

Kansas Higher Education Enrollment Package
Conversion From GCOS to VM/CMS

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Introduction

The Kansas Higher Education Enrollment Package (KHEEP) was originally implemented on the Honeywell GCOS computer at the University of Kansas. With the planned replacement of the GCOS system it became necessary to convert the KHEEP package to run on another computer. The new computer chosen for KHEEP was the IBM VM/CMS system at the University of Kansas. This document summarizes the kinds of changes which were made in order to convert the package, and describes those few ways in which the operation of the package has changed as a result of the conversion. For a complete description of the KHEEP package please see the original documentation dated August 1, 1981.

The guiding principles of the conversion were to leave the operation of KHEEP as much the same as possible and to preserve computational accuracy. In practice, a great deal of the KHEEP code had to be modified, particularly code dealing with file access, and communication with the user's terminal.

In the past KHEEP was run from a printing terminal which could display 132 columns. With the new computer system it was desirable to switch to using a video display type terminal, or a microcomputer emulating such a terminal. This switch made it necessary to rearrange the terminal output to fit on the screen and to control the grouping of output to the terminal so that information did not disappear from the screen before it was needed.

Another major part of the conversion was the rewriting of code dealing with text input from the terminal. KHEEP was written using "free-formatted input" in order to make it easier to use. IBM FORTRAN requires free formatted input to have quotation marks around non-numeric data (such as a "yes" response). GCOS FORTRAN did not have this requirement. Much of KHEEP had to be rewritten in order to allow non-numeric input without quotation marks.

Other internal changes were required. The GCOS version was written using "overlays" to minimize the use of computer memory. This was not desirable for the VM/CMS version and was changed. Calls to GCOS specific subroutines, such as the date and time function, also had to be changed.

Conversion also required the writing of special programs to transfer the binary data files from GCOS to VM/CMS. A FOCUS master file was also written for each of the KHEEP data files in order to allow better access to the data.

After conversion, each KHEEP module was run with the same data and options as the last run on GCOS. All modules produced identical results on the two systems.

Differences between VM/CMS and GCOS versions

Running KHEEP

As before, the KHEEP system has three modules, each of which is invoked by a separate command. The modules are:

- KHUPDT - the basefile update procedure
- KHHSO - projects high school graduates
- KHHEE - projects higher education enrollments

These commands are the same as on the Honeywell. To run the basefile update procedure, for example, type the following at the CMS command level.

KHUPDT

Note: do not run KHEEP if you have attached a disk as the "E" disk with some procedure other than a KHEEP module.

Output will be paged instead of scrolled

The VM/CMS system is designed to be used with a 327x type display terminal. The University of Kansas system can also be accessed through a device called a 7171 protocol converter. This allows an ASCII terminal or an IBM/PC compatible microcomputer to emulate a 327x terminal.

On the Honeywell, information displayed on a terminal "scrolled" when the terminal's screen filled up. The IBM, on the other hand, pauses when the screen fills up and displays "more..." on the lower right hand corner of the screen. The display will move on to the next screen automatically after 60 seconds, or as soon as the "clear" key is pressed. If the "enter" or "return" key is pressed while "more..." is displayed the display will be frozen until the return is pressed again or until the clear key is pressed.

Interactive output was reformatted for an 80 column screen

The GCOS version of KHEEP was most often accessed with a 132 column printing terminal. The IBM version will most often be accessed with an 80 column video terminal. Information to be displayed on the screen has been rearranged to fit on the shorter lines.

Null response for numeric zero

The GCOS system allowed for the entry of a "null response" to indicate a numeric input of zero. A null response is the entry of just a carriage return in response to a request for input. On VM/CMS a null response for numeric input will generate an error condition and the program will have to be rerun.

"running" and "vm read"

The lower right hand corner of the screen on the IBM VM/CMS system also gives an indication of whether the KHEEP system is requesting input or is processing information. When the program is requesting input from the user, the lower right hand corner says "vm read". When the program is processing information the lower right hand corner says "running".

The Wait facility

As of the time of the implementation of the IBM version of KHEEP, the VM/CMS system will not disconnect an inactive user until at least 30 minutes have passed. This means that a wait facility is less crucial than on the Honeywell. Nevertheless, the VM/CMS version of KHEEP has a wait facility just like the Honeywell version. If a "W" is typed in response to any yes/no question, KHEEP will display a clock on the screen for up to 45 minutes. The PF3 key is used to resume execution.

