INSTALLATION

MARC
Analysis
Research
Corporation

MARC® K7.3.2

Installation Instructions for UNIX Systems

4070.73.02

MARC® Installation and Usage on UNIX machines

This document describes the installation and usage of the MARC programs on UNIX platforms listed in Table 1. The instructions given here require a basic knowledge of the machine on which you are loading the MARC software, no attempt is made to teach the use of UNIX commands.

This document contains a quick installation section intended for experienced MARC users, a section containing details about the installation procedure, a section concerning the usage of the MARC programs and a section about making permanent changes to the MARC programs.

Appendices include a sample installation session and hints about troubleshooting.

If you encounter a problem during the installation, please contact the customer support staff at the nearest MARC office listed below.

CALIFORNIA - Palo Alto
MARC Corporate Headquarters
260 Sheridan Avenue, Suite 309
Palo Alto, CA 94306, USA
Tel: 1 650 329 6800
Fax: 1 650 323 5892
Email: support@marc.com

CALIFORNIA - San Diego
MARC Analysis Research Corp.
4330 LaJolla Village Drive, Suite 320
San Diego, CA 92122
Tel: 1 619 658 9588
Fax: 1 619 787 8710

CONNECTICUT - E. Berlin
MARC Analysis Research Corp.
1224 Mill Street
E. Berlin, CT 06023
Tel: 1 860 828-2055
Fax: 1 860 828 2031

MICHIGAN - Ann Arbor
MARC Analysis Research Corp.
24 Frank Lloyd Wright Drive
Ann Arbor, MI 48106-0523
Tel: 1 734 998 0540
Fax: 1 734 998 0542

CZECH REPUBLIC
MARC Overseas, Inc.
Podolska 50
147 00 Praha 4, Czech Republic
Tel: 420 (2) 6121 4123
420 (2) 6121 4111 x252
Fax: 420 (2) 6121 4123
Email: support@marc.cz

FRANCE
MARC France S.A.
Bercy Expo SR 6101A
40 Avenue des Terroirs de France
75611 Paris Cedex 12 France
Tel: 33 (1) 4474 1550
Fax: 33 (1) 4474 1554
Email: support@marc.fr

GERMANY - Munich
MARC Software Deutschland GmbH
Ismaninger Str. 9
85609 Aschheim (by Munich), Germany
Tel: 49 (89) 904 50 33
Fax: 49 (89) 903 06 76
Email: support@marc.de

GERMANY - Hannover
MARC Software Deutschland GmbH
Alte Dohrener Str. 66
D 30173 Hannover, Germany
Tel: 49 (511) 980 5182
Fax: 49 (511) 980 5187

ITALY
Espri-MARC s.r.l.
Viale Brigata Bisagno 2/10
16129 Genova, Italy
Tel: 39 (010) 585 949
Fax: 39 (010) 585 949
Email: espri.marc@interbusiness.it

THE NETHERLANDS
MARC Analysis Research Corporation
Dublinstraat 32
2713 HS Zoetermeer
The Netherlands
Tel: 31 (79) 3510 411
Fax: 31 (79) 3517 560
Email: support@marc.nl

UNITED KINGDOM
MARC UK Ltd.
11 Linford Forum, Rockingham Drive
Linford Wood
Milton Keynes, MK14 6LY
Tel: 44 (1908) 606 070
Fax: 44 (1908) 606 633
Email: support@marc.co.uk

CHINA
MARC Overseas, Inc.
Bright Chang An Building, Suite 321
7# Jian Guo Men Nei Street
Beijing, China 100 005
Tel: 86 (10) 6510 2056
86 (10) 6510 2057
86 (10) 6510 2058
Fax: 86 (10) 6510 2053
Email: marcbj@public.bta.net.cn

JAPAN - Nagoya
Nippon MARC Co., Ltd.
Nagoya Nishiki Daiichi Seimei Bldg.
2F, 6-5 Nishiki 1-chome
Naka-ku, Nagoya, Aichi 460-0003
Tel: 81 (52) 202 5661
Fax: 81 (52) 202-5665

JAPAN - Osaka
Nippon MARC Co., Ltd.
4F 2nd Kimi Building
2-11 Toyotucho Suita-shi
Osaka 564-0051
Tel: 81 (6) 385 1101
Fax: 81 (6) 385-4343

JAPAN - Tokyo
(Asian Operations Headquarters)
Nippon MARC Co., Ltd.
Shinjuku Daiichi Seimei Building
P.O. Box 5056
2-7-1 Nishi-Shinjuku, Shinjuku-ku
Tokyo 163-0704
Tel: 81 (3) 3345 0181
Fax: 81 (3) 3345 1529
Email: support@marc.co.jp

KOREA
Dong Kyung Bldg. 7FL
824-19 Yuksam-Dong
Kangnam-Ku, Seoul, Korea
Tel: 82 (2) 561 7543
Fax: 82 (2) 561 7767
Email: marck@unitel.co.kr

Table 1 Requirements of MARC & Mentat Running on Windows NT

Operating System	Microsoft Windows NT 4.0
CPU	Intel Pentium or higher CPU
Graphics Card	SVGA or better running in at least 16 bit color mode
Hard Drive	Minimum 300 MB (MARC-K7 will require at least 200 MB of swap space)
CD-ROM Drive	Required
Mouse	3 button mouse is recommended
Memory	Minimum 64 MB Recommended 128 MB
FORTRAN Compiler	Digital Fortran Version 6.0 or Digital Fortran Version 5.0

