Installing and Using the Executable-Image Version of GEMPACK on DOS/Windows PCs

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W. J. Harrison
K. R. Pearson

Centre of Policy Studies and Impact Project
Monash University, Melbourne, Australia

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This is part of the documentation of the GEMPACK Software System for solving large economic models, developed by the IMPACT Project, Monash University, Clayton Vic 3168, Australia.

Abstract

80386/80486/Pentium machines with extended memory running Windows 3.1, Windows 95 or Windows NT provide excellent platforms for doing serious general equilibrium modelling. This document describes how to install and use the Executable-Image Version of GEMPACK on such machines. It also introduces WinGEM, the Windows interface to GEMPACK, ViewHAR, the Windows Header Array file viewer, and ViewSOL, the Windows Solution viewer.

The Executable-Image Version allows the full range of modelling tasks (building new models or modifying existing models). However models are limited to those which can be implemented and solved within about 16-20 megabytes of memory. This is large enough for many medium-sized models but not sufficient for large models. In order to use WinGEM, the Windows version of GEMPACK, a machine with at least 16 megabytes of memory is needed.

Authors and Earlier Editions

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1. The Executable-Image Version of GEMPACK

GEMPACK runs essentially unchanged on a variety of machines. This document tells you how to install the Executable-Image Version of GEMPACK on an 80386, 80486 or Pentium PC running Windows 3.1, Windows 95 or Windows NT and tells you machine-specific information you may need to know to maximise your use of GEMPACK on such a machine.

This document describes

1. how to install and use the Executable-Image version of GEMPACK under Windows,
2. how to install and use **WinGEM**, the Windows interface to GEMPACK under Windows 3.1, Windows 95 or Windows NT.[1]
3. how to install and use other Windows programs such as **ViewHAR**, the Header Array file viewer and **ViewSOL**, the Windows viewer for GEMPACK Solution files.

This version of GEMPACK can be used to build new models or modify existing models. However models are limited to those which can be implemented and solved within about 16-20 megabytes of memory (even when the computer on which the software is installed has more than this amount of memory). This includes many medium-sized models, but excludes large models such as ORANI or MONASH at the usual disaggregation of 100 or more sectors and many intertemporal models. Precise details of the size of models that can be handled are given in section 6.2.1 below.

The user documentation for GEMPACK can be found in the other GEMPACK documents, of which GPD-1[2] *Introduction to GEMPACK* should be your starting point. You can carry out the installation and testing described below without being familiar with GEMPACK. But if you intend to use GEMPACK for modelling, we recommend you at least quickly read Chapters 1 to 3 in GPD-1 before attempting any modelling on your PC (and perhaps before you install GEMPACK on your PC).

An introduction to the different GEMPACK programs can be found in section 1.1 of GPD-1, while a guide to the models supplied with GEMPACK (including the Executable-Image version) is given in section 1.3 of GPD-1. A guide to the full user documentation for GEMPACK can be found in chapter 9 of GPD-1. Hands-on examples for GEMPACK can be found in GPD-8.

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[1] We expect that the Executable-Image version and WinGEM will run unchanged under Windows 98.

[2] References to GEMPACK documents identify the document by GEMPACK Document (GPD) number, rather than by author or date. References are always to the version of the document which is current at the date of issue of the cross-referencing document. The GEMPACK documents referenced are listed in a separate section at the end of the References section of this document. Comments from readers on this or any of the GEMPACK documents, either pointing out errors, inaccuracies, omissions or obscurities, or making other suggestions for improvements, will be welcomed. Please address such comments to one of the authors at the Impact Project.