The GCOS SCAN facility

This was replaced in the converted version of KHEEP with the VM/CMS BROWSE facility. With BROWSE output can be perused using commands consistent with the VM/CMS editor (XEDIT). Browse commands are listed in the quick guide which follows.

Data preparation procedures

The IBM VM/CMS version of KHEEP includes two new procedures to do data-preparation formerly done annually by the University of Kansas. These procedures put data into the proper form for the update programs for the freshmen by county basefile (UPDFBC) and the public school enrollment basefile (UPDK12).

The two procedures are:

- PREPFBC - prepares data for a new year for UPDFBC
- PREPK12 - prepares data for a new year for UPDK12

Focus and the data files

All of the data files for KHEEP are stored in binary format just as in the GCOS version. Every number is stored as an 8 byte floating point number. A Focus master file has been written for each data file. The Focus Table File procedure can be used to generate reports or extract data from any of the data files. A filedef command must be performed to define a ddname for the data file before the table file command can be issued. Sample Focus commands for the freshmen by county basefile are shown below.

```
cms filedef updfbc disk updfbc bindata d
table file updfbc
?f
<variable names would be shown here>
print .....
.
.
.
```

File locations

All KHEEP permanent data files are on a separate mini-disk, which is usually accessed as disk "D". The data files have the filetype "bindata". These files should never be changed with anything other than KHEEP.

All programs for KHEEP are also on the "D" disk.

KHEEP also will create a temporary "E" disk of 20 cylinders which is used for temporary files such as the output report file.

No \$ Ident required

The Honeywell system required a \$ IDENT to print reports to the system printer. This is not required under VM/CMS. Routing of output can be done with the VMSECURE USER facility.

File space costs

If all of the KHEEP system files are kept on line all year, they could cost over \$3000 per year at the regular filespace rate. It is likely that some procedure can be worked out with the Computing Center to allow the account to go "dormant" for the majority of the year when KHEEP is not needed. The IBM system does not offer good facilities for dynamic allocation of disk space, so this will involve some sort of administrative solution.

Perhaps the best option would be to arrange for a bulk rate on disk storage. The Computing Center can obtain disk drives for the cost of a maintenance contract. The cost of such a contract should be about \$77 per month for 550 cylinders. Even half of this space should cover anticipated storage needs for several years, and would cost about what storage on the GCOS system cost.

KHEEP quick reference

holding - Displayed in the lower right hand corner of the screen when the return key is pressed in response to "more...". This freezes the screen until the "clear" key is pressed.

clear key - A key on a 3270 type terminal. On an ASCII terminal or a microcomputer pressing two "ESC" keys will emulate the clear key. On a microcomputer using KERMIT you may also modify a KERMIT .ini file to pick another key to be used as the clear key.

more... - Displayed in the lower right hand corner of the screen when the current screen is full and there is more information to be displayed. After a clear key is pressed or 60 seconds the next screen will be displayed.

running - Displayed in the lower right hand corner of the screen when the system is busy processing information.

vm read - Displayed in the lower right hand corner of the screen when the system is waiting for input from the user.

PF keys - These are keys on a 3270 type terminal. On an ASCII terminal these are emulated by a sequence of keystrokes, PF1 for example is emulated by "esc" followed by "1". PF11 is emulated by "esc" followed by the key just to the right of the "0" key. On an IBM/PC compatible PF1 through PF10 are emulated by the function keys F1 through F10. PF11 through PF20 are emulated by "shift F1" through "shift F10".

Browse - is a VM/CMS command which KHEEP lets you use to look through the report generated by each KHEEP program.

PF3 - is used to end the "wait" state (when the clock is showing) and to exit from browsing your output. (F3 on a PC, "ESC" then "3" on an ascii terminal.)

PF7 - moves to the **previous** screen in Browse. (F7 on a PC, "ESC" then "7" on an ascii terminal.)

PF8 - moves to the **next** screen in Browse. (F8 on a PC, "ESC" then "8" on an ascii terminal.)

PF10 - moves to the **left** in Browse. (F10 on a PC, "ESC" then the key right of "0" on an ascii terminal.)

PF11 - moves to the **right** in Browse. ("shift F1" on a PC, "ESC" then the key two to the right of "0" on an ascii terminal.)

