lk

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lk

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1.2 lk V1.04 - (About)

lk V1.04
The no limit linker.

After I started with a huge (About 512Kb) program which needed a linker, the current linker I used crashed. I quickly saw (Before the guru) that a memory problem was the source of that horrible crash. At that time I used BLink V7.2 and my program was about 420,000 bytes. Another linker was necessary...

lk is born from that time and is more convenient for me and, hopefully, for you. The next explainations show you the tremendous possibilities offered by lk. Actualy, a total of 15741 lines (317092 bytes) of code were written in 68000 with GenIm2 from DevPac. And this does not take in account the large amount of lines I wrote for my library which is 90508 bytes when compiled...

Why use lk anyway ?
After several tests, checking the speed between lk and BLink, I saw that lk is more than twice faster. (Note that I tested that with my biggest codes for a better approximation.) Even so, I have several things to do to improve the speed some more.
And lk supports new hunks (HUNK_RELOC32SHORT, HUNK_DREL<size>, ...)

lk is a shareware also, if you like this program and you use it, please send me US $15.00 or more at:

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Note: I accept money orders and checks from U.S.A. and France, or the Euro-Check, otherwise use cash money! Only U.S. dollars and francs are accepted (FF90,00).
This will allow me to make it faster and more confortable. Also, if you have any requests, concerns, questions, comments or any problem with this linker, do not hesitat to contact me. I will be glad to make improvements and, of course, correct any bug or disfunction.

The use of lk editor is at your own risk.

No copy of the registered version is permitted except for personal back-up. Any copy of the demonstration version MUST be a copy of the entire archive file unaltered in any way which ever it could be.

No commercial use can be provided by any one without the written and express consent of Alexis WILKE.

Credits

Programming	Alexis WILKE
Assemblers	BAsm V1.99 & DevPac© V2.00
Linker	lk©
Text Editor	CygnusEd© V2.12
Icons	Alexis WILKE & Patrik Lundquist
Documentation	AHelp© V1.00 & Icon® V8.00 & AmigaGuide® V39.11
Written by	Alexis WILKE
Some Corrections & Ameliorations by	Patrik Lundquist

Special thanks to the following people which helped me to provide the last touches to lk:
Michael van Elst
Patrik Lundquist
Ralph Schmidt

1.3 lk V1.04 - (Addrall)

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ADDRALL or -ma or -mw <value>
Default: no addresses

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

This instruction defines the address of the code hunk and set the SINGLEHUNK flag. This way one big block is saved with a static address.
Thank you to refer you to ADDRESS CODE and SINGLEHUNK.

See also:
ADDRESS
SINGLEHUNK
Become Registred

1.4 lk V1.04 - (Address)

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ADDRESS CODE or DATA or BSS <value>
Default: no addresses

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

This instruction defines an origin for the code, data and BSS hunks. This is especially nice for those which are making games, ROMs or Unix like links.
The memory requirements can not be taken in account in this case.

Each type of hunk is supposed to be unique. You can use the SINGLE instructions for this purpose. Any data which is read-only should be given within the CODE hunk. The special instruction ONEDATA will suppress the BSS hunks and link them within the data hunks. The special instruction SINGLEHUNK will create one hunk of code. No data neither BSS will exist in that last case.

When several hunks exist, they are supposed to be one after another into the resulting files. The address is computed that way. One file is created per hunk, those files receive the following extensions:

code: <file name>.c<value>
data: <file name>.d<value>
bss: <file name>.b<value>

where the <file name> is the destination file name and <value> is the hunk

```
number (in decimal.)
  Note: because your compiler may move some hunks, the hunk numbers might change
from one link to another.

  ADDRESS CODE <value>
    Defines the absolute address where the code will be loaded.

  ADDRESS DATA <value>
    Defines the absolute address where the data will be loaded.

  ADDRESS BSS <value>
    Defines the absolute address where the BSS hunk will be loaded.

  See also:
     ADDRALL
     ONEDATA
     SINGLE
     Become Registred
```

1.5 lk V1.04 - (Addsym)

```
                                                                    Page 11-3
                                    ADDSYM
                        Default: keep symbol tables and known debugs

  Create simple LINE debugs from the unit name and the missing symbols. This  is
also an equivalent to CREATESYMBOL and CREATEDEBUG both used at the same time.

  See also:
     ADDSYMBOL
     CREATESYMBOL
     KEEPDEBUG
     NOBSSDEBUG
     NOCODEDEBUG
     NODATADEBUG
     NODEBUG
     NOLIBDEBUG
     NOLOCALSYMBOL
     NOOVLDEBUG
     NOSYMBOL
     SETADVISORY
     Become Registred
```

1.6 lk V1.04 - (Advisory)

```
                                                                    Page 11-4
                                  CLEARADVISORY
                                   HUNKADVISORY
                                LEFTADVISORY or LA
                                   SETADVISORY
                              Default: HUNKADVISORY
```

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

SETADVISORY asks for the advisory bit. This instruction will force the advisory bit to be set in all hunks of the following object files, not taking in account the possible flags setting defined inside each hunks, until another advisory instruction appears.

The CLEARADVISORY instruction will clear that bit instead of setting it. HUNKADVISORY restores the normal state.

The LEFTADVISORY instruction enables you to suppress hunks from the object files having the advisory bit set. This instruction should not be used conjoined with any other advisory instruction.

This bit is used to create some kind of debug hunks (ignored by AmigaDOS and also the 'LoadSeg()' function.)

See also:
ADDSYM
CREATEDEBUG
CREATESYMBOL
KEEPDEBUG
NOBSSDEBUG
NOCODEDEBUG
NODATADEBUG
NODEBUG
NOLIBDEBUG
NOLOCALSYMBOL
NOOVLDEBUG
NOSYMBOL
STRIPDEBUG
Become Registred

1.7 lk V1.04 - (Alv)

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ALV or ALVS
Default: NOALV

lk is build to link codes of any sizes. You still may use the BSR and JSR/JMP d16(PC) instructions and lk will create a list of JMP instructions to handle those which are too large or defined between hunks. The usage of automatic-load vectors is usuly safe. Now you must know that works in hunks of code only and lk suppose that those hunks are read-only. If those two points are not respected, the change to have a bug to show up are high.
lk has a more powerful system than Slink to create the load vectors. For lk to produce less relocations in some cases.

When you link a small program, you should avoid ALV and save one or more passes into the reloc and reference tables.

You may use the command MAKERELATIVE if you want to create some relative BSR/BRA from JSR/JMP instruction. This will reduce the size of your relocation information. Now this instruction may generate a lot of bugs into your program.

Please refer to its documentation before to use it.

Note: the BSR.B instruction is supported, but it should never be used with an external pointer. And lk also supports the GenIm2 bug which generate the code $6xFF rather than $6x00.

See also:
MAKERELATIVE
NOALV
SMALLCODE
VALIDNOP
Become Registred

1.8 lk V1.04 - (Amigalibrary)

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AMIGALIBRARY or AL
Default: normal executable

NOTE: if this flag is set (or one of the LIBFD, LIBID, LIBPREFIX, LIBREVISION or LIBVERSION instructions is used,) lk supposes that you want to use the default 'library.o' file. Any file which contains the '_LibraryBase' symbol (XDEF) will replace the default lk object. lk will link that file as the first object and it must be of type code. If such symbol does not exist, lk will first check for 'LK:LIB/library.o', if that file does not exist, the internal one will be used instead. The default lk header file does not handle Slink or DICE required initialisations.
Another solution is to use the DEFINE instruction to forbid the usage of the default library with:

```
DEFINE _LibraryBase=0
```

This instruction supposes that you are creating an Amiga library (like those present into your LIBS: path.) lk will automatically generates the table list for the function jumps from the corresponding file description ('.fd' file.) The name of the '.fd' file will be defined with the LIBFD instruction or from the destination file name. The name of the library will be the destination file name.
If you have to define private functions into the file description, you should define them with the names 'private1', 'private2', etc... and use the DEFINE instruction to redirect them on your functions:

```
DEFINE private1=<my function1 name>
DEFINE private2=<my function2 name>
...
```

If you need to receive the parameters on the stack you will use LIBSTACKPARAM instruction. By default lk supposes that your functions receive registers.

The version and revision numbers of the library are defined through the instructions LIBVERSION and LIBREVISION. Those will also define the __LIBRARYVERSION and __LIBRARYREVISION symbols respectivly. Both values are used to define the library identification as well than the library version used to bump an open.

The string identification will be defined throught one of the COPYRIGHT or LIBID instructions. Only the copyright is required because the remained is

always generated by lk. If no copyright is defined, the default identification string is still created by lk.

If you use the default library header given with lk, you must define the following functions, and the variable '_LibraryBase' is available to you. This global variable contains the pointer of your library which does not need to be opened by again, and can always be used in replacement to the variable called 'mylib' given in any of the following functions. To avoid the usual auto-init/exit open/close code, you may add a definition when you link:

```
    DEFINE <lib base name>=_LibraryBase
```

like for instance:

```
    DEFINE _BOSBase=_LibraryBase
```

1. 'LibInit' which contains all necessary initialisations for your library. Its C proto-type is:

```
extern struct Library * _LibInit(
                                                    struct Library *mylib);
```

If you have nothing to create, just type:

```
long _LibInit(mylib)
   struct Library *struct;
   {
      return (mylib);
   }
```

This function must return the library pointer (mylib) to accept the library installation, otherwise return null (failed) and the complete library will be freed by the system. This function should avoid calls to other functions of the library.
If your compiler support register definition you may defines 'mylib' as register D0 (and A6 is SysBase.)

2. 'LibOpen' which contains the necessary initialisations for each new open intented by user. The system will increment the open counter by one when this routine does not fail. Its C proto-type is:

```
extern struct Library * _LibOpen(
                                                    struct Library *mylib);
```

If you have nothing to allocate, just type:

```
long _LibOpen(mylib)
   struct Library *struct;
   {
      return (mylib);
   }
```

This function must return the library pointer if the library has been opened with success.
If your compiler supports register definitions you may defines 'mylib' as register D0.

3. 'LibClose' which contains the necessary destructors. The system will decrement the open counter by one. Its C proto-type is:

```
extern BOOLEAN _LibClose(
                                                    struct Library *mylib);
```

If you have nothing to free, just type:

```
long _LibClose(mylib)
   struct Library *struct;
   {
      return (0);
   }
```

This function must return FALSE if the library does not have to be expunged. Do not forget that you cannot expunge your library until all users closes it (however the expunge code check the counter.)
If your compiler supports register definitions you may defines 'mylib' as A6.

4. 'LibExpunge' which contains the necessary destructors to free the library from memory. If this function is not defined lk assume that no expunge is available and the default LibExpunge will be used (it does nothing!) Its C proto-type is:

```
extern long _LibExpunge(
                                                struct Library *mylib);
```

If you have nothing to destroy, just type:

```
long _LibExpunge(mylib)
   struct Library *struct;
   {
      return (1);
   }
```

This function must return FALSE if the library cannot be expunged. Otherwise it will return any non zero value and the system expunge function will free the library memories (base and segment list.) The system expunge function automatically prevents the destruction while some users still access the library.
If your compiler supports register definitions you may defines 'mylib' as A6.

IMPORTANT:

In the LibInit() and LibExpunge() functions, you MUST avoid the usage of the DOS filer system, otherwise the Forbid()/Permit() of the system are lost and the system may crash.

See also:

COPYRIGHT
FDLIB
LIBFD
LIBID
LIBPREFIX
LIBREVISION
LIBVERSION
VERSION
Become Registred

1.9 lk V1.04 - (Anyrelative)

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ANYRELATIVE
Default: only code

Enable lk to generate some code for too large relatives founded in data hunks. This works only when MAKERELATIVE was specified.

See also:
MAKERELATIVE
Become Registred

1.10 lk V1.04 - (Arc)

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Archived Libraries

Note: before to read this, you have to know that you will need the tool "LhA" to be able to use the archive supports.

Because librairies are very big files, it takes a lot of rooms on your hard drive. If you want to save some space, you may archive all libraries. lk supports two different archive modes, and a mix of both:

1. one library by file, the name of the archive is the name of the library with the '.lib' changed into '.a'.

2. all librairies in one single file, the name of the archive must be 'libraries.a'.

3. a mix of both, single and multiple libraries; lk searchs for a single library archive at first, if it does not exist, the multiple libraries archive is scanned.

In any case, an archive file name can have one of the following extensions:

1. ".a" searched first
2. ".lha"
3. ".lzh" searched last

Because 'LhA' tool scan LHAOPTS, you can use that environment variable to add some flags.

There is nearly no change to do to use archived libraries:

1. archive your libraries; this is done by the use of "LhA" tool in a CLI; the archives will be put in one of the directories defined in the library paths;

   lha a <filename>.a <filename>.lib
   (single library)

   or

```
  lha a libraries.a <lib1>.lib <lib2>.lib ...
  (multiple libraries)
```

the starting small letter 'a' means add to the archive, you will refer to the archiver documentation for more information.

note: no path can appear inside the archive, otherwise the resulting files will not be found.

2. ensure that the device "T:" exists; this is usually an assign on "RAM:T" (T being a directory); it is better to have "T:" in a ram disk, while it would take a lot more time to uncompact a file and you would use hard disk space;

```
  assign T: RAM:T
```

3. change the extension of the libraries on your command lines or into your WITH files; also the '.lib' will become '.a'; libraries present in the commun file named 'libraries.a' will keep their original names (only the extension is changed) on command lines and WITH files, lk automatically makes the necessary transformations.

   note: your object libraries MUST have had the extension '.lib' because lk assumes it so. Of course you might just renamed them before to archive them.

Example:

If you use lk with Amiga functions, you probably use the 'amiga.lib' library. There are the steps to follow into your CLI to transform that library into an archived library:

```
[assign T: RAM:T]      ;if it does not exists

lha a lib:amiga.a [<path>]amiga.lib
```

or

```
lha a lib:libraries.a [<path>]amiga.lib
```

command line changed:

```
lk ... lib ... amiga.a ...
```

See also:
KEEPARC
LIBPATH
LIBRARY

1.11 lk V1.04 - (Archiver)

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ARCHIVER
Default: 'lha -q e '

If you use the archived library feature, you may want to use your own archiver rather than 'LhA'. This command enables you to define the archiver command line. This command line will have the file names added to it this way:

```
<archiver> <library name>  T:
```

1. The <archiver> is the startup of the command line that you define, including the necessary options.

2. The <library name> is the name of the archive file (Usually 'libraries.a'.)

3. The is the name of the file which has to be extracted, but it will appear only if the library name differ.

4. The 'T:' at the end is the destination directory.

Your archiver will have to support those file names in this order to be used with 'lk'. The default command line for 'LhA' is also:

```
'lha -q e '
```

Note: the space after the 'e' is very important and you may not put one if your archiver does not need it.

For more information about the archive feature of lk, please refer to~'Archived Libraries'.

See also:
- KEEPARC
- Archived Libraries
- Become Registred

1.12 lk V1.04 - (Askundef)

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ASKUNDEF
Default: process an error

This instruction make lk react in asking a value for undefined symbols. This will be a little be more like BLINK/SLINK does. It will execute the WARUNDEF command at the same time.

After this instruction is encountered, lk will wait on user to type a value for the each unknown symbol. The default will be zero for an absolute and '_stub' for a label.

See also:
- MAXREF
- WARUNDEF
- Become Registred

1.13 lk V1.04 - (Attributes)

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ATTRIBUTES <value>
Default: DEFAULT

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

Link all hunks of specified object files to be loaded in the given memory. This is done regarless of any information present in those file hunks. It will last with the next memory instruction (CHIP/DEFAULT/FAST or PUBLIC.) The value represent a combinaison of the memory attributes:

```
MEMF_ANY         ($00000000)

MEMF_PUBLIC      ($00000001)
MEMF_CHIP        ($00000002)
MEMF_FAST        ($00000004)

MEMF_LOCAL       ($00000100)
MEMF_24BITDMA    ($00000200)
MEMF_KICK        ($00000400)

MEMF_CLEAR       ($00010000)
MEMF_LARGEST     ($00020000)
MEMF_REVERSE     ($00040000)
MEMF_TOTAL       ($00080000)

MEMF_NO_EXPUNGE ($80000000)
```

Note: you should avoid the REVERSE bit while some exec.library are bugged and will crash the Amiga. The bits LARGEST and TOTAL are useless to allocates a buffer of memory.

Because this is a user specification, lk will not send any warning.

lk will change simple attributes into the commonly hunk definition available. This means the following will never appear:

```
MEMF_ANY         no memory flag used
MEMF_FAST        becomes FHNK_FAST
MEMF_CHIP        becomes FHNK_CHIP
```

This instruction can appear into the OVERLAY/END block.

See also:
- CHIP
- DEFAULT
- FAST
- <filename>
- HUNKMEMORY
- PUBLIC
- Become Registred

1.14 lk V1.04 - (Auto)

Auto-Initialisation
Auto-Exit

lk actually supports two types of intialisation and exit code. Those are from:
Slink
and
DICE

. Slink's autos:

This mode needs the use of the option SLINK.

To have auto-initialisation, SAS/C creates functions named __STI<function name> or @@_STI<function name> (The second one correspond to the same function called with registers not saved on the stack.) Those are called 'CREATORS.'
To have auto-exit, SAS/C creates functions named __STD<function name> or @@_STD<function name>. Those are called 'DESTRUCTORS.'
The code (or data) which needs those initialisation and exit functions is created into the same unit.
The disaventage of this method is to create a relocation pointer for each function. This has a high time and space cost. The following initialisation method does not have that disaventage.

The following example is an illustration of the functions of SAS/C. Note that's not a copy of it. Nothing oblige you to use those models.

To call each of those functions, you need a function called '___construct'. lk will create two lists one after another both terminated with a null pointer and before the first one a pointer to the '___construct' function will be saved. In C, the declarations are:

```
  int (*)(void) __ctors[];
  void (*)(void) __dtors[];

/* construct is called with ctors and dtors */
  extern int __construct(int (*)(void)[]);
```

with '__ctors[-1] == __construct'
and '__ctors[LASTFUNC + 1] == 0'

Example of the functions which will call '___construct':

```
int __init()
{
  return (__construct(_ctors));
}

int __exit()
{
  return (__construct(_dtors));
}
```

Of course you will have to call those two functions.

Example of '___construct' function:

```
int __construct(int (_tors*)(void))
{
  int r = 0;

  while(*_tors) {
/* This suppose destructors always returns 0 */
    if(!r) r = (*_tors)();
    _tors++;
  }

  return (r);
}
```

Note: SAS/C has a flag to know if the called functions are the creators or the destuctors.

The object file looks like:

```
  hunk_unit  <unit name>
  hunk_name  <hunk name>
  hunk_code  <680x0 code>
             (it could be a hunk of data)
  hunk_ext   <ext_def: user function(s)>
             and other externals
  hunk_end
  hunk_name  <init hunk name>
  hunk_code  <680x0 code>
  hunk_ext   <ext_def: __STI<user function>
             and other externals
  hunk_end
  hunk_name  <exit hunk name>
  hunk_code  <680x0 code>
  hunk_ext   <ext_def: __STD<user function>
             and other externals
  hunk_end
```

Note: there is no need to have STI/STD functions into another hunk of code, each function or hunk name can be different, some data or bss hunks can exist and any hunk can have the usual debug and symbols.

To ensure that the order is respected, the creators and destructors names can include a level. The creator function with the lower level will be called first and the higher level will be called last. For the destructor functions the order is inverted; functions with the lower level will be called last and functions with the higher level will be called first. When no level is included the default is used, also 30000. The level is a long word value. Functions with the same level are called in the order they were defined (Now lk does not garantie it.)

There is the generic syntax:

```
   __ST?[_]<value><user function name>
```

any number of underscore (_) may appear before the value.

Example of names:

```
  __STI3890_MyInit     (Called before defaults)
```

```
    @@_STD__81956_MyExit  (Called after defaults)
```

The initialisation function, in C, is declared as:

```
   extern int _STImyinit(void);
```

when a creator returns TRUE (a value other than null) following creators will not be called.

The exit function, in C, is declared as:

```
   extern void _STDmyexit(void);
```

with the default SAS/C '___construct' function all descriptors are always called, even the corresponding initialisation has never took place.

How to use it:

For instance, if you define a function which needs the IntuitionBase, you will write:

```
external void *Intuition;
...
  #asm
    MOVEA.L _Intuition(A6)
    JSR _LVOOpenWorkBench(A6)
  #endasm
...
```

Then the corresponding initialisation and exit will be:

```
void *Intuition;
_STI_OpenIntuition()
{
  Intuition = OldOpenLibrary
                                                    ("intuition.library");
  return (!Intuition);
}

void *Intuition;
_STD_CloseIntuition()
{
  if(Intuition) {
    CloseLibrary(Intuition);
    Intuition = (void *) 0;
  }
}
```

. DICE's autos:

This mode needs the use of the option BLOCKUNIT (and eventually CC.) The use of DICE is needed only if you use DICE object files.

dlink, to have auto-initialisation, uses the hunk names autoinit and autoexit. Those names might be modified as you want with lk, there is no restriction.

Because all hunks with the same name are linked together, all autoinit and autoexit will be. Those hunks will be found in the same unit than the function/data which needs to be initialized. You need to have one hunk for the user function or data, one hunk for the initialisation and one hunk for the exit code. To produce several levels, several names are used (like autoinit0, autoinit1, ...) The header will call each of those groups of hunks one after

another.

Actually DICE uses autoinit0, autoinit1, autoexit0, autoexit1 and autoconfig. The only problem in DICE is the file 'c.o' which have some relocation pointing to empty hunks. This could be avoided by creating hunks with NOP's instructions. Anyway lk handled them, but it needs the use of the option DICE.
The difference for DICE between the autoinits and autoconfig is that autoinits may fail.

The functions of initialisation or of exit does not have the usual RTS at the end. This also enable, with a single call, to execute all functions of a given level. To create that kind of hunks you may use DICE which enables initialisation and exit functions or use your prefered assembler. You will have to verify that your assembler finish your hunks of code with a NOP when your code is not long word aligned.

The last object file will also contains all init/exit hunks with that simple hunk of code which is the RTS. In DICE that file is the 'x.o' object. An RTS instruction will be used while initializing if you need to report a failure. DICE have a function named '__AutoFail' for this purpose.

Note: all hunks having one of those names must be of type code.

Example:

file 'c.a'

```
    ...
    JSR     _autoinit0
    BEQ     .error      ;Exit now
    JSR     _autoinit1
    BEQ     .error
    JSR     __main
    JSR     _autoexit0  ;The order is user choice
    JSR     _autoexit1
    ...
```

file 'myinit.a'

```
    LEA      _cnttable,A0
    MOVE.W  #$00FF,D0
.next
    MOVEQ   #$00,D1
    MOVEQ   #$07,D2
.cnt
    BTST.B  D2,D0
    BEQ.B   .iszero
    ADDQ.B  #$01,D1
.iszero
    DBF     D2,.cnt
    MOVE.B  D1,(A0)+
    DBF     D0,.next
                        ;<- NO RTS!
```

file 'x.a'

```
    RTS
```

```
  See also:
     BLOCKUNIT
     BLOCKHUNK
     CC
     DICE
     SLINK
     Become Registred
```

1.15 lk V1.04 - (Autochip)

```
                                                                Page 11-11
                                AUTOCHIP
              Default: no check on extensions '.oc' and '.chip'

  This enables lk to recognize the '.oc' and '.chip' extensions. Then  any  file
with those extensions will be linked with the chip memory  attribute.  See  also
the help file about CHIP instruction.

  See also:
     AUTOFAST
     AUTOFD
     AUTOLIBRARY
     AUTOOVERLAY
     CHIP
     Become Registred
```

1.16 lk V1.04 - (Autofast)

```
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                                AUTOFAST
              Default: no check on extensions '.of' and '.fast'

  This enables lk to recognize the '.of' and '.fast' extensions. Then  any  file
with those extensions will be linked with the fast memory  attribute.  See  also
the help file about FAST instruction.

  See also:
     AUTOCHIP
     AUTOFD
     AUTOLIBRARY
     AUTOOVERLAY
     FAST
     Become Registred
```

1.17 lk V1.04 - (Autofd)

```
                                                                Page 11-13
                                AUTOFD
                    Default: no check on extension '.fd'
```

This enables lk to recognize the '.fd' extension. Then any file with that extension will be used as an FD file to defines offsets. See also the FD instruction for more information.

See also:
AUTOCHIP
AUTOFAST
AUTOLIBRARY
AUTOOVERLAY
FD
Become Registred

1.18 lk V1.04 - (Autolibrary)

Page 11-14

AUTOLIBRARY or AUTOLIB
Default: no check on extension '.lib'
The option DICE, set the recognizion of '.lib'

This enables lk to recognize the '.lib' extension. Then any file with that extension will be used as a library file. See also the LIBRARY instruction for more information.

This option is automatically set when you use DICE. This is necessary because libraries and objects are given in any order.

See also:
AUTOCHIP
AUTOFAST
AUTOFD
AUTOOVERLAY
LIBRARY (LIB)
Become Registred

1.19 lk V1.04 - (Autooverlay)

Page 11-15

AUTOOVERLAY
Default: no check on extension '.ovl'

This enables lk to recognize the '.ovl' extension. Then any file with that extension will be used as an overlaid file. See also the OVERLAY instruction for more information.