Table 2 Versions of MARC Running Under UNIX

Computer	Operating System Revision	CD-ROM mount command (assumes a directory /cdrom exists)
Digital Equipment Alpha	OSF 4.0 or later	mount -tcdfs /dev/rz**uA** /cdrom **u** = CD-ROM unit number, **A** = a or c
HP 9000-700, 800	HP-UX 10.2 or later	mount -F cdfs /dev/dsk/c0t**n**d0 /cdrom **n** = SCSI controller number for CD-ROM
IBM RS6000	AIX 3.2.5 or later	mount -rv cdrfs /dev/cd0 /cdrom
Silicon Graphics MIPS 5000	IRIX 6.3 or later (32 bit version)	mount -rt iso9660 /dev/scsi/sc**n**d**u**l0 /cdrom **n** = SCSI controller number, **u** = CD-ROM unit #
Silicon Graphics MIPS 8000	IRIX 6.2 or later (64 bit version)	mount -rt iso9660 /dev/scsi/sc**n**d**u**l0 /cdrom **n** = SCSI controller number, **u** = CD-ROM unit # The CD-ROM will usually automount to /cdrom or /CDROM
SUN SparcStations	Solaris 2.4 or later	mount -F hsfs /dev/dsk/c0t**n**d**u**s0 /cdrom **n** = SCSI controller number, **u** = CD-ROM unit #
SUN SparcStation	Solaris 2.5 or later	Uses automounting to /cdrom

Contents

Chapter 1: Read me first: Installation Prerequisites

Before installing the software

Decide where you want the product to be installed before reading in the MARC software from the CD-ROM. You will be prompted for a parent directory to install the software, which will be referred to as `<parent>`. During the installation, a directory called `marck73`, `install`, and `security` will be created in the directory you specify.

MARC requires approximately 100 Mbytes of permanent disk storage capacity.

Personal data

During installation, you will be prompted to supply your name, address, telephone number, etc. You will also be asked to enter the client specific administration code (e.g., MARCK73.U0123) which is listed on the accompanying delivery letter. If you have also installed Mentat, enter your Mentat code when prompted. If no codes were provided to you, then leave it blank.

This information will be sent to the MARC office supplying you the installation passwords and is intended to keep your data as known to the MARC company up to date.

Password protection

The MARC version you have received is protected against illegal usage by means of Globetrotter's FLEXlm licensing software. You *cannot* run the program directly after you have installed the product from the CD-ROM until you obtain passwords from MARC. Passwords will be supplied to you from the nearest MARC office after you have performed the first two steps of the installation procedure. These steps are as follows:

1. Run the installation script, install the software from the CD-ROM, and generate a machine specific identifier for the purpose of creating passwords.
2. Send the machine specific identifier to the nearest MARC office.
3. Upon return of the passwords, enter these by editing the `license.dat` file.

Passwords need normally be entered only once.

Multiple machines\ NFS Fileserver

If you are installing MARC on an NFS Fileserver, the install script needs to create directories in which to install MARC; the default NFS export options do not allow this level of access by root. Two approaches are possible – do not install as root, or if you must install as root, modify your NFS export options to include *~root=list* (where *list* can include hostnames and netgroups).

Should I be "root"?

Normally, there is no need to be logged in as `root`. However, you will be queried as to whether you want to create an optional *link* by which MARC will be known system-wide under the name `marck73`. This link will, by default, be placed in the directory `/usr/local/bin` to which you must have write permission. Logging in as `root` is one way of ensuring that you can create this link. Make sure that you have write permission to the installation directory before you start the installation script. Note that on most systems you will have to be `root` to mount the CD-ROM.

For NFS fileserver networks, read the above paragraph.

FORTRAN compiler

We strongly advise you to have a FORTRAN compiler on your system.

Chapter 2: Quick Installation Procedure

Step 1: Start the install script

```
<cdrom_dir>/install.exe
```

Run the MARC installation script *install.exe* from the CD-ROM. Substitute your CD-ROM device name for `<cdrom_dir>`. For example, on a SUN this may be `/cdrom/cdrom0`.

Welcome to the MARC Installation script

Enter the pathname to the directory to install the software
(<current directory>)
:

Enter the path for the directory in which you want to install the MARC product(s). The default selection will be your current directory. You must have write permission to this directory.

Step 2: Extract the files from the CD-ROM

Main Menu

1) Install the MARC program
2) Install the Mentat program
3) Install AutoForge-Analysis
4) Install AutoForge-GUI
5) Install MARC/Link-P Products
6) Install MARC/Link-Cat Products

s) Install Security
sd) Install Security documentation
d) Install on-line Documentation
u) Update Product scripts

ci) Change the installation directory
cd) Change the CDROM path
l) Change the product listing file
?) Help information
q) Exit from the installation script

Selection : **1**

Select option 1 to install MARC-K7.3.2. This will take you to the MARC-K7.3.2 submenu.

MARC-K7.3.2 Menu

D1) Install for DEC OSF 3.2 (~70 MB)
D2) Install for DEC OSF 4.0 (~70 MB)

H1) Install for HP-UX 10.20 (PA 1.1) (~60 MB)
H2) Install for HP-UX 10.20 (PA 2.0) (~60 MB)
H3) Install for HP-UX/800 11.00 (~60 MB)

I1) Install for IBM AIX 3.2.5 (~45 MB)
I2) Install for IBM AIX 4.1.5 (~45 MB)
I3) Install for IBM AIX 4.3.1 (~45 MB)

G1) Install for SGI R4k IRIX 5.3 (~70 MB)
G2) Install for SGI R5k IRIX 6.3 (~70 MB)
G3) Install for SGI R8k-10k IRIX64 6.2 (~70 MB)

S1) Install for Sun Solaris 2.4 (~55 MB)
S2) Install for Sun Solaris 2.5/2.6/2.7 (~55 MB)

t) Test the installation

?) Help information
r) Return to previous menu

Selection [] :

Select the platform that you will be running MARC on. The script will determine a default value, and it will be shown in brackets after the *Selection* prompt. Just press return to use the default value.