1.1 GEMPACK Programs Supplied with the Executable-Image Version

The GEMPACK programs included with the Executable-Image Version of GEMPACK are:

TABLO	for processing the description of your model
GEMSIM	for carrying out simulations with your model
GEMPIE	for printing simulation results
SAGEM	for carrying out Johansen simulations
MODHAR	for building or modifying data files
SEEHAR	for looking at data files
SLTOHT	for converting simulation results to other forms
MKHAR	for moving data files between different computers
RWHAR	for moving data files between different computers
SUMEQ	for obtaining information about Equations files
SEENV	for obtaining information about Environment files
CMPHAR	for comparing data on two Header Array files
ACCUM	for side-joining solutions for spreadsheet programs
DEVIA	for preparing deviations between solutions for spreadsheets

There are also the Windows programs:

ViewHAR	for viewing your data files
ViewSOL	for viewing your Solution files
WinGEM	the Windows shell for GEMPACK
RunGEM	for running simulations on an established model

Other programs can be obtained from the GEMPACK Web site:

http://www.monash.edu.au/policy/gempack.htm

1.2 Models Supplied with the Executable-Image Version

All the models usually supplied with source-code version of GEMPACK are supplied with the Executable-Image Version of GEMPACK. The models currently supplied are those listed in section 1 of GPD-8.

The models currently supplied include Stylized Johansen, Miniature ORANI, TRADMOD, ORANIG, ORANI-F, GTAP, DMR, TREES, CRTS and 5SECT. These can all be solved in 16 megabytes of memory.

1.3 Current Release

The current version of GEMPACK is Release 6.0 (October 1998).

2. System Requirements for the Executable-Image Version

2.1 Summary

1. A pentium machine, or an 80486 DX machine, or an 80486 SX machine with a coprocessor (80487 SX), or an 80386 machine with maths coprocessor (80387).

2. Windows 3.1, Windows 95 or Windows NT.

3. Hard disk, requiring at least 25 MB free to install and test GEMPACK.

4. At least 16 MB of memory (RAM) or 32MB of memory for Windows NT.

If your computer easily satisfies the above requirements, you can omit the next section and go on to section 3.

2.2 Details

2.2.1 Disk space free

You can determine how much disk space is free by entering the DOS command:

dir

The number of bytes free is shown on the screen at the end of the output. (1Mb is about a million bytes, so you will need about 25,000,000 bytes free to install, test and use GEMPACK.) Implementing your own models takes more disk space. As you would expect, the larger the model, the more space you will need.

2.2.2 Memory required

The amount of extended memory you have limits the size of models you can build. Our experience is that many models that are being built now can be implemented with 16 MB of RAM (although more is required to implement very large models such as ORANI and its extensions, or large intertemporal models).

You can determine how much memory is available from information shown on the screen as your computer boots up. Another method is to enter the command **mem** at the DOS prompt and look at the available extended memory.

3. Installation Instructions

This installation is carried out under Windows.[3]

A little of this installation needs to be carried out either in DOS or in a DOS box. [You can get a DOS box by clicking on the DOS Prompt icon which is available on your machine or by selecting Programs in the Start menu for Windows 95 or NT.] We realise that many Windows users are not familiar with DOS commands, and so we spell out in complete detail the relatively few DOS commands you need to use.

3.1 Text Editor

When installing and using GEMPACK, you will need to be able to edit text files. This is often best done using a text editor (that is, an editor designed for handling text files exclusively). A text editor **EDIT** is supplied with DOS or Windows. There are many other text editors available on PC machines.

If you install WinGEM, you can use its associated text editor GEMEDIT.

Alternatively, you can use a word processor (such as Microsoft Word or WordPerfect) to edit text files; if so, you must be careful to save the resulting file as a text file.

3.2 If You Have An Earlier Release of GEMPACK Installed

If you have an earlier release of GEMPACK installed on your machine, you may prefer to move it before installing Release 6.0, or else to install Release 6.0 in a different directory. Indeed, it is probably best (if you have enough disk space) to leave the earlier version on the disk until you have successfully installed and tested Release 6.0 (in case an unexpected problem occurs).

If you decide to move the existing version before installing Release 6.0, you can change the name of the directory it is in using the File Manager (Windows 3.1) or My Computer (Windows 95 or NT).[4]

[3] If you need to install under DOS or under OS/2, please contact the Impact Project for different files and instructions.

[4] Alternatively, if you prefer to work under DOS, you can use the RENDIR command if it is available on your PC. For example, the commands to rename directory \gp to \gp52 are

```
cd \
rendir gp gp52
```

3.3 Copying the GEMPACK Licence File

You need to copy your GEMPACK licence file LICEN.GEM from the first GEMPACK floppy disk. If you are installing from CD, the licence file is supplied separately on a floppy disk.