See also:
AUTOCHIP
AUTOFAST
AUTOFD
AUTOLIBRARY
OVERLAY
The Overlays

Become Registred

1.20 lk V1.04 - (Autorun)

Page 11-16

AUTORUN or BACKGROUND
Default: no auto-detach

Asks lk to put a startup hunk to run the task. This means the task immediatly returns to the CLI. This is transparent (like inexistant) to your program and should also work with any other startup (like 'c.o'.)
If you want to create your own 'autorun' object file, save it into one of the library path. Now lk will automatically load it and put it at the beginning of the executable file (when AUTORUN command has been used, of course.) Please, refer to LIBPATH instruction for more informations about the default paths.
Note: to ensure that your own code will be linked at start, you have to use the

This function does not actually work when you are creating a library or using an overlaid program.

Note: this is not compatible to have a resident code working with this kind of autorun.

See also:
AUTOCHIP
AUTOFAST
AUTOFD
AUTOLIBRARY
LIBPATH
OVERLAY
Become Registred

1.21 lk V1.04 - (Block)

Page 11-17

BLOCKHUNK or BH
BLOCKUNIT or BU
Default: BLOCKHUNK

Enables the selection of the block size for the link.

A hunk block link means:
Any hunk which is needed from a library will be linked alone into the resulting file. If other hunks are present into the same unit, they will not be linked into the resulting file; accept if they have at least a reference, of course.

A unit block link means:
Any hunk which is needed from a library will be linked with the other hunks present in that unit. This is the usual way used to enable some auto-initialisation and auto-exit.

DICE and SLINK instructions automatically call the command BLOCKUNIT.

See also:
Auto-Init/Exit
CC
DICE
SLINK
Become Registred

1.22 lk V1.04 - (Bounds)

Page 11-18

BOUNDS "<...>" ...
Default: no bounds

Defines hunks which needs auto-bounds. For each of the specified hunk lk generates four symbols. Like you know, hunks of the same name are linked together. This way lk enables you to know where a specific hunk group starts and stops. Bounded hunks will not be linked with other list of hunks (The SMALLCODE, SMALLDATA and SMALLBSS are useless with them.) However, if you want one code, data or bss, you might link the result again.
There is the list of the generated symbols:

```
__START<hunk name>
__END<hunk name>
__SIZE<hunk name>       (long word size)
__BYTESIZE<hunk name>
```

This function might not work properly if you use one of the FRAG??? instructions.

Note: this instruction has been created to support the '_COVER' hunk of Slink. There are the necessary things needed to enable the programming of a COVER program:

```
BOUNDS "_COVER"
DEFINE __CoverStart=__START__COVER
       __CoverLength=__SIZE__COVER
                  or
       __CoverLength=__SIZE__COVER
```

See also:
Become Registred

1.23 lk V1.04 - (Break)

Page 11-19

BREAK [C][,[D]][,[E]][,[F]]
Default: BREAK C

Defines break controls. lk can be stopped by Control-C. You can also change

this default with BREAK command. The four AmigaDOS controls may be specified at a time or separatly.

The control letters are case insensitive. No letter means that no user break is possible.

See also:
Become Registred

1.24 lk V1.04 - (Bugs)

Page 5

Frequently Asked Questions ... and answers!
And the known bugs

Note: at anytime, if you think there is a problem you may make a first check using the WARNING instruction. This way you may discover a lot of strange things...

WARNING

It says lk was compatible to Slink and DICE, but I checked once without success!

lk has been build to replace any linker (other linker object files and documentations are welcome...) For this reason you need a preferences file to ensure one mode or another. This is available into 'LK:PREFS/' directory. You can simply rename (or copy) the needed file into: 'lk.prefs' and run your link again. Usuly the file 'lk.prefs' remains in 'LK:PREFS/' directory, but you may move that file into the directory from which you link.
Please refer to the specific linker for more detailed informations.

My file is bigger with SD (or SC) !

This may happend. The best way to make the smallest file than you can is not always to use SD. Some files will be smaller with only XDATA. lk is able to suppress zeroes at the end of each data hunk, but SMALLDATA force all hunks to be linked one after another. This means zeroes will be suppressed only in the last data hunk.
The best way to know the best solution is to check each one.

My resident crash or does not run properly:

You probably forgot to use the PURE flag. This flag will force lk to generate a table of relocation offset for the near data hunk. That table is saved at the end of the hunk (Note that it usuly starts where the BSS was.)
This table is needed if you use SAS/C 'cres.o' object file.
Because of this table, link an executable file with any option which change the data hunk organization may generate an invalid program.

The command line generates errors:

The command line is not completly compatible to any other linker. This would be hard to do so while each of them has a specific way to do that. Then please, refer to the documentation if you have any particuliar problem.

For instance Slink enable you to use any number of FROM or ROOT instructions. On my side I create a warning and files following the second FROM or ROOT will not be part of the link.

Automatic file type:

If you use the AUTOLIBRARY flag you should avoid the LIBRARY (and also LIB/-l) instruction. This will ensure you that the libraries are used in the given order.

The near data hunk:

Because lk tries to make its best in order to produce the smallest possible executable, the near data hunks may not be ordered like you thought. This is not a problem if you do not have to care about the DATA hunks order. This is the case most of the time.

Strange things happend when I installed QuickDOS!

This is possible. QuickDOS is used by lk in a special way which some times generates some kind of problems. Those might be a misfunction of patterns, or the impossibility to load the same file twice (which should not be useful.) Usuly this can simply be avoid with the use of QDSTOP keyword:

QDSTOP

Compatibility with DICE 2.06.35

The option '-frag' of dice will not split the autoinit and autoexit hunks. lk does not actually do that, it really split every hunks.

The NOEMPTYHUNK option will generate a wrong output file when you link with DICE object files. Those uses initilisation and exit code in a very special way and emptyhunks are necessary for that purpose (Note that no empty hunk is generated into the output file however.)

Compatibility with Slink of SAS any version

You may find some instructions which differ from Slink. All functions from Slink are available but all cannot be used the same way. There is a brief list:

- CHIP
- DEFINE
- FAST
- MAP
- MAXHUNK
- NODEBUG (Use STRIPDEBUG instead)
- OVERLAY/END
- PRELINK
- QUIET
- XREF

The overlays of lk are very specific to it-self and are for sure a lot more viable. If you had some overlaid executables, you may have some good suprises...

If you created your own startup file, you will probably have some trouble if you use the default preferences files 'slink.prefs'. This is due to the set-up available in that preferences file, it suppose that you use the default 'c.o' or another default SAS startup. Thank you to refer you to each instruction present into that preference file to see which are and which are not correct with your own startup file.

Compatibility Blink/Slink with SAS 4.xx

I know, because I worked out on that particular point, that lk may include the DATA long word '_DOSBase' within the BSS hunk. This means it will be cleared by the little loop which reset the BSS hunk. To be sure to avoid that bug you may clear the BSS hunk at the beginning of your 'c.a' file, before to open dos.library (like DICE does) or put another value than zero inside the DOSBase variable (which is an ugly technic) to be sure it will not be part of the BSS hunk.

This can happend because lk, to create XDATA hunks, does not take care of DATA/BSS hunks but check the end of the final hunks and check back cleared longs.

1.25 lk V1.04 - (Calm)

Page 11-20

CALM

Sets the warning level to the lk's default. The actual default is 5.

See also:
- NOWARNING
- QUIET
- WARNING
- WARNINGLEVEL
- Become Registred

1.26 lk V1.04 - (Caseinsensitive)

Page 11-21

CASEINSENSITIVE or CI
Default: symbols are case sensitive

Test symbols regardless of character case. Any letter with and without accent will be tested in upper case.

See also:
- HUNKCASEINSENSITIVE
- Become Registred

1.27 lk V1.04 - (Cc)

Page 11-22

CC
Default: does not accept multiple symbols

C compatible option enable lk to receive multiple label definition from libaries. No error is emited and the last definition is used.

This is set by lk when the option DICE is used in which case you should not type CC.

The instruction USELASTDEFINE will be used to change the usage mode of the C libraries.

In order to make lk compatible to Blink and Slink you have to type the following define on the top:

```
 DEFINE  _LinkerDB=__DATA_START
         __BSSBAS=__BSS_BASE
         __BSSLEN=__BSS_LENGTH
```

See also:
- DICE
- USELASTDEFINE
- Become Registred

1.28 lk V1.04 - (Chip)

Page 11-23

CHIP or -CHIP
Default: DEFAULT

Link all hunks of the following object files to be automatically loaded in chip memory. This is done regarless of any information present in the object file hunks. It will last with the next memory instruction (ATTRIBUTES/DEFAULT/FAST or PUBLIC.)
You may avoid the usage of the CHIP keyword using the AUTOCHIP command. Please, refer to that instuction.

Because this is a user specification, lk will not send any warning.

This instruction can appear into the OVERLAY/END block.

Note: this instruction is not an equivalent the the CHIP instruction of BLINK or SLINK or -chip of dlink. In this case only following files are moved to CHIP memory, until another memory specification appears.

See also:
- ATTRIBUTES
- AUTOCHIP
- DEFAULT
- FAST
- <filename>

HUNKMEMORY
PUBLIC
Become Registred

1.29 lk V1.04 - (Color)

Page 11-24

COLOR
Default: no color

Permit colours errors display.

Note: I love colors...

See also:
Become Registred

1.30 lk V1.04 - (Command)

Page 6

The command line

Please select one of the following points:

Automatic WITH File
Command Line Contents
Commentaries
Instructions Order
Preferences File

. Command Line Contents

A command line is a list of words. A word is a string of any character except spaces, tabulations, carriage return and line feed; a carriage return is taken as a space character and should be followed by a line feed. A special case exist: this is the the quoted words, which may contains spaces but no line feed.

Keywords are reserved and cannot be used as a file name. The pool of reserved keywords is supposed to grow in the future. Also you may write the name of your files between quotes to avoid any confusion with any upcoming version or release. To see all keywords actually available click on next line:

Keywords list

A file name or parameter is any word which is not a keyword. Any word explicitly written between quotes will never be used as a keyword. Available quotes are '...' or "...". Opposite cotes can be used inside the other ones. Quotes are useful if you need to use specific characters like a space or a sharp (#) sign.

Note that the following command line will be parsed as two words:

word1"word 2"

is also 'word1' and 'word 2'.

All keywords and file names are case insensitive. But the parameters may have to be written in upper and/or lower case.

. Instructions Order

The order of instructions on your command line is totally insignificant, except in one special case. See also:

FROM/ROOT keyword

The order of files might be very significant if you link C objects and libraries. The first file contains the startup and libraries must usuly be given in a specific order. Please, refer to the documentation of you C to know how it works.

. Commentaries

In your WITH files you may include some commentaries. Those are like in assembly language; starting with a semi-colon (;) and ending with the end of the line. The commentaries of your makefile are also supported; those start with a sharp (#) sign and end with the end of the line. Because the diese sign can be used for AmigaDOS patterns, it has to be followed by a space or a tabulation character to be taken as a commentary entry. A diese used alone (followed by a new line) will be taken as the end of the overlay section if you are listing overlaid file names; otherwise it is taken as a commentary (This is done this way to keep the compatibility with Slink.)

. Preference File

The name of the preference file can be defined through 'LK/PREFS' global variable or, when you start lk from the Workbench, 'PREFS' tool type (The tool type will overwrite the global variable definition.)

If none of those definition is given, or if files does not exist, lk uses the default preference file names (in the order it is searched):

lk.prefs
blinkwith (For Blink compatibility)

The preference file is searched and exectuted before anything else (even the command line!)

The preference file will be searched into all directories defined with the 'WITHPATH'. The default paths are:

. Current Directory
  (directory of lk icon from the Workbench)
. LK:PREFS/
. S:
. SLINKWITH:

Paths can be redefined into the variable 'LK/WITHPATH'. Please refer to the following instruction for more information:

WITHPATH

The file which is found by lk can contain all your defaults; like SC, SD and SB.

Note that the preference file can include WITH instructions, but those included files will be executed AFTER the command line. This can be used to always override some user instructions!

. Automatic WITH File

When lk is used without any arguments, it checks for a default WITH file. This

file is named 'Automatic WITH File'. lk searchs for one file only, its name is one of the following:

lkfile
lk.file
lk.with

lk searchs in this order. The first existing file will be used as a WITH file, if other files exists they are ignored. Like said above for the preference WITH file, each file is searched into the corresponding list of paths; see also:
The With Paths

1.31 lk V1.04 - (Copyright)

Page 11-25

COPYRIGHT or CR "<...>"
LIBID "<...>"
Default: no copyright

Define this executable copyright notice. The string will also be saved into the destination file with the version number when that one is defined.
This function also permit to the CLI function VERSION of Commodore to find a version into the final output.

When more than one copyright is given, then all of them are concatened one after another.

Example 1:
```
COPYRIGHT "$VER: lkopts 2.34 (21.6.94) by Alexis WILKE"
```

In this example I wrote everythings like I want it to appear into the executable file. In that case I did not use the instruction VERSION and no symbol VERSION (and RELEASE) does exist in any of my object files.
Note: the date is static.

Example 2:
```
TO lkopts
VERSION 2.34
COPYRIGHT "by Alexis WILKE"
```

will generate the version string:
```
"$VER: lkopts 2.34 (21.06.94) by Alexis WILKE"
```
Where the date if the date at the link time. In this second example you may add the instruction TIME to have the link time added into the string:
```
"$VER: lkopts 2.34 (10:53:23 21.06.94) ..."
```

The instruction LIBID is used the same way but will set the Amiga library flag. See the instruction AMIGALIBRARY to have all necessary informations.

See also:
AMIGALIBRARY
LIBREVISION
LIBVERSION
TIME
VERSION

Become Registred

1.32 lk V1.04 - (Createdebug)

Page 11-26

CREATEDEBUG or CD
Default: keep known debugs

Create simple LINE debugs from the unit name. This is useful to keep a track of the original units within the final file.

See also:
- ADDSYMBOL
- CLEARADVISORY
- CREATESYMBOL
- HUNKADVISORY
- KEEPDEBUG
- LEFTADVISORY
- NOBSSDEBUG
- NOCODEDEBUG
- NODATADEBUG
- NODEBUG
- NOLIBDEBUG
- NOLOCALSYMBOL
- NOOVLDEBUG
- NOSYMBOL
- SETADVISORY
- Become Registred

1.33 lk V1.04 - (Createlibrary)

Page 11-27

CREATELIBRARY or CL or PRELINK
Default: executable

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

Like FOR instruction, this flag can be used to force the generation of a '.Lib' file.

In that case, the library name will automatically be generated, using the FROM/ROOT or first object file name and changing extension with '.lib'. If any of your object file name is similar, a new extension will be concatened ('.obj'.)

See also:
- FOR
- SINGLEUNIT
- SMALLUNIT
- Become Registred

1.34 lk V1.04 - (Createsymbol)

Page 11-28

CREATESYMBOL or CS
or -S
Default: keep symbol tables

Create symbol hunk from XDEF definitions. This does not disturbe already existing symbols while a check is done to avoid any double symbol at the same address.

See also:
ADDSYMBOL
CLEARADVISORY
CREATEDEBUG
HUNKADVISORY
KEEPDEBUG
LEFTADVISORY
NOBSSDEBUG
NOCODEDEBUG
NODATADEBUG
NODEBUG
NOLIBDEBUG
NOLOCALSYMBOL
NOOVLDEBUG
NOSYMBOL
SETADVISORY
Become Registred

1.35 lk V1.04 - (Default)

Page 11-29

DEFAULT
Default: DEFAULT

Restart with the default mode; lk will also use the memory informations like defined in object files.
If you use the WITH instruction, you can be sure that none of ATTRIBUTES, CHIP, FAST or PUBLIC keywords are currently in effect.

This may be used after the keywords which disable default file names (lk does not recognize word(s) as a default object file name after some instructions, this is done to be sure you want that word to be taken as an object file.)

This instruction can also appear into the OVERLAY/END block.

See also:
ATTRIBUTES
CHIP
FAST
<filename>
PUBLIC
Become Registred

1.36 lk V1.04 - (Deficon)

Page 11-30

DEFICON
Default: NOICON
(DEFICON if lk is started from the Workbench)

Ask for the default icon when creating the destination file. If an icon already exists, it will not be replaced by the default icon. lk tries to pick-up default icons inside one of the directories defined into the icon path list. lk will look for one of the following icon:

Destination	Default Icon Name
AMIGALIBRARY	def_amigalibrary
ERRORFILE	def_errorfile
FD/FDLIB + FDOBJECT	def_library
FD/FDLIB + FDINCLUDE	def_text
FDHEADER	def_text
FDPASCAL	def_text
FOR (CREATELIBRARY)	def_library
LIST	def_list
TO (normal mode)	def_tool
(Used with ADDRESS)	def_binary
XREF	def_xref

Note: the "def_with" icon is used by lkopts© tool.

This command will be overridden by the ICON one.

See also:
ICON
NOICON
UNSNAPSHOT
Become Registred

1.37 lk V1.04 - (Define)

Page 11-31

DEFINE or DEF <label=symbol> or <label=value> ...
Default: see the list of internal symbols below

Add a declaration. This function may be used to declare an equivalent or to set a specific value dynamically. A value can be specified in decimal or hexadecimal. When you declare an hexadecimal value, you must start it with the dollar ($) sign.
When lk find a wrong value (Too large, with invalid digits.) the value zero will be used instead (No warning is generated!)

A label cannot start with the dollar ($) sign or any digit (0-9.) This equivalent will not generates a 'defined twice' error and will be used only when required (Which means, while this define is present in one of your object file, the one defined on command line remains useless.)

While those defines are not recursive, a define must be or a value or a symbol

which exist in your object files.

Labels are case sensitive except if CASEINSENSITIVE was specified.
lk has some intern variables. Those are:
(Note: all DATA and BSS variables are defined with only the relative data. Other DATA and BSS hunks are not considered.)

__autostartup
This label is automatically defined when required. It points on the first hunk of code (except where it has a reference) found or to the startup label when it has been given. This enables a startup code like those of 'priority.o' or 'stack.o'.

__BSS_BASE
Defines the pointer at the beginning of the BSS block. This is equal to the sum of __DATA_BASE and __DATA_LENGTH.

__BSS_LENGTH
Defines the total length of the BSS block.
(This length is given in long words)

__COPYRIGHT
The COPYRIGHT (or LIBID) instruction generate that symbol as being a pointer on the automatically created string identification. You can use it as you like.

__DATA_BASE
Defines the pointer at the beginning of the DATA block.

__DATA_BYTESIZE
Defines the total length of the near DATA block includind the BSS block. This is the sum of __BSS_LENGTH and __DATA_LENGTH. This length is given en byte.

__DATA_LENGTH
Defines the length of the DATA block.
(This length is given in long words)

__DATA_OFFSET
Defines the offset for (An) to access DATA buffer. You may fix its value with the OFFSET command.

__DATA_POSITION
Defines the position for (An) from the beginning of the buffer. If you use the instruction OFFSET, you must first negate the value (__DATA_POSITION = - __DATA_OFFSET.)

__DATA_SIZE
Defines the total length of the near DATA block including the BSS block. This is the sum of __BSS_LENGTH and __DATA_LENGTH.
(This length is given in long words)

__DATA_START
Defines the pointer needed for An. This is also the sum of __DATA_BASE and __DATA_OFFSET.

__ISDICE

Is TRUE (1) when the keyword DICE was used, otherwise its FALSE (0).

__ISPURE
Is TRUE (1) when the keyword PURE was used, otherwise its FALSE (0).

__ISSLINK
Is TRUE (1) when the keyword SLINK was used, otherwise its FALSE (0).

__LIBRARYPRIORITY
Takes the value given through the LIBPRIORITY instruction. This symbole can be used to automatically define the Amiga library priority.

__LIBRARYREVISION
Takes the value given through the LIBREVISION instruction. This is to support the compatibility with Slink. This symbol is always define and receive the value 0 by default.

__LIBRARYVERSION
Takes the value given through the LIBVERSION instruction. This is to support the compatibility with Slink. This symbol is always define and receive the value 0 by default.

__NEGATIVESIZE
Negative size for shared Amiga libraries. This is the number of function multiply by 6. Note that from V36 of Exec, libraries are automatically long word justified and this value might be wrong by 2. It's preferable to use the system defined value which is saved in LIB_NEGSIZE.

__NUMCTORS
Total number of constructors.
(Valid only when the instruction SLINK was used)

__NUMDTORS
Total number of destructors.
(Valid only when the instruction SLINK was used)

__NUMFUNCS
This symbol contains the number of functions available into a shared Amiga library.

PRIORITY
Symbol created when the PRIORITY keyword is used, please refer to that command for more information.

REVISION
Symbol created when the VERSION keyword is used, please refer to that command for more information.

__STACKSIZE
Symbol always available. By default set to 4096 and modified via the instruction STACKSIZE.

VERSION
Symbol created when the VERSION keyword is used, please refer to that command for more information.

See also:
CASEINSENSITIVE
LIBREVISION
LIBVERSION
OFFSET
PRIORITY
PURE
SLINK
STACKSIZE
Become Registred

1.38 lk V1.04 - (Dice)

Page 11-32

DICE
Default: normal link

DICE compatible option enable lk to link dice objects. This does not make lk 100% compatible. DLINK is really very special... Note that file with '.lib' extension will automatically be linked as library files, the option AUTOLIBRARY is not necessary.

This option automatically set the CC flag for you. Anyway you have to use all the following instruction to make a dice link:

```
DICE        ALV
SMALLCODE   SMALLDATA
OFFSET -$7FFE
DEFINE   __DATA_BAS = __DATA_BASE
         __DATA_LEN = __DATA_LENGTH
         __BSS_LEN  = __BSS_LENGTH
         __RESIDENT = __ISPURE
```

The instruction USELASTDEFINE will be used to change the usage mode of the C libraries.

See also:
Auto-Init/Exit
BLOCKHUNK
BLOCKUNIT
CC
SLINK
USELASTDEFINE
Become Registred

1.39 lk V1.04 - (Drel2reloc)

Page 11-33

DREL2RELOC

lk, by default, uses all DREL hunks as relative offset to the data hunk. However SAS/C does not do the same. Then I had to implement this instruction to

fulfill the compatibility with SLINK linker.
When this instruction has been used, lk transforms all HUNK_DREL32 in HUNK_ABSREF32 (relative in absolute.)

The usage of this instruction is really not adviced if you are not using SAS/C, this could cause link errors.

See also:
SLINK
Become Registred

1.40 lk V1.04 - (Echo)

Page 11-34

ECHO "<...>" ...
Default: nothing

Print the following names/strings into the output until another lk keyword is encountered.