You will also be prompted whether you want to create a system wide link to the *marck73* script.

Note that other platforms may appear on your menu list that are not shown here.

r) Return to the previous menu

Choose the R*eturn to previous menu* option to return to the main menu.

Step 3: Generate system identifier

s) Security submenu
1) Generate system identifier file

Generate system identifier. From the main menu, select option s, and then option 1. You will be prompted for your name, address, etc. You will also be prompted for your license code which is in the accompanying letter; e.g., MARCK73.U0123. If you have also installed Mentat, enter the Mentat license also; e.g., MENT330.U0123.

Step 4: Send the system identifier to MARC

2) Show system identifier
3) Print the system identifier
4) Send the system identifier

The system identifier is stored in the subdirectory `install` under the `<parent>` directory, in a file called `sid001.dat`. Send the contents of this file to the nearest MARC office. In return, you will receive passwords.

r) Return to previous menu
q) Exit from the installation script

You may exit the script now by choosing the option q.

Step 5: Enter the password

```
cd <parent>/security
vi license.dat
chmod 644 license.dat
```

When you receive the passwords from the MARC office, they should be entered by means of creating the file `license.dat` file in the `security` subdirectory using an editor. If the file was E-mailed to you, then save the contents in `license.dat`.

See Globetrotter's *FLEXlm End User Manual* for more information on the license file format.

Step 6: Checking

For Network Version skip Step 6.

1) Install the MARC program
t) Test the installation

MARC Tools Menu

1) Test MARC installation

Test the MARC installation

1.1) Run a MARC job without user subroutine
1.2) Trial MARC job with user subroutine

Start the `install.exe` script again, and select *option 1*, "Install the MARC program", and then select t) Test the installation. This brings up a new menu. Select option 1, "Test MARC installation". A new "Test" menu appears.

Run one of the standard MARC demonstration examples as proof of a successful installation by choosing option 1.1. If all goes well, one of the final messages on screen should read:

marc exit number 3004

If you have a FORTRAN compiler on your system, choose a second demonstration example, option 1.2. Here again, MARC should give a **marc exit number 3004**.

Troubleshooting:

1. If you get an error message of `f77 not found` when running a job with a user subroutine and there is a Fortran compiler, its path needs to be appended to your path in the `.cshrc` file. A typical example would be the SUN platform where the f77 compiler may live in the `/opt/SUNWspro/bin` directory. This path must be added if you get the `f77` error message.
2. For the IBM-SP machines, if you get `ERROR: Hostfile or pool must be used to request nodes`, create a `hostfile` in the `marck73/tools` directory with the available nodes in it as:

```
node 1
node 2
  ⋮
etc.
```

   and set the path to point to this file in *MP_HOSTFILE* variable in the `include` file in the `tools` directory.

Step 7: Exit

r) Return to previous menu
q) Exit from the installation script

Repeatedly choose the *return/exit* option to leave the installation script.

Step 8: For Network version only

Please follow the *MARC K7.3.2 Network Version for UNIX Installation and User Notes* (Parts I and II) for important information on installing and running jobs with the network version.

Chapter 3: Installation Procedure Information

Multiple machines/ NFS Servers

If you are installing MARC on an NFS Fileserver, the install script needs to create directories in which to install MARC; the default NFS export options do not allow this level of access by root. Two approaches are possible – do not install as root, or if you must install as root, modify your NFS export options to include *~root=list* (where *list* can include hostnames and netgroups).

Step 1: Start the install script from the CD-ROM

Start the installation by running the *install.exe* script located on the CD-ROM from a "C" or Bourne shell. You should not have your current directory be the CD-ROM device, since temporary files will need to be created.

Decide where the MARC program will be located in the system. This location is called the `<parent>` directory. For example, if you specify the installation path as `/usr/software/marc`, the `<parent>` directory is `/usr/software/marc.` It is recommended that you create this directory before you start the installation script. The directories `marck73`, `install`, and `security` will be created when the program is installed.

The *install.exe* script will accept the following options:

`-a`	Turns on automatic installation. The script will install both MARC-K7.3.2 and Mentat 3.3.2 from the CD-ROM. The *-i* option is required (described below).
`-c <path>`	Specifies the path to the CD-ROM device. This may also be the path to a NFS mounted CD-ROM. Normally the script will determine the path to the CD-ROM device from the path specified to invoke *install.exe* on the command line.
`-i <path>`	Specifies the installation path (`<parent>` directory). This option is required when specifying the automatic installation option, *-a*.
`-l <file>`	Specifies a file for product listing
`-v`	Turns on verbose mode.

The "automatic" installation will install both MARC and Mentat. To perform an "automatic" installation, run the installation script as follows:

```
/cdrom/install.exe -a -i <path>
```

Note that when the "automatic" installation is complete, you will have to run the installation script interactively to generate the system identifier using option 1 (see Step 3).

You may want to check the contents against the list supplied in Appendix C of this document. Should any subdirectory be missing, please contact MARC customer support for further details.

> **Note:** See Table 1 at the beginning of this document for the name of the CD-ROM device for your machine if you can't determine what it is named, or see your systems administration guide.

