OK, folks! ... It's a wrap!"

SAMPLE OUTPUT

FIRST HALF OF DAY

Time Average number of patients in the PACU on Monday for the whole year.

Time of day	Average number of patients	Maximum number of patients	Minimum number of patients	Average Nursing Staff required
8.00	0.1	1	0	0.1
8.30	0.9	4	0	0.5
9.00	3.0	6	1	1.5
9.30	4.7	8	1	2.3
10.00	6.3	11	2	3.2
10.30	8.3	13	4	4.1
11.00	9.5	13	4	4.7
11.30	10.1	17	5	5.1
12.00	11.4	16	3	5.7
12.30	11.6	15	4	5.8
13.00	12.3	17	8	6.2
13.30	11.5	17	8	5.8
14.00	10.3	16	7	5.2
14.30	10.1	16	6	5.0

SECOND HALF OF DAY

15.00	9.5	13	4	4.8
15.30	9.3	17	2	4.7
16.00	9.1	16	3	4.5
16.30	8.8	14	4	4.4
17.00	8.3	15	4	4.2
17.30	7.2	13	3	3.6
18.00	5.7	11	2	2.9
18.30	4.7	8	2	2.3
19.00	4.4	8	2	2.2
19.30	3.8	7	1	1.9
20.00	3.4	6	1	1.7
20.30	2.9	6	0	1.4
21.00	2.4	6	0	1.2
21.30	2.0	5	0	1.0
22.00	1.4	3	0	0.7
22.30	1.1	3	0	0.5
23.00	0.9	3	0	0.4
23.30	0.8	3	0	0.4
24.00	0.5	3	0	0.2
24.30	0.2	1	0	0.1