See also:
Become Registred

1.41 lk V1.04 - (Error)

Page 7

lk errors

Table of Contents

001- *** INTERNAL ERROR ***
002- Out of memory.
003- Undefined reference '<symbol name>'. <type>
004- No hunk of type code. Cannot create a valid executable.
005- Not a hunk code at start. Use TEXT hunk as first hunk.
006- Hunk at start is not of type CODE ($03E9). Get following hunk.
007- Two hunks named '<hunkname>' have different type and/or memory and will not be linked together. (In files: "<filename>" and "<filename>")
008- Hunk with CHIP and hunk with FAST requirements are linked together.
009- Some errors occur during cross reference check.
010- Cannot create destination file '<filename>'.
011- Error while writing in destination file '<filename>'.
012- Relative XDEF defined across different hunks.
013- Relocation offset <symbol name> out of bounds.
014- Relative offset <symbol name> out of bounds.
015- Odd offset in reloc 16/32.
016- Found relative relocation.
017- Error while checking object files.
018- '<filename>' is not an object or executable file.
019- File '<filename>' is invalid (Error at position: <value>.)
020- Only ONE executable file can be specified.
021- Some dirty bytes remains at the end of file '<filename>'.

```
022-  Cannot create a library from executable file.
023-  Resident libraries no longer supported by Commodore Amiga (Name:
    "<libraryname>")
024-  Absolute value '<symbolname>' is defined as $<hexvalue> in file
    "<filename>", and as $<hexvalue> in file "<filename>"
025-  Absolute/Define '<symbolname>' conflict in files '<filename>' and
    "<filename>".
026-  Define/Absolute '<symbolname>' conflict in files '<filename>' and
    "<filename>".
027-  Definition '<symbolname>' defined twice in files '<filename>' and
    "<filename>".
028-  Absolute '<symbolname>' defined twice in files '<filename>' and
    "<filename>".
029-  Symbol '<symbolname>' from file '<filename>' have an unknown type.
030-  Error while parsing command line/file(s).
031-  Skip unknown keyword '<keyword>'.
032-  Only one root available per executable file (<filename>/<filename>).
033-  Destination defined twice (<filename>/<filename>).
034-  Overlay in overlay.
035-  Overlay object defined twice '<filename>' (Keep <filename>.)
036-  Closing overlay without overlay.
037-  Bad label definition '<label>'.
038-  External file defined twice (<filename>/<filename>).
039-  <flag name> flag defined twice.
040-  Two startup definitions. The startup is '<startup 2>' ('<startup 1>'.)
041-  OFFSET for relative data hunk is defined twice. The offset is <value>
    (<value>.)
042-  OFFSET <value> is odd.
043-  The PC-Relative of <value> bits '<symbol name>' uses an absolute value.
044-  The absolute '<symbol name>' of <value> bits uses a PC-Relative.
045-  Invalid hunk number in relocation table.
046-  Invalid reloc to a zero length hunk '<hunkname>'.
047-  Can not find '<symbol name>' symbol of startup definition.
048-  lk made a relative instruction at offset $<value>.
049-  Two relocations at the same position.
050-  No '___construct' symbol for '___ctors' and '___dtors' calls.
051-  Unknown instruction '<instruction>' in FD file <filename> at line
    #<value>.
052-  No ##public or ##private instruction before line #<value> in FD file
    <filename>.
053-  Base value missing in FD file <filename> at line #<value>.
054-  Invalid base name in FD file <filename> at line #<value>.
055-  Symbol table size defined twice (Size is <value>).
056-  Symbol table size to small (Defaulted to <value>).
057-  Reloc table size defined twice (Size is <value>).
058-  Reloc table size to small (Defaulted to <value>).
059-  Reloc table size to large (Defaulted to <value>).
060-  Hunk table size defined twice (Size is <value>).
061-  Hunk table size to small (Defaulted to <value>).
062-  Hunk table size to large (Defaulted to <value>).
063-  No object file specified.
064-  Overlays are forbidden in library files.
065-  NODEBUG and CREATESYMBOL cannot be used together. Only NODEBUG is keept.
066-  No root file defined. Cannot generate file.
067-  Error while opening/reading file '<filename>'.
068-  File '<filename>' skipped (Empty).
069-  Code hunk transformed and saved as BSS.
```

070- Data hunk transformed and saved as BSS.
071- Code hunk (#<hunknumber>) truncated at <length> bytes and saved as XCODE.
072- Data hunk (#<hunknumber>) truncated at <length> bytes and saved as XDATA.
073- Invalid overlay header object file.
074- More than one file match, keep '<filename>' (Skip: '<filename>').
075- No match for '<filename>' pattern.
076- No HUNK_CODE to jump to from overlay header.
077- File name missing.
078- Wild character(s) used for single file purpose (In: '<filename>').
079- Destination name will be '<filename>'.
080- Two defines with the same name '<symbol>'.
081- NOLOCALSYMBOL is useless when NOSYMBOL is specified.
082- Bad FD function declaration at line #<value>.
083- No library name given in FD file at line #<value>.
084- Cannot create external file named '<filename>'
085- Bad break letter (Only C to F are valid).
086- Width too small. The minimum will be used (<value>).
087- Width too large. The maximum will be used (<value>).
088- Unknown width keyword.
089- Height too small. The minimum will be used (<value>.)
090- Height too large. The maximum will be used (<value>.)
091- Unknown margin keyword.
092- Invalid margin value. It must be defined between 0 and 255 included.
093- Bad map letter (See documentation.)
094- Base name defined twice in FD file at line #<value>.
095- No base defined in FD file at line #<value>.
096- References '<symbol name>' defined with two different types ($<value> and $<value>.)
097- COLOR flag defined twice.
098- The base offset is not a multiple of 6 in FD file at line #<value>.
099- Base value overflow in FD file at line #<value>.
100- Left/Right members differ for function <function name> in FD file <filename> at line #<value>.
101- Invalid DREL32 in executable file.
102- Invalid debug skipped.
103- Different memory flags in header and hunk.
104- Hunk type conflict for relative links in file '<filename>' (CODE/DATA).
105- No library hunk before HUNK_INDEX.
106- No overlay header needed without overlay.
107- Math conflict between hunks.
108- Integer conflict between hunks.
109- Bad hunk for executable file. It contains memory informations.
110- Two overlay object handlers defined.
111- Libraries should not be defined in overlay.
112- The overlay link '<label name>' not within a hunk of code.
113- lk cannot work with odd pointer with your CPU.
114- Relative relocation not in a CODE hunk. No ALV possible.
115- The overlay link '<label name>' is used with an unknown instruction.
116- Relative relocation '<symbol name>' uses an unknown instruction. lk cannot create an ALV.
117- Hunk too large to create an ALV for '<symbol name>' (<offset>.)
118- Unknown address keyword.
119- No destination file deleted while some errors occur.
120- BSS hunk has some relocation information in file: '<file name>'.
121- Address $<hexa value> is odd.

122- The code header was moved during relative organization.
123- Icon file name defined twice (<file name>/<file name>).
124- <file name> is not a valid icon file name.
125- Fragmented <type> can not be SMALL or SINGLE...
126- Hunk of type CODE named '<hunk name>'. This hunk will not be merged this way.
127- Invalid entry hunk '<hunk name>'. Not of type CODE.
128- Multiple entry hunks, skip the last ('<hunk name>'.)
129- Entry hunk can not be in an overlay ('<hunk name>'.)
130- Be careful, MAKERELATIVE may create an invalid program.
131- Overlay handler found in overlay hunks ('<hunk name>'.)
132- ONEDATA should be used with [CLEAR]XDATA and SMALLDATA.
133- Auto-Run is not allowed with overlaid program.
134- Symbol '<symbol name>' defined into library '<library file name>' and object "<object file name>".
135- The symbol '<symbol name>' is already defined, lk can not create the array.
136- Error file name defined twice (<file name>/<file name>.)
137- Relocation(s) pointing on the near data hunk.
138- The relative '<symbol name>' is defined in a hunk of code.
139- Overlaid file with a corrupted first header.
140- Overlay hunk number larger than indicated in first header.
141- lk found more hunks than indicated in first header.
142- Invalid overlay table size.
143- The number of overlaid unit changed.
144- From/Root '<file name>' should not be defined in overlay.
145- Value missing for '<keyword>' instruction.
146- Label '<symbol>' is undefined, lk cannot create the Slink array.
147- All of the relative DATA/BSS hunks have not the same memory requirements.
148- String missing for '<keyword>' instruction.
149- List file name defined twice (<file name>/<file name>.)
150- '<file name>' is not a valid FD file (line #<value>.)
151- Create an ALV for '<symbol name>' symbol.
152- Two library definition files defined (<file name>/<file name>.)
153- Two library prefix defined (<prefix>/<prefix>.)
154- Invalid icon type (Type: '<type name>'.)
155- This file is not an icon.
156- Invalid stack size, the minimum required is <value>.
157- The value <value> is not a valid priority (Bounds -128 and 127.)

001- *** INTERNAL ERROR ***

When this error happend my algorithm is wrong in some places and should be reviewed. This can be called a bug!

002- Out of memory.

Not enough memory for link purpose. This may happen on small memory systems.

003- Undefined reference "<symbol name>". <type>

A needed reference cannot be satisfied. Four cases may occur:

1. This message is an error, lk will not save the result and also forget about that reference. If you use the WARUNDEF command this error will become a warning.
   (<type> = <nothing>)
2. The reference is used with a Bcc/JSR/JMP instruction and a default '_stub' function exist.
   (<type> = Use the "_stub" function.)
3. The reference is used with a Bcc/JSR/JMP instruction and no default '_stub' function exist.
   (<type> = Create a "_stub" function.)
4. The reference is used with another instruction.
   (<type> = Use absolute value $00000000.)

The '_stub' function is nothing more than:

```
        XDEF    _stub

_stub   MoveQ   #$00,D0
        Rts
```

or

```
    extern _stub;

    int _stub()
    {
        return 0;
    };
```

This error is usuly followed by a large number of references. If you want to limit that list of references, use the instruction MAXREF.

See also:

MAXREF
WARUNDEF

004- No hunk of type code. Cannot create a valid executable.

AmigaDOS have to find a hunk of type CODE at start of any executable file. Also lk will not create a file which cannot be loaded by AmigaDOS.
Note that this error will occur only if all of your files contain DATA and/or BSS hunks only.

005- Not a hunk code at start. Use TEXT hunk as first hunk.

The first file should contain a hunk of type CODE at start. When this is not the case, lk will search through each hunk to find a hunk of type CODE and named TEXT. This will become the CODE header.
The test of the hunk name is case insensitive.

006- Hunk at start is not of type CODE ($03E9). Get following hunk.

The first file should contain a hunk of type CODE at start. When this is not the case, lk will search through each hunk to find the first hunk of type CODE. This will become the CODE header.

007- Two hunks named "<hunk name" have different type and/or memory and will not be linked together. (In files: "<filename>" and "<filename>")

Because each hunk receives its own name, you can give two hunks the same name. All hunks with the same name are automatically linked togehter, while they are of similar type and the memory requirements are equivalent.
If this error occur, you should change the name of one of your hunks.

008- Hunk with CHIP and hunk with FAST requirements are linked together.

When one of the SINGLE commands is invoked, this warning may happen. To avoid this warning use SMALL command instead.
The instruction SINGLE was keept because in a lot of cases it may not generates any error. Anyway this is not the best way to link hunks together.

009- Some errors occur during cross reference check.

When some errors occur, the process is stopped. You should therefor correct errors and rerun lk.

010- Cannot create destination file "<filename>".

Any DOS error may happen, bad path, invalid file name, file already in use, etc... Check those errors and try again.

011- Error while writing in destination file "<filename>".

This should happen only when your disk have some bad blocks or is full.

012- Relative XDEF defined across different hunks.

A symbol is defined into a hunk and refer to another. This will happen only when a relative define is encountered.
In the future this may disappear because lk may have the ability to automatically create some JMP instructions.
For some C compiler, you may have to use a large model.

013- Relocation offset "<symbol name>" out of bounds.

Recompile, regenerate your file and try again! If this error occur again, delete your assembler/compiler/... it fails.

014- Relative offset "<symbol name>" out of bounds.

A relative symbol refer to a position to far to enable a consistant definition.
This may be overriden by lk in some cases which are branchements and JSR/JMP relative to PC. In thoses cases you can use the ALV instruction, knowing that

may generates some bugs.
For some C compiler, you may have to use a large model.

See also:
ALV

015- Odd offset in reloc 16/32.

Recompile, regenerate your file and try again! If this error occur again, delete your assembler/compiler/... it fails.

016- Found relative relocation.

This warning tells you when some relative symbols exist.

017- Error while checking object files.

When an error occur while lk is checking object files, this message will arrive at last and stop the process.
You will have to correct all errors and rerun lk.

018- "<filename>" is not an object or executable file.

<filename> must be a valid object file, or an executable.

019- File "<filename>" is invalid (Error at position: <value>.)

<filename> seems to be an object or an executable file but contains some bad information or hunks not supported by lk. The position gives you where the error occured into the file.

020- Only ONE executable file can be specified.

When lk is invoked to delete debug/symbols or link hunks all together into an executable, only one file can be specified.

021- Some dirty bytes remains at the end of file "<filename>".

The file is taken, but one to three unknown bytes were founded at the end.

022- Cannot create a library from executable file.

Libraries need to have references which are not present in executable files.
This may change in the future when some debug and/or symbol tables exist.

023- Resident libraries no longer supported by Commodore Amiga (Name: "<libraryname>")

In old object files some resident library may be founded and deleted by lk.

024- Absolute value "<symbolname>" is defined as $<hexvalue> in file "<filename>", and as $<hexvalue> in file "<filename>"

An absolute is defined twice with two different values. This error shows you the symbol name and in which files it can be founded.
One of the absolute should be deleted or both should receive the same value (In this case you will still be prompted by a warning.)

025- Absolute/Define "<symbolname>" conflict in files "<filename>" and "<filename>".

A symbol was used as an absolute and as a define value. The file names define the sources, where you will have to modify one of those symbols at least.
The first file contains the absolute, the second the define (Note: in this case the absolute was founded first.)

026- Define/Absolute "<symbolname>" conflict in files "<filename>" and "<filename>".

A symbol was used as an absolute and as a define value. The file names define the sources, where you will have to modify one of those symbols at least.
The first file contains the define, the second the absolute (Note: in this case the define was founded first.)

027- Definition "<symbolname>" defined twice in files "<filename>" and "<filename>".

The same symbol was used for two different functions. This will occur even that symbol is unused. You will have to modify one of the two specified files at least.

028- Absolute "<symbolname>" defined twice in files "<filename>" and "<filename>".

The same symbol was defined in two files. This will occur even that symbol is unused. You will have to modify one of the two specified files at least.
Note that this error will not occur if you do not forbid multiple absolute definition.

See also:

NOMULTIPLE

029- Symbol "<symbolname>" from file "<filename>" have an unknown type.

Supported types are EXT_DEF and EXT_ABS for definitions and EXT_REL32, EXT_REL16, EXT_REL8 and EXT_COMMON for relocation.
The EXT_DEXT8, EXT_DEXT16 and EXT_DEXT32 types are enable if only a hunk named data exists or one hunk of type DATA results.
Any other type will generate this error and the link process will end up.

030- Error while parsing command line/file(s).

This error may occur while a bad command line or a WITH file line generated an error, or because one of the specified files was unreadable.
Note that empty source files will generates an error.

031- Skip unknown keyword "<keyword>".

Some keywords (Like VERBOSE) cannot be followed by anything else than another system keyword. If this was a file name also you should add DEFAULT keyword to enable lk to know about it.

032- Only one root available per executable file (<filename>/<filename>).

Because lk cannot choose between two files, this error will let you know which file should be the right root.

033- Destination defined twice (<filename>/<filename>).

Because lk cannot choose between two files, this error will let you know which file should be the right destination.

034- Overlay in overlay.

Only one overlay can be created at a time.

035- Overlay object defined twice "<filename>" (Keep <filename>.)

Only one object file can be given as being the overlay handler. You will have to select the one you want.

036- Closing overlay without overlay.

One overlay can be opened at a time, then only one can be closed. You will have the suppress this second end.

037- Bad label definition "<label>".

The define syntax was not fully respected. Check DEFINE instruction for more information.

See also:

DEFINE

038- External file defined twice (<filename>/<filename>)

Because lk cannot choose between two files, this error will let you know which

file should be the right external.

039- <flag name> flag defined twice.

This warning can be avoid using QUIET instruction. lk will display a warning for a lot of flags, while some of them might not be used somewhere.

040- Two startup definitions. The startup is "<startup 2>" ("<startup 1>".)

The startup name is defined twice and differ. lk will take the last definition ("startup 2" also.)

041- OFFSET for relative data hunk is defined twice. The offset is <value> (<value>.)

The relative data hunk usuly receive an automatic offset. This means the offset may change with your object between several links. To avoid the offset to change you may use the OFFSET instruction once.

042- OFFSET <value> is odd.

The offset for relative data hunks is odd and may cause some problems for 68000/010/012 CPUs...

043- The PC-Relative of <value> bits "<symbol name>" uses an absolute value.

With old linker and assembler, no reference type distinction could be made for 16/8 bits symbols. On V37 and over Commodore added the EXT_ABSREF16 and EXT_ABSREF8. Anyway lk will support both of them correctly making a warning to prevent you of an eventual mistake.

044- The absolute "<symbol name>" of <value> bits uses a PC-Relative.

With old linker and assembler, no reference type distinction could be made for 16/8 bits symbols. On V37 and over Commodore added the EXT_ABSREF16 and EXT_ABSREF8. Anyway lk will support both of them correctly making a warning to prevent you of an eventual mistake.

045- Invalid hunk number in relocation table.

Hunk number must refer to an existing hunk, an overflow (a number too large) will generate this error. The current hunk will be used instead.

046- Invalid reloc to a zero length hunk "<hunkname>".

The hunk offset is not null but point into a zero length hunk.

047- Can not find "<symbol name>" symbol of startup definition.

You gave a symbol name for lk to use as the startup code, but that name is not available in any of the linked object files.

048- lk made a relative instruction at offset $<value>.

This warning gives you an information which might be useful if you want to correct the instruction into your sources. Anyway this can easiely be forgotten.

049- Two relocations at the same position.

When relocation tables are sorted, this error will tell you that thoses tables are invalid.

050- No "___construct" symbol for "___ctors" and "___dtors" calls.

When compiling a SAS/C 6.xx program you need to have some constructors and destructors. To call those functions, you need the '___construct' function. This error may happen because you forgot to include 'sc.lib' into your command line or WITH file.

051- Unknown instruction "<instruction>" in FD file <filename> at line #<value>.

This warning tells you about skipped instructions in an FD file.

052- No ##public or ##private instruction before line #<value> in FD file <filename>.

lk cannot decide if the first encountered function has to be public or private. An instruction ##public or ##private must be added before any function.

053- Base value missing in FD file <filename> at line #<value>.

After the instruction ##bias a value must appear to define the library first offset. The increment is 6. Note that the physical value is -30 but the fd files contain 30.

054- Invalid base name in FD file <filename> at line #<value>.

The name of the library is not valid (bad characters, end of file, etc...)

055- Symbol table size defined twice (Size is <value>).

Because only one size can be used, the first size (Which is here displayed) will be keept.

056- Symbol table size to small (Defaulted to <value>).

A minimum value (for internal reasons) have to be used.

057- Reloc table size defined twice (Size is <value>)

Because only one size can be used, the first size (Which is here displayed) will be keept.

058- Reloc table size to small (Defaulted to <value>).

A minimum value (for internal reasons) have to be used.

059- Reloc table size to large (Defaulted to <value>).

A maximum value (for internal reasons) have to be used.

060- Hunk table size defined twice (Size is <value>).

Because only one size can be used, the first size (Which is here displayed) will be keept.

061- Hunk table size to small (Defaulted to <value>).

A minimum value (for internal reasons) have to be used.

062- Hunk table size to large (Defaulted to <value>).

A maximum value (for internal reasons) have to be used.

063- No object file specified.

No object/executable file, lk cannot do anything.

064- Overlays are forbidden in library files.

A library is just a list of unit/hunk with references. This cannot include an overlay hunk which is valid only in an executable file.

065- NODEBUG and CREATESYMBOL cannot be used together. Only NODEBUG is keept.

This warning can be avoid by deleting one of the instruction CREATESYMBOL or NODEBUG.

066- No root file defined. Cannot generate file.

You may have some library/overlay files defined, but stil no consistant objects. Try to give some object files to lk!

067- Error while opening/reading file "<filename>".

This file is unreadable. This may occur when a low amount of memory is actualy available. Otherwise check the filename and path or access validity.

068- File "<filename>" skipped (Empty).

An empty file will only generates this warning. Anyway you may avoid to use empty files as object files.

069- Code hunk transformed and saved as BSS.

lk founded a hunk of type code which contains only zeroes.
(This should never be true?!?)

070- Data hunk transformed and saved as BSS.

lk founded a hunk of type data which contains only zeroes. A single BSS hunk (8 bytes) will be created replacing data hunk. The function modifying hunks take care of eventual relocation.

071- Code hunk (#<hunknumber>) truncated at <length> bytes and saved as XCODE.

The end of this hunk of type CODE contains only zeroes and is not saved in resulting file. The hunk number and length may enable your code to clear that remainder. Any relocation will forbid a such truncation.

See also:
XCODE

072- Data hunk (#<hunknumber>) truncated at <length> bytes and saved as XDATA.

The end of this hunk of type DATA contains only zeroes and is not saved in resulting file. The hunk number and length may enable your code to clear that remainder. Any relocation will forbid a such truncation.

See also:
XCODE

073- Invalid overlay header object file.

Your overlay header file is not valid. It must have a HUNK_CODE at start, a reference to '_ovl_root' function, an export to '_ovl_call' function and an overlay table at start ($0000ABCD.)

See also:
OVERLAY/END

074- More than one file match, keep "<filename>" (Skip: "<filename>").

For some instructions, only one file name can be specified. But, because the file name can contains some wildcards, more than one file may match and only the first one will be loaded.

075- No match for "<filename>" pattern.

This error will be display rather than the error '067' when you are working with version V36.00 or more of AmigaDOS.
See also:
067- Error while opening/reading file '<filename>'.

076- No HUNK_CODE to jump to from overlay header.

The overlay header should not be the complete program. Then another hunk of type CODE must exist to enable lk to create a reloc to that code.

077- File name missing.

Some instruction needs to be followed by a file name. This prevent some command line mistake (Because a file name, when equivalent to a keyword, must be written between cotes.)

078- Wild character(s) used for single file purpose (In: "<filename>").

This warning will be displayed each time some wildcards are used with an instruction which can receive only one file.

079- Destination name will be "<filename>".

When a problem occur creating destination file name (Usuly because an object file have the same name), the destination name will be displayed.

080- Two defines with the same name "<symbol>".

While you are defining some define with the DEFINE/VERSION instructions, this error will prompt you for double definition and a modification will have to take place.

081- NOLOCALSYMBOL is useless when NOSYMBOL is specified

While NOSYMBOL deletes all symbols, NOLOCALSYMBOL is really unneccessary. Suppress NOLOCALSYMBOL or NOSYMBOL to avoid this warning.

082- Bad FD function declaration at line #<value>.

A function declaration is defined with:

function name

```
    parameter list
    register list
    cariage return
```

The parameter list MUST have the same number of parameters than the number of registers defined into the register list.
Any name (function and parameter) can contain any letter (Upper and lower case) plus the underscore (_) sign. The parameters should be separated only by a coma (,) and the registers can be separated by a coma (,) or a slash (/). The slash is used to define registers which could be extract from the stack with a 68000 MOVEM.L instruction.

083- No library name given in FD file at line #<value>.

After the instruction ##base a name must appear to define the library name.

084- Cannot create external file named "<filename>"

Check the path and file name validity, and rerun lk.
lk will try to create the external references file when its completly finishing with all checking, whenever an error occur during check processing this file will be created.

085- Bad break letter (Only C to F are valid).

When you change the break controls, only the four DOS break letters may be specified. Change the following string.

086- Width too small. The minimum will be used (<value>).

The width of a line have some restiction to enable lk to run finely. This warning will prompt you if you are asking for a too small width.

087- Width too large. The maximum will be used (<value>).

The width of a line have some restiction to enable lk to run finely. This warning will prompt you if you are asking for a too large width.

088- Unknown width keyword.

WIDTH instruction may be followed by one the next keywords:

```
      OBJECTNAME
      UNITNAME
      HUNKNAME
      SYMBOLNAME
```

any other keyword will generates this error.

089- Height too small. The minimum will be used (<value>.)

The height of a page have to be consistant enough to enable lk to create the external file. Anyway a value of zero is a valid value which disable page usage.

090- Height too large. The maximum will be used (<value>.)

The height of a page cannot be larger than the field to hold it.

091- Unknown margin keyword.

MARGIN instruction can be followed only by next keywords:

```
LEFT
RIGHT
TOP
BOTTOM
```

Themselfes must be followed by a value.

092- Invalid margin value. It must be defined between 0 and 255 included.

The margin are saved into a byte. What a limitation!

093- Bad map letter (See documentation.)

A letter specified after MAP keyword is invalid and must be suppressed.

See also:

MAP

094- Base name defined twice in FD file at line #<value>.

The base name is defined twice for the same library. You might verify if you use the ##end instruction of the previous library.

095- No base defined in FD file at line #<value>.

A base definition is required before any function definition.

096- References "<symbol name>" defined with two different types ($<value> and $<value>.)

A references was defined in two different hunks with two different types. This means you might have some errors, because one of those two references may be wrong. lk will check, whenever possible, to avoid the emission of this warning.
Not that this warning is more an information than an error.

097- COLOR flag defined twice.

This warning can be avoid using QUIET instruction.

098- The base offset is not a multiple of 6 in FD file at line #<value>.

The base offset into a library should always be a multiple of 6. Because the Amiga system uses only the 68000 JMP instruction which uses 6 byte per function call.

099- Base value overflow in FD file at line #<value>.

The base value can be defined between -32767 and 32767 and should be a multiple of 6.

100- Left/Right members differ for function <function name> in FD file <filename> at line #<value>.

lk verify that the left and right members have the same number of parameters (Than you have the same number of named parameters than registers.)
This is a warning become libraries using floating points might use less named parameters than registers.

101- Invalid DREL32 in executable file.

This warning will alarm you about the existance of a bad hunk into an executable file. This may happen with programs which are compatible with the V37 of DOS.
You can avoid this warning using the instruction:

READSRV37

102- Invalid debug skipped.

A debug can not be handled by lk when some data inside are wrong. In that case, those debugs are just suppressed.

103- Different memory flags in header and hunk.

A memory type was defined into the hunk list and that type is not equal to the one defined into the hunk declaration. Some compilers/linkers save the memory flags in the hunk it-self, use the HUNKMEMORY command to do the same.

Only the memory type of the hunk list is keept.

Note: The hunk is supposed to have the type PUBLIC, also this is not checked against other values.

104- Hunk type conflict for relative links in file "<filename>" (CODE/DATA).

Any relative information (HUNK_DREL or EXT_DREL) must be used with a link to the same type of hunk (also supposed to be DATA.) In future releases I may check the used register to know if CODE or DATA is accessed (For instance, A4 accesses the DATA and A5 the CODE.)

105- No library hunk before HUNK_INDEX.

No HUNK_LIB exist before to find a HUNK_INDEX. lk cannot find the code, data and bss header this way. Your file is corrupt and cannot be used.

106- No overlay header needed without overlay.

No overlay file was defined, then no overlay header has to be.

107- Math conflict between hunks.

SAS let's some debug information about the math library to use. lk know how to check this and also emit an error when two files uses incompatible format. This check does not occur while linking two libraries together.

108- Integer conflict between hunks.