Step 2: Extract the files and set paths

Extract the files from the CD-ROM and set the path names in the MARC background files to correspond to the location where you have installed the version. From the main menu list of the `install.exe` script, choose option 1 to install MARC, and then select the platform from the MARC-K73 submenu. Note that a default platform selection will be displayed if the script determines that MARC has not yet been installed.

The installation script will then extract the files and then proceed to set the path names in the run_marc scripts to correspond to the current location of the MARC version.

ranlib

Some MARC-UNIX versions will ask if you want to *ranlib* the MARC binary libraries supplied with the version. This will create a fresh table of contents for the libraries. It is advisable to do this and you need to do it only once.

link

You will also be asked whether MARC should be made accessible system wide under the link-name *marck73*. If so, a symbolic link (`marck73`) will, by default, be created in the directory `/usr/local/bin`.

> **Notes:** Not all UNIX versions need the *ranlib*; the question will not appear on them.
>
> If you decide to create the link, you
>
> - must be allowed to create the link at the chosen location.
> - must ensure your users who want to use MARC have that location in their search path.

Step 3: Generate system identifier

Using the installation script `install.exe`, choose option s) Install security from the main menu list. A submenu will appear. Choose option 1 from this submenu to generate the system identifier.

> **Note:** When you generate the system identifier, you will be asked to enter your name, address etc. See Appendix A for a sample session.

Step 4: Send to MARC

The system identifier is stored in the subdirectory `install` under the `<parent>` directory, in a file called `sid001.dat`. The file can be printed using the `install.exe` option 3. Send the printout by means of telefax to the nearest MARC office. If you have access to the E-mail facility, you can E-mail the system identifiers directly using the `install.exe` option 4.

Step 5: Password

Change your current directory to the subdirectory `security` under the `<parent>` directory. If you receive your passwords via E-mail, then save the license data in a file named `license.dat` in this directory. The permissions for `license.dat` should be 644, since all users will need read access. If you receive your passwords via telefax, then enter them by means of creating the `license.dat` file using an editor and typing in the information. The password will consist of at least three lines:

"SERVER" line which specifies the system hostname

"DAEMON" line which specifies the vendor specific daemon name and path

"FEATURE" line(s) which specifies the product and options. This line contains the password and the expiration dates.

The *run_marc* script uses the following environment variables to locate the `license.dat` file:

FLEXDIR

LM_LICENSE_FILE

The FLEXDIR environment variable typically points to the `security` directory, and the name `license.dat` is appended to it for the full pathname. If the file does not exist, then the environment variable LM_LICENSE_FILE is used to obtain the full pathname for the license file.

See Globetrotter's *FLEXlm End User Manual* for more information on entering your license password.

Note: There is generally no need to start the Flexlm license manager. The *run_marc* script will do so.

Step 6: Checking

Run one of the standard MARC demonstration examples as proof of a successful installation. Using the installation script `install.exe`, choose t) Test the installation from the main menu list, and the MARC K73 *maintain* menu will appear. Choose option 1 from this menu, and a new menu will appear. Choose option 1 from this new menu. If all goes well, one of the final messages on screen should read **marc exit number 3004**. If you have a FORTRAN compiler on your system, choose a second demonstration example by means of the maintain option 2. Again, MARC should give a **marc exit number 3004**.

> **Note:** Should any of these examples not run, please use the checklist in Appendix B to verify whether the installation was executed correctly. Refer to Chapter 4 of this document for the syntax of *run_marc*. Contact MARC customer support if you are still unable to run the examples.

Step 7: Exit

Choose the *exit* option to leave the installation script:

r) Exit from the trial submenu

q) Exit from the installation script

Chapter 4: Running MARC

This section describes the MARC usage on UNIX based machines applicable to either BSD4 or System V machines except where noted. The MARC programs are mainly controlled by a shell script program called *run_marc* which is stored in the `marck73` subdirectory `tools`. If you have used the option to creating a link during the installation, this shell script is also known system wide as `marck73`. It is designed to handle practically all possible options.

The shell script will submit a job and automatically take care of the file assignments providing that use is made of the default FORTRAN file units as specified in Table 4. Note that the program automatically opens file units 1-36, excluding 26-30. The shell script must be executed in the directory where all relevant input and output files concerning the job are available. To use the shell script, each MARC job should have a unique name qualifier and all MARC output files connected to that job will use this same qualifier.

MARC input files should always be named *job_name.dat*, whereby the prefix *job_name* is the name qualifier which you are free to choose. The suffix *.dat* is obligatory.

To actually submit a MARC job, the following command should be used. The single input line is split over multiple lines for clarity:

```
run_marc    -jid        job_name (required as minimum)
            -rid        restart_name
            -pid        post_name
            -sid        substructure_name
            -prog       program_name
            -user       user_subroutine_name
            -save       save_user_executable
            -queue      queue_name
            -ver        verification_flag
            -vf         viewfactor_name
            -def        defaults_name
            -nprocd     number_of_processors
            -nthread    number_of_threads
            -itree      message passing type
            -host       hostfile (for running over the network)
            -dist       for distributed execution in network version
            -comp       compatible machines on a network
```

Table 2 describes the meaning of these input options and Table 3 gives examples. Table 4 gives FORTRAN file units used.