LISTING OF PROGRAM

```
1       DIM TOT(50,5,12),AVG(50),TOTAL(50),MIN(50),MAX(50),MAXWK(13)
13        FOR I=1 TO 5
14         PRINT
15       NEXT I
16    PRINT "This program was designed for Cindy Christensen, the Head Nurse"
20      PRINT "of the  Post-Anesthesia Care Unit (PACU)  in the  University of"
21      PRINT "Michigan Hospital.   It will compute the time average number of"
22      PRINT "patients in the PACU  for different  modes of  processing which "
23      PRINT "will be  determined  by the user  (see the users  manual  for a"
24      PRINT "description  of the modes). "
26      PRINT
27      PRINT "(Hit return to continue)"
29      INPUT GUS
30        FOR I=1 TO 20
32          PRINT
34        NEXT I
36      PRINT "If you would like the results to be  printed to  a  FILE,  type in a
38      PRINT
40      PRINT "If you would like the results to be printed on the SCREEN, type in a
42      PRINT
44      PRINT "Remember to hit the RETURN key after your entry."
46      INPUT WHERE
47      REM
48        IF WHERE=1 THEN 60
50        IF WHERE=2 THEN 60
52        PRINT " lets try again "
54        PRINT
56        GOTO 36
58      REM ******
60        FOR I= 1 TO 20
61          PRINT
62        NEXT I
70      PRINT " If you would like DAY-IN-MONTH processing, please type in a 1"
75      PRINT
80      PRINT " If you would like DAY-IN-YEAR  processing, please type in a 2"
85      PRINT
90      PRINT " Remember to hit the RETURN key after your entry."
100     PRINT
110     PRINT
120     PRINT
130     INPUT TYPE
132     FOR I=1 TO 20
134     PRINT
136     NEXT I
140     IF TYPE=1 THEN 200
150     IF TYPE=2 THEN 600
160     PRINT " You have to enter either 1 or 2. Lets try again"
170     GOTO 70
180     REM
182     FOR I=1 TO 28
183     PRINT
184     NEXT I
200     PRINT "You picked DAY-IN-MONTH processing.  Please type in the"
201     PRINT "abbreviated name of the month you would like to consider."
202     PRINT "Do not forget to hit the RETURN key after your entry."
210     PRINT
220     PRINT "                 January   - JAN"
230     PRINT "                 February  - FEB"
240     PRINT "                 March     - MAR"
250     PRINT "                 April     - APR"
260     PRINT "                 May       - MAY"
270     PRINT "                 June      - JUN"
280     PRINT "                 July      - JUL"
290     PRINT "                 August    - AUG"
300     PRINT "                 September - SEP"
310     PRINT "                 October   - OCT"
```

```
320     PRINT "                    November  = NOV"
330     PRINT "                    December  = DEC"
331     INPUT MONTH$
332     REM *********** WE MIGHT WANT TO CHECK TO SEE IF MONTH$ IS VALID***
340     FOR I=1 TO 20
341     PRINT
342     NEXT I
350     PRINT " Please type in the abbreviation corresponding to the day of "
351     PRINT " week you would like to consider.  Do not forget to hit the "
352     PRINT " RETURN key after your entry."
353     PRINT
354     PRINT
355     PRINT "                Monday    = MO"
356     PRINT "                Tuesday   = TU"
357     PRINT "                Wednesday = WE"
358     PRINT "                Thursday  = TH"
359     PRINT "                Friday    = FR"
360     INPUT D$
361     IF D$="MO" THEN 390
362     IF D$="TU" THEN 390
363     IF D$="WE" THEN 390
364     IF D$="TH" THEN 390
365     IF D$="FR" THEN 390
366     PRINT "You have entered the wrong abbreviation.  Lets try again"
367     GOTO 350
369     REM
370     REM **********  WE MIGHT WANT TO CHECK TO SEE IF D$ IS VALID  *****
390     NMONTH=1
400     PRINT
410      PRINT
420     PRINT " The program is running now.  If you hurry you might be able"
421     PRINT " to get a cup of coffee before its done."
425   IF MONTH$="JAN" THEN 426 ELSE 428
426     OPEN "B:JAN" FOR INPUT AS #1
427     GOTO 469
428   IF MONTH$="FEB" THEN 429 ELSE 431
429     OPEN "B:FEB" FOR INPUT AS #1
430     GOTO 469
431   IF MONTH$="MAR" THEN 432 ELSE 434
432     OPEN "B:MAR" FOR INPUT AS #1
433     GOTO 469
434   IF MONTH$="APR" THEN 435 ELSE 437
435     OPEN "B:APR" FOR INPUT AS #1
436     GOTO 469
437   IF MONTH$="MAY" THEN 438 ELSE 440