SAS let's some debug information about the integer library to use. lk know how to check this and also emit an error when two files uses incompatible format. This check does not occur while linking two libraries together.

109- Bad hunk for executable file. It contains memory informations.

This error should never happen, because it is forbidden to write memory requirements into hunks within executable files. Those requirements should appear only into the header list.

Note: some compiler/assembler and linkers produce code with such information. lk has an option (HUNKMEMORY) to do it, if required.

110- Two overlay object handlers defined.

Only one object can be defined as being the overlay handler. See the overlay function to have more information.

See also:

OVERLAY

111- Libraries should not be defined in overlay.

This warning tell you that you use the LIBRARY keyword within the overlay/end block definition. Anyway the libraries will be loaded correctly.

112- The overlay link '<label name>' not within a hunk of code.

lk will link only JSR/JMP and Bcc instructions between the generic program and different overlay units. And instructions stands only in hunks of codes.

113- lk cannot work with odd pointer with your CPU.

The flag ODD is available only on 68020 CPUs and over. This would require a special programing to handle odd pointers on 68000.

114- Relative relocation not in a CODE hunk. No ALV possible.

When relative relocation exist and generates an overflow, lk will try to create some code to enable the link to work. This might be an enormous code generation, but it works in most cases.
Anyway lk will be quiet in any hunk which is not of type CODE. lk cannot modify data to fits a requirement. Thus data hunks should contain only data no code has to be modified in there. But the instruction ANYRELATIVE will make lk smarter and let him work in data hunks. This may just produce a lot of problems. Note that BSS hunks will still generates this error.

See also:
ANYRELATIVE

115- The overlay link '<label name>' is used with an unknown instruction.

The link to that label into a different overlay unit is not done while it does not refer to a valid instruction. The supported instructions are the JSR/JMP and Bcc.

116- Relative relocation "<symbol name>" uses an unknown instruction. lk cannot create an ALV.

In the first release lk supports only Bcc and JSR/JMP d16(PC) instructions. This
will be enlarged to any d16(PC) addressing mode in time.

Note that the usage of ALVs might generates some bugs.

117- Hunk too large to create an ALV for "<symbol name>" (<offset>.)

lk cannot create an ALV for the the symbol <symbol name> because the hunk is so large than the beginning and the end of the hunk are both too far.

118- Unknown address keyword.

ADDRESS keyword must be followed by CODE, DATA or BSS keywords.

119- No destination file deleted while some errors occur.

Some errors occur while lk saved the result. This means your make program file may not deal with the next operations correctly.

This may happen only if you fix the hunk addresses.

120- BSS hunk has some relocation information in file: "<file name>".

Signal that a BSS has some relocation informations. This means it should not be saved just as a four bytes file but as a file of zeroes except for the relocated addresses.

This can occur only if the BSS had a reloc to the beginning of another hunk.

121- Address $<hexa value> is odd.

DATA and BSS hunks might be relocated at a odd address, but code should never be at a odd address on any 680x0 CPUs. Make your change.

122- The code header was moved during relative organization.

To permit relative to be linked properly, lk try to organize hunks which are accessed as relative. This will enable 8 bit relatives the most of the time.

This warning should never happen, while the code header should never be used as a 'relativly pointed hunk.'

123- Icon file name defined twice (<file name>/<file name>).

Only one icon file can be defined while there is only one destination file.

124- <file name> is not a valid icon file name.

The file name of the icon file should have the usual '.icon' at the end. This ensure the usage of the 'icon.library' functions.

125- Fragmented <type> can not be SMALL or SINGLE...

A FRAG instruction has been used with an SMALL/SINGLE instruction of the same type. Only the FRAG flag is keept. Note that '-frag' is equivalent to FRAGBSS, FRAGCODE and FRAGDATA all together.

126- Hunk of type CODE named "<hunk name>". This hunk will not be merged this way.

A hunk of code can not receive one of the 'merge' name. Those are:
MERGE, MERGED, _MERGE, _MERGED, __MERGE, __MERGED
The hunk is not merged to anything except if SMALLCODE was used.

See Also:
Hunk names

127- Invalid entry hunk "<hunk name>". Not of type CODE.

An entry hunk must be a hunk of CODE, or it cannot be an entry.

128- Multiple entry hunks, skip the last ("<hunk name>".)

Only one entry is available per program. Then only the first fiven entry will be keept.

129- Entry hunk can not be in an overlay ("<hunk name>".)

You can not have the entry of the program within the overlay. It has to be included in the root.

130- Be careful, MAKERELATIVE may create an invalid program.

This warning is just to remenber you that the instruction MAKERELATIVE is not conventionnal... and may generate some errors.

131- Overlay handler found in overlay hunks ("<hunk name>".)

The overlay handler must be in root program. It will be forced at start by lk but not if present in overlay.

132- ONEDATA should be used with [CLEAR]XDATA and SMALLDATA.

This warning is to remember you that ONEDATA option is better used when used with XDATA or CLEARXDATA and SMALLDATA.

133- Auto-Run is not allowed with overlaid program.

Overlaid programs keeps a lock and a handle from the executable file. This means you have to remains linked to it. If you want to play with overlaid programs and an auto-run, change the 'overlay.s' code to handle that logic. (Note: this is something 100% possible.)

134- Symbol "<symbol name>" defined into library "<library file name>" and object "<object file name>".

This warns you about a symbol which is redefined into your object files. This might be a problem. That warning level is 8, which means that you can easily hide it.

135- The symbol "<symbol name>" is already defined, lk can not create the array.

The symbol '___ctors' or '___dtors' has been defined by user. Thoses symbols are strictly reserved for the linker internal use. You must delete that definition and recompile and relink.

136- Error file name defined twice (<file name>/<file name>.)

Only one file can be used as the destination for error strings.

137- Relocation(s) pointing on the near data hunk.

You can have as much relocations as you want except relocations to the relative data hunk when you link to produce a resident executable for DICE or SLINK. Only the first hunk in file 'c.o' or 'cres.o' have the possibility to reference the near data hunk. After, the near data hunk is suppositivly in an allocated buffer.
SLINK accepts relocations from the near data hunk to the near data hunk. DICE does not accept those relocations.
This error can usuly be recovered using the SMALLDATA instruction. Otherwise you will have to find another way to create the links. For instance you can create an initialisation function which will set some far data variables to near data pointers.

Note: SMALLDATA works only if you have a single memory model.

138- The relative "<symbol name>" is defined in a hunk of code.

This is not normal to have relative symbol pointing in any other hunk than data and BSS. This warning remains you about that problem.

139- Overlaid file with a corrupted first header.

Your overlay file is no correct. This does not means it does not work, but lk will change that into a file a little bit more valid. This error usuly happen when the very first header does not say that the file is overlaid, however an overlay hunk exists...

140- Overlay hunk number larger than indicated in first header.

Into an overlay file you have several hunk_header. If one of them gives a hunk number larger than the one which is defined into the very first header, this warning will prompt you.

141- lk found more hunks than indicated in first header.

Each hunk has a number. When too much hunks appear in entire file, lk tell you about that 'overflow.' If you use overlaid program, you can consider this error as a very low level warning.

142- Invalid overlay table size.

All overlay table sizes I saw up to now are invalid (Except those of lk.) Then this warning has a level of 4.

143- The number of overlaid unit changed.

When you link an executable which is defined in overlay, lk may change the number of overlay unit, also creating an invalid overlay table.

144- From/Root "<file name>" should not be defined in overlay.

The given file name will be used as the root file, but you should extract its definition from the overlay/end block.

145- Value missing for "<keyword>" instruction.

The <keyword> instruction needs a value to be correctly defined. Have a look to the documentation to know the exact purpose of that value.

146- Label "<symbol>" is undefined, lk cannot create the Slink array.

lk needs '_ctors,' '_dtors' and '_construct' symbols to be able to build the constructors and destructors for Slink.

147- All of the relative DATA/BSS hunks have not the same memory requirements.

Relative (or near) data should all be in the same memory format. It says PUBLIC. However lk does not require you to put those data in a specific memory model. But lk generate this warning when all hunks have not the same memory requirements. The warning has a level of 12.

148- String missing for "<keyword>" instruction.

The <keyword> instruction must be followed by a string. You should refer you to that instruction to know the purpose of the string.

149- List file name defined twice (<file name>/<file name>.)

The file name for the list output has been defined twice. Only the first one will be used.

150- "<file name>" is not a valid FD file (line #<value>.)

A file defined with FD, FDLIB or LIBFD instruction is not correct. The syntax of FD files is explained into:

FD

151- Create an ALV for "<symbol name>" symbol.

This warning will appear only if the warning level is 4 or less. This might be useful if you want to modify the order of your files or change some call from near to far, etc...

152- Two library definition files defined (<file name>/<file name>.)

The instruction LIBFD has been defined twice. It cannot be. Only the first file name is used.

153- Two library prefixes defined (<prefix>/<prefix>.)

Two prefixes has been defined, only the first one will be keept and used by lk.

154- Invalid icon type (Type: "<type name>".)

The icon has a type which does not match the required type. The type must be TOOL for executables and also PROJECT for libraries.

155- This file is not an icon.

The icon file is not correct. lk supports all icons from V1.x to V3.x. I suppose icons will not change.

156- Invalid stack size, the minimum required is <value>.

The Amiga system requires a minimum of about 4Ko of stack; this minimum is also repected by lk and the majority of good C compiler. When an invalid stack is defined, lk readjust it to the minimum.

157- The value <value> is not a valid priority (Bounds -128 and 127.)

The value of the priority is no valid because this must be signed byte (a value of height bits maximum.) When an invalid priority is defined, the previous value is keept.

1.42 lk V1.04 - (Errorfile)

Page 11-35

ERRORFILE or VERIFY or VER <filename>
Default: standard I/O or '>>filename' on command line

Defines the destination error file name. That file will be created only if lk generate an error or more. If the file cannot be created, the errors will be sent to the usual output console.

See also:
Become Registred

1.43 lk V1.04 - (Fancy)

Page 11-36

FANCY
Default: FANCY

Enable all printer/console characters (CSI) to be inluded in XREF file. To forbid those characters, use PLAIN keyword.

See also:
HEIGHT
MAP
MARGIN
PLAIN
SWAPFH
WIDTH
XREF
Become Registred

1.44 lk V1.04 - (Fast)

Page 11-37

FAST
Default: DEFAULT

Link all hunks of the following object files to be automatically loaded in fast memory. This is done regarless of any information present in those file hunks. It will last with the next memory instruction (ATTRIBUTES/CHIP/DEFAULT or PUBLIC.)
You may avoid the usage of the FAST keyword using the AUTOFAST command. Please, refer to that instuction.

Because this is a user specification, lk will not send any warning.

This instruction can appear into the OVERLAY/END block.

See also:
ATTRIBUTES
AUTOFAST
CHIP
DEFAULT
<filename>
HUNKMEMORY
PUBLIC
Become Registred

1.45 lk V1.04 - (Fd)

Page 11-38

FD [<filename> ...]
Default: OBJECT

Reads the following files as description or '.fd' files to create a list of

XDEF from the function names. You may avoid the usage of this instruction by using the AUTOFD instruction. Please, refer to that instruction.

The '.fd' files have the following format:

```
##base <library name>
##bias <value>
* <comment>
##public
<function name>([<parameter name>,...])
                                                    ([<register>,...])
##private
<function name>([<parameter name>,...])
                                                    ([<register>,...])
##end
```

Any number of function may appear. The coma (,) may be replaced by a slash character (/) and the multiply (*) sign is used as a comment delimiter. The public/private switcher can be used any number of time as required. The value defined behind '##bias' represent the first function's offset, which is 30 by default. All private functions may have the same names, except if you are creating an Amiga library. No spaces can appear within the function definition.

Note: the function offset can be modified through '##bias' instruction as required, except if you are creating an Amiga library.

See also:
- AUTOFD
- FDHEADER
- FDINCLUDE
- FDLIB
- FDOBJECT
- FDPASCAL
- FDQUICK
- FDSMALL
- <filename>
- LIBFD
- LIBRARY
- Become Registred

1.46 lk V1.04 - (Fdflg)

Page 11-39

FDHEADER
FDINCLUDE
FDOBJECT
FDPASCAL
FDQUICK
FDSMALL
Default: no flag set

Only the commercial version will have all those instructions fully supported. Registred people will receive that version.

'.fd' files might be used in a lot of different ways. There is a list of the

available flags and their usage:

FDHEADER
This flag enables the creation of a C like header file. When this flag is used with the FD instruction, a list of offset is created with the following format:

#define _LVO<function name> <offset>

When this flag is used with the FDLIB instruction, a list of external instruction call is created. lk cannot recognize the type of each parameter, then this can be used as a first step to a header creation. The external functions have the following format:

extern _<function name>(<parameter 1>[, ...]);

You may use the FDQUICK flag to suppress any parameter definition.

FDINCLUDE
This flag enables the creation of an include file. It can be used only with FD instruction, a list of offset is create with the following format:

_LVO<function name> EQU <offset>

FDOBJECT
lk creates an object from the '.fd' file to use it as any other object. This flag will enable you to save that object and use it rather than the '.fd' file (Making the future usage quicker.)

When used with the FD instruction, only offsets are saved as external definitions.

When used with the FDLIB instruction, lk creates a small call code to enable any C language like to call the library.

FDPASCAL
This flag enables a Pascal type header to be created from the '.fd' file. When it is used with the FD instruction only a list of offset is defined with the following format:

const _LVO<function name> = <offset>;

When used with the FDLIB instruction, lk creates a sub-functionnal header of external definitions with the following format:

extern _<function name>(A: <parameter1>[, ...]);

FDQUICK
This flag can be used to avoid the parameter list into the C external definitions (See also FDHEADER flag.)

FDSMALL
Ask for a small code into the current library. This will force lk to use the instruction:

MOVEA.L <library base offset:16>(A4),A6

rather than:

MOVEA.L <library base pointer:32>,A6

This makes library calls smaller and a bit quicker.

See also:
FD
<filename>
FDLIB
LIBRARY
Become Registred

1.47 lk V1.04 - (Fdlib)

Page 11-40

FDLIB [<filename> ...]
Default: OBJECT

This function must be used with C program likes, it generates a library (.lib file) from a '.fd' file.
It also reads the following files as '.fd' files. Please refer to FD instruction to have complete informations about the '.fd' file syntax.

The resulting code is something like:

```
MOVEM.L  ...A6,-(A7)
MOVEM.L  ...(A6),...
MOVEA.L  <library base>(A4),A6
JSR      <function offset>(A6)
MOVEM.L  (A7)+,...A6
RTS
```

Note: A4 is used only when the flag FDSMALL has been used.

See also:
FD
FDHEADER
FDINCLUDE
FDOBJECT
FDPASCAL
FDQUICK
FDSMALL
<filename>
LIBFD
LIBRARY
Become Registred

1.48 lk V1.04 - (Filename)

Page 8

<filename>

You directly can start your command line with the name of an object file or an executable. lk is in DEFAULT state at start. You may see that instruction for more informations:

DEFAULT

The file types are defined in following table:

Precedent Keyword	File Type
<none>	(s) multiple objects
ATTRIBUTES <value>	(s) multiple objects
CHIP	(s) multiple objects
DEFAULT	(s) multiple objects
ERRORFILE	(d) error output
FAST	(s) multiple objects

```
FD ........................ (s) multiple deffiles
FDLIB ..................... (s) multiple deffiles
FD/FDLIB + FDHEADER ....... (d) include file
           FDINCLUDE ...... (d) include file
           FDOBJECT ....... (d) library object
           FDPASCAL ....... (d) include file
FOR ....................... (d) object
FROM/ROOT ................. (s) object or exec.
ICON ...................... (s) icon (.info)
LIBFD ..................... (s) one deffile
LIBRARY ................... (s) object
LIST ...................... (d) list output
OVERLAY/END ............... (s) multiple objects
OVERLAYOBJECT ............. (s) object
PUBLIC .................... (s) multiple objects
TO ........................ (d) executable
WITH ...................... (s) lk source file
XREF ...................... (d) reference file
```

(s) stands for source file (Always safe)
(d) stands for destination file (Will be overwritten)

Other keywords cannot be followed by a file name (Note that equivalent keywords were not listed here.) See each of them for more explanations.
The reference, list and error files are text files.

With AmigaDOS V36.00 and over, a keyword followed by multiple sources may use a file name containing wild cards. All normal DOS wild cards are supported. The research is also made into each directory of a multiple assign and the assign might be defered.
A keyword, which has to receive only a single source file, will generate a warning (Except with QUIET), and keep only the first file responding to the wild card(s).
Only source file names can include wild card(s).

IMPORTANT NOTE ABOUT WILD CARDS:

The next command line is fully supported:

```
LK FROM main.o #?.o TO myprog LIB amiga.lib
```

even the pattern #?.o will return main.o, lk will not link that file twice. However, only FROM and ROOT instructions enables a such comparaison. For 'CHIP/FAST programs' it should become:

```
LK ROOT main.o #?.o CHIP chip/#?.o
                                        FAST fast/#?.o TO myprog LIB amiga.lib
```

or

```
LK ROOT main.o #?.o CHIP #?.chip
                                          FAST #?.fast TO myprog LIB amiga.lib
```

(Note: The FROM/ROOT instructions are declared before '#?.o' and the AUTO??? keywords could be used instead of CHIP/FAST keywords, thank you to refer you to those commandes.)

For any source file, lk uses paths to read files without patterns. For more informations about paths, please refer you to:

PATHS

lk have a generator for the destination file name. You can refer to FROM/ROOT for more informations.

The memory requirement or advisory state must appear before a file name to be effective. You can change those as much as you want. The following are possible usages:

```
CHIP SETADVISORY <filename>
FAST CLEARADVISORY ROOT <filename>
HUNKADVISORY ATTRIBUTES $10040
                                    LIBRARY <filename>
```

See also:

- ATTRIBUTES
- AUTOCHIP
- AUTOFD
- AUTOFAST
- AUTOLIBRARY
- AUTOOVERLAY
- CHIP
- CLEARADVISORY
- DEFAULT
- ERRORFILE
- FAST
- FD
- FDHEADER
- FDINCLUDE
- FDLIB
- FDOBJECT
- FDPASCAL
- FDPATH
- FOR
- FROM/ROOT
- ICON
- ICONPATH
- HUNKADVISORY
- LEFTADVISORY
- LIBFD
- LIBPATH
- LIBRARY
- LIST
- NOPATH
- OBJPATH
- OVERLAY/END
- OVERLAYOBJECT
- PUBLIC
- SETADVISORY
- TO
- WITH
- WITHPATH
- XREF
- Become Registred

1.49 lk V1.04 - (For)

Page 11-41

FOR <filename>
Default: TO

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

Generates a library with specified file name. This will load each object and order hunks and units to produce a library object file. You may ask for SINGLEUNIT to have a universal library.

When specified, the instruction SMALLUNIT will enable a link of some hunks together. This is done when hunk A needs hunk B and hunk B needs hunk A (This may be more complex while hunk A may need hunk B going through hunk C and D, and hunk B may need hunk A through hunk E and F.) Hunks of different types are not linked together, whenever they need each other.

If the given file name is a directory name, the usual auto creator file name will be used and the result will be saved into the given directory. The source file name will have its path suppressed before the concatenation to the source file name.
Example:
FROM prg:object/myprog.o
FOR ram:
generates the destination file name:
ram:myprog.lib

See also:
CREATELIBRARY
<filename>
SINGLEUNIT
SMALLUNIT
Become Registred

1.50 lk V1.04 - (Frag)

Page 11-42

FRAGBSS
FRAGCODE
FRAGDATA
-FRAG
Default: NORM???

This instruction forbids any link between hunks, even their names are equal. This will also generate a big resulting file. Those instructions are useless for libraries.
Note that small data code (HUNK_DATA access with A4 register) will anyway be linked together or there would be no use of this function.

Note: the instruction -FRAG ask for all type of hunk to be fragmented. This is to ensure a compatibility with DLINK.

See also:
NORM

```
NORMBSS
NORMCODE
NORMDATA
NORMHUNK
NORMUNIT
SMALL
SMALLBSS
SMALLCODE
SMALLDATA
SMALLHUNK
SMALLUNIT
SINGLE
SINGLEBSS
SINGLECODE
SINGLEDATA
SINGLEHUNK
SINGLEUNIT
Become Registred
```

1.51 lk V1.04 - (From)

Page 11-43

FROM or ROOT <filename>
Default: first file specified

Defines the first file, which should start with a hunk of type code. This will be linked at start in destination executable file (Usuly a C or pascal startup or main assembly code.) The first file is not always the first if you use one of the instructions STARTUP or OVERLAY (Please refer to those instructions for more informations.)
The use of FROM instruction returns lk in default OBJECT mode. Please see that instruction for more informations.

When no destination is defined or only a directory is given, the root (or first) file name is used as the destination file name (Erasing the extension '.o' or '.exe' and eventualy appending '.exe' when a source file have that name.) If the root (first) file is 'c.o', 'cback.o', 'cres.o', 'catch.o' or 'catchres.o' the following file name will be used instead, enabling C programmers to avoid the TO instruction.

In the case of a library, one of this instruction may be used only to have the destination file name automatically computed. Also the specified name will receive the usual '.Lib' extension. Note this may not always be supported.

All following files will be defined though DEFAULT keyword was used (See.) There is no problem to use wild cards in those file names, lk will automatically check and prevent the ROOT file to be loaded twice.
All hunks of each file will be present into the result.

If you need to put the root into a specific memory type you will have to specify that type at first and then use the instruction ROOT. For instance to put the root in chip memory:

```
CHIP ROOT my_root_file
```

See also:

```
     DEFAULT
     <filename>
     OBJECT
     OVERLAY
     STARTUP
     Become Registred
```

1.52 lk V1.04 - (Height)

```
                                                                  Page 11-44
                                HEIGHT <value>
                              Default: 60 (10..255)

  Defines the page height. The height does not include the top
and bottom margins and the four lines used for foot and header
titles. A height of zero (0) will elimites any pagination.

  See also:
     FANCY
     MAP
     MARGIN
     PLAIN
     SWAPFH
     WIDTH
     XREF
     Become Registred
```

1.53 lk V1.04 - (Help)

```
                                                                      Page 9
                            lk V1.04 -- Help about Help

  There is a skeleton of the organization of my help files. This hopefully  will
help you a little bit more to quickly find the requiered information.

     1.  About

    2.  Generic information

       2.1  Purpose
           (For beginners)

       2.2  Release informations
           (For those who know about lk©)

       2.3  Command
           (For advanced users)

       2.4  Start

         2.4.1  CLI
```

1.54 lk V1.04 - (Hlp)

Page 11-45

HELP or -HELP or ?? or ?
Default: nothing

Print the complet list of available instructions with a quick reference. This is helpful if you forgot about a specific keyword. The single question mark will list only important keywords.
After the help has been displayed, you will enter the prompt mode. Please refer to the PROMPT instruction.

This keyword should never be used inside a WITH file.

See also:
PROMPT
VERBOSE
Become Registred

1.55 lk V1.04 - (Hunk)

Page 11-46

HUNK <value>
Default: 50

Defines the number of hunk structures needed. The default is 50. Like SYMBOL, the number of hunk used by a link may be known using VERBOSE keyword.

The default value is really small if you use some libraries.

See also:

```
    RELOC
    SYMBOL
    VERBOSE
    Become Registred
```

1.56 lk V1.04 - (Hunkcaseinsensitive)

```
                                                                Page 11-47
                        HUNKCASEINSENSITIVE or HCI
                    Default: hunk names are case sensitive

  Test hunk names regardless of character case.  Any  letter  with  and  without
accent will be tested in upper case.

  See also:
     CASEINSENSITIVE
     Become Registred
```

1.57 lk V1.04 - (Hunkmemory)

```
                                                                Page 11-48
                              HUNKMEMORY
                    Default: no memory flags in hunks

  Force the memory requirements to be copied into the hunk declaration. This  is
useless as long as I know. Some programs (like basm) does it, also I propose the
option to do the same.

  Note that when a memory requirement appear into the  file  it  take  4  bytes,
repeated twice it take 4  more  bytes  for  nothing  I  know  about...  and  the
executable is not valid.

  See also:
     ATTRIBUTES
     CHIP
     DEFAULT
     FAST
     PUBLIC
     Become Registred
```

1.58 lk V1.04 - (Hunknames)

```
                                                                    Page 10
                            The special hunk names

  To enable lk to link properly any kind of program, special hunk names  may  be
used. You have to be careful when you use those name, while they are specific to
lk.

  BSS
```

This is the default name for a hunk of type BSS. You should use this name, except if you want specific hunks of BSS (Hunks to be loaded in CHIP memory for instance.)

COVER or _COVER or __COVER

By default, lk does not support this special hunk. You must use the BOUNDS instruction in order to generate the startup pointer and the size. Please refer to this instruction for more informations:
BOUNDS

DATA

This is the default name for a hunk of type DATA. You should use this name, except if you want specific hunks of data (Hunks to be loaded in CHIP memory for instance.)
BSS hunks should not be called DATA, while they can not be linked with DATA hunks.

ENTRYHUNK or NTRYHUNK or _ENTRYHUNK

This name is useful to define the very first hunk of a program (The second name is implemented to accept Blink/Slink special hunk.) This hunk must be of type code and have to be a valid startup.
With this hunk, you should not use the instruction STARTUP. Anyway the STARTUP label override this hunk.