Table 2 run_marc Input Options*

Keyword	Options	Description
-jid (-j)	job_name	Job and input file name identification. Requires *job_name.dat* for all programs except the curve fit and neutral plot programs.
-prog (-pr)	progname	Run saved executable *progname.marc* from a previous job (usually *user_name*; see below).
-user (-u)	user_name	User subroutine *user_name.f* will be used to generate a new executable program called *user_name.marc*.
-save (-sa)	**no** yes	Do *not* save the new executable program *user_name.marc.* Save the executable program *user_name.marc* for a next time.
-rid -(r)	restart_name	Identification of previous job that created RESTART file.
-pid (-p)	post_name	Identification of previous job that created postfile containing temperature data.
-sid (-si)	substructure	Substructure jobs only: name of the substructuring file *substructure.t31*.
-queue (-q)	**background** foreground queue name	Run the program in the background. Run the program in the foreground. Submit to batch queue the queue name. Only available for machines with batch queue; e.g., Convex, Cray. Queue names and submit command syntax may differ from site to site, adjust *run_marc* if necessary.
-back (-b)	**yes** no	Alternative for -queue: run the program in the background. Run the program in the foreground.
-ver (-v)	**yes** no	Ask for confirmation before starting the job Will start the job immediately
-nprocd	1,2,4,etc	Number of processors (generally same as the number of domains)
-nthread	1,2,4,etc	Number of threads
-host	hostfile	Specify the name of the host file for running over a network (default is execution on one machine only in which case this option is not needed).
-dist	yes no	When the execution is distributed over a network.
-comp	yes no	When machines are compatible in a run over the network. Examples of compatible machines are: 1. Two or more SGI, SUN, IBM, HP, and DEC with exactly the same processor type and OS. 2 One SGI R8000/Irix 6.2 and one SGI R10000/Irix 6.5 machine. 3. One SUN Ultra/Solaris 2.5 and one SUN Ultra/Solaris 2.6. 4. One HP J Class/HPUX-10.20 and and one HP C Class/HPUX-10.20. This option is only needed when user subroutines are used.
-pq	0,1,2,etc	Batch queue only: queue priority
-at (-a)	date/time	Batch queue only: delay time for start of job. Syntax: January,1,1998,12:30 or: today,5pm
*Default options are shown in **bold**.		

Table 2 run_marc Input Options*(Continued)

-cpu	sec	Batch queue only: cpu time limit
-vf	vf_filename	Refers to the viewfactor file for a heat transfer radiation analysis.
-def	defaults_file	Used to define an auxiliary input file containing default values.
*Default options are shown in **bold**.		

Table 3 Examples of Running MARC Jobs

Examples of running MARC jobs	Description:
`run_marc -jid e2x1`	Runs the job e2x1 in the background, the input file *e2x1.dat* resides in the current working directory.
`run_marc -jid e2x14 -user u2x14 -save yes`	Runs the job *e2x14* in the background, using the user subroutine *u2x14.f* and the input file *e2x14.dat*. An executable program named *u2x14.marc* will be saved after completion of the job.
`run_marc -jid e2x14a -prog u2x14`	Runs the job *e2x14a* using the executable produced by job *e2x14*.
`run_marc -jid e3x2a -ver no -back no`	Runs the job *e3x2a* in the foreground. The job will run immediately without verifying interactively.
`run_marc -jid e3x2b -rid e3x2a`	Performs a restart job using the results of the previous job *e3x2a*.
`run_marc -jid e2x1 -nprocd 2`	Runs a two processor job on a single parallel machine.
`run_marc -jid e2x1 -nprocd 2 -host hostfile`	Runs a two-processor job over a network. The hosts are specified in the file `hostfile`.

Table 4 FORTRAN File Units Used by the UNIX version of MARC

File name	Unit	Description	Comments
`jidname.log`	0	Error message output unit	Except HP
`jidname.t01`	1	Formatted data file	Usually contains mesh
`jidname.t02`	2	OOC* solver scratch file	random access binary file
`jidname.t03`	3	ELSTO file	sequential access binary file
`jidname.t04`	4	Neutral plot file	sequential access binary file
`jidname.dat`	5	Formatted data input file	formatted FORTRAN file
`jidname.out`	6	Printed output file	formatted FORTRAN file
`jidname.log`	7	Error message output file	HP only
`jidname.t08`	8	New RESTART file	sequential access binary file
`ridname.t08`	9	Old RESTART file	sequential access binary file
`jidname.t11`	11	OOC* solver scratch file	sequential access binary file
`jidname.t12`	12	OOC* solver scratch file	sequential access binary file
`jidname.t13`	13	OOC* solver scratch file	sequential access binary file
`jidname.t14`	14	OOC* solver scratch file	random access binary file
`jidname.t15`	15	OOC* solver scratch file	sequential access binary file
`jidname.t16`	16	New POST file (FORTRAN file)	sequential access binary file
`jidname.t17`	17	Old POST file (FORTRAN file)	sequential access binary file
`jidname.t18`	18	Formatted data file, optimization table	formatted FORTRAN file
`jidname.t19`	19	New POST file	formatted FORTRAN file
`ridname.t19`	20	Old POST file	formatted FORTRAN file
`jidname.t22`	22	Subspace iteration scratch file	sequential access binary file
`jidname.t23`	23	Fluid-solid interaction file	sequential access binary file
`pidname.t19`	24	Heat data input file	formatted FORTRAN file
`pidname.t16`	25	Heat data input file (FORTRAN file)	sequential access binary file
`sidname.t31`	31	Substructure master data file	random access binary file
`jidname.t32`	32	Secant method file	sequential access binary file
`jidname.t34`	34	Neutral plot file	formatted FORTRAN file
`sidname.t35`	35	Substructure file	sequential access binary file
`sidname.t36`	36	Substructure file	sequential access binary file

*OOC denotes Out-Of-Core solution.