[This is necessary even if you had a previous version of GEMPACK since Release 6.0 licence files are different from Release 5.2 licence files.]

Using My Computer (Windows 95 or NT) or File Manager (Windows 3.1), create a new folder or directory to hold the GEMPACK files. The usual place to install GEMPACK is in the directory C:\GP (but you can install it to a different directory if you prefer). Create the new directory \GP on C: drive.

Insert the first GEMPACK disk into your floppy drive and copy the licence file LICEN.GEM from your floppy drive to your GEMPACK directory (usually C:\GP).

3.4 Copying the GEMPACK Files

The GEMPACK files are usually supplied either on a CD or on several floppy disks. See the relevant section below for details.

3.4.1 Installing from a CD

The installation must be done under Windows. Insert the CD into your CD drive. (In the following we will assume that this is drive d:)

a) If you are using Windows 95 or Windows NT, select ***Run…*** from the Start menu.
b) If you are using Windows 3.1, select ***File | Run*** from the Program manager's main menu.

In either case, you need to enter

d:\install.exe

(where you should change **d:** to whatever drive letter your CD drive is called) and then click on ***Ok***

This will start a small install program so that you can choose what items on the CD you wish to install. Select the check box *GEMPACK Executable Image files* to install the basic GEMPACK Executable Image programs and also *Windows GEMPACK programs* to install WinGEM, ViewHAR, ViewSOL and the new programs RunGEM and TABMate. (TABMate is only available for Windows 95, 98 and NT not for Windows 3.1.)

3.4.2 Installing from Floppy Disks

The installation must be done under Windows. Insert the first installation disk into your floppy drive.

a) If you are using Windows 95 or Windows NT, select ***Run…*** from the Start menu.
b) If you are using Windows 3.1, select ***File | Run*** from the Program manager's main menu.

In either case, you need to enter

a:\install.exe

(where you should change **a:** to **b:** if your floppy drive is called b:) and then click on ***Ok***
Insert the other disks as requested. This will carry out the installation of the GEMPACK Executable Image. You need to carry out a further install to install WinGEM, ViewHAR, ViewSOL and RunGEM (see section 3.5).

3.4.3 Questions asked during installing from CD or Floppy Disks

1) You will be asked about the folder in which you wish to install GEMPACK (the installation program refers to this as the **Destination Location**). The default name offered by the installation program is C:\GP. (This is the folder C:\GP into which you copied your licence file in the previous section.) If you wish to install GEMPACK in a folder other than C:\GP, click on the Browse button, and type in the name of the folder. We will refer to this folder as the **GEMPACK directory** in the instructions below.

2) There is also a question regarding changes to your AUTOEXEC.BAT. We recommend that you answer Yes to this question.[5] To run GEMPACK easily on your machine, the simplest arrangement is to add the GEMPACK directory (usually C:\GP) on your DOS path and also to set an Environment variable called GPDIR to point to this directory. The changes to your AUTOEXEC.BAT are to add the following statements to the end of your AUTOEXEC.BAT: (Assuming you are installing GEMPACK in folder C:\VVV as an example,)

```
SET GPDIR=C:\VVV
PATH=C:\VVV;%PATH%
```

If you are unsure, see section 6.7 for more details about your path and GPDIR.

If you are using Windows 3.1, you may also have to make some changes to your file CONFIG.SYS. Check the file CONFIG.SYS in your default directory C:\. Look for the lines

```
FILES=xx
BUFFERS=yy
```

If necessary, change these (use your text editor) so that the number xx is at least 60 and yy is at least 20. If either of these lines is not present, add new lines

```
FILES=60
BUFFERS=20
```

as appropriate. (If you do not have a CONFIG.SYS file, create a new one containing the two lines above.)