438     OPEN "B:MAY" FOR INPUT AS #1
439     GOTO 469
440   IF MONTH$="JUN" THEN 441 ELSE 443
441     OPEN "B:JUN" FOR INPUT AS #1
442     GOTO 469
443   IF MONTH$="JUL" THEN 444 ELSE 449
444     OPEN "B:JUL" FOR INPUT AS #1
445     GOTO 469
449   IF MONTH$="AUG" THEN 450 ELSE 452
450     OPEN "B:AUG" FOR INPUT AS #1
451        GOTO 469
452   IF MONTH$="SEP" THEN 453 ELSE 455
453        OPEN "B:SEP" FOR INPUT AS #1
454        GOTO 469
455   IF MONTH$="OCT" THEN 456 ELSE 458
456        OPEN "B:OCT" FOR INPUT AS #1
457        GOTO 469
458   IF MONTH$="NOV" THEN 459 ELSE 461
459        OPEN "B:NOV" FOR INPUT AS #1
460        GOTO 469
461   IF MONTH$="DEC" THEN 462 ELSE 464
```

```
462        OPEN "B:DEC" FOR INPUT AS #1
463        GOTO 469
464     PRINT "****   You put in the wrong abbreviation for the month you "
465     PRINT "       wanted to consider.  Let's try again."
466     PRINT "(Hit return to continue)"
467     INPUT GUS
468     GOTO 180
469     IF EOF(1) THEN 1500
480     INPUT #1,DAY$,WEEK,TIN,TOUT
481   IF DAY$="EMPTY" THEN 482 ELSE 495
482      FOR I=1 TO 20
483   PRINT
484      NEXT I
485   PRINT USING "No data exists for the month of \   \, let's try another month."
487   CLOSE 1
488   GOTO 200
490   REM    *********
495     IF D$=DAY$ THEN 500 ELSE 469
500     IF WEEK<NUMDAY THEN 520
510     NUMDAY=WEEK
512     MAXWK(NMONTH)=NUMDAY
515     REM      ******    GO TO THE ROUND OFF SUB
520     GOSUB 1000
530     GOTO 469
540     REM
600     FOR I=1 TO 10
604     PRINT
605     NEXT I
606     PRINT "You  picked  DAY-IN-YEAR  processing.   Please  type in the "
607     PRINT "abbreviation corresponding to the day of the week you would"
608     PRINT "like to consider.  Do not forget to hit the RETURN key after"
609     PRINT "your entry."
610     PRINT
615     PRINT
616     PRINT "                Monday    = MO"
617     PRINT "                Tuesday   = TU"
618     PRINT "                Wednesday = WE"
619   PRINT "               Thursday  = TH"
620     PRINT "                Friday    = FR"
621     INPUT D$
622     PRINT
624     IF D$="MO" THEN 681
626     IF D$="TU" THEN 681
628     IF D$="WE" THEN 681
630     IF D$="TH" THEN 681
632     IF D$="FR" THEN 681
634     PRINT "You entered the wrong abbreviation.  Lets try again"
636     GOTO 606
681     REM   ***** SHOULD WE CHECK TO SEE IF D$ IS VALID
690     PRINT
695     PRINT "The program is running now.  If you hurry you might be able"
700     PRINT "to get a coffee and a doughnut before its done."
701     PRINT
705     OPEN "B:JAN" FOR INPUT AS #1
706     GOTO 765
707     OPEN "B:FEB" FOR INPUT AS #1
708     GOTO 765
709     OPEN "B:MAR" FOR INPUT AS #1
710     GOTO 765
711     OPEN "B:APR" FOR INPUT AS #1
712     GOTO 765
713     OPEN "B:MAY" FOR INPUT AS #1
714     GOTO 765
715     OPEN "B:JUN" FOR INPUT AS #1
716     GOTO 765
717     OPEN "B:JUL" FOR INPUT AS #1
```

```
718     GOTO 765
719     OPEN "B:AUG" FOR INPUT AS #1
720     GOTO 765
721     OPEN "B:SEP" FOR INPUT AS #1
722     GOTO 765
723     OPEN "B:OCT" FOR INPUT AS #1
724     GOTO 765
725     OPEN "B:NOV" FOR INPUT AS #1
726     GOTO 765
727     OPEN "B:DEC" FOR INPUT AS #1
728     GOTO 765
740     REM     ****    NOW TO PROCESS MONTH BY MONTH
750     REM
765     NMONTH=NMONTH+1
770             IF EOF(1) THEN 840
780     INPUT #1,DAY$,WEEK,TIN,TOUT
785             IF DAY$="EMPTY" THEN 840
790             IF D$=DAY$ THEN 800 ELSE 770
800             IF WEEK<NUM THEN 820
810     NUM=WEEK
812             IF NUM<MAXWK(NMONTH) THEN 820
814     MAXWK(NMONTH)=NUM
820     GOSUB 1000
830     GOTO 770
840     NUMDAY=NUMDAY+NUM
845     NUM=0
850     CLOSE 1
862     IF NMONTH=1 THEN 707
864     IF NMONTH=2 THEN 709
866     IF NMONTH=3 THEN 711
868     IF NMONTH=4 THEN 713
870     IF NMONTH=5 THEN 715
872     IF NMONTH=6 THEN 717
874     IF NMONTH=7 THEN 719
876     IF NMONTH=8 THEN 721
878     IF NMONTH=9 THEN 723
880     IF NMONTH=10 THEN 725
882     IF NMONTH=11 THEN 727
885     NMONTH=12
890     GOTO 1510
900     REM
910     REM    ***********  SUB 1000 IS THE ROUNDING AND SUMMING SUB
920     REM
1000    NIN=FIX(TIN)
1020    MIN=TIN-NIN
1030    IF MIN >.44 THEN 1100