Table 4 FORTRAN File Units Used by the UNIX version of MARC (Continued)

`jidname.t41`	41	Post output for domain decomposition	sequential access binary file
`jidname.t42`	42	Post output for domain decomposition	formatted FORTRAN file
`jidname.t45`	45	Design Optimization	formatted FORTRAN file
`jidname.t46`	46	Design Sensitivity or Optimization	sequential access binary file
`def.dat`	49	Defaults File	formatted FORTRAN file
`jidname.lck`	51	Post File Lock File	formatted FORTRAN file
`jidname.cnt`	52	Dynamic Control File	formatted FORTRAN file
Environment variable EXITMSG	97	Exit Messages	formatted FORTRAN file
Environment variable USRDEF	98	Global default File	formatted FORTRAN file
Environment variable AFMATDAT	99	Material Database	formatted FORTRAN file
*OOC denotes Out-Of-Core solution.			

Chapter 5: Making Changes to the MARC Programs

The MARC program sizing

The K7 release of MARC uses dynamic memory. As opposed to previous versions of the product, the program will not need to relink if the value on the SIZING parameter is large, or if additional memory is required. If no value for SIZING is entered, MARC will initially request NORMAL number of words. The value of NORMAL is given in the `include` file in the `tools` directory. It is set to **5,000,000** words. It may be reset as discussed below. The `include` file also contains MAXNUM for the maximum number of entities a model can accommodate for the given size of NORMAL. This value should be one-fifth of the NORMAL value and is currently set to 1,000,000 words. MARC will continue to allocate memory as necessary until it reaches a value of MAXSIZE. The value of MAXSIZE is set at **200,000,000** words. If the analysis requires more than MAXSIZE number of words, MARC will select at least one of the out-of-core options, either ELSTO or out-of-core solver.

You may choose to modify the NORMAL size permanently by means of the *install.exe* shell script:

```
cd <parent>/install
install.exe
```

Choose *option 1* from the main menu to get you to the MARC menu, and then choose t) Test the installation to get you to the tools menu. You will then have a new menu appear. Here, choose option 2 to get into the maintenance submenu. Choose option 2.4 to redefine the default workspace size (NORMAL).

Note that apart from the NORMAL value of the workspace you are also able to set a MAXSIZE to the workspace: option 2.5 of the maintenance submenu. This upper limit should reflect the maximum permissible program size which your computer can handle. NORMAL**,** MAXNUM**,** and MAXSIZE are given in single precision words; i.e., four bytes per word and can be changed in the include file under the tools directory.

Chapter 6: Managing Flexlm with MARC

Flexlm License File

Flexlm is the network based licensing product from Globetrotter Software used in MARC products.

The license file, `license.dat`, should be placed in the `<parent>/security` directory once you receive your licenses from your nearest MARC office. Everyone should have read permission to the file. The license file has the following format:

Line	Description
SERVER	This line specifies the license server. It has the format: SERVER hostname hostid port
DAEMON	This line specifies the name of the vendor daemon (marcd), and the path. It has the format: DAEMON marcd <parent>/security
FEATURE	This line lists the feature, or license names. This line cannot be modified from what is sent to you. For your MARC license, it has the format: FEATURE marck71 marcd 1.000 ... (for single processor version) FEATURE marcp marcd 1.000 (for single machine parallel version) FEATURE marcn marcd 1.000 (for network version)
USE_SERVER	When used together with the SERVER line, this line is used on the licensed "client system" (as opposed to the license server), to specify that it should obtain a license from the specified license server. It has no options.

Flexlm License Manager

The `run_marc` script will start the Flexlm license manager daemon `lmgrd.marc` using the `rc.lmgrd` script located in the `security` directory. Once `lmgrd.marc` is running, it reads the license file `license.dat` which is also located in the `security` directory. The license file contains the MARC license (and other MARC product licenses, if necessary). In addition, `lmgrd.marc` also starts the MARC vendor daemon `marcd`. The path to `marcd` is specified in the license file on the DAEMON line. These processes must be running on the license server for the MARC security system to obtain a license.

MARC contacts these daemons at regular intervals. If no contact is made after a specified time period, then MARC terminates execution.

Environment Variables

The environment variable ***FLEXDIR*** is used to specify the directory containing the `license.dat` file. The variable is set in the `run_marc` script, and the default setting is `$DIR/../security`, where `$DIR` is the path to the MARC directory. When MARC executes, it will look for the file `license.dat` in the `FLEXDIR` directory. If it cannot find the file or if it cannot find the MARC license, it will check the list of license files specified by the environment variable `LM_LICENSE_FILE`. This environment variable can be set by the user in the `run_marc` script, and is a colon separated list of file pathnames. A typical setting for this variable is:

```
LM_LICENSE_FILE=$FLEXDIR/license.dat:/usr/local/flexlm/licenses/license.dat
```

You may want to combine all of your Flexlm licenses into one file and change the FLEXDIR setting appropriately. The FLEXDIR environment variable is also used in the `rc.lmgrd` script located in the `security` directory.

Security Directory

The security directory defaults to <`parent`>`/security`. It must be writable by all MARC users since `lmgrd.marc` writes the logfile (`security/license.log`) to that directory. If you do not wish to have the security directory writable by others, then you must modify the `rc.lmgrd` script to write the logfile to a different location (such as `/tmp`).

You may also want to monitor the size of the logfile, since all Flexlm activity is recorded to that file.

> **Note:** The `license.log` file contains important status information regarding the license manager daemon. Always check this file when you get a security error.

If you move the security directory to a different location, or more specifically if you move `lmgrd.marc` and `marcd`, then you must modify the FLEXDIR environment variable specified in the `run_marc` script to specify their location.