`/anything/` - On the command line in Browse you can find the next instance of any text in your report by typing the text surrounded by "forward slashes". Typing `/WYANDOTTE/` for example, would find the next place "WYANDOTTE" appears.

`top` - moves to the beginning of the text in BROWSE.

`bottom` - moves to the end of the text in BROWSE.

Maintenance Information

Files:

* bindata d

The binary data files - With the exception of sysbst bindata, they are all double precision floating point binary (real*8) files as described in the original KHEEP documentation.

* master d

For each binary data file there is a FOCUS master file. This file names each field (variable) in the file and assigns input and output formats.

SOURCE FILES:

KHUP FORTRAN D
KHHS FORTRAN D
KHHE FORTRAN D

These are the source files for the three modules.

KHCMNSUB FORTRAN D

This contains all of the subroutines shared by all three modules. It should be compiled into a library (txtlib) file named KHLIB TXTLIB D. There are several new routines which were written for the conversion. These are:

ILEN - returns the position of the last non-blank character in a string.
READST - reads an 80 column string from the terminal with no quotes required. If just a return is typed a blank string is returned instead of an end of file.
DOMORE - calls the KU routine MORE() which forces a "more..." on the screen.
FRSTNB - returns the location of the first non-blank character in a string.
SPLTST - splits a string at the first comma or blank, used to replace unformatted input.
FDEFS - does filedefs for all binary files.
ISORT - replaces the GCOS sort routine.
DATIM - replaces the GCOS date and time routine.

EXEC FILES:

KHBROWSE EXEC - This is called by the FORTRAN KHEEP routines to look through the report on the listing file while the FORTRAN program is still running.
KHWAITER EXEC - This is used to do a "wait" in the KHEEP routines.
KHWPAPER EXEC - This prints the report on the listing file on long white paper.

KHVMPRNT EXEC - This sends the report on the listing file to the printer.

KHMKDE EXEC - this makes a temporary disk E. It is only needed for testing purposes.

KHTEMPD EXEC - this makes a temporary disk D and then attaches the real disk D as C. Finally, it copies the needed files to the temporary disk D. This is handy for testing since changes to the temporary disk D are temporary.

FBCPREP EXEC - the freshmen by county procedure described later in this document.

K12PREP EXEC - the public school enrollment procedure described later in this document.

K12TAPE EXEC - this exec contains filedefs useful in accessing data from the K12 update tape.

KHDSKTHR EXEC - this is used to test for the existence of a minidisk.

KHHEE EXEC - the exec that starts the higher education enrollment portion of KHEEP.

KHHSO EXEC - the exec that starts the high school graduates part of KHEEP.

KHUPDT EXEC - the exec that starts the basefile update part of KHEEP.

Compiling and Loading

All three modules must be loaded with the shared subroutines on the library KHLIB TXTLIB D and the function MORE TEXT D. The "clear" option should also be selected when loading the programs. The GCOS system automatically set all memory values to zero when loading. As a consequence of this default on GCOS, the original KHEEP didn't initialize variables. As a part of the conversion process, KHEEP was changed to explicitly initialize all variables (such as counters) which need initialization, but as a precaution the loader should be made to set memory to zero.

The FBCPREP procedure

The FBCPREP procedure takes a text file prepared by Legislative Research and translates it into a format which can be used by the UPDFBC procedure of the KHUPDT module of KHEEP. This file can be used to either modify entries in the Freshmen by County basefile or to enter or replace an entire year in the basefile.

When the FBCPREP procedure is run it first prints the following message:

```
THIS PROCEDURE PREPARES INPUT TO THE KHUPDT UPDFBC MODULE
IS THIS WHAT YOU WANT TO DO?
```

If you answer N (no), FBCPREP quits. If you answer Y (yes) FBCPREP then asks:

```
OK, YOU CAN EITHER PREPARE DATA TO:
  update an Old year  (type O)
or  enter a New year  (type N)

WHICH WOULD YOU LIKE TO DO
```

Typing an "O" will result in the replacement of only the values listed in the file typed by Legislative Research. This would be used to correct any incorrect values in the basefile.

Typing an "N" will result in the replacement of an entire year's data in the basefile. Any county, institute combinations which are not listed in the typed file will be set to zero. For example if there is no entry in the typed input file for freshmen from Allen county going to KU then if the basefile contains an entry for Allen county going to KU for the year being updated it will be set to zero.

The "N" procedure is normally used for entering a new year into the basefile. It could also be used to re-enter a year for which the data were really messed up.