If you are running Windows NT, you may need to make similar changes to CONFIG.NT to include a *Files* statement such as

```
FILES=60
```

3.4.4 Reboot

As you have changed AUTOEXEC.BAT and possibly CONFIG.SYS, reboot your system as follows before proceeding to the rest of the installation:

[5] This will work if your AUTOEXEC.BAT is fairly simple. If you are reinstalling in the directory where you previously had GEMPACK, these changes adding the GEMPACK directory to your path and setting GPDIR may have already been made. So in this case there is no need to make any changes to your AUTOEXEC.BAT.

(a) If you are running Windows, exit from Windows (choose ***File | Exit*** from the Windows main menu) to get back to DOS. Then press Ctrl, Alt and Del simultaneously.
(b) If you are running Windows 95 or NT, you will need to restart your computer. To do this, from the ***Start*** menu of Windows 95 or NT, select ***Shut down...*** Then select the option "Restart your computer?" and click on ***Yes***.

You have now copied all the files from the GEMPACK disks. The files in the GEMPACK directory C:\GP and its subdirectories will occupy about 16 Mb of disk at this stage. More precisely, there should be

- at least 16 .EXE files and at least the files LICEN.GEM and PKUNZIP.EXE in directory \GP,
- a large number of files in subdirectory \GP\EXAMPLES.

If these are not all there, go through the steps above again.

3.5 WinGEM, ViewHAR and ViewSOL

WinGEM is the Windows interface to GEMPACK. If you are installing from a CD, the installation of WinGEM may have been carried out as part of the installation above, so you can skip the rest of this section. [You can install just the Windows GEMPACK files and not the GEMPACK Executable Image files by making the relevant choice in section 3.4.1 above.]

If you are installing from floppy disks, insert the first of the WinGEM disks in your floppy drive and enter

a:\install.exe

The installation process may ask you whether to add the WinGEM directory to your path. If you have already added the directory to your path when installing the GEMPACK Executable Image files, answer *No* to this question.

The installation also copies the files for ViewHAR, the viewer for Header Array files and ViewSOL, the viewer for Solution files, to your GEMPACK directory. There is also a new Windows program called RunGEM which allows model users to run simulations very easily for an existing model. For Windows 95 or NT there is also the program TABMate which makes writing TABLO Input files easier.

In earlier versions of GEMPACK, the WinGEM, ViewHAR and ViewSOL files were in subdirectories of the GEMPACK directory. However now all the files are in the main GEMPACK directory.

The install program will also create some icons for WinGEM, ViewHAR and ViewSOL either in a group called GEMPACK (for Windows 3.1) or on your desktop for Windows 95. In Windows NT you can create a shortcut to each of these programs by right clicking on the mouse. If you do not want these icons, either delete them or drag them to the Recycling Bin.

The Install program will also install **RunGEM** (see section 9.3 of GPD-4 and section 5 of GPD-8). If you are running Windows 95 or NT, it will also install **TABmate** (a Windows program for modifying and debugging TABLO Input files) but TABMate is not available for Windows 3.1.

In earlier versions of WinGEM, the WinGEM, ViewHAR and ViewSOL files were in subdirectories of the GEMPACK directory. However now all the files are in the main GEMPACK directory.

4. Testing the Installation

In this section we suggest that you test the main features of the installation by carrying out a simulation with the Stylized Johansen model.

If this simulation does not work, you will need to go back to some of the steps in section 3 above.

Since most users will work with WinGEM, we first tell you how to carry out the testing via WinGEM.

4.1 Making a Directory for the Stylized Johansen Model

Start WinGEM running, following the procedure described in section 2.1 of GPD-8. Then prepare a directory for the model SJ (Stylized Johansen) as described there in section 2.5.2, and set the working directory, also as described there in.

4.2 Checking the DOS Path and Access to Your GEMPACK Licence

Before carrying out the test simulations, we suggest that you check that your DOS Path has been set correctly and that GEMPACK programs are able to access your GEMPACK licence.

To do this, select

File | Shell to DOS

from the main WinGEM menu. [That is, click on ***File*** and then click on ***Shell to DOS*** from the menu items which drop down.]