Client/Server Licensing

The default installation assumes that the system in which MARC is installed functions as the license server. The term license server only refers to the fact that `lmgrd.marc` and `marcd` are running on that system, and maintains the state of available licenses. Even if you have purchased a nodelocked license, the nodelocked system functions as the license server for that license. A nodelocked license can be distinguished from a floating license since it will have a `HOSTID=xxx` in the feature line.

If you have purchased a floating license, the system that is to be the license server must be determined before generating the system identification file (`sid001.dat`). You must generate the system identification file from the license server, since the *lmhostid* value of the server is needed to generate your passwords. The license file that is returned to you should be placed in the `security` directory. The client systems can use the same license file, or they can use a brief license file with just the SERVER and USE_SERVER lines.

If you are using a license server and `lmgrd.marc` will always be running, then you may wish to remove or rename the `rc.lmgrd` script started by the `run_marc` script so that it does not attempt to start the license manager on the client.

Product Layout

When you install MARC you will get the following installation hierarchy:

```
<Parent>
```

- **install** — Contains the `install_marc` script and other installation scripts
- **security** — Contains the Flexlm programs
- **marck73** — Contains the MARC program files
- **mentat330** — Contains the Mentat program files (if installed)

The environment variables involved with the Flexlm security are set in the `run_marc` script as follows:

```
DIR=<parent>/marck73
FLEXDIR=$DIR/../security
```

Appendix A: Sample Installation of MARC

In this appendix, a sample installation, assuming a single license installation for SGI R8000, is demonstrated.

Step 1: Start the installation script on the CD-ROM	`<cdrom_dir>/ install.exe`	In most cases, the name of <cdrom_dir> will be /cdrom or /CDROM. The device name for your CD-ROM may be different, so check your system administration guide. For example, on a SUN the name may be /cdrom/cdrom0.
Step 2: Extract the files from the CD-ROM		**Welcome to the MARC Installation script** Enter the pathname to the directory to install the software (`<current directory>`)
	enter the path	**/opt/marc** ***MARC Installation script for UNIX systems*** *MARC Analysis Research Corporation* *Main menu* *1) Install the MARC program* *2) Install the Mentat program* *3) Install AutoForge-Analysis* *4) Install AutoForge-GUI* *5) Install MARC/Link-P Products* *6) Install MARC/Link-Cat Products* *s) Install Security* *sd) Install Security documentation* *d) Install on-line Documentation* *u) Update Product scripts* *ci) Change the installation directory* *cd) Change the CDROM path* *l) Change the product listing file* *?) Help information* *q) Exit from the installation script*
	select option 1	*Selection : **1***

MARC Analysis Research Corporation
MARC K7.3.2 Menu

D1)	*Install for DEC OSF 3.2*	*(~70 MB)*
D2)	*Install for DEC OSF 4.0*	*(~70 MB)*
H1)	*Install for HP-UX 10.20 (PA 1.1)*	*(~60 MB)*
H2)	*Install for HP-UX 10.20 (PA 2.0)*	*(~60 MB)*
H3)	*Install for HP-UX/800 11.00*	*(~60 MB)*
I1)	*Install for IBM AIX 3.2.5*	*(~45 MB)*
I2)	*Install for IBM AIX 4.1.5*	*(~45 MB)*
I3)	*Install for IBM AIX 4.3.1*	*(~45 MB)*
G1)	*Install for SGI R4k IRIX 5.3*	*(~70 MB)*
G2)	*Install for SGI R5k IRIX 6.3*	*(~70 MB)*
G3)	*Install for SGI R8k-10k IRIX64 6.2*	*(~70 MB)*
S1)	*Install for Sun Solaris 2.4*	*(~55 MB)*
S2)	*Install for Sun Solaris 2.5/2.6/2.7*	*(~55 MB)*
t)	*Test the installation*	
?)	*Help information*	
r)	*Return to previous menu*	

Select option 11

Selection [11] : ***11***

Installing from /cdrom/marck732_sgi_r8-r10_62.tar.Z
tools/run_marc file adjusted.
tools/include file adjusted.

The very first time you run the installation script you will need to perform the next step : updating the MARC libraries.

Make your choice.

Do you want to ranlib all archives ? ***y***

You must be `root` to create the link.

Create a link to the startup file run_marc (/usr/local/bin) ? ***y***

If you will also be installing Mentat 3.3.0, then install Mentat before proceeding to the next step.

Step 3: Generate a system identifier

select option 3

Security submenu

1) Generate system identifier file
2) Show the system identifier
3) Print the system identifier
4) Send the system identifier
5) Reset the license manager (lmreread)
6) Start the license manager daemon
7) Stop the license manager daemon

?) Help
r) Return to previous menu

Select option 1

Selection : **1**

	Enter your data	*Please enter the following information:* *Your company name () :* ***PieMontVue Inc.*** *Your department () :* *Your company address () :* ***101 Grant St.*** *City and postal code () :* ***Woodsland, Ca 97001*** *Country () :* ***USA*** *Your name () :* ***Pat Smith*** *Your email address () :* ***psmith@pie.com*** *Your telephone number () :* ***498 8779221*** *Your telefax number () :* ***498 8770101*** *Current system data :* *Computer type (SGI) :* ***SGI*** *Computer model (IP27) :* ***O2*** *Mentat license code () :* ***MENT320.U0123*** *MARC license code () :* ***MARCK73.U0123*** *Any changes (y/n) [n] ?* ***n*** ***** Data written in file "/opt/marc/install/sid001.dat".*
	If you are installing both MARC and Mentat, enter both of your license codes.	
Step 4: Send the system identifier to the nearest MARC office	**Select option 3 to print, or 4 for E-mail**	*Send this file to MARC* *Selection :* ***4***
Step 5: Enter passwords	*vi license.dat* *chmod 644 license.dat*	When you receive your passwords from MARC, edit or create the `<parent>/security/license.dat` file and add the license data sent to you. It will consist of at least three lines: a SERVER line, a DAEMON line, and a FEATURE line. See Globetrotter's *FLEXlm End User Manual* for more information.
	Select option q to exit the installation script	*Selection :* ***q***

Appendix B: Troubleshooting

Cannot read CD-ROM

- The device name listed in Table 1 may be incorrect for your system. Please consult your system manager.
- The CD-ROM device may not be mounted. Please consult your system manager.