If you type something other than an "O" or an "N" FBCPREP will type the following message and then halt.

```
NEITHER NEW NOR OLD SPECIFIED, PROGRAM HALTS'
```

After you have selected either "O" or "N" FBCPREP will ask for the name of the file containing the typed input. This must be a typical CMS filename in the format:

<filename> <filetype> <filemode>

An example filename might be:

FBC8788 INPUT A

This style of naming, where both beginning and ending years are used is strongly recommended to avoid confusion about which year the data describe. KHEEP uses a single number to refer to the year, usually the beginning year (the 87-88 school year is referred to as 1987).

The FBCPREP prompt for the entry of the file name is:

WHAT IS THE NAME OF THE FILE WITH YOUR RAW FBC DATA?'

If there is a problem in accessing the file named, FBCPREP will print the message:

ERROR IN FILE NAME, TRY AGAIN'

Once a proper file name is given then FBCPREP prints the message:

PROCESSING RAW INPUT FILE, PLEASE WAIT'

When the data have been processed, FBCPREP prints this message:

THE NEW UPDATE FILE IS FBCUPDT INPUT E'
THIS IS THE DEFAULT FILE FOR THE KHUPDT UPDFBC PROCEDURE'
FBCPREP ENDS'

As the message says, FBCPREP writes the file:
"FBCUPDT INPUT E".

This file is on a temporary disk "E". It should be used as input for KHUPDT immediately after running FBCPREP since it will go away when you logoff. This arrangement was chosen so as to avoid needing extra permanent disk space for a file which can be reproduced by simply running FBCPREP again.

Files Used By FBCPREP

- FBCPREP EXEC - the preparation procedure program itself.
- FBCMKEDT FOCEXEC - the FOCUS procedure to prepare an update file to edit the data for a year which is already on the basefile. This procedure is called automatically by FBCPREP.
- FBCMKNEW FOCEXEC - the FOCUS procedure to prepare an update file with the data for a new year (one which is not on the basefile).
- FBCZED FORTRAN - a FORTRAN program to generate all possible county and institution combinations for the use of the FBCMKNEW FOCEXEC.
- FBCZED MASTER - a FOCUS MASTER to read the file created by the FORTRAN procedure FBCZED.
- FBCNEW FOCUS - the FOCUS database used to merge the FBCZED file with the user input file in the FBCMKNEW FOCEXEC.
- FBCNEW MASTER - the FOCUS master file description for FBCNEW FOCUS.
- FBCRAW MASTER - a FOCUS master file description which can be used to read the user input file.
- FBCUPDT INPUT - the binary file generated by FBCPREP EXEC for input into the KHUPDT procedure.
- FBCUPDT MASTER - a FOCUS master file description which can be used to read the FBCUPDT INPUT file.

Preparing the Grade School Enrollment Data (K12)

The K12PREP procedure prepares data for the UPDK12 procedure in the KHUPDT module of the Kansas Higher Education Enrollment Package (KHEEP). These data are normally written to a tape by the Department of Education. The K12PREP procedure will read that tape, process the data, and write the results to a file which can be used by KHEEP. This assumes that the format of the tape has not changed from the "usual" format. This format is described at the end of this section.

When K12PREP is run it first prints the following message:

THIS PROCEDURE PREPARES INPUT TO THE KHUPDT UPDK12 MODULE
The program copies then manipulates enrollment data from a tape prepared by the Department of Education. The program prepares a file which is used by the updk12 module of khupdt.
BEFORE YOU RUN THIS PROCEDURE YOU MUST HAVE CHECKED IN A NEW TAPE INTO THE COMPUTING CENTER LIBRARY. THE TAPE MUST ALSO BE IN THE USUAL FORMAT.

Is this what you wish to do? (Y or N)

If you answer N (no), K12PREP quits. If you answer Y (yes) K12PREP then asks:

OK, What is the REEL NUMBER of the tape you wish to use?

At this point you should enter the 5 digit number assigned by Academic Computing to your tape.

What is the ACS NAME of the tape you wish to use?

At this point you should enter the six character name you chose for the tape when you checked it into the Academic Computing Center. K12PREP then responds with:

ISSUING TAPE MOUNT REQUEST

K12PREP then attempts to mount your tape. It will give a progress report once a minute until either the tape is mounted or 30 minutes have passed. This report is shown below.