This will start a DOS box running. [If the font in the DOS box is too small to read, change the Font size of the System font. Under Windows 95 or NT, use the dropdown box on the left hand side of the Menu bar to an appropriate size, for example 10 x 18.]

In the DOS box, type in the commands

**cd **
tablo

If your DOS settings are set correctly, the GEMPACK program TABLO will start to run and it will find your GEMPACK licence. In this case you will be offered lots of options for the program TABLO.

Stop TABLO running by typing Control-C (that is, hold down the Control key, which is usually on the left of your keyboard and may be labelled "Ctrl", and, while holding it down, touch the C key). TABLO should stop running (though you may need to type Control-C twice). Now type

exit

which should close the DOS box. You are now ready to carry out the test simulations, so please skip to the next section.

1) If TABLO does not start running, your DOS Path is not as required. This may mean that you didn't change your AUTOEXEC.BAT file, or perhaps you haven't yet rebooted your computer since you made

these changes.

2) If TABLO started running but reported that it could not access your GEMPACK licence, the error message will tell you which licence file the program was trying to access. Please check that your licence file (it is called LICEN.GEM) is in the directory in which you installed GEMPACK. If the program indicates it is trying to access LICEN.GEM in a directory which is different from the one in which you installed GEMPACK, check the parts of section 6.7.1 which relate to the DOS environment variable GPDIR.

Check that the PATH and GPDIR are correctly set. To do this, first go into a DOS box, and type the DOS command

set

Check that the PATH is as you expect, that is, that it includes the GEMPACK directory (usually C:\GP). If you installed GEMPACK in a directory other than C:\GP, also check that the variable GPDIR has its expected value. If either of these is not as required, read section 6.7 (and check that you rebooted). Only proceed when everything is as required.

If you are unable to diagnose the problems here, please type

exit

(which will close the DOS box) and then click on WinGEM (which should be at the top of your screen). Select

Options | Generate diagnostic file

Select a directory in which to save the diagnostic file (the file will be called **diagnose.txt**). Then please send (via email or fax) this file (it is a text file) to us at the Impact Project. We will endeavour to assist. Details about how to contact the Impact Project are in GEMPACK document GPD-1, section 1.6.

4.3 Simulations to Test GEMPACK and WinGEM

To test that GEMPACK and WinGEM are working correctly, we suggest that you carry out the simulations with Stylized Johansen in Examples 2.1.6 to 2.1.8 of Chapter 2 of GPD-8. This carries out the simulations using GEMSIM (see also section 2.5 of GPD-1). Check that the results of the simulation are as expected (see, for example, section 2.7 of GPD-1).

If any of these tests does not work, re-check the steps in the installation in section 3 above.

4.4 GEMPACK and WinGEM

If you have previously used a version of GEMPACK under DOS (or another operating system), you will probably think initially of WinGEM as providing an interface to this DOS version. If you are new to GEMPACK, you should probably not worry about trying to distinguish between WinGEM and GEMPACK.

Note that WinGEM comes with its own text editor **GEMEDIT** (which can handle large text files up to about 16 Mb in size). We suggest that you use this editor when required to edit text files (such as Command files, TABLO Input files) for GEMPACK. [However, if you are already familiar with another text editor, you can tell WinGEM to use this alternative editor by selecting ***Options | Change editor...*** from WinGEM's main menu.]

WinGEM also comes with the Windows programs **ViewHAR,** which allows you to view the data on GEMPACK's Header Array files directly, and **ViewSOL**, which allows you to view Solution files directly. [Those who have used GEMPACK before can think of ViewHAR as an alternative to the GEMPACK program SEEHAR and ViewSOL as an alternative to the GEMPACK program GEMPIE.] ViewHAR and ViewSOL are written by our colleague Mark Horridge (Centre of Policy Studies, Monash University). ViewHAR and ViewSOL are not documented in the GEMPACK user documentation. However you will find them well documented via their ***Help*** menus.

4.4.1 How WinGEM Works

You will see that when you carry out a modelling task using WinGEM, WinGEM starts one of the GEMPACK programs running in a DOS box. The WinGEM program windows are designed to enable you to carry out most modelling tasks simply.