MERGE or MERGED
_MERGE or _MERGED
__MERGE or __MERGED

Only DATA and BSS hunks can receive that name and all of them will automatically be linked together, even ONEDATA is unused. Note that the option XDATA is still needed and recommended. Hunks of DATA or BSS with one of those names which are present into an overlay hunk will automatically be extracted from the overlay hunk. Do not forget that when a FRAG??? instruction has been used, no merge is effective for the specified types.
This name is used by Blink and Slink to force relative hunks to be linked together. lk does not need that extra information and is intelligent enough to know when that kind of hunks have to be linked together.
The number of underscore defines a new set of merged block.
Note: A hunk of code with that name will generate a warning, and will not be linked with data hunks by any means.

NOMERGE or NOMERGED or _NOMERGE or _NOMERGED

Any hunk may have this name. This way it can not be merged with another hunk. This is useful to create a hunk that has to be freed or when a linked list is necessary. This is used for the background task startup code.

OVERLAYENTRY

This defines the overlay handler. This hunk must be of type code and be a valid overlay startup, thus have the overlay magic long word $0000ABCD and the following null pointers (4) for the overlay table, file stream and more.
This hunk will call one of the following function. The order is important is

that it's check into that given order:
    1. '_ovl_root' (May not exist)
    2. function defined with STARTUP instruction
    3. first function of ENTRYHUNK hunk
    4. the first hunk of CODE

RDATA

  This is the default name for a hunk of type DATA used with read only operation. This might be used to automatically protect the program when loaded with the special MMU loader of lk.
  Note: this loader is not actually available.

TEXT

  This is the default name for a hunk of type CODE. When the first given hunk is not of type CODE, lk will search the first hunk named TEXT and moved it at start.

See also:
   FRAGBSS
   FRAGCODE
   FRAGDATA
   ONEDATA
   OVERLAY
   STARTUP
   Become Registred

1.59 lk V1.04 - (Icon)

Page 11-49

ICON or INFO <filename>
Default: NOICON
(DEFICON if lk is started from the Workbench)

Define the icon you want to use for your executable. This file will be read and copied into the file named like the destination with the extension '.info'. A check is done on the icon file to ensure a correct type. An icon for an executable must be of type TOOL and an icon for a library muts be of type PROJECT. If this is not the case a warning of level 15 is displayed and the correct type is set into the icon.
If the keyword ICON does no appear and the file is a correct icon, it will be reconized and used as an icon.

When the icon file name is terminated with '.info' lk will try to make the copy through the 'icon.library' also enabling the notification message of the workbench.

When a icon is specified, it will overwrite the existing icon.

See also:
   DEFICON
   NOICON
   UNSNAPSHOT

Become Registred

1.60 lk V1.04 - (Keeparc)

Page 11-50

KEEPARC
Default: delete files extracted from archive(s)

If you use the archived library feature, you may want to keep the uncompacted files in memory for future links (do not forget that each compacted library is extracted from an archive and it takes a lot of time.)

Note: you should not use that function if you installed the QuickDOS© shared library, because the extract files are automatically saved through QuickDOS©.

For more information about the archive feature of lk, please refer to~'Archived Libraries'.

See also:
ARCHIVER
Archived Libraries
QuickDOS© V1.00
Become Registred

1.61 lk V1.04 - (Keepdebug)

Page 11-51

KEEPDEBUG or KD
Default: keep the debugs which are known

When this instruction is used all debugs, even if their are not known, will be keept and saved into the destination file. The unknown debug hunks remains unmodified into the destination file, then most of the time it will certainly create invalid hunks of debug.

The instructions NODEBUG and NOLIBDEBUG have a higher priority and will be taken in account rather than KEEPDEBUG.

See also:
ADDSYM
CLEARADVISORY
CREATEDEBUG
CREATESYMBOL
HUNKADVISORY
LEFTADVISORY
NOBSSDEBUG
NOCODEDEBUG
NODATADEBUG
NODEBUG
NOLIBDEBUG
NOLOCALSYMBOL
NOSYMBOL

NOOVLDEBUG
SETADVISORY
STRIPDEBUG
Become Registred

1.62 lk V1.04 - (Keywords)

Page 11

Keywords

All keywords actually available in lk are listed below. Click on any of them to receive the corresponding informations. For more generic informations about keywords see also:

Command Line

A very large amount of keywords is available. For this reason I propose two kind of listes. One with all commandes defined in alphabetical order and one list for each type I could think of. Click on the following to reach one of those listes:

Complete alphabetical list

Amiga libraries (shared)
Automation
Compatibility
Copyright
Debug
DICE flags
Error
File description
File type
Help
Hunk attributes
Map
Memory (at link time)
Object library
Overlays
Paths
QuickDOS
ROM
Sizes
Workbench

In the following documentation a special syntax has been used to indicate different ways to use arguments. For this purpose specific characters are used, those characters will never appear in the final command line. On the top of that, the upper case words are reserved (they cannot be used as a file name for instance) and the lower case words represent the words that you have to replace with the correct name. The used characters are:

<> Angle brackets enclose arguments that must be provided. For instance, <filename> means that you must enter the appropriate filename in that position. Unless square brackets surround the argument (see below), the argument is required. lk will not work as you want unless it is specified. Note that only arguments of commands are necessary, a

command is never necessary.

[] Square brackets enclose arguments and keywords that are optional. They will be accepted by the command but are not required.

... Three points means that the previous option can be repeated any number of times.

or The keyword 'or' is used to separate commands or options of which you can choose only one.

In the following list a star (*) shows the startup state (Instructions set by default.)

Keywords:

ADDRALL
ADDRESS
ADDSYM
ALV (ALVS)
AMIGALIBRARY
ANYRELATIVE
ASKUNDEF
ATTRIBUTES (ATTR)
AUTOCHIP
AUTOFAST
AUTOFD
AUTOLIBRARY (AUTOLIB)
(AUTOLIBRARY is set with DICE)
AUTOOVERLAY
AUTORUN
BACKGROUND
* BLOCKHUNK (BH)
BLOCKUNIT (BU)
(BLOCKUNIT is set with DICE or SLINK)
BREAK
* CALM
CASEINSENSITIVE (CI)
CC
(CC is set with DICE or SLINK)
CHIP
CLEARADVISORY
CLEARXCODE (CXC)
CLEARXDATA (CXD)
CODE2BSS
COLOR
COPYRIGHT (CR)
CREATEDEBUG (CD)
CREATELIBRARY (CL)
CREATESYMBOL (CS)
DATA2BSS (D2B)
* DEFAULT
DEFICON
DEFINE (DEF)
DICE
ECHO
END (#)
ERRORFILE

```
*  FANCY
   FAST
   FD (Offsets definition)
   FDHEADER
   FDINCLUDE
   FDLIB (Function definition)
   FDOBJECT
   FDPASCAL
   FDPATH
   FDQUICK
   FDSMALL
   <filename>
   FOR
   FRAGBSS
   FRAGCODE
   FRAGDATA
   FROM
   FWIDTH
   HEIGHT
   HELP (??)
   HUNK
*  HUNKADVISORY
   HUNKCASEINSENSITIVE (HCI)
   HUNKMEMORY
   HWIDTH
   ICON
   ICONSPATH
   INFO
   KEEPARC
   KEEPDEBUG
   KEEPXDATA
   LEFTADVISORY (LA)
   LIBFD (To save function definition)
   LIBID
   LIBPATH
   LIBPREFIX
   LIBPRIORITY
   LIBRARY (LIB)
   LIBREVISION
   LIBVERSION
   LIST
   MAKERELATIVE (MR)
   MAP
   MARGIN
   MAXREF
   NEWOBJECTS
*  NOALV (NOALVS)
   NOBSSDEBUG (NBD)
   NOCODEDEBUG (NCD)
   NODATADEBUG (NDD)
   NODATAOVERLAID (NDO)
   NODEBUG (ND)
   NOEMPTYHUNK (NEH)
   NOEXE
*  NOICON (NOICONS)
   NOLIBDEBUG (NLD)
   NOLOCALSYMBOL (NLS)
```

```
    NOMULTIPLE (NM)
    NOOVERFLOW32
    NOOVLDEBUG (NOD)
    NOPATH
*   NORM
*   NORMBSS
*   NORMCODE
*   NORMDATA
    NORMHUNK
*   NORMUNIT
    NOSYMBOL (NS)
    NOWARNING (NW)
    OBJECT (OBJ)
    OBJPATH
    ODD
    OFFSET
    ONEDATA (OD)
    ORDER
    OVERLAY ... END
    OVERLAYOBJECT (OO)
    OVLYMRG
    PLAIN
    PRELINK (CL)
    PRIORITY (PRI)
    PROMPT
    PUBLIC
    PURE
    PWIDTH
    QDDISCARD
    QDLIST
    QDPREPARE
    QDREMOVE
*   QDSTART
    QDSTOP
    QUICKFATAL (QF)
    QUIET
    READSRV37
    RELOC
    ROOT (À partir de)
    SETADVISORY
    SETLKPRI
    SHORTRELOC (SR)
    SHORTRELOCOVERLAY (SRO)
    SINGLE
    SINGLEBSS (SGB)
    SINGLECODE (SGC)
    SINGLEDATA (SGD)
    SINGLEHUNK
    SINGLEUNIT (SGU)
    SLINK
    SMALL
    SMALLBSS (SB)
    SMALLCODE (SC)
    SMALLDATA (SD)
    SMALLHUNK
    SMALLUNIT (SU)
    SORT
```

```
   STACKSIZE
   STARTUP
   STRIPDEBUG (STRIP)
   SWAPFH
   SWIDTH
   SYMBOL
   <symbols>
   TIME
   TO
   UNSNAPSHOT
   USELASTDEFINE (ULD)
   VALIDNOP
   VERBOSE
   VERIFY (VER)
   VERSION
   WARNING
   WARNINGLEVEL (WL)
   WARUNDEF
   WIDTH
   WITH
   WITHPATH
   WRITESRV37
   XCODE (XC)
   XDATA (XD)
   XREF
   XRELATIVEDATA (XRD)

    Amiga libraries (shared):

   AMIGALIBRARY (AL)
   LIBFD
   LIBID
   LIBPREFIX
   LIBPRIORITY
   LIBREVISION
   LIBVERSION

    Automation:

   AMIGALIBRARY (For 'library.o')
   AUTOCHIP
   AUTOFAST
   AUTOFD
   AUTORUN (For 'autorun.o')
   AUTOLIBRARY (AUTOLIB)
   AUTOOVERLAY
   BACKGROUND
   KEEPARC
   PURE
   PRIORITY (PRI) (For 'priority.o')
   OVERLAY (For 'overlay.o')
   STACKSIZE (For 'stacksize.o')

    Compatibility:

   AUTOLIBRARY (AUTOLIB)
*  BLOCKHUNK (BH)
```

```
   BLOCKUNIT (BU)
   CASEINSENSITIVE (CI)
   CC
   DICE
   HUNKCASEINSENSITIVE (HCI)
   NEWOBJECTS
   NOEMPTYHUNK
   ODD
   OFFSET
   READSRV37
   SLINK
   SORT
   STARTUP
   USELASTDEFINE (ULD)
   XRELATIVEDATA (XRD)
   WRITESRV37

    Copyright:

   COPYRIGHT (CR)
   LIBID
   LIBREVISION
   LIBVERSION
   TIME
   TO (Use to define the file name)
   VERSION

    Debug:

   ADDSYM
   CREATEDEBUG (CD)
   CREATESYMBOL (CS)
   CLEARADVISORY
*  HUNKADVISORY
   KEEPDEBUG (KD)
   LEFTADVISORY (LA)
   NOBSSDEBUG (NBD)
   NOCODEDEBUG (NCD)
   NODATADEBUG (NDD)
   NODEBUG (ND)
   NOLIBDEBUG (NLD)
   NOOVLDEBUG (NOD)
   NOSYMBOL (NS)
   NOLOCALSYMBOL (NLS)
   SETADVISORY
   STRIPDEBUG (STRIP)

    DICE flags:
   -chip
   -frag
   -help (-h/??/?)
   -l
   -ma
   -mw
   -o
   -p
   -r
```

```
   -s
   # (END)

    Error:

   ALV (ALVS) (Suppress a lot of errors)
   ASKUNDEF
   BREAK
*  CALM
   COLOR
   DEFINE (DEF) (Give equivalence)
   ERRORFILE
   MAXREF
   NOMULTIPLE (NM)
   NOOVERFLOW32
   NOWARNING (NW)
   ODD
   QUICKFATAL (QF)
   QUIET
   VERIFY (VER)
   WARNING
   WARNINGLEVEL (WL)
   WARUNDEF

    File description:

   FD
   FDHEADER
   FDINCLUDE
   FDLIB
   FDOBJECT
   FDPASCAL
   FDQUICK
   FDSMALL

    File type:

   END
   FD
   FDLIB
   FROM/ROOT
   KEEPARC
   LIBRARY
   NOEXE
   OVERLAY
   OBJECT (OBJ)
   ORDER
   WITH

    Help:

   ECHO
   HELP (??)
   LIST
   PROMPT
   VERBOSE
```

```
    Hunk attributes:

   ATTRIBUTES (ATTR)
   CHIP
*  DEFAULT
   FAST
   HUNKCASEINSENSITIVE (HCI)
   HUNKMEMORY
   PUBLIC

    Map:

*  FANCY
   FWIDTH
   HEIGHT
   HWIDTH
   MAP
   MARGIN
   PLAIN
   PWIDTH
   SWAPFH
   SWIDTH
   WIDTH
   XREF

    Memory (at link time):

   HUNK
   QDSTOP
   RELOC
   SYMBOL
   SETLKPRI

    Object library:

   CREATELIBRARY (CL)
   FOR
   PRELINK
   SMALLUNIT
   SINGLEUNIT

    Overlays:

   END
   NODATAOVERLAID (NDO)
   OVERLAYOBJECT
   OVLYMRG
   OVERLAY
   SHORTRELOCOVERLAY

    Paths:

   FDPATH
   ICONPATH
   LIBPATH
   NOPATH
   OBJPATH
```

```
   WITHPATH

    QuickDOS:

   QDDISCARD
   QDLIST
   QDPREPARE
   QDREMOVE
*  QDSTART
   QDSTOP

    ROM:

   ADDRALL
   ADDRESS
   SINGLEHUNK
   SMALLHUNK
   ONEDATA (OD)

    Sizes:

   ALV (ALVS)
   ANYRELATIVE
   CLEAREDXCODE
   CLEAREDXDATA
   CODE2BSS
   DATA2BSS (D2B)
   FRAGBSS
   FRAGCODE
   FRAGDATA
   KEEPXDATA
   MAKERELATIVE
*  NOALV (NOALVS)
   NOEMPTYHUNK
*  NORM
*  NORMBSS
*  NORMCODE
*  NORMDATA
   NORMHUNK
*  NORMUNIT
   ONEDATA (OD)
   SHORTRELOC
   SHORTRELOCOVERLAY
   SINGLE
   SINGLEBSS (SGB)
   SINGLECODE (SGC)
   SINGLEDATA (SGD)
   SINGLEHUNK
   SINGLEUNIT (SGU)
   SMALL
   SMALLBSS (SB)
   SMALLCODE (SC)
   SMALLDATA (SD)
   SMALLHUNK
   SMALLUNIT (SU)
   VALIDNOP
   XCODE (XC)
```

```
   XDATA (XD)
   XRELATIVEDATA (XRD)

    Workbench:

   DEFICON
   ICON
   INFO
*  NOICON (NOICONS)
   UNSNAPSHOT
```

The following keywords exists and then don't generate an error, but they are unused:
BUFSIZE, FASTER, FNDATAM, IGNORE, NEWOCV, NOOCVHNK.

For those who used the NEWOCV option of Slink: lk© is a lot more powerful while the flags returned by the user function are also returned to the caller, and the function parameters might be defined into the stack or in registers. And all this by default.

1.63 lk V1.04 - (Libfd)

Page 11-52

LIBFD <filename>
Default: OBJECT

This instruction defines the list file with the definition of the library functions. This file has the usual library definition syntax; like defined within FD instruction.
The file is transformed into a table of function (defined into a hunk of code) and will be linked with the pre-defined memory requirements. You should also preceed LIBFD by DEFAULT if you do not want to have that table in a specific memory.

The fact this instruction is used set the flag AMIGALIBRARY. Please refer you to that instruction to have all necessary informations.

The default file name is the destination file name with the '.library' extension modified into '.fd'.

See also:
- AMIGALIBRARY
- COPYRIGHT
- FDLIB
- <filename>
- LIBID
- LIBPREFIX
- LIBREVISION
- LIBVERSION
- VERSION
- Become Registred

1.64 lk V1.04 - (Libprefix)

Page 11-53

LIBPREFIX "<...>"
Default: "_"

This instruction defines a common prefix for the name of your library functions. This prefix will be added to the name present into the definition file. For instance for QuickDOS library all library functions are all defined with '_QD' lettres at the beginning. If the .fd files was defined as follow:

```
   .fd file               object file

  OpenFile               _QDOpenFile
  CloseFile              _QDCloseFile
  CloseAllFiles          _QDCloseAllFiles
  ...
```

lk will not be able to find the labels present into the object files. But with the prefix "_QD" the symbols are now correct. Note that the prefix is not applied to the system functions: '_LibInit', '_LibOpen', '_LibClose' and '_LibExpunge'.

This instruction is useful if you want, in C, to make some calls of your function not going through the library base pointer. This is faster but not conventional.

The fact this instruction is used, set the flag AMIGALIBRARY. Please refer you to that instruction to have all necessary informations.

See also:
- AMIGALIBRARY
- COPYRIGHT
- LIBFD
- LIBID
- LIBREVISION
- LIBVERSION
- VERSION
- Become Registred

1.65 lk V1.04 - (Library)

Page 11-54

LIBRARY or LIB or -L [<filename> ...]
Default: OBJECT

Defines files which will be used as libraries. This means that only necessary hunks (or units) will be included in the destination file. The selection between hunk or unit basis is done via BLOCKHUNK or BLOCKUNIT. The default is BLOCKHUNK until you specify DICE or SLINK.

The file name may include wild cards. Wild card should be avoid when you use CC, DICE or SLINK instructions because the order of libraries objects is VERY important (The first symbol found is the symbol which will be used.)

The AUTOLIBRARY command will be used to avoid the usage of the LIBRARY keyword. If the DICE flag was used, all files with the extension '.lib' will be taken as libraries.

For each given name specified after the LIBRARY instruction, lk search the file in:

- . the current directory
- . the LK:LIB/ directory when it exists
- . the LIB: directory when it exists

lk will search only the current directory if the file name include a path. A path is included when a slash (/) or colon (:) character appear in the file name.
This feature does not actually work when you use AUTOLIBRARY flag.

To ensure that your libraries are loaded with the normal memory requirement you should use the instruction DEFAULT.

When you are creating a library, this function enables you to generate an independant library. If the library A needs the library B to be linked, because it uses some hunks from B, joining library A with library B (With JOIN instrucion in your CLI) may generates a big file, linking library A with file B specified as a library should generate a smaller result.

See also:
AUTOLIBRARY
BLOCKHUNK
BLOCKUNIT
DEFAULT
FD
<filename>
FDLIB
OBJECT
Become Registred

1.66 lk V1.04 - (List)

Page 11-55

LIST <filename>
Default: nothing

Ask for a list of the hunks saved into the resulting file. That list will be written into the specified file. You may type "*" (or "CONSOLE:" under V36+) to have the list appearing into the current CLI window.

See also:
Become Registred

1.67 lk V1.04 - (Makerelative)

Page 11-56

MAKERELATIVE or MR
Default: nothing

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

Ask lk to transform, whenever possible, the RELOC32 in a relative addressing mode. Of course only relocation from one hunk to it-self will be transformed by this function, making some executable files smaller.

This instruction is also available for executable programs only.

To receive the WARNING which informs you about the modified hunks, type 'WARNING 4'.

BUG BUG BUG BUG BUG BUG BUG BUG BUG BUG BUG BUG

This may create a lot of bugs... lk will check and suppose that the word before the RELOC32 is an instruction (2 words before for MOVEM.W/L and BTST.B.)
You should never use this instruction if you compiled your program in 68020 mode, or when a lot of data appear within the hunk of code. Usully the hunk of code contains only code, right? And in any case, try your program extensivly when you used that instruction to ensure it was correct.
An instruction which uses a relocation for its second operand (Destination) may create some errors.

Note: if you only used RELOC32 for long branchements (Also JSR and JMP,) you can use this function without any trouble.

Supported instructions:

(Size field: ?=B,W,L/S=W,L)

```
ADD.?     (x.L),Dn
ADDA.S    (x.L),An
AND.?     (x.L),Dn
BTST.B    #07,(x.L)
BTST.B    Dn,(x.L)
CHK.W     (x.L),Dn
CMP.?     (x.L),Dn
CMPA.S    (x.L),An
DIVU.W    (x.L),Dn
DIVS.W    (x.L),Dn
JMP       (x.L)
JSR       (x.L)
LEA.L     (x.L),An
MOVE.?    (x.L),Dn
MOVE.?    (x.L),(An)
MOVE.?    (x.L),(An)+
MOVE.?    (x.L),-(An)
MOVE.W    (x.L),CCR
MOVE.W    (x.L),SR
MOVEM.S   (x.L),reglist
MULU.W    (x.L),Dn
MULS.W    (x.L),Dn
OR.?      (x.L),Dn
PEA.L     (x.L)
```

```
      SUB.?     (x.L),Dn
      SUBA.S    (x.L),An
where the field (x.L) become (d16,PC).
```

See also:
ALV
ANYRELATIVE
NOWARNING
WARNING
Become Registred

1.68 lk V1.04 - (Map)

Page 11-57

MAP [H|h][,[R|r]][,[S|s]][,[U|u]]
Default: all flags

This function enables you to declare what you want to write into the external file (See XREF.)

Each letter will enable (in upper case) or disable (in lower case) a specific table. All tables are enable at start. Those letters may be written in any order and can be separated by comas.

The signification of each letter is:

H	hunks table
R	references table
S	symbol table
U	unit table

See also:
FANCY
HEIGHT
MARGIN
PLAIN
SWAPFH
WIDTH
XREF
Become Registred

1.69 lk V1.04 - (Margin)

Page 11-58

MARGIN LEFT or RIGHT or TOP or BOTTOM <value>
INDENT <value>
Default: all 0

Defines one of the four margins. lk never writes in margins. A margin is added to the width or the height values (See.)

Usuly margin values are defined with the printer preferences tool only. The

default lk margin are all null.

The instruction INDENT <value> is an equivalent to:
MARGIN LEFT <value>

See also:
FANCY
HEIGHT
MAP
PLAIN
SWAPFH
WIDTH
XREF
Become Registred

1.70 lk V1.04 - (Maxref)

Page 11-59

MAXREF <value>
Default: 5

Defines the maximum number of hunk and unit pair references displayed when a symbol does not exist. lk will, by default, display 5 references. The value can be written in decimal, or in hexadecimal when started with a dollar ($) sign. Set this to zero to ask all existing references.

See also:
ASKUNDEF
WARUNDEF
Become Registred

1.71 lk V1.04 - (Memory)

Page 12

Memory Management

To make it quick, lk allocates large buffers of memory even a very small (1 byte!) amount of memory is required. Then each new little structure is allocated inside the last large buffer taken.
With small program, no modification is necessairy. But if you are working with really large program or large libraries, you should change the large buffer sizes. This is done with one of the following instruction:

HUNK
(Number of hunks, default 50)
SYMBOL
(Total of symbols names, default 16Kb)
RELOC
(Number of reloc structure, default 1000)

lk has a low level memory allocation routine which enables it to display a requester when a memory allocation fails. This will enable you to ends some programs, if you have some running in the background, and retry the lk

allocation.
  If you click on 'Cancel' button, lk will stop and return the main to user.

  If a memory error happend very often on your system, you may suppress the QuickDOS.library or use the following instruction:
QDSTOP

1.72 lk V1.04 - (Newobjects)

Page 11-60

NEWOBJECTS
Default: old objects

  Most of the existing object files uses some external definitions which are no proper. A current mismatch is the similarity given to relative and absolute symbols. lk will check those mistakes and print a warning when the NEWOBJECTS flag is given.

  See also:
    Become Registred

1.73 lk V1.04 - (Noalv)

Page 11-61

NOALV or NOALVS
Default: NOALV

  This instruction suppress the effect of ALV. This is the default.

  See also:
    ALV
    MAKERELATIVE
    NOWARNING
    WARNING
    Become Registred

1.74 lk V1.04 - (Nodataoverlaid)

Page 11-62

NODATAOVERLAID
Default: data in overlay are allowed

  Only the commercial version will have this instruction fully supported. Registred people will receive that version.

  This instruction will suppress any DATA or BSS hunk from overlaid units. This is useful when you do not want to know how DATA and BSS hunks are managed. Note that you still have to forget the usage of any kind of data within your hunks of code (except for case tables or that kind of 'code' things.)
  This instruction is useless on executable files. Those files are supposed

functional and cannot be changed.

In one way this is not the most intelligent usage of overlaid program. But your C may not give you a choice.

