INTRODUCTION TO SYSTEM CALLS

Section II of this manual lists all the entries into the system. In most cases two calling sequences are specified, one of which is usable from assembly language, and the other from C. Most of these calls have an error return. From assembly language an erroneous call is always indicated by turning on the c-bit of the condition codes. The presence of an error is most easily tested by the instructions *bes* and *bec* (''branch on error set (or clear)''). These are synonyms for the *bcs* and *bcc* instructions.

From C, an error condition is indicated by an otherwise impossible returned value. Almost always this is −1; the individual sections specify the details.

In both cases an error number is also available. In assembly language, this number is returned in r0 on erroneous calls. From C, the external variable *errno* is set to the error number. *Errno* is not cleared on succesful calls, so it should be tested only after an error has occurred. There is a table of messages associated with each error, and a routine for printing the message. See *perror (III).*

The possible error numbers are not recited with each writeup in section II, since many errors are possible for most of the calls. Here is a list of the error numbers, their names inside the system (for the benefit of system-readers), and the messages available using *perror*. A short explanation is also provided.

0 – (unused)

1 EPERM Not owner and not super-user
Typically this error indicates an attempt to modify a file in some way forbidden except to its owner. It is also returned for attempts by ordinary users to do things allowed only to the super-user.

2 ENOENT No such file or directory
This error occurs when a file name is specified and the file should exist but doesn't, or when one of the directories in a path name does not exist.

3 ESRCH No such process
The process whose number was given to *signal* does not exist, or is already dead.

4 – (unused)

5 EIO I/O error
Some physical I/O error occurred during a *read* or *write*. This error may in some cases occur on a call following the one to which it actually applies.

6 ENXIO No such device or address
I/O on a special file refers to a subdevice which does not exist, or beyond the limits of the device. It may also occur when, for example, a tape drive is not dialled in or no disk pack is loaded on a drive.

7 E2BIG Arg list too long
An argument list longer than 512 bytes (counting the null at the end of each argument) is presented to *exec*.

8 ENOEXEC Exec format error
A request is made to execute a file which, although it has the appropriate permissions, does not start with one of the magic numbers 407 or 410.

9 EBADF Bad file number
Either a file descriptor refers to no open file, or a read (resp. write) request is made to a file which is open only for writing (resp. reading).

10 ECHILD No children
Wait and the process has no living or unwaited-for children.

11 EAGAIN No more processes
In a *fork*, the system's process table is full and no more processes can for the moment be created.

12 ENOMEM Not enough core
During an *exec* or *break*, a program asks for more core than the system is able to supply. This is not a temporary condition; the maximum core size is a system parameter. The error may also occur if the arrangement of text, data, and stack segments is such as to require more than the existing 8 segmentation registers.

13 EACCES Permission denied
An attempt was made to access a file in a way forbidden by the protection system.

14 – (unused)

15 ENOTBLK Block device required
A plain file was mentioned where a block device was required, e.g. in *mount.*

16 EBUSY Mount device busy
An attempt was made to dismount a device on which there is an open file or some process's current directory.

17 EEXIST File exists
In existing file was mentioned in a context in which it should not have, e.g. *link.*

18 EXDEV Cross-device link
A link to a file on another device was attempted.

19 ENODEV No such device
An attempt was made to apply an inappropriate system call to a device; e.g. read a write-only device.

20 ENOTDIR Not a directory
A non-directory was specified where a directory is required, for example in a path name or as an argument to *chdir.*

21 EISDIR Is a directory
An attempt to write on a directory.

22 EINVAL Invalid argument
Some invalid argument: currently, dismounting a non-mounted device, mentioning an unknown signal in *signal,* and giving an unknown request in *stty* to the TIU special file.

23 ENFILE File table overflow
The system's table of open files is full, and temporarily no more *opens* can be accepted.

24 EMFILE Too many open files
Only 10 files can be open per process; this error occurs when the eleventh is opened.

25 ENOTTY Not a typewriter
The file mentioned in *stty* or *gtty* is not a typewriter or one of the other devices to which these calls apply.

26 ETXTBSY Text file busy
An attempt to execute a pure-procedure program which is currently open for writing (or reading!).

27 EFBIG File too large
An attempt to make a file larger than the maximum of 2048 blocks.

28 ENOSPC No space left on device
During a *write* to an ordinary file, there is no free space left on the device.

29 ESPIPE Seek on pipe
A *seek* was issued to a pipe. This error should also be issued for other non-seekable devices.