You should be aware that not all modelling tasks are automated via WinGEM. For example, when you use WinGEM to run SEEHAR to look at the data on a Header Array file, you get to look at all the data on the file. If you only want to look at some of the arrays on the file, you will need to run SEEHAR interactively. You could do this by going to a DOS box and running SEEHAR interactively. But you will probably find it easier to do this through WinGEM's ***Programs | Run programs interactively...*** menu.

In running GEMSIM, it is **not possible to give terminal input** under the normal ***Run*** button method where a Command file is selected and used in the simulation. In models which use terminal input, you will need to use ***Run interactively*** or ***Run from STI file.***

WinGEM is really an interface to the DOS version of GEMPACK rather than a separate version of GEMPACK. WinGEM can only function correctly if the DOS version is also functioning properly. Note that WinGEM requires Release 5.2 (or later) of GEMPACK - it will not function as expected in conjunction with Release 5.1 (or earlier) of GEMPACK.

5. Familiarising Yourself with the Software

In this section we give suggestions for hands-on computing which will help you to become familiar with many important features of the use of GEMPACK on 80386/80486/pentium machines. These are based on the models supplied with GEMPACK (see section 1 of GPD-8), especially the Stylized Johansen and Miniature ORANI models.

Note that the files corresponding to the example models sent with GEMPACK are all in the EXAMPLES subdirectory of your GEMPACK directory (usually C:\GP\EXAMPLES). You should be able to carry out simulations with all of these models in 16Mb of memory.

5.1 Using WinGEM

Detailed suggestions for hands-on computing using WinGEM can be found in section 2 “Getting Started with GEMPACK via WinGEM” of GPD-8. This begins with examples based on the Stylized Johansen and goes on to examples based on Miniature ORANI, GTAP and ORANIG.

5.2 Not Using WinGEM

Detailed suggestions for hands-on computing using WinGEM can be found in section 3 “Unix/DOS Prompt: Hands-on Computing” of GPD-8. This begins with examples based on the Stylized Johansen and goes on to examples based on Miniature ORANI. You should ignore the examples there using TABLO-generated programs.

6. Building Your Own Models

This section contains other information relevant to working with GEMPACK on your DOS or Windows machine. Most of it applies whether you are running WinGEM or not (though most of the changes discussed below need to be made in DOS or in a DOS box).

6.1 New Model's Directory Location

We suggest that each new model you build is put in a separate directory on the hard disk, outside of \GP. Note that your PATH command (as set in section 3.4 above) will ensure that the GEMPACK programs are found correctly when, for example, you (or WinGEM) issue the command

tablo

When you use WinGEM with any model, make sure that you set WinGEM's working directory to point to the directory containing the files for this model (as spelled out in section 2.1.3 of GPD-8).

6.2 If Your Model Becomes Too Large

This may happen because you have exceeded the limits on your Executable-Image licence, or because you have run out of available memory on your computer.

6.2.1 Executable-Image Licence Limits

A limit is imposed on the size of the models you can carry out simulations with using this Executable-Image Version of GEMPACK. The only programs that may end with an error because your model has exceeded these limits are GEMSIM and SAGEM. The limits only apply to simulations. There are no limits imposed on the size of data-manipulation tasks you can carry out with the Executable-Image version of GEMSIM.

We expect that all simulations which could have been carried out with the Release 5.2 Executable-image version of GEMPACK will also be allowed with the Release 6.0 Executable-image version.

The limits on the size of simulations that this Executable-Image version of GEMSIM can solve are:

- Total number of (components of) endogenous variables, including any backsolved for, must be no more than 30,000.
- Total number of (components of) variables (exogenous and endogenous, including any backsolved for) must be no more than 35,000.
- Total number of (components of) endogenous variables in the condensed system must be no more than 10,000.
- Total number of (components of) variables (exogenous and endogenous) in the condensed system must be no more than 16,000.
- Number of nonzeros in the Left-Hand Side (LHS) matrix (for any step of the simulation) must be no more than 75,000.
- Total number of reals and integers used for coefficients (pre-simulation and updated), plus those used to store simulation results, must be no more than 150,000.
- Total number of components of variables (in the condensed system or backsolved of) with one argument[6] and more than 40 components must not be more than 1000. [This condition should only affect single-country models with more than 40 sectors.]