Example of code:

This first example will need the NODATAOVERLAID:

```
char *getdefaultstring()
{
    return ("I am the default string");
}

using a compilation mode which forbid strings to be compiled within the code
hunk.
```

or

```
    section text,code

getdefaultstring:
  move.l #defaultstring,d0
  rts

    section data,data

defaultstring:
  dc.b "I am the default string",0
```

This second example is not a valid overlay object:

```
char *getdefaultstring()
{
    return ("I am the default string");
}

using a compilation mode which forces strings to be compiled within the code
hunk.
```

or

```
    section text,code

getdefaultstring:
  move.l #defaultstring,d0
  rts

defaultstring:
  dc.b "I am the default string",0
```

Note: in both cases the function is suppositivly called from an external hunk. This kind of function may be called by the overlaid unit it-self.

This third example shows the best way to do it:

```
  char *defaultstr = "I am the default string";

  char *getdefaultstring()
  {
      char *s;
      s = malloc(strlen(defaultstr));
      ... /* handle memory errors */
      strcpy(s, defaultstr);
      return (s)
  }

or

  char *defaultstr = "I am the default string";

  char *getdefaultstring(char *s) /* s has to be large enough */
  {
      strcpy(s, defaultstr);
      return (s)
  }

or

    section text,code

  ;input: a0 as the destination buffer
  getdefaultstring:
    lea     defaultstring,a1
    move.l  a1,d0
  .cpy
    move.b  (a1)+,(a0)+
    bne.b   .cpy
    rts

    section data,data

  defaultstring
    dc.b "I am the default string",0

See also:
   ALV
   AUTOOVERLAY
   <filename>
   NODATAOVERLAID
   NOOVLDEBUG
   OVERLAY
   OVERLAYOBJECT
   SHORTRELOCOVERLAY
   Become Registred
```

1.75 lk V1.04 - (Nodebug)

```
                                                          Page 11-63

                        NODEBUG or ND
              Default: keep the debugs which are known
```

Eliminates all debug tables. This will not destroy symbols. However only known symbols are keept by default. If you want to keep all debugs, you will have to use the KEEPDEBUG instruction.

NODEBUG is not compatible to the same instruction of Slink. The instruction of Slink will suppress debugs and symbols. lk will suppress only debugs. You should use the STRIPDEBUG (STRIP) instruction which is the new and correct instruction of Slink V6.xx (You can read the documentation of Slink about the instruction 'nodebug'.)

See also:
ADDSYM
CLEARADVISORY
CREATEDEBUG
CREATESYMBOL
KEEPDEBUG
HUNKADVISORY
LEFTADVISORY
NOBSSDEBUG
NOCODEDEBUG
NODATADEBUG
NOLIBDEBUG
NOLOCALSYMBOL
NOOVLDEBUG
NOSYMBOL
SETADVISORY
STRIPDEBUG
Become Registred

1.76 lk V1.04 - (Noemptyhunk)

Page 11-64

NOEMPTYHUNK or NEH
Default: keep empty hunks

This instruction enables the systematical suppression of empty hunks.

Those are very needed when you link objects from DICE. The automatic init/exit code will not be properly linked when NOEMPTYHUNK is used.
This of course does not affect executable files.

See also:
NODEBUG
NOMULTIPLE
NOSYMBOL
NOWARNING
Become Registred

1.77 lk V1.04 - (Noexe)

Page 11-65

NOEXE
Default: put a '.exe' extension

Forbid the automatic '.exe' extension to appear when the destination file name exists within the list of source file. This might be dangerous when present into your preferences file ('lk.prefs'.)

See also:
TO
FOR
Become Registred

1.78 lk V1.04 - (Noicon)

Page 11-66

NOICON or NOICONS
Default: NOICON
(DEFICON if lk is started from the Workbench)

Forbid the création of an icon.
By default, when you start lk from your CLI, no icon is created. But when you start lk from the Workbench, the default icon will be automatically selected. You can also use this command to forbid the default icon of appearing.

See also:
DEFICON
ICON
UNSNAPSHOT
Become Registred

1.79 lk V1.04 - (Nolocalsymbol)

Page 11-67

NOLOCALSYMBOL or NLS
Default: keep all symbols

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

Go through symbol tables and deletes any symbol which starts with a period (.) or ends with a dollar ($). This is useful because some compilers keep all symbols, even those are internal to the given function.

This may be used to have smaller executables and quicker debugging.

See also:
ADDSYM
LEFTADVISORY
CREATEDEBUG
CREATESYMBOL

KEEPDEBUG
HUNKADVISORY
LEFTADVISORY
NOBSSDEBUG
NOCODEDEBUG
NODATADEBUG
NODEBUG
NOLIBDEBUG
NOOVLDEBUG
NOSYMBOL
SETADVISORY
STRIPDEBUG
Become Registred

1.80 lk V1.04 - (Nomultiple)

Page 11-68

NOMULTIPLE or NM
Default: absolute symbol can be defined several times

No multiple absolute symbol definition allowed.

Even the same symbol is defined twice with exactly the same value, an error will be generated (See error #028.)

See also:
Error #028
NOWARNING
Become Registred

1.81 lk V1.04 - (Nooverflow32)

Page 11-69

NOOVERFLOW32
Default: error on overflow 32 bits

lk, like peviously said, checks a lot of things. Also it does an overflow checking on the reloc32 and ref32. If this is a problem, use the NOOVERFLOW32 flag to forget that error.

See also:
NOWARNING
Become Registred

1.82 lk V1.04 - (Nopath)

Page 11-70

NOPATH
Default: See any of the ???PATH instruction

Suppress all default paths. Only the current directory will be checked while none of the PATH instructions are used.

See also:
FDPATH
ICONSPATH
LIBPATH
OBJPATH
WITHPATH
Become Registred

1.83 lk V1.04 - (Norm)

Page 11-71

NORM
NORMBSS
NORMCODE
NORMDATA
NORMHUNK
NORMUNIT
Default: NORM

This instruction forbids any link between hunks, even their names are equal. This will also generate a big resulting file. Those instructions are useless for libraries.
Note that small data code (HUNK_DATA access with A4 register) will anyway be linked together or there would be no use of this function.
The instruction NORM is an equivalent to all other NORM??? called at the same time, including NORMHUNK.

Note: the instruction -FRAG ask for all type of hunk to be fragmented. This is to ensure a compatibility with DLINK.

See also:
FRAGBSS
FRAGCODE
FRAGDATA
SMALL
SMALLBSS
SMALLCODE
SMALLDATA
SMALLHUNK
SMALLUNIT
SINGLE
SINGLEBSS
SINGLECODE
SINGLEDATA
SINGLEHUNK
SINGLEUNIT
Become Registred

1.84 lk V1.04 - (Nospecialdebug)

Page 11-72

NOBSSDEBUG or NBD
NOCODEDEBUG or NCD
NODATADEBUG or NDD
NOLIBDEBUG or NLD
NOOVLDEBUG or NOD
Default: keep known debugs

Eliminates all debug tables from the specific type. This will not destroy symbols.

NOCODEDEBUG forget all debugs from any CODE hunk.
NODATADEBUG forget all debugs from any DATA hunk.
NOBSSDEBUG forget all debugs from any BSS hunk.
NOLIBDEBUG forget all debugs from libraries. (This is unused when you link executable.)
NOOVLDEBUG forget all debugs from overlaid hunks.

See also:
ADDSYM
CLEARADVISORY
CREATEDEBUG
CREATESYMBOL
KEEPDEBUG
HUNKADVISORY
LEFTADVISORY
NODEBUG
NOLOCALSYMBOL
NOSYMBOL
SETADVISORY
STRIPDEBUG (No debug and symbol)
Become Registred

1.85 lk V1.04 - (Nosymbol)

Page 11-73

NOSYMBOL or NS
Default: keep all symbols

Eliminates all symbol tables. This will not destroy the debug tables.

This flag is automatically set when you ask for NODEBUG and SLINK has been used. This is to enable a real Slink compatibility.

For executable file, there is no way to restore any symbol (Except if you have the sources!)

See also:
ADDSYM
CLEARADVISORY
CREATEDEBUG
CREATESYMBOL
KEEPDEBUG
HUNKADVISORY

```
    LEFTADVISORY
    NOBSSDEBUG
    NOCODEDEBUG
    NODATADEBUG
    NODEBUG
    NOLIBDEBUG
    NOLOCALSYMBOL
    NOOVLDEBUG
    SETADVISORY
    STRIPDEBUG (No debug and symbol)
    Become Registred
```

1.86 lk V1.04 - (Nowarning)

```
                                                                Page 11-74
                          NOWARNING or NW
                           Default: QUIET

  Suppresses absolutly all warnings regardless of their  level.  This  might  be
smarter to use the WARNINGLEVEL instruction and to keep the lower level you  can
(NOWARNING instruction also places the level at 100.)

  See also:
     QUIET
     WARNING
     WARNINGLEVEL
     Become Registred
```

1.87 lk V1.04 - (Object)

```
                                                                Page 11-75
                      OBJECT or OBJ [<filename> ...]
                             Default: OBJECT

  Following object files will be linked into the resulting  file.  This  is  the
opposite of LIBRARY keyword which loads files which are not automatically linked
into the resulting file. OVERLAY keyword changes the stream as well.
  Note: the keywords FROM or ROOT automatically restore this mode.

  Usully this keyword is unused. The following format should be used:

  FROM  <fichier racine>
        [<fichier objet> ...]
  LIB   <fichier librairie> [...]
  OVERLAYOBJECT <fichier objet>
  OVERLAY
        <fichier objet> [...]
  END
  FD    <fichier definition> [...]
  FDLIB <fichier definition> [...]
  WITH  <fichier WITH> [...]
```

See also:
FROM/ROOT
LIBRARY
Become Registred

1.88 lk V1.04 - (Odd)

Page 11-76

ODD
Default: accept only even relocs

Odd relocation values are usuly forbidden. Those would generates addresses errors on 68000 based machines. But now that more and more are programming in 68020, it could happen that some pointer where oddly defined (in data hunks usuly.) Then you may specify ODD and enable odd relocation values.

Note: this is not supported on CPU below the 68020.

See also:
Become Registred

1.89 lk V1.04 - (Offset)

Page 11-77

OFFSET <value>
Default: automatic

Defines the offset at which the relative informations will be linked.

This will force the relative to be at that position which means the 8 bits relative pointers may certainly not be linkable. This should only be used if you do not use 8 bit relative.

The OFFSET value should be defined between -32768 and +32768 and be even. No check is provided to let user make its choice; except the warning which is sent when the OFFSET is odd.

For DICE an offset of -$7FFE must be given or the link will not work properly (When you link executable the offset is unused then it is safe to let it undefined.)

See also:
DICE
Become Registred

1.90 lk V1.04 - (Onedata)

Page 11-78

ONEDATA or OD
Default: keep data and bss hunks distinct

Transform BSS hunks into DATA hunks and link them at the end. This is useful to build pure programs, while this way only one section has to be copied.
To work properly ONEDATA has to be used with SMALLDATA and XDATA. Then the result will be a single hunk of data per type of memory. Without SMALLDATA, only hunks of the same name will be linked together and without XDATA, the BSS hunk will be expanded as a large area of zeroes.
Note that BSS and DATA hunks may have the same name when this instruction is used.

This instruction is not valid when a library is created.

See also:
SMALL
SMALLBSS
SMALLCODE
SMALLDATA
XCODE
XDATA
Become Registred

1.91 lk V1.04 - (Opts)

Page 13

lkopts V1.01
The linker options interface.

This program is useful for the one which work with its Workbench a lot. All tasks can be done into the Workbench.

This utility has been created to facilitate the option selection. There is a so large number of options and so many ways to make a mistake, that this program not only enables you to make your choices, but it also prevent you to use redondant keywords or the right values at the right place.

After lkopts loads a first window appear into the top-left corner. It contains the following buttons:

About
display the current version
Help
try to load this help file
Quit
quit lkopts program
Set Default
enables you to select a default setting
Destination
definition of the destination file name
External Map
symbol tables preferences for output
Load
it loads a new WITH file
Object
defines the list of objects, WITHs, libraries...
Defines

```
     enables the definition of external labels
    Save
     it saves the current WITH file
    Flags
     defines specific flag setting
    Address
     gives the program location
    Verify
     verify your selection
   Info
     gives information about each instruction
```

At any time, when a file name as to be declared you may drop an icon into the string gadget. The name will automatically appear with the entire path.

This utility has been created with 'Intuition Interface' tool which was written by Alexis WILKE (c) 1993-1994.

1.92 lk V1.04 - (Opts_address)

```
                                                                Page 13-1
                              lkopts V1.01
                                Address

  This window gives you the possibility to type the address where each type of
hunk has to be relocated. This is useful to link programs at a specific address
(For games, ROMs or Unix like systems.)

  Each type of hunk needs to have an address, except:

     if ONEDATA is used no BSS hunk will exist, then no BSS address is needed.
     if SMALLHUNK or SINGLEHUNK is used no data and BSS hunk will exist, then
    data and BSS address is needed.


  See Also:
     lkopts helps
     ADDRESS
     ONEDATA
     SMALLHUNK
     SINGLEHUNK
```

1.93 lk V1.04 - (Opts_default)

```
                                                                Page 13-2
                              lkopts V1.01
                                Default

  This window enables you to ask 'lkopts' to reset to a specific default
setting.
  A default setting is also used to make lk compatible to a specific type of
link.
```

Available defaults:

lk
: Resets 'lkopts' to lk as used directly into the CLI or from the Workbench without any WITH file.

No Dbl. Symb.
: Resets 'lkopts' to link simple assembler object files. This will suppose that no symbol is duplicated anywhere. Libraries used with C language like will usuly have several functions with exactly the same name.

C
: Resets 'lkopts' to link C like code and libraries. This will also enable multiple symbols definition into the libraries.

DICE
: Resets 'lkopts' to link like dlink of DICE. This may not be fully compatible, while I do not have any documentation about that very specific linker. Note that you should never use DICE instruction if you do not compile DICE object files.

Blink
: Resets 'lkopts' to be compatible to Slink. This will not be fully compatible because lk does not crash when too much symbols are defined...

Slink
: Resets 'lkopts' to be compatible to Slink. The greatest difference with Blink is in the fact the Slink support more hunk types and have more internal variables (like '___ctors' and '___dtors'.)

See also:
lkopts helps
CC
DICE
SLINK

1.94 lk V1.04 - (Opts_defines)

Page 13-3

lkopts V1.01
Defines

This window displays the list of defines. Defines are mostly used for compatibility with other linkers. It can also be used to define some symbols externally. See also the DEFINE instruction for more information.

The button NEW create a new symbol. This one appear in bright color and will become black when valid. No space or sign should appear. Type the external symbol name in the left edit box and the value or the internal symbol name in the right edit box.

The DELETE button will deletes the currently selected definition. There is no

way to restore a delete definition.

The CLEAR button will clear all definitions.

The HIDE button will hide the window. A click on DEFINE will re-open the window.

The use of the 'Default' window may add some definition.

See alo
lkopts helps
DEFINE
VERSION

1.95 lk V1.04 - (Opts_destination)

Page 13-4

lkopts V1.01
Destination

This window will be used to define the destination file name (Into the box named 'File Name') and type which is 'Executable' or 'Library'. Library means you want to create an object file (this is also some kind of pre-link.)
When a library is created no external map is available. lk does not really support this actually.
Note: you may drop an icon into the file name gadget box; its name will automatically appear.

You may type the name of an icon or drop an icon over the big rectangle from your workbench. No check is done to be sure the icon is of type TOOL, you have to take care of that. Select one of the check gadget 'Normal' or 'Selected' to see the two states of the icon.
The default of lk is NOICON, but if you have a preference file you may select the check button named 'No Icon' to forget about the icon from the preference file.

If you define the version and copyright lk will automatically create the version string. To be valid, the copyright must be the program name only. The version must be two values separated by a period. lk will take the date at the time of the link to define the date of the version string. For instance:

```
Version:    1.03
Copyright:  lk
```

Note: you may drop an icon into the copyright gadget box to have its version appearing inside. The icon must refer to a file with a valid version string.

See also:
lkopts helps
filer of lkopts©
COPYRIGHT
CREATELIBRARY
DEFICON
FOR
ICON
NOICON
TO

VERSION

1.96 lk V1.04 - (Opts_filer)

Page 13-5

lkopts V1.01
Load/Save

When you want to load or save a file, you will have a normal requester file which appear.

The file name edit box will be used to type the name of the WITH file.
The Drawer file name edit box will be used to type the path to reach the WITH file.
The parent button can be used to reach the parent (previous level) directory.
The list of devices, assigns and volumes can be used to list their contains. Click on one of them for this purpose.
The list of file and drawers will be used to reach another drawer (next level) or select the WITH file. A double click on the WITH file will correspond to a click on the button 'Load' or 'Save'.
The button 'Cancel' will stop the selection and cancel the eventual effect. No file will be loaded or saved.
The file 'S:lk.prefs' can automatically be loaded when it does exist because a button named 'Prefs' will appear. When you are saving a WITH file, the button 'Prefs' will always appear.
When you save a WITH file and no icon exists, the default icon is automatically added. lkopts© tries first to load 'def_with' file from the current directory, 'LK:ICONS/', 'SC:ICONS/' and 'ENV:SYS/'. If it is not founded, the internal icon is used.

The same window will also appear when you want to select object files, the destination file and the icon file.

See also:
lkopts helps

1.97 lk V1.04 - (Opts_flags)

Page 13-6

lkopts V1.01
Flags

This window includes all flags. You will have to select the flag to modify in the list on the left, then make the selection on the right side of the window. The title gives you the name of the currently modified flag.

Depending upon your selection, some comments may appear. Comments give a complete information for beginners. Those will be increased in the future. If more information is needed, the 'Information' window can be used for this purpose. If you are not sure about a selection, you may keep the 'Verify' window open, it will automatically be refreshed with each new choice and it directly gives you a list of your 'mistakes'.

The check boxes present on the right side of the window will be enable when needed. It's not possible to unselect all of them at a time. You will quickly see that some choices are not possible, you cannot ask to link in mode DICE and SLINK at the same time!

The edit box is needed for many flags which need a more complex choice. The startup label has to be defined by you, like the offset value if you want to specify it.

Be careful! If you want to select a default state, you MUST select that state first and make your modifications after.

See also:
lkopts helps
All lk© keywords

1.98 lk V1.04 - (Opts_object)

Page 13-7

lkopts V1.01
Object

A click on this button will open the object window. This window contains three parts:
1. the object list (left)
2. the object definition (right)
3. the actions (buttons at the bottom)

To enter new object into the list you can:
1. click on 'New Object' to create an object by your-self
2. take an icon from Workbench and drop it into the list (*). If you drop a drawer the form '#?' (all files of that drawer) will be appened to its name. It's up to you to modify the pattern into '#?.o' or '#?.lib' or whatever else.
3. click on 'Get File' and search the file into the requester

(*) a dropped icon is usuly directly copied into the list. If you select the 'Select dropped files' check box, you will have a pre-selection window opened. That secondary window enables you to drop a complete directory and select only a few files of the entire drop.

To be able to modify an object information it has to be selected. For this you have to click on it with the mouse, it will appear with a different color and the file name will appear into the edit box.
You may change the file type by selecting a type into the first selection button. The available types are:

Object
Normal AmigaDOS object file, present in result.

Root
Object to be linked at start of executable file.
Note that the overlay handler will always be linked in front of it.

Library
Library object, linked only when necessary.

Executable
Only one executable can be defined, it will apply the selection onto the selected file.

Overlay
Object files which will be saved in the overlay units; each file will be into a distinct unit.
(please refer to overlay documentation for more informations)

Overlay Handler
The object file which will be used as the overlay handler. The default is 'LK:LIB/overlay.o' or the internal handler when that file file does not exists.

FD
Source files must be library definition files. It will be used to create include or library (object) files with the offsets of each function.

FD Library
Source files must be library definition files. It will be used to create header or library (object) files with a C call for each function.

With
WITH files which will be executed after this one. No check is done to ensure that a WITH file does not call it-self. If you do it, lk will loop forever.

You can change the memory requierement for Object, Root, Library, Executable, Overlay and Overlay Object files. This is done with the menu selection of the middle. The available memory requirements are: Default (take the definition from the file), Chip, Fast and Attributes. The last one will enable you to type the requirement flags as you like. If you do not know your memory flags, you must use 'Select Attributes'. A new window will be opened, make your selection and click the OK button to accept. The requierement flags appear into the edit box.

You can change the new debug mode for each file; like the memory requierements. There are three possible choices:

1. 'Use Hunk Advisory'
   Takes the definition present in the source files.

2. 'Set Advisory Bit'
   Forces the advisory bit to be set into all hunks of the source files. Those hunks will not be automatically loaded by the function 'LoadSeg()' of the AmigaDOS.

3. 'Clear Advisory Bit'
   Clears the advisary bit from any hunk of the source files. All hunks will then be loaded by the AmigaDOS function 'LoadSeg()'.

See also:
lkopts helps
filer of lkopts©

```
CHIP
CLEARADVISORY
DEFAULT
FAST
FD
FDLIB
FROM/ROOT
HUNKADVISORY
LEFTADVISORY
OVERLAY/END
OVERLAYOBJECT
SETADVISORY
WITH
```

1.99 lk V1.04 - (Opts_verify)

```
                                                                Page 13-8
                              lkopts V1.01
                                 Verify

  This window shows you the 'invalid' selections. Because lk is a complex
linker, it's easy to make a mistake. This window has been created to support you
into your selections.

  You have three levels of invalid states:

    1. Remarks. QUIET instruction which is not compatible to Slink instruction
       is shown as a remark.
    2. Incompatible selection. Definition of a startup label with Slink mode.
    3. Wrong or dangerous selection. Ask for fragmented code hunks in DICE mode
       will generate invalid init/exit routines.

  To recover any of those problems, you may select the one you want and then
       click on the 'Correct' button. All remarks may not be recoverable.

  See also:
     lkopts helps
```

1.100 lk V1.04 - (Opts_xref)

```
                                                                Page 13-9
                              lkopts V1.01
                              External Map

  This window enables a quick and simple selection for the external map. You
should keep all default values, except if you really need a specific size.
  While a file name is not specified, no external map is created.

  Into the 'Print' group you can select which kind of reference you need:

    Symbol
      A list of all symbols will be written to the map file. Each symbol is
```

displayed with each of its references. The total number of reference is given as well as the position and size into the resulting executable.

Hunks
Display the list of hunks. That list gives the position and size of each hunk into the destination file. This way you may find out, when you are debugging, which source file the code is from (Note: the use of CREATEDEBUG might be another way.)

Unit
Display the list of units. This is similar to the hunk list, but usuly quicker because a unit may contains several hunks.

References
This gives the list of the referenced symbols.

Into the 'File/Hunk' group you can select the title and the foot of your page. There is nothing very important.

Into the 'Console' group you will accept (Fancy) or forbid (Plain) the usage of special modes. Into a console or with your printer, it will be nicer to use 'Fancy', because you will see the bold and colored characters. If you just want to edit the resulting map file, you should probably use 'Plain', especially if your editor does not interpret the CSI codes

See also:
lkopts helps
FANCY
FWIDTH
HEIGHT
HWIDTH
MAP
MARGIN
PLAIN
PWIDTH
SWAPFH
SWIDTH
WIDTH
XREF

1.101 lk V1.04 - (Order)

Page 11-79

ORDER
Default: given order

The ORDER keyword has been added to enable specific preferences files. If you want to give default libraries in your preference file, those will be linked before the object files. This will generate problems especially if you are linking objects and libraries from SAS.

When you give file names to lk, all files are linked into one list. The ORDER instruction will force object files to be at start, overlaid files to be in the middle and the libraries at the end.

The use of this instruction to link DICE codes will generate invalid programs.

See also:
LIBRARY
OBJECT
OVERLAY
Become Registred

1.102 lk V1.04 - (Other)

Page 14

About my other products

If you want to know about my products, do not hesitate to contact me (Please send me stamped letter with your address.) If you want to receive my programs on a diskette, send a disk with your mail. The disk does not need to be formatted. If only text files is what you want, tell me the computer Amiga or PC.

Click here to have my address!

The next products of mine, soon available, are:

An intuition editor
- supports 12 different gadgets (buttons, edit boxes, complete lists, check box, menus, etc...)
- creates object files (Nothing is to be compiled with a specific compiler or assembler.)
- possesses a forth generation language object oriented (4GL)
- the shareware version is coming soon on your prefered BBS

A map editor
- for any game development, you always need a map editor to create the background, define position of animations, etc...
- enables any programmer to have an IFF file containing a map created by any graphist!
- the map size is limited only by memory (Also sizes are limited to 16383, but 16384 * 16384 * 2 is the memory requirement to create the larger map, enough memory ?)
- the brushes are not limited to one block, but (like maps) are limited to a size of 16384x16384...
- the blocks are 'created' from any IFF picture, having up to 16383 blocks (block zero is the background color) which can be swapped horizontally and vertically (Also this is 65536 blocks...)
- this product will be commercial only.
- if you want more informations, please contact me, I'll provide a complete documentation about all features present in this editor.

A help displayer
- enables anyone to write help files with its prefered editor
- supports any number of languages than required (which can be selected dynamically and through locale preferences.)
- possesses a search command over all files in specified language.
- comes with a help stripper to transform help files into normal text files and a help to amiga guide to transform help files into one guide file.