WAITING FOR TAPE DRIVE, <n> MINUTES ELAPSED

If K12PREP cannot mount the tape within 30 minutes, it gives up and prints the following message:

THE TAPE HAS STILL NOT BEEN MOUNTED, THIS PROGRAM WILL END
TRY IT AGAIN LATER

If the tape is mounted but the file could not be moved to disk successfully the following message is printed:

THE TAPE COULD NOT BE COPIED TO DISK, PROGRAM HALTS

If the tape is successfully read then K12PREP goes on to make the binary file needed by KHUPDT.

MAKING BINARY INPUT FILE FROM TAPE FILE, PLEASE WAIT

K12PREP must ask for a year to identify the data on the tape since the school year is not on the tape itself. K12PREP will ask for the year with the following screen:

THE BINARY INPUT FILE PREPARED BY K12PREP MUST CONTAIN
THE SCHOOL YEAR. KHEEP USES A SINGLE NUMBER TO DESCRIBE
A SCHOOL YEAR. THE 1985-86 SCHOOL YEAR, FOR EXAMPLE,
WOULD BE CALLED 1985

ENTER THE SCHOOL YEAR FOR THIS FILE ON THE NEXT LINE"
SCHOOL YEAR IS:

After you have entered the year, K12PREP prints a last message and finishes.

```
THE NEW UPDATE FILE IS  K12 INPUT D
THIS IS THE DEFAULT FILE FOR THE KHUPDT UPDFBC PROCEDURE
FBCPREP ENDS
```

As the message says, K12PREP writes the file "K12 INPUT D". The KHUPDT procedure knows about this file and will find it automatically if you tell it to.

TAPE FORMAT FOR THE K12 TAPE

The tape from the Department of education must have the following format for the K12PREP procedure to work.

The tape must be unlabeled, 1600 BPI, 9 track, odd parity, EBCDIC, with fixed blocks of size 895 bytes and record lengths of 179. The following FILEDEF can be used to read such a tape.

```
Filedef k12tap tap1 BLP (recfm fb lrecl 179 blksize 895 den 1600
```

The following FOCUS master file will read the tape.

```
FILENAME=K12TPD, SUFFIX=FIX
SEGNAME=ONLYSEG
FIELDNAME=DUMMY, ALIAS=D, FORMAT=A1, ACTUAL=A1,$
FIELDNAME=USDNUM, ALIAS=UNU, FORMAT=I4, ACTUAL=A4,$
FIELDNAME=CYNUM, ALIAS=CNU, FORMAT=I3, ACTUAL=A3,$
FIELDNAME=USDNAM, ALIAS=UNA, FORMAT=A28, ACTUAL=A28,$
FIELDNAME=CYNAM, ALIAS=CNA, FORMAT=A15, ACTUAL=A15,$
FIELDNAME=KIND, ALIAS=K, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G1, ALIAS=G1, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G2, ALIAS=G2, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G3, ALIAS=G3, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G4, ALIAS=G4, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G5, ALIAS=G5, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G6, ALIAS=G6, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G7, ALIAS=G7, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G8, ALIAS=G8, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G9, ALIAS=G9, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G10, ALIAS=G10, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G11, ALIAS=G11, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=G12, ALIAS=G12, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=SPECIAL, ALIAS=SP, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=NONGRAD, ALIAS=NG, FORMAT=P10.1, ACTUAL=P8,$
FIELDNAME=TOTAL, ALIAS=T, FORMAT=P10.1, ACTUAL=P8,$
```

where:

USDNUM is the USD numeric code
CYNUM is the county numeric code
USDNAM is the (text) name of the USD
CYNAM is the (text) name of the county
KIND is kindergarten enrollment
G1 - G12 are first through twelfth
SPECIAL is special student enrollment
NONGRAD is ungraded enrollment
TOTAL is total enrollment

Files used by K12PREP

- K12PREP EXEC - the preparation procedure program itself.
- K12MAKIN FOCEXEC - the FOCUS procedure called by k12prep exec.
- K12 TAPDAT - the K12 data as copied directly from the Department of Education tape.
- K12TPD MASTER - a FOCUS master file for reading the tape file.
- K12TAPE EXEC - an exec for doing filedefs for the K12 files.
- K12 INPUT - the binary update file prepared by K12PREP EXEC.
- K12INP MASTER - a FOCUS master for reading the K12 INPUT file.