[6] Variables with two or more arguments, only one of which ranges over a set of size more than 1 are also included here.

All the other programs supplied with this Executable-Image version should be able to handle arbitrarily large tasks, subject only to the amount of memory on your computer.

If a simulation you are carrying out exceeds the limits for the version of GEMSIM supplied with this Executable-Image version of GEMPACK, you will receive a message like the following one.

%% This simulation has exceeded the dimensions allowed with GEMSIM
for your type of Executable-image GEMPACK licence.

To continue you would need a source-code version of GEMPACK
(or an "Unlimited Executable-image" licence, if
appropriate for you).
You can obtain these from the GEMPACK distributors.

This will be followed by details telling you by how much your simulation has exceeded the three limits specified above.

With the Executable-Image Version, your main alternative is to find another way of carrying out the same task. The only other alternative is to obtain a larger version of GEMPACK (this usually means the source-code version of GEMPACK, which allows you to reconfigure programs to take advantage of all the memory in your computer).

The limits shown above are also the limits for a Release 6.0 TABLO-generated program without any form of GEMPACK licence. If a simulation with a TABLO-generated program exceeds any of these limits, it will require at least a Large-simulations licence - see section 1.2 of GPD-1.

6.2.2 Not Enough Memory Available on your Computer

If the task you are carrying out with any of the programs supplied with the Executable-Image version of GEMPACK requires more memory that is available on your computer, you will receive a message saying that the program is stopping because it is

unable to allocate sufficient memory.

If this happens, you may be able to free up more memory by closing down any other applications running (for example, word processors), in which case you can then try to rerun the task. Otherwise you need to find some other way of carrying out the task (or buy more memory).

6.3 Using GEMPACK in a DOS box

If you prefer to, or need to, work in a DOS box, we strongly suggest that you always work in the DOS box that WinGEM provides via its

File | Shell to DOS

menu option. The settings of this DOS box have been designed to produce good productivity, especially for GEMPACK users who are running long simulations in a DOS box and simultaneously working with other Windows programs (for example, wordprocessing or spreadsheet programs). In particular, programs running "in the background" in these DOS boxes usually receive a reasonable fraction of total CPU time without disrupting the foreground task.

6.4 Using Stored-input Files in a DOS Box

This section does not apply if you are running WinGEM.

You can use Stored-input files under DOS on 80386/80486/Pentium machines either via the GEMPACK **sti** option or using redirection of input as in, for example,

gemsim < sjlb.sti

or using the new command line **-sti** feature (introduced with Release 6.0 of GEMPACK - see section 7.3 of GPD-4), as in, for example,

gemsim -sti sjlb.sti

[The latter may be more robust under Windows NT.]

If you make your own Stored-input files to use via input redirection, it is a good idea to include the line

bat

at the start of these files. This means that, if the program encounters invalid input, it will stop. (See section 5.3 of GPD-1 for more about this.)

6.5 Interrupting Programs and Controlling Screen Output

This section only applies when you are running under DOS or in a DOS box.

6.5.1 Interrupting Programs

Sometimes you will start a program running and then realise that it is not doing what you intend. You can interrupt the program and return to the DOS prompt by typing Control-C (that is, hold down the Control key, which is usually on the left of your keyboard and may be labelled "Ctrl", and, while holding it down, type C). Sometimes you may have to type Control-C twice to achieve this.

6.5.2 Controlling Screen Output

Often screen output goes much too quickly for you to read. You can control it using the

Control-S Control-Q

keystrokes. (For Control-S, hold down the Control key, which is usually on the left of your keyboard and may be labelled "Ctrl", and, while holding it down, type S).

Use Control-S to stop the screen output and Control-Q to start it again. You can repeat these as needed. However, if you get out of step, say by typing two Control-S in a row, you will lose control of the output and have to wait until the program ends; even Control-C (see section 6.5.1 above) will probably fail then.