1.103 lk V1.04 - (Overlay)

Page 11-80

OVERLAY <filename> ... END
Default: OBJECT (No overlay)

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

All object files defined between OVERLAY and END keywords will be linked into the overlay part of the file. Each unit of each object file will represent an overlay unit into the destination file. Memory attributes keywords are valid within that définition. You may also write:

```
OVERLAY
  FAST prog1.o
  CHIP pic1.o
  PUBLIC port_n_msg.o
END
```

Note: The sharp sign (#) is a synonym of END keyword to keep the compatibility with Blink and Slink. The star sign (*) is simply taken as a space character (If you use a star as part of a DOS pattern, you will have to enclose your file name within cotes.)

See also:
AUTOOVERLAY
<filename>
NODATAOVERLAID
NOOVLDEBUG
OVERLAYOBJECT
SHORTRELOCOVERLAY
The Overlays
Become Registred

1.104 lk V1.04 - (Overlayobject)

Page 11-81

OVERLAYOBJECT or OO or OVRLMRG <filename>
Default: OBJECT

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

lk overlay handler program is given with this product to enable programmers to make mofications and eventually transform it completly. If you create an external handler, you will have to specify it with the OVERLAYOBJECT instruction.

You may put that object file into one of your libraries. In this case you must give a specific name to the hunk section of CODE which will be the program startup:

OVERLAYENTRY or NTRYHUNK or ENTRYHUNK

lk also offer another possibility. You can save your object file as

'LK:LIB/overlay.o'. lk will automatically try to load that file and it will use it rather than the internal one. That file will never be used when the OVERLAYOBJECT instruction was used.
The usage of OVERLAYOBJECT instruction will enable the effect of memory instructions to be effective. The following command line will link the overlay handler to be loaded in fast memory:

```
FAST OVERLAYOBJECT <filename>
```

That object has to contain:

- a JSR/JMP to the '_ovl_root' which is the startup point of the main program.
- a function called '_ovl_call' to ensure that the object in overlays can be called (It was the function named '_ovlyMrg' when you used Blink and Slink.)
- a starting overlay table with the magic long word $0000ABCD followed by four null long words.
- a hunk of type CODE at start (It may contain some other code or data and bss hunks.)

Note:
If you define a label or a function named '_ovl_root', lk will use it as the startup program instead of the STARTUP label or the first hunk of code.

See also:
AUTOOVERLAY
<filename>
NODATAOVERLAID
NOOVLDEBUG
OVERLAY
SHORTRELOCOVERLAY
The Overlays
Become Registred

1.105 lk V1.04 - (Ovl)

Page 15

The overlays

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

The purpose of overlays is to have really big programs not entirely in memory at a time. The overlay manager will take care of memory allocations and dispositions.
To make the main code the smaller than posible, all library hunks which are used only by a specific overlaid unit will be linked into that unit. This will save execution time and space.

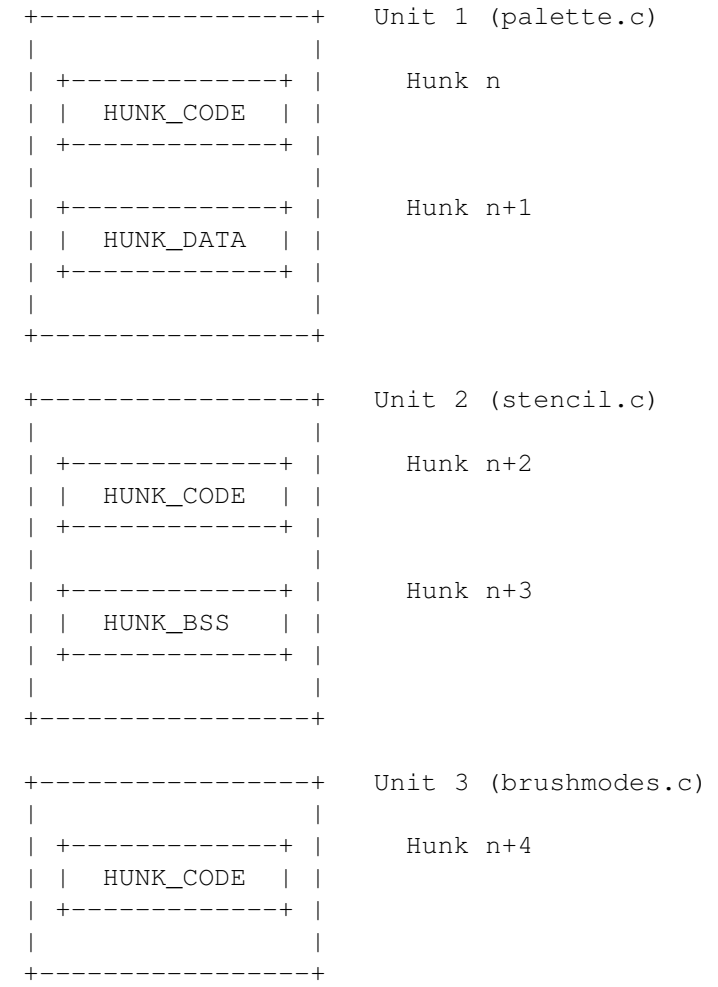
To correctly show you the difference between an overlay hunk and an overlay unit there is a diagram:

let's say that we have a WITH file which contains:

```
OVERLAY
  palette.o
```

```
          stencil.o
          brushmodes.o
        END
```

knowing that each object file contains a hunk of code and a hunk of DATA or BSS, the following diagram show you how each file is saved inside the final overlaid executable:



(*) where n is the number of hunk is the root part.

Of course, each hunk of CODE, DATA and BSS may have some attached hunks of DEBUG, SYMBOL and RELOCation. If you need to refer a hunk in overlay, you just need its unit number.

The overlay section of lk does not follow the way it was designed by Commodore. No tree has to be respected, every unit can call every other unit, lk will take care of that. Calls to an external module can be done with a JSR/JMP and BSR/BRA instructions as well. lk will automatically generates the overlay tables needed to permit those calls (If you used BSR/BRA assembly instructions, you will probably need the use of the ALV command.)

Note that calls from an overlaid hunk to any of the root hunks is just part of the relocation informations. Only calls from the root to the overlaid units or calls from overlaid units to other overlaid units generate overlay tables.

An overlay call is very long and you MUST avoid them in loops. It actually includes around 20 assembly instructions. To ensure faster calls, you should use

the SMALLCODE command. This will avoid the research of the CODE hunk to call.
An overlay unit may consist of DATA only. In that case, an access will be granted only after a call to the overlay handler loader.
After a call returns from an external function, the called funtion is no longer residing in memory. No direct access can be realised (Even if that function is keept in memory by the default overlay handler.) This means no pointer on static data can be returned from an overlaid hunk. Note that the special NODATAOVERLAID command can be used to enable this kind of programming. Have a look to the instruction NODATAOVERLAID to see some examples.
You may force all overlaid hunks to be loaded at a time with a call to the 'ovl_load' function.

If you are linking C objects which access their data in an unknown way, you may take the risk to have problems with those data because they are no more available after the last return from an overlaid function. To prevent that problem the NODATAOVERLAID instruction will move all DATA and BSS hunks into the main program.
Note: this is required if you use a small memory model (?!?) But lk will automatically handle the data displacement and NODATAOVERLAID use not necessary.

When loaded with the default overlay handler, hunks are NOT linked like they are with LoadSeg() of AmigaDOS. The segments have height bytes at the beginning with the size and the 68000 pointer to the next segment.
Each unit is a new linked list (Units are never linked together.)

The available functions from the default overlay handler are listed and explained below. Those are available into the 'overlay.h' header.

```
hunk_pointer _ovl_load(unit_number)

void *ovl_load(long);
```

The parameter is the number of the unit to be loaded. This call will increase the access counter by one. This function might be called to ensure the physical presence of a unit in memory, especially if that unit is only composed of data.
The returned pointer is the startup to the first hunk of that overlay unit. This is a normal 68000 pointer, not a BCPL.
If you call this function with -1, all units will be loaded in memory and then available at any time. In this case this function returns DOSTRUE when no error occured, otherwise DOSFALSE. To know a unit pointer you will have to call 'ovl_load' again with a specific unit number. A call to 'ovl_release' enable the system to suppress the lock.

```
success _ovl_release(unit_number)

long ovl_release(long);
```

Release the specified unit from its lock. This function reduce the access counter by one, but does not free the corresponding units memory, even the counter drop to zero. The free is realised with the 'ovl_dispatch' function.
If you need a data hunk temporary in memory, you may call the 'ovl_load' function and then the 'ovl_release' and 'ovl_dispatch' to free it when you do not need it any longer.

```
success _ovl_dispatch(unit_number)
```

```
long ovl_dispatch(long);
```

Try to free the specified unit from memory. It only works when the access counter is null. You might pass -1 as parameter to discard all units which can actually be freed.

```
success _ovl_freehook(free_func)

long ovl_freehook(void (*)(long));
```

When the overlay handler needs to load a new hunk, it may fails with the memory allocation. Then it will free all memory buffers reserved for other unused units. If the allocation fails again a call to a user function is processed.

If that function is able to free some memory, it will return and the overlay handler will try again to load the needed unit. If it does not work a second call will be processed to the user function... and so on. Each new call to the user function will be done with an incremented parameter starting from null. On zero the user should free unused data, on one it should free every thing it can and on 2 it should quit on an 'out of memory' error (except if the unit is not necessary...)

The overlay handler will call that function with -1 if it has a problem loading the unit (AmigaDOS error.)

If no user function is defined and the new hunk can not be loaded, the function 'ovl_call' will return with all registers unchanged (including CCR) giving the impression of an empty call.

Note: the parameter is given in D0 and on the stack.

The overlay handler program is given with this product to enable programmers to make mofications and eventually transform it completly. See also the instruction OVERLAYOBJECT for more informations.

See also:
ALV
AUTOOVERLAY
<filename>
NODATAOVERLAID
NOOVLDEBUG
OVERLAY
OVERLAYOBJECT
SHORTRELOCOVERLAY
Become Registred

1.106 lk V1.04 - (Paths)


```
  FDPATH "<...>" ...
ICONSPATH "<...>" ...
 LIBPATH "<...>" ...
 OBJPATH "<...>" ...
 WITHPATH "<...>" ...
  Default: see below
```

Defines the list of paths to search the given type of file. Any number of directories and assigns can appear into your paths. Devices which does not exists into your system are not checked. For instance, if 'LIB:' does not exist, the path for library search will not create the usual DOS requester.) Multiple paths may appear into one string, in this case you must separate each path with one of the following sign (only the first one is conventional):

- '|' a pipe (Logical OR in C)
- '+' a plus
- ' ' a space character
- ',' a coma
- '\\' a backslash

If you have some spaces into the name of your directory, you will have to type its name between cotes:

```
"'My Path As Spaces'|NormalPath"
```

become:

1. My Path As Spaces
2. NormalPath

(Note: the opposite cotes was used within the string definition.)

To indicate the current directory you can use a single dot (.), like:

```
".|LK:LIB/|LIB:"
```

for the default library paths present in lk. If you need to use only the current directory an empty string is valid, for instance:

```
WITHPATH ""
```

Paths are checked in the given order. If you prefer to check 'LIB:' before 'LK:LIB/', you could change the default path with:

```
LIBPATH ".|LIB:|LK:LIB/"
```

The fact you use one of those instructions, destroy the previous list of paths of the given type. If you want to suppress all default paths, use the instruction NOPATH.

At start, if you have the V36 or more of AmigaDOS, lk checks global variables (Present in 'ENV:' assign.) All paths can be defined that way and also available to all of you links. The variables have the same name plus the prefix 'LK/'. To redefine the path for the description files, you may type into your CLI:

```
setenv LK/FDPATH ".|INCLUDE:FD.FILES/"
```

This definition is temporary until the next RESET. If you want it to become permanent, you must copy each variable into the 'ENVARC:' assign.

Note: the usage of one of the instructions will erase the external variable paths.

The available paths and their usage are listed below. If you use a specific preference file ('slink.prefs' for instance) the starting default will differ. The default given here is the defaults which are found into the original file (except for those of lk which are internal.) The 'c.prefs' file uses the same defaults than lk.

```
    Command: FDPATH
       Type: Description Files
 lk Default: Current Directory
             INCLUDE:FD.FILES/
 Slink Def.: Current Directory
 Blink Def.: Current Directory
  Dice Def.: Current Directory
Instruction: FD
```

```
             FDLIB
             LIBFD

    Command:  ICONSPATH
       Type: Icon Files
 lk Default: Current Directory
             LK:ICONS/
             SC:ICONS/
             ENV:SYS/
 Slink Def.: Current Directory
             SC:ICONS/
             ENV:SYS/
 Blink Def.: Current Directory
  Dice Def.: Current Directory
             ENV:SYS/
Instruction: DEFICON
             ICON

    Command: LIBPATH
       Type: User libraries
             Default objects (*)
 lk Default: Current Directory
             LK:LIB/
             LIB:
 Slink Def.: Current Directory
             LIB:
 Blink Def.: Current Directory
  Dice Def.: Current Directory
Instruction: LIBRARY
             OVERLAYOBJECT

    Command: OBJPATH
       Type: User objects
 lk Default: Current Directory
             LK:OBJECT
             OBJECT/
 Slink Def.: Current Directory
 Blink Def.: Current Directory
  Dice Def.: Current Directory
Instruction: <default object files>
             OBJECT
             FROM/ROOT

    Command: WITHPATH
       Type: Script Files
 lk Default: Current Directory
             LK:PREFS/
             S:
             SLINKWITH:
 Slink Def.: Current Directory
             SLINKWITH:
 Blink Def.: Current Directory
  Dice Def.: Current Directory
Instruction: WITH

(*) Default objects are any automatically loaded object file. Those are:
     . 'autorun.o'  (AUTORUN)
```

```
    . 'overlay.o'   (OVERLAY)
    . 'library.o'   (AMIGALIBRARY)
    . 'stub.o'      (WARUNDEF)
```

Note: patterns (or wild cards) are searched only into the current directory, event the current directory does not exist into the path.

See also:
AMIGALIBRARY
AUTORUN
DEFICON
FD
FDLIB
<filename>
FROM/ROOT
ICON
LIBFD
LIBRARY
OVERLAY
OVERLAYOBJECT
WARUNDEF
WITH
Become Registred

1.107 lk V1.04 - (Plain)

Page 11-83

PLAIN
Default: FANCY

Forbid any printer/console character (CSI) to be included in XREF file. To reset to default use FANCY keyword.

See also:
FANCY
HEIGHT
MAP
MARGIN
SWAPFH
WIDTH
XREF
Become Registred

1.108 lk V1.04 - (Priority)

Page 11-84

PRIORITY or PRI <value>
LIBPRIORITY <value>
Default: no priority symbol

This instruction defines the symbol PRIORITY. This symbol can be used for any purpose. lk has a special header named 'priority.o' which will use this symbol

to automatically change the priority of the created command.

The LIBPRIORITY instruction will defines the priority of an Amiga library, also the __LIBRARYPRIORITY symbol. The default value of that symbol is zero. That symbol is always defined.

See also:
SETLKPRI
STACKSIZE
Become Registred

1.109 lk V1.04 - (Prompt)

Page 11-85

PROMPT or -P
Default: no prompt

Ask to user to types its own informations. This will ask new lk instructions until the 'QUIT' command is typed or an empty line is given.

See also:
HELP
Become Registred

1.110 lk V1.04 - (Public)

Page 11-86

PUBLIC
Default: DEFAULT

Link all hunks of following object files to be automatically loaded in public memory. This is done regarless of any information present in those object file hunks. It will last with the next memory instruction (ATTRIBUTES/CHIP/DEFAULT or FAST.)

Because this is a user specification, lk will not send any warning.

This instruction can appear into the OVERLAY/END block.

See also:
ATTRIBUTES
CHIP
DEFAULT
FAST
HUNKMEMORY
<filename>
Become Registred

1.111 lk V1.04 - (Pure)

Page 11-87

PURE or -R
Default: impure

This instruction will turn the pure bit to ON into your destination file. This is useless when you create a library.
If the instruction SLINK has been used, then a table of relocation will be created at the end of the near data hunk (if that hunk exists.) This table is also required when you use the startup object file: 'cres.o', the lk automatically set the PURE flag when 'cres.o' or 'catchres.o' are used.

When an executable file is read by lk, the current flag setting is kept for the result. PURE will just force that bit to be set.

See also:
Become Registred

1.112 lk V1.04 - (Purpose)

Page 16

The purpose of lk

lk is a linker editor. It may be used to link any object all together. Objects can be created with any language and compiler or assembler which generate normal Amiga object files (Also not AztecC from manx.)

Four ways to use lk:
1. Link object files to generate an executable.
2. Link object files to generate a library (.Lib file.)
3. "Link" an executable to remove symbols and debugs and ask for small code, data and bss hunks.
   This may eventually be used to force all the program to be loaded in a specific memory type, reshoot relocation table from long to short, and some more.
4. Fix code, data and bss hunks to a specific address.
   This is essential for people which are building games or ROMs.

The first way is the first purpose of lk. When you need to create very large programs, it will be more convenient to make each function in a single file, and then link all object files to generate the program.

The second function was created to enable anyone to generate libraries with a more convenient way than with a JOIN function of the AmigaDOS shell. When files pass trough lk for this purpose, lk may already link some hunks together (This is done this way to ensure a better linking time. Of course, only hunks which needs each other will be linked in a single one.)

The third way can be useful to eliminate debug and symbol hunks from executable files. And this is possible whenever you do not have the source object files (The future AmigaDOS loadings will automatically be faster!)

The forth option will be used only by people which does not want to use AmigaDOS. This will create plain binary files without the reloc tables because it already is positionned. Game and ROMs are only two examples, this features

might be used for other purpose like Unix codes (Which usuly are loaded at a fixed address.)
The debug and symbol tables are freed too.
See also the following keyword for more informations:

ADDRESS

Whenever possible lk will prompt you about a bizarre object(s). To eliminate most or all of lk warnings, see:

QUIET (Default)
WARNINGLEVEL
NOWARNING

To disable the reloc32 and ref32 to generate overflow (which should never happen, but...) use the flag:

NOOVERFLOW32

All source hunks with the same name will be linked together, creating one hunk. Some special keywords may be used to force other hunks to be linked together. Note that there is no way to avoid hunks with the same name to be appended one after another. The given order of the source files will always be keept inside the resulting file.
Note: most of linkers, which support a function to link hunks together, will not check memory requirements correctly. But lk does that for you. Anyway you may not use these functions.

Because some compilers or assemblers does not support a way to specify specific memory requirements, 'lk' have special keywords for that purpose. See also:

CHIP
FAST
PUBLIC
ATTRIBUTES
DEFAULT

Some symbols may be specified on the command line or into the WITH files. This creates an internal file. Also you may receive some errors and comments which occur with the file named: 'Quick Defines'. See also:

DEFINE

If you always have an error because some branchement and JSR/JMP with PC genereteS an overflow, you can use the instruction ALV to enable lk to create ALV tables (Thus are table of JMP instructions.)
In the future versions, this will support more instructions, but this will probably generate some bugs at times.
See also:

ALV

lk supports relative definitions. This is complex to properly use those informations and be able to link objects most of the time. lk will always try to order hunks to fit the relative requirements. Except for tiny programs, a relative of 8 bits should be avoid or used a very small amount of times. If you use your own offset (See OFFSET instruction,) hunks may not be well ordered, generating overflow errors. If no error occur, the resulting code will always be working.
The fact that lk keeps the BSS hunks at the end is important for users which want to use XDATA, CLEARXDATA or XRELATIVE instructions.
lk will try to let BSS hunks at the end of the resulting hunk, this may not be possible when you use short and long relatives (16 and 32 bits.)

lk keep a BSS hunk when all relative informations point to a BSS hunk, otherwise the hunk become a DATA hunk.
lk will link a program with relative informations pointing to a hunk of CODE type. In this case only hunks of type code can be pointed.
In the future versions, lk will be able to handle large d16(An) addressing mode and transform the instruction to accept 32 bits (Similarly the d8(An,Xn.S) will be transformed.)
See also:

OFFSET
XCODE
XDATA
CLEARXCODE
CLEARXDATA
KEEPXDATA
XRELATIVEDATA

A safer utilisation of lk, is to run it with a destination file in your RAM: disk. Because this is the first version, it may remains a big bug (Even I tryed it in a lot of ways...)

1.113 lk V1.04 - (Qddiscard)

Page 11-88

QDDISCARD
Default: keep all pre-loaded files

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

lk uses QuickDOS.library when that library is installed into your 'LIBS:' assign. QuickDOS will also read and keep in memory any file used by lk. After a while you will have a lot of memory used only by those files. If you need that memory, just type:

```
lk qddiscard
```

lk will display the name of the discarded files or not.

See also:
- QDLIST
- QDPREPARE
- QDREMOVE
- QDSTART
- QDSTOP
- QuickDOS
- Become Registred

1.114 lk V1.04 - (Qdlist)

Page 11-89

QDLIST
Default: do not display QuickDOS directory

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

lk uses QuickDOS.library when that library is installed into your 'LIBS:' assign. QuickDOS will also read and keep in memory any file used by lk.
At any time, you can know how much memory is used by typing:

```
lk qdlist
```

lk displays the name of each file with their protection flags and respective size, and at the end the number of file and the total size in use.

See also:
QDDISCARD
QDPREPARE
QDREMOVE
QDSTART
QDSTOP
QuickDOS
Become Registred

1.115 lk V1.04 - (Qdprepare)

Page 11-90

QDPREPARE
Default: link

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

This instruction is useful to ask lk to load files through QuickDOS but not link them. This way files will be ready for the first link.

For instance:

```
lk qdprepare lib:mylib.lib
```

See also:
QDDISCARD
QDLIST
QDREMOVE
QDSTART
QDSTOP
QuickDOS
Become Registred

1.116 lk V1.04 - (Qdremove)

Page 11-91

QDREMOVE
Default: keep the library in memory

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

lk uses QuickDOS.library when that library is installed into your 'LIBS:' assign. QuickDOS will always stay in memory. This takes about 6Kb (The library code and the necessary memory buffers.) If you want to suppress QuickDOS from your memory because you are finished with lk, type:

```
lk qdremove
```

lk tries to free the library and display a message saying so when it succeed.

See also:
- QDDISCARD
- QDLIST
- QDPREPARE
- QDSTART
- QDSTOP
- QuickDOS
- Become Registred

1.117 lk V1.04 - (Qdstart)

Page 11-92

QDSTART
Default: QDSTART

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

lk, by default, uses QuickDOS.library when that library is installed into your 'LIBS:' assign. You can forbid its usage by typing QDSTOP. Files loaded after that instruction will be loaded as usuly. Now if you need to recover the default usage you can use QDSTART, then files will be loaded through QuickDOS again.

See also:
- QDDISCARD
- QDLIST
- QDPREPARE
- QDREMOVE
- QDSTOP
- QuickDOS
- Become Registred

1.118 lk V1.04 - (Qdstop)

Page 11-93

QDSTOP
Default: QDSTART

Only the commercial version will have this instruction fully supported.

Registred people will receive that version.

lk, by default, uses QuickDOS.library when that library is installed into your 'LIBS:' assign. You can forbid its usage by typing QDSTOP. Note that only files loaded after that instruction will be loaded as usuly. Then if you need to recover the default usage you can use QDSTART.

See also:
QDDISCARD
QDLIST
QDPREPARE
QDREMOVE
QDSTART
QuickDOS
Become Registred

1.119 lk V1.04 - (Quickdos)

Page 17

QuickDOS© V1.00

lk is offered with a library named QuickDOS. That library can be installed with other usual libraries into your LIBS: directory.

QuickDOS was created to increase by two or three the loading speed (I check this on a product linking 751Kb of data!)
To increase the speed at its maximum you will have to add buffers to the device you use to stock your object files. One buffer is needed for each object file plus one per directory (only one is necessary for a directory even that directory is used for several objects.) If you use assigns, do not forget that every file name is extended. QuickDOS uses only full paths. To know about thoses paths, you may use the instruction QDLIST after the first usage of lk. An overhead of 50 buffers is not a lux. To add thoses buffers use ADDBUFFERS instruction from you CLI.

QuickDOS will automatically be invoked by lk. Some useful keywords are available to check QuickDOS:

QDDISCARD
QDLIST
QDPREPARE
QDREMOVE
QDSTART
QDSTOP

QuickDOS can be used by any programmer. All necessary informations are given into the QuickDOS archive file. This one is given with the registred version and is available on your prefered BBS.

1.120 lk V1.04 - (Quickfatal)

Page 11-94

QUICKFATAL or QF

lk always stops on a fatal error. It has a few number of fatal errors which remains (like "Out of Memory",) Most of the errors are just overridden by changing some data in a convenient way.

lk is composed of four general levels:

1. command line parse
2. builder
3. cheker
4. saver

(5. external reference file creator)

each level stops lk when an error occurs during its process. Note that is the way I used at start to develop lk. To restore that state use QUICKFATAL. Otherwise lk processes the most of the things it can before to stop.

Note: when a source file is not founded, lk will continue and you should have a lot of missing references appearing. This is the reason I though it could be cool to keep QUICKFATAL.

If you find a fatal error which, you think, should not be endless, let me know. Or eventually an error which should become a warning or vice versa.