Cannot create

- You have no write permission in the parent directory. Change with *chmod*.

MARC exit 67

MARC was unable to obtain a license from the FLEXlm licensing software. You should first check the Flexlm logfile `security/license.log`. The possible causes for this are:

- The FLEXlm license manager is missing or can not be executed due to permission problems. Check the log file `license.log` in the `security` directory. Try testing the FLEXlm license server with the command `security/lmstat`. If this fails, consult the *FLEXlm End User Manual*.
- You are attempting to run on a machine that according to the MARC password(s) you are not allowed to use.
- Your license period has expired. Check the date on your machine.
- For counted licenses, currently running too many MARC jobs. Try later. If the limit has not been exceeded, try restarting the license manager, `lmgrd.marc` and the vendor daemon `marcd`. Make sure no other MARC jobs are running.
- If you have just modified the `license.dat` file, the `lmgrd.marc` and `marcd` daemons may not have been restarted. Run the *lmreread* utility as follows:

  ```
  lmreread -c "parent"/security/license.dat
  ```

- If you get the FLEXlm error:

  Invalid (inconsistent) license key (-8,130:2) No such file or directory

  it may be implying that the hostid value specified on the SERVER line are inconsistent with the passwords. Check the values and restart the license manager.
- If you get the FLEXlm error:

  Cannot connect to license server (-15,12:146)

  and you are using a floating license, the license manager (`lmgrd.marc`) may not be running on the license server, or the USE_SERVER line in your client side `license.dat` file is incorrect. Also make sure that the TCP/IP port numbers used on the SERVER line are the same on both the client and the server.
- If you get the FLEXlm error:

  No such feature exists (-5,147)

  and your license is limited to certain systems, you may be trying to run on a system that is not licensed for use. Check that the *lmhostid* of the system you are trying to use and that on your `marck73` (*FEATURE marck71*) license is the same.

Link failed

- Your user subroutine causes compiler errors.
- You have no FORTRAN compiler.
- FORTRAN libraries not available.
- Check the variable **syslibs** in the file `include` in the `marck73` subdirectory `tools`. It references special system libraries in `/usr/lib` which may not exist on your system.

Appendix C: MARC subdirectories

The MARC version you have received contains a full set of subdirectories listed below. You can save disk space by removing the subsets that you do not need.

Table 5 Contents of the MARC Distribution CD-ROM*

Basic set:	**Contents: required as minimum**
bin	executable MARC programs
tools	shell scripts to run and maintain the MARC programs
../security	Flexlm security files
AF_flowmat	material data for database
Extended set:	**Contents: only for use with user subroutines**
common	insert files containing MARC common blocks
lib	binary libraries with the compiled MARC routines
main	MARC programs main routines
user	templates for all available MARC user subroutines
update	empty directory: reserved for updated MARC routines (fixes)
notes	useful information about MPI installation, compilers, and testing parallel installation
Examples:	**Contents: example files**
demo	input files and user subroutines for the MARC demonstration manual E
demo_ddm	input files and user subroutines for the single parallel machine as well as the network parallel version of MARC
benchmark	small set of demonstration examples for performance measurement
test_ddm	one, two, and four processor test examples for installation testing of the single parallel machine as well as the network parallel version
primer	input files for the MARC primer manual
Utilities:	**Contents:**
pldump	source routines for the post-file conversion program pldump
neutral	source routines for the MARC plot file conversion programs
mpich	MPI libraries for network parallel version
Source code:	**Contents: for source code licenses only**
source	source routines for the standard MARC program
*Note that the last set is available on SOURCE code license tapes only.	

Table 5 Contents of the MARC Distribution CD-ROM* (Continued)

cscource	source routines for the standard MARC program written in C
solver	source routines for machine dependent solver
mdsrc	machine dependant routines for the MARC programs
*Note that the last set is available on SOURCE code license tapes only.	

Table 6 Contents of the Security directory unloaded from CD-ROM

Program	Description
flexuser	A directory containing the *Flexlm End User Guide* in HTML format.
flexuser.pdf	The *Flexlm End User Guide* in Adobe Acrobat 3.0 format.
flexuser.ps	The *Flexlm End User Guide* in Postscript format.
lmcksum	Performs a checksum of the license file
lmdiag	Diagnose a problem with checking out a license
lmdown	Shutdowns the license daemons
lmgrd.marc	The main license manager daemon for Flexlm
lmhostid	Prints the Flexlm hostid of a system
lmremove	Allows you to remove a single user's license
lmreread	Causes the license manager to reread the license file
lmstat	Helps you monitor the status of all network licensing activities
lmswitchr	Switches the FLEXadmin log file for the specified feature
lmutil	The executable to which the Flexlm utilities are linked
lmver	Lists the Flexlm version of a library or executable
marcd	The vendor daemon used to pass MARC specific licensing information to lmgrd.marc
rc.lmgrd	The script that starts lmgrd.marc
rc_lmgrd	An example script that could be placed in /etc/rc?.d so that lmgrd is started at boot time
See the *FLEXlm End User Manual* for more information	