1040    IF MIN >.14 THEN 1150 ELSE 1200
1100    NIN=NIN+1.0
1110    TIN=NIN
1120    GOTO 1220
1150    MIN=.5
1160     TIN=NIN+MIN
1170     GOTO 1220
1200    TIN=NIN
1220    NIN=FIX(TOUT)
1230    MIN=TOUT-NIN
1240    IF MIN>.44 THEN 1260
1250    IF MIN>.14 THEN 1300 ELSE 1350
1260    NIN=NIN+1
1270    TOUT=NIN
1280    GOTO 1360
1300    MIN=.5
1310    TOUT=NIN+MIN
1320    GOTO 1360
1350    TOUT=NIN
1355    REM     ********   THIS LOOP SUMS UP THE TIME IN PACU
```

```
1360    FOR I=TIN TO TOUT STEP .5
1370            J=2*I
1380            TOT(J,WEEK,NMONTH)=TOT(J,WEEK,NMONTH)+1
1390    NEXT I
1400    RETURN
1470    REM   ************************************************************
1480    REM
1490    REM                        REPORT PRINTOUT
1491    REM
1500    CLOSE 1
1510    FOR I=8 TO 24.5 STEP .5
1520      J=2*I
1521      REM   *** ASSIGN MIN AND MAX VALUES
1522      MAX(J)=0
1524      MIN(J)=100
1525       FOR L=1 TO NMONTH
1526    REM ****   To process each month
1527            IF MAXWK(L)=0 THEN 1542
1528         FOR K=1 TO MAXWK(L)
1530          TOTAL(J)=TOTAL(J)+TOT(J,K,L)
1531    REM ****   To process each week
1532            IF TOT(J,K,L) < MIN(J) THEN 1534 ELSE 1536
1534             MIN(J)=TOT(J,K,L)
1536            IF TOT(J,K,L) < MAX(J) THEN 1540
1538             MAX(J)=TOT(J,K,L)
1540         NEXT K
1542       NEXT L
1547    AVG(J)=TOTAL(J)/NUMDAY
1548    NEXT I
1550    REM
1560  FOR I=1 TO 10
1562  PRINT
1564  NEXT I
1600    IF D$="MO" THEN 1610 ELSE 1620
1610    D$="Monday"
1620    IF D$="TU" THEN 1625 ELSE 1635
1625    D$="Tuesday"
1635    IF D$="WE" THEN 1640 ELSE 1645
1640    D$="Wednesday"
1645    IF D$="TH" THEN 1650 ELSE 1655
1650    D$="Thursday"
1655    IF D$="FR" THEN 1660 ELSE 1665
1660    D$="Friday"
1662    REM
1664    REM                      *** CHECK TO SEE WHERE OUTPUT IS GOING
1665    IF WHERE=1 THEN 1690
1667    IF WHERE=2 THEN 2000
1669    PRINT
1670    REM ***
1690    PRINT
1696    PRINT "The output has gone to the file named OUTPUT"
1700    OPEN "OUTPUT.BAS" FOR OUTPUT AS #2
1710    IF TYPE =2 THEN 1740
1720    PRINT #2,USING "Time Average number of patients in the PACU on \        \";
1721    PRINT #2,USING "in the month of \   \";MONTH$
1730    GOTO 1800
1740    PRINT #2,USING "Time Average number of patients in the PACU on \        \";
1750    PRINT #2, "for the whole year."
1800    PRINT #2,
1810    PRINT #2,
1819    PRINT #2, "Time     Average      Maximum      Minimum        Average "
1820    PRINT #2, " of     number of    number of    number of     Nursing Staff"
1821    PRINT #2, "day     patients     patients     patients        required "
1822    PRINT #2, "----    ---------    ---------    ---------    -------------"
1825    PRINT #2,
1840    FOR I=8 TO 24.5 STEP .5
```

```
1860    J=2*I
1865    NSR=AVG(J)/2
1870    NIN=FIX(I)
1880    MIN=I-NIN
1890    IF MIN<.5 THEN 1920
1900    MIN=.30
1910    NIN=NIN+MIN
1920    PRINT #2,USING "##.##     ##.#          ##           ##           ##.#";NIN
1940    NEXT I
1950    REM
1960    REM
1970    REM
1975    GOTO 4999
2000    REM                  *****   THIS GOES TO THE SCREEN   ******
2020    PRINT USING "Time average number of patients in the PACU on \        \";D$
2021    IF TYPE=2 THEN 2040
2025    PRINT USING "in the month of \   \";MONTH$
2030    GOTO 2100
2040    PRINT "for the whole year."
2100    PRINT
2120    PRINT "Time       Average        Maximum        Minimum        Average"
2130    PRINT " of       number of      number of      number of      Nursing Staff
2140    PRINT "day       patients       patients       patients        required"
2145    PRINT "----      ---------      ---------      ---------      -------------
2150    PRINT
2160    FOR I=8 TO 24.5 STEP .5
2170    J=2*I
2180    NSR=AVG(J)/2
2190    NIN=FIX(I)
2200    MIN=I-NIN
2210    IF MIN<.5 THEN 2250
2220    MIN=.3
2230    NIN=NIN+MIN
2232    IF I>14 THEN 2234 ELSE 2250
2234  IF I<15 THEN 2235 ELSE 2250
2235    PRINT
2236    PRINT " (Hit return to see the rest of the day)"
2238    INPUT GUS
2250    PRINT USING "##.##        ##.#          ##           ##           ##.#";
2260    NEXT I
2300    REM
2400    REM
4999    END
```