See also:
WARUNDEF
Become Registred

1.121 lk V1.04 - (Quiet)

Page 11-95

QUIET

Intend to suppress all warnings and commentaries of any kind. However come commentaries may appear when an error occur.

See also:
CALM
NOWARNING
WARNING
WARNINGLEVEL
Become Registred

1.122 lk V1.04 - (Release)

Page 11-96

What about the next releases ?

If I have a lot of request about one point, it will also quickly be handled. This will also depend upon the amount of documentation I have about the specific things I will have to do.

The following options will be included for my own pleasure and will also be available for you.

1. More listing with more details.
2. More references check, verifying really everything.
3. Eliminates eventual empty code/data/bss hunks in libraries, which may not be fully supported by all of existing linkers.

1.123 lk V1.04 - (Reloc)

Page 11-97

RELOC <value>

Defines the number of reloc structures needed. The default is 1000. Like SYMBOL, the number of reloc used by a link, may be known using VERBOSE keyword.

See also:
HUNK
SYMBOL
VERBOSE
Become Registred

1.124 lk V1.04 - (Script)

Page 11-98

Scripts supplied with lk

Rather than always think on how to do this and that, lk development system is given with some useful scripts. You can modify then as required and create you own scripts.
The scripts given with lk have the 's' flag set. You set that flag with your CLI instruction:

PROTECT <filename> +S

This flag prevent the usage of the EXECUTE intruction every time you call a script.

There is a list of the available scripts:

strip
fd2lib
fd2offset

. strip <source> <destination>

This script will ask to lk to load a file (which has to be an executable) and save that file without any kind of debug. All debugs, symbols and advisory hunks are suppressed. The organization of the hunks will remains the same.

. fd2lib

Creates a library or a header file with the function names defined within a description ('.fd') file.

1. ASM

   You can ask for an assembler include file. This will create a text file with a list of reference. Usuly assembler programmers uses the 'fd2offset' script.

   XREF _<funcname>

2. C

   You can ask for a C header file. This will create a text file with a list of function reference. Because the '.fd' files does not describe suffisiantly the parameter types, only 'long' and 'void *' are used. You may use VERBOSE and edit the resulting file to provide the correct types.

   extern long <funcname>(type,type,...);

3. PASCAL

   You can ask for a Pascal header file. This will create a text file with a list of function references. Because the '.fd' files does not describe suffisiantly the parameter types, only 'long' and '^long' are used. You may use VERBOSE and edit the resulting file to provide each function of the correct types.

   extern Function <funcname>(a:type,b:type,...): long;

4. OBJECT

   You can ask for an object file. In this case lk generates a library (like Amiga.Lib) with each function which can be called with a C like call, which means that parameters are stacked. You can use the option 'C' to have the corresponding function calls.

. fd2offset

Creates a library or a header file with the offset generated from a description ('.fd') file.

1. ASM

   You can ask for an assembler include file. This will create a text file with a list of offset.

   _LVO<funcname> = <offset>

2. C

   You can ask for a C header file. This will create a text file with a list of #define.

   #define _LVO<funcname> <offset>

3. PASCAL

You can ask for a PASCAL header file. This will create a text file with a list of constants.

```
const _LVO<funcname> = <offset>;
```

4. OBJECT

You can ask for an object file. In this case lk generates a library (not like Amiga.Lib) with each function offset defined as an XDEF. The correspong assembler programme would be:

```
      XDEF  _LVO<funcname>
_LVO<funcname>     =   <offset>
```

See also:
WITH
WITHPATH

1.125 lk V1.04 - (Setlkpri)

Page 11-99

SETLKPRI <value>
Default: CLI priority

This instruction defines the priority of lk. lk usuly takes the priority of your CLI. This instruction enable you to fix the priority at a given value.

The last call to SETLKPRI will be effective for all the duration of the link.

See also:
PRIORITY
Become Registred

1.126 lk V1.04 - (Shortreloc)

Page 11-100

SHORTRELOC or SR
SHORTRELOCOVERLAY or SRO

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

The instruction SHORTRELOC can be used for version 37 and over of DOS. This will transform any reloc hunk into a short 32 reloc hunk. It should enable you to save up to 32Kb...

You must also consider that the usage of this instruction disables the ability

of the earlier DOS versions to load your executable.

The usage of this keyword moves all small relocs into the short reloc table. This might enlarge your file in a so few cases that no internal test is done.
You can use lk on all of your executable (even thoses of Commodore) to make them smaller. Anyway, ensure that you have a copy of the original file.

When you do not use this instruction, the short reloc tables are deleted and replaced by normal reloc 32.

If you want to generate (or load) files for the V37 of DOS, you will have to use the following instructions:
READSRV37
WRITESRV37
which is a counter pass to the Commodore bugs.

The lk overlays support short relocs at anytime while you use the default lk overlay handler. This does not check the system version. Then the SHORTRELOCOVERLAY instruction should be used at anytime when an overlay is created. The short reloc of the overlay takes in account the version V37 bug.

See also:
MAKERELATIVE
OVERLAY
SMALL
SMALLBSS
SMALLCODE
SMALLDATA
SINGLE
SINGLEBSS
SINGLECODE
SINGLEDATA
READSRV37
WRITESRV37
Become Registred

1.127 lk V1.04 - (Shortv37)

Page 11-101

READSRV37
WRITESRV37
Default: warning when a HUNK_DREL32 is read
and writes HUNK_RELOC32SHORT has it should be

Only the commercial version will have this instruction fully supported. Registred people will receive that version.

Because Commodore made a big mistake under the V37 of DOS loader, there is a way to create dirty codes.

The specification of READSRV37 will enable the usage of the value 1015 (HUNK_DREL32) as an equivalent to the value 1020 (HUNK_RELOC32SHORT.)
This flag is not necessary, but it forbids the generation of a warning when a 1015 is founded into an executable.

The usage of WRITESRV37 should be prohibited. Do not use short reloc in V37, to avoid this bug, that's all! Otherwise it will use the value 1015 instead of 1020 to save small relocation tables.

See also:
SHORTRELOC
SHORTRELOCOVERLAY
Become Registred

1.128 lk V1.04 - (Single)

Page 11-102

SINGLE
SINGLEBSS or SGB
SINGLECODE or SGC
SINGLEDATA or SGD
SINGLEHUNK
SINGLEUNIT or SGU
Default: NORM

Note: I take the right to tell you that the SMALL???? instructions are more valuable to produce clean executable than those ones.

Ask for one hunk of specified type. While different type of memory may have been defined for each hunk, a way of priority was defined. If only one type of hunk exist, the single hunk will be of that type. If any of the hunk is for CHIP memory the resulting hunk will be in chip memory. If any of the hunk is for FAST memory, and no CHIP hunk exists, the resulting hunk will be in fast memory.
The SINGLE instruction is an equivalent to all SINGLE??? instructions, except SINGLEHUNK.
The SINGLEHUNK instruction transforms all hunks into one single hunk of type CODE, the BSS's will be transformed into large areas of zeroes. This instruction should be used in conjunction with all other SINGLE??? instructions if you want to have an x-hunk.

This function generates a lot of warning if a lot of hunk have different memory requirements. You may use the NOWARNING command to avoid all of them.

In the case of a library (Note SINGLEUNIT only is valid) this instruction will create a single unit. Most of the time this has the effect of destroying a C library.

Note: this instruction does not replace the ONEDATA one.

See also:
CREATELIBRARY
FOR
FRAGBSS
FRAGCODE
FRAGDATA
NOWARNING
NORM
NORMBSS
NORMCODE
NORMDATA

NORMHUNK
NORMUNIT
ONEDATA
SMALL
SMALLBSS
SMALLCODE
SMALLDATA
SMALLHUNK
SMALLUNIT
WARNINGLEVEL
Become Registred

1.129 lk V1.04 - (Slink)

Page 11-103

SLINK

This instruction enables the creation of the special creators and destructors tables. This will ask to lk to create the '___ctors' and '___dtors' arrays.

This option automatically calls CC and BLOCKUNIT. Now the following instructions are needed to ensure that lk will work correctly (as Slink):

```
SLINK   ALV
DEFINE  __BSSBAS=__BSS_BASE
        __BSSLEN=__BSS_LENGTH
        _LinkerDB=__DATA_START
        __BackGroundIO=___BackGroundIO
```

or for resident:

```
DEFINE  _LinkerDB=__DATA_BASE
        __RESBASE=__DATA_OFFSET
        __RESLEN=__DATA_SIZE
        _NEWDATAL=__DATA_LENGTH
        __BackGroundIO=___BackGroundIO
```

I added an option for those symbols, even a very simple test would suffice for two reasons. Not slow down the speed of lk, and enable anyone to use the special symbols '___ctors' and '___dtors' like any other symbol.

See also:
Auto-Init/Exit
BLOCKHUNK
BLOCKUNIT
CC
DICE
Become Registred

1.130 lk V1.04 - (Small)

SMALL
SMALLBSS or SB
SMALLCODE or SC
SMALLDATA or SD
SMALLHUNK
SMALLUNIT or SU
Default: NORM

Ask for the smallest distribution than possible. All hunks of the specified type which have the same memory requirements will be linked together.

If you really want all hunks put all togheter regardless of whatever memory it should be loaded in, you may use SINGLE???? keyword instead.

The instruction SMALL is a short hand to execute all small instruction at the same time.

The instruction SMALLHUNK will change DATA and BSS hunks in CODE hunks and all hunks with the same memory requierement will be linked together. This instruction should be used with all other SMALL??? instructions, if you want to have a x-hunk.

A common mistake is to use the SMALLBSS instruction to enable small data hunks. A C program like always will have a hunk of data which have a smaller size than the size specified into the HUNK_HEADER. To keep (and eventually reduce) those small data, you have to use XDATA instruction.

C programs (Like do Slink/Blink) usuly needs the option ONEDATA.

In the case of a library (Note that SMALLUNIT only is valid) this instruction will make hunks which needs each other to be linked at the library creation time (See FOR for more information about how it goes.) This instruction should not be used when you still develop your library, because it is really slow (It uses a recursive algorithm which cannot make the stack crash!)

See also:
CREATELIBRARY
FOR
FRAGBSS
FRAGCODE
FRAGDATA
FRAGHUNK
NORM
NORMBSS
NORMCODE
NORMDATA
NORMHUNK
NORMUNIT
ONEDATA
SINGLE
SINGLEBSS
SINGLECODE
SINGLEDATA
SINGLEHUNK
SINGLEUNIT
XDATA
XCODE
Become Registred

1.131 lk V1.04 - (Sort)

Page 11-105

SORT
Default: unsorted lists

When this instruction is specified on the command line a sort is intented on tables and symbols.

The sorted informations:
. number of referenced hunks (0 to max)
. relocation tables (Smaller to bigger)
. hunk types (CODE, DATA, BSS)
. symbols (Sort with their values)

This function is useless for AmigaDOS, this might be used only for some debuggers which may not understand unsorted tables.

The use of this instruction will ask lk to make a check on relocation tables.

Note: lk does not sort, this enables it to be quicker.

See also:
Become Registred

1.132 lk V1.04 - (Stacksize)

Page 11-106

STACKSIZE <value>
Default: 4 kb

This instruction defines the value of the symbol named __STACKSIZE. That symbol is always defined, the default value being 4096. The default is also the minimum stack required.

The object file 'stacksize.o' given with lk enables your executable(s) to have an allocated stack of the defined size at start. This object needs to be present into your command line to work.
This is not necessary if you are creating an executable for the Workbench. Note that the eventual icon associated with the executable will receive that stack size.

See also:
LIBREVISION
LIBVERSION
VERSION
Become Registred

1.133 lk V1.04 - (Start)

Page 18

Start with lk®

lk® is a utility which works from CLI or from your Workbench. In that second case you must have a prepared WITH file. In any case you should have a preference file. You may use 'lkopts' utility to create those files.
In order to run lk at its full power, you should assign the directory of lk as 'LK:'. That directory should include 'HELP/', 'PREFS/', 'GUIDE/', 'SOURCES/', 'LIB/', 'ICONS/', 'TOOLS/' directories.

In any case, when you start lk on V36+, it checks global variables of the AmigaDOS. You may defined a global variable with the instruction 'setenv' of your CLI (you will have to copy variables from 'ENV:' to 'ENVARC:' to keep them after a reset.) Those variables are not necessary. The available variables are:

. LK/PREFS

Gives the preference file name. If this file does not exist, the default preference file will be searched as usuly. For more informations, please refer to the following documentation:
The preferences file

. LK/OBJPATH
. LK/LIBPATH
. LK/FDPATH
. LK/WITHPATH
. LK/ICONPATH

Give the path of the given type. Those are unused when you use the preference files: 'slink.prefs', 'dice.prefs' or 'blink.prefs'. For more information, please refer to the following documentation:
PATHS

. LHAOPTS

This variable is used by the archiver. If you have archived libraries and you use 'lha' tool, then the LHAOPTS variable can be set to add some option flags to the default ones. The actual command line to extract files is:

```
lha -q e <library name> <file name>
```

A great option is also: '-w t:' to have the temporary files created in memory instead of your hard drive.

Start from CLI:

. type lk followed by a list of instruction
. create a WITH file and type 'lk with <with file>'
. create a WITH file named lk.with and type lk alone

Start from your Workbench:

. double-click on lkopts to create the WITH file
. click on lk icon and then double-click on a WITH file
(You may select several WITH files)
OUTPUT
that type defines the output window; all lk messages will be sent to that window.
PREFS

that type defines the preferences file name. That name will overwrite the global variable LK/PREFS definition and it will be used instead of the usual default 'lk.prefs' file.

OBJPATH
LIBPATH
FDPATH
WITHPATH
ICONPATH

those types define the given acces paths. Those definitions will erase the one given in global variables.
Note: if you define WITHPATH before or after PREFS it will be used to serach the preference file.

1.134 lk V1.04 - (Startup)

Page 11-107

STARTUP <label name>
Default: use root (first) file

Defines the startup label name. lk will search for that label and try to use its hunk as the first hunk. The label should be defined in a hunk of CODE type and defined with an offset of zero. In any case lk will be able to use that label as the startup, but it has to be the beginning of the program.
An alteration is effective over STARTUP when the instruction OVERLAY or AUTORUN is used.

The normal usage of lk uses three steps to determine the hunk of code to use at start:

. the very first hunk when it is of type CODE.
. searchs the first hunk of code named "TEXT" (The name is case insensitive.)
. the first hunk of code will be used instead.
. if no hunk of code is available, no executable will be created.

See also:
AUTORUN
OVERLAY
Become Registred

1.135 lk V1.04 - (Stripdebug)

Page 11-108

STRIPDEBUG or STRIP
Default: keep the known debugs and symbols

Eliminates all debug and symbol tables. This is also an equivalent to NODEBUG and NOSYMBOL used together.

See also:
ADDSYM
CLEARADVISORY
CREATEDEBUG

```
    CREATESYMBOL
    KEEPDEBUG
    HUNKADVISORY
    LEFTADVISORY
    NOBSSDEBUG
    NOCODEDEBUG
    NODATADEBUG
    NODEBUG
    NOLIBDEBUG
    NOLOCALSYMBOL
    NOOVLDEBUG
    NOSYMBOL
    SETADVISORY
    Become Registred
```

1.136 lk V1.04 - (Swapfh)

```
                                                                Page 11-109
                              SWAPFH
                        Default: header/foot
```

If you prefer to have the foot replacing header line and vice versa in XREF files, use this function.

See also:

```
    FANCY
    HEIGHT
    MAP
    MARGIN
    PLAIN
    WIDTH
    XREF
    Become Registred
```

1.137 lk V1.04 - (Symbol)

```
                                                                Page 11-110
                           SYMBOL <value>
                           Default: 16Kb
```

Defines the symbol buffer size. The default is 16384 bytes (16Kb). For a faster system it may be enlarged while huge programs need more.

Use VERBOSE keyword to know about the current amount of memory used. Note that there is no need to change this value and it is really useless to write a size just under the amount of memory used.

In reality the lk system allocates a new table, each time that a table is full.

See also:

```
    HUNK
```

```
    RELOC
    VERBOSE
    Become Registred
```

1.138 lk V1.04 - (Time)

```
                                                                Page 11-111
                                TIME
                            Default: no time

  Automatically adds the time into the  copyright  string.  This  is  not  fully
supported by the VERSION command but a lot of people use it.
  The time will appear only when a version and a copyright string are defined.

  See also:
     COPYRIGHT
     VERSION
     Become Registred
```

1.139 lk V1.04 - (To)

```
                                                                Page 11-112
                            TO or -O <filename>
                Default: take the name of the first (root) object file

  Defines the destination file name. This may be unused and  also  an  automatic
file name will be generated. Anyway this is safer while you develop  and  always
modify your lk instructions.

  The automatic file name creator will use the root file name (Or the very first
object file  name  when  no  FROM/ROOT  was  specified)  deleting  the  eventual
extension '.o' or '.exe'. If such a name exist in the list of your  object  file
names then '.exe' extension will be appended. No check is provided if the option
NOEXE has been used.

  If the given file name is a directory name, the usual auto creator  file  name
will be used and the result will be saved into the given directory.  The  source
file name will have its path suppressed before the concatenation to  the  source
file name.
  Example:
    FROM prg:object/myprog.o
    TO ram:
  generates the destination file name:
    ram:myprog

  See also:
     <filename>
     FOR
     FROM/ROOT
     NOEXE
     Become Registred
```

1.140 lk V1.04 - (Tobss)

Page 11-113

CODE2BSS
DATA2BSS or D2B
Default: no transformation

By testing each hunk of code and/or data, you may have the possibility to find out some of them which may be a BSS. lk automatically transforms and saves them into a BSS hunk.

While your CODE (or DATA) hunk may have the same name than another CODE (or DATA) hunk, this function may produce a warning when lk try to link hunks of the same name together.

This transformation occurs before the relative ordering and also is consequent for it.

See also:
- CLEARXCODE
- CLEARXDATA
- XCODE
- XDATA
- OFFSET
- Become Registred

1.141 lk V1.04 - (Unsnapshot)

Page 11-114

UNSNAPSHOT
Default: do not touch positions

When an icon is defined, you may want to ensure the positions are undefined. The use of this instruction will automatically undefine positions.

See also:
- DEFICON
- ICON
- NOICON
- Become Registred

1.142 lk V1.04 - (Uselastdefine)

Page 11-115

USELASTDEFINE or ULD
Default: use first define

Uses the last definition found in libraries. This instruction is valid only if CC or DICE has been used. Usuly only the first definition is used, the following being forgotten. This is also another mode to use C libraries, which is not common.

See also:
CC
DICE
Become Registred

1.143 lk V1.04 - (Validnop)

Page 11-116

VALIDNOP
Default: do not check NOP instruction

Some times lk needs to append some data at the end of a hunk of code (Usuly when you have ALVs.) lk checks if that hunk was finished by a NOP instruction when VALIDNOP has been specified, and if so lk uses the space of that NOP. Otherwise no check is done to be sure that lk is not taking a value for that purpose.

See also:
ALV
NOALV
WARUNDEF
Become Registred

1.144 lk V1.04 - (Verbose)

Page 11-117

VERBOSE
Default: no verbose

Make the linker speaking as much as it can. You will have the name of the currently processed files, and some more info!

See also:
ECHO
HELP
Become Registred

1.145 lk V1.04 - (Version)

Page 11-118

VERSION <value 1>[.[<value 2>]]
LIBVERSION <value>
LIBREVISION <value>
Default: no version symbols

Defines the version and release numbers. This defines two symbols (XDEF or extern.) The symbol VERSION is set to the first value and the symbol REVISION is set to the second one.
The fact that the version number is defined enables lk to create the copyright string automatically including the system current date and time. Please, refer

to the COPYRIGHT command for more informations.

When the period (.) does not appear, the REVISION symbol is not created. When the period is not followed by anything, REVISION receives the value 0.

Values may be written in signed decimal or hexadecimal when the value start with a dollar sign ($).
Example: 'Version -5.$A7'.

The LIBVERSION and LIBREVISION instructions were added for Slink compatibility. Slink always creates two symbols _LibVersion and _LibRevision, those receive the default value of zero. If you want to define them you can use the VERSION instruction or LIBVERSION and LIBREVISION respectivly. lk creates two internal symbols __LIBRARYVERSION and __LIBRARYREVISION which will be transformed via the DEFINE instruction like defined in the 'slink.prefs' file. The copyright ID generator accept those two symbols as well as VERSION and REVISION.
The fact one of the LIB instructions is used set the flag AMIGALIBRARY. Please refer you to that instruction to have all necessary informations.
Note that the VERSION instruction will defines __LIBRARYVERSION and __LIBRARYREVISION equal to the symbols VERSION and REVISION respectivly.

See also:
AMIGALIBRARY
CASEINSENSITIVE
COPYRIGHT
DEFINE
LIBID
TIME
Become Registred

1.146 lk V1.04 - (Warning)

Page 11-119

WARNING
Default: QUIET

This instruction will ask to lk to display all warnings regardless of their levels.

See also:
QUIET
NOWARNING
WARNINGLEVEL
Become Registred

1.147 lk V1.04 - (Warninglevel)

Page 11-120

WARNINGLEVEL or WL <value>
Default: QUIET

Suppresses absolutly all warnings having a level lower than the specified value. A value over 99 will suppress all warnings and the value zero will enable all warnings.

The default warning level is 5. 10 is usuly a good enough value.

The warning level appear when the given warning occur. That level is given as the number after the period (.) character.

See also:
QUIET
NOWARNING
WARNING
Become Registred

1.148 lk V1.04 - (Warundef)

Page 11-121

WARUNDEF
Default: error on undefined

Transforms the error 'Undefined reference "<symbol name>".' into a warning. This enables the creation of the resulting file, whenever unresolved symbols existent. However, when there are unresolved symbol, lk creates a wrong (but not automatically invalid) executable, with some long words, words and/or bytes which remain undefined.

If lk detects a function call with a missing define, a '_stub' function will be defined to handle the call.

You may define your own '_stub' function. It must be defined into a CODE hunk. You may save its object file to a file named 'stub.o' in your current directory, 'LK:LIB/' or 'LIB:'. Otherwise you can use it as a library.
The internal lk '_stub' function is a very simple code:

```
    XREF _stub
_stub:
    MOVEQ   #$00,D0
    RTS
```

lk is also supplied with a nice '_stub' function. The declaration of the '_stub' function is:

```
  extern void stub(char *function_name);
```

The variable 'function_name' is also defined into A0 register and is null when no function name is available:

```
if(function_name == (char *) 0) {
  function_name = "no function name";
}
```

Note: lk look for '_stub', '__stub' and '___stub' in this order. Any of those may be defined.

```
  See also:
     ASKUNDEF
     MAXREF
     VALIDNOP
     Error #003
     Become Registred
```

1.149 lk V1.04 - (Width)

```
                                                                    Page 11-122
                        FWIDTH or WIDTH OBJECTNAME <value>
                                    Default: 8
                         HWIDTH or WIDTH HUNKNAME <value>
                                    Default: 8
                         PWIDTH or WIDTH UNITNAME <value>
                                    Default: 8
                        SWIDTH or WIDTH SYMBOLNAME <value>
                                   Default: 16
                                  WIDTH <value>
                              Default: 80 (30..255)

  Defines a width. WIDTH directly followed by a value defines  the  output  line
width. This size does not include margins.

  Followed by a keyword width defines the size of that item in the tables:
    OBJECTNAME
        defines the source file length
        (Default is 8)
    UNITNAME
        defines the unit name length when exist
        (Default is 8)
    HUNKNAME
        defines the hunk name length
        (Default is 8)
    SYMBOLNAME
        defines the symbol name length
        (Default is 16)

  See also:
     FANCY
     HEIGHT
     MAP
     MARGIN
     PLAIN
     SWAPFH
     WIDTH
     XREF
     Become Registred
```

1.150 lk V1.04 - (With)

Page 11-123

WITH [<filename> ...]
Default: OBJECT

Specify a text file which contains some linker instructions. Before to execute any WITH file, the current file (or the command line at start) will be entirly parsed. Also WITH is not defined like an INCLUDE instruction from most of compilers or assemblers.
The WITH file is searched in each WITH path. If it is not found, the extension '.lnk' (SAS link files) is append and lk checks again.

Any number of WITH file may be specified, they will be proceeded in the given order, one after another.

WITH files may contain any instruction.

An automatic WITH file may be created. Also lk will search for any file called:

lkfile
lk.file
lk.with

in that order. If one of those files exist it will be used as a WITH file. The command line must be empty to enable one of those WITH file to be automatically loaded. The current directory and then 'S:' will be scanned.

On the top of that, at the very begining, lk scans the current directory and then 'S:' for a file named 'lk.prefs'. If a such named file exists, it will be loaded and executed as a WITH file before even the command line.

See also:
<filename>
Become Registred

1.151 lk V1.04 - (Xhunk)

Page 11-124

CLEARXCODE or CXC
CLEARXDATA or CXD
KEEPXDATA or KXD
XCODE or XC
XDATA or XD
XRELATIVEDATA or XRD
Default: no X hunk (hunks are extended)

By testing the end of each hunk of code and/or data, lk will try to delete zeroes at that point. Also creating an X hunk. This means that, when loading the hunk, the data at that position may or may not be zeroes; the hunk still