On some machines the Scroll Lock key works in a similar way. (It first stops screen output, then starts it, then stops it, and so on.)

6.6 DOS Batch Files

If you create DOS batch (.BAT) files for carrying out tasks including running GEMPACK programs, you may like to take advantage of the fact that, if any GEMPACK program ends with a fatal error, it sets the value of the DOS parameter ERRORLEVEL value to 1. You can test for this in .BAT files to stop the batch job early in such a case.

For example, the .BAT file below runs SAGEM and then GEMPIE. If the SAGEM run ends unsuccessfully, the test of ERRORLEVEL after it aborts the batch job and gives a message saying that the job was unsuccessful.

```
REM Beginning of batch file
REM  Run SAGEM
REM (uses DOS input redirection) sagem < sag1.sti
REM Next uses the GEMPACK alternative (see section 7.3 of GPD-4)
sagem  -sti sag1.sti
REM test ERRORLEVEL to see if this was successful
if errorlevel 1 goto error
REM  Run GEMPIE
gempie < gemp1.sti
if errorlevel 1 goto error
echo off
echo BATCH JOB SUCCESSFUL
goto endbat
:error
echo off
echo *** ERROR: BATCH JOB FAILED ***
:endbat
REM End of batch file
```

6.7 Changes to the DOS Settings

In this section we explain the setting of the PATH variable and the Environment variable GPDIR without assuming that the installation program has carried out these changes to DOS settings for you. This topic is one which is changing as the various Windows operating systems change. There are new ways of setting the PATH and Environment variables which are available under Windows NT not explained here.

6.7.1 DOS PATH and AUTOEXEC.BAT

The usual place to install GEMPACK is in the directory C:\GP on part of your hard disk.

You can install it in a different directory if you prefer. In that case, whenever we refer to **C:\GP** or **\GP** you should replace that by the name of the directory in which you installed GEMPACK.

The directory C:\GP must be on the DOS path.

To arrange this, you must edit the appropriate file (called AUTOEXEC.BAT in your default directory \) which is executed when you turn on your PC. (If you have no such file, create one.) You should add these directories to the PATH line in that file.[7] (Use a text editor, such as the EDIT which comes with DOS.)

For example, if you find a line

PATH = C:\;C:\DOS

you should change it to

PATH = C:\;C:\DOS;C:\GP

If you do not find a PATH line, make a new line

PATH = C:\GP
(If you plan to install GEMPACK on a disk drive different from C:, specify that drive in the PATH line.)

If you plan to install the GEMPACK files in directory C:\GP, no other change is required to AUTOEXEC.BAT.

But if you intend to install these files in another directory (not C:\GP), you need to add an extra line to AUTOEXEC.BAT to set the DOS variable called GPDIR.[8] For example, if you intend to install the GEMPACK files in directory D:\PROGRAMS\GP60, add the following line to AUTOEXEC.BAT.

SET GPDIR=D:\PROGRAMS\GP60

(Change this appropriately to indicate where you actually installed these files.) Note that it is important not to include any spaces in this line, apart from the one between SET and GPDIR.

---

[7] The installation program does this differently by adding the statement to the end of your AUTOEXEC.BAT

```
PATH=C:\GP;%PATH%
```

This adds the directory C:\GP to the start of your current path.

[8] Make sure there is only one such "SET GPDIR =…" statement since Windows NT sometimes just looks at the first of these whereas Windows 3.1 or Windows 95 look at the last.

EXAMPLE

Suppose you have a machine with starting hard disk C:, suppose that COMMAND.COM is in C:\, that your external DOS commands are in C:\DOS, and that you intend to install GEMPACK on drive E in directory \GP60. Then your AUTOEXEC.BAT file should contain at least the following:

```
PATH C:\;C:\DOS;E:\GP60
SET GPDIR=E:\GP60
```

REFERENCES

GEMPACK DOCUMENTS[9]

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[9] The numbering of GEMPACK Documents has been re-started with Release 5 of GEMPACK, when the abbreviation "GPD" was first used. Previous editions of these documents did not have the same numbers as the current editions. Pre-Release-5 documents are numbered "GED-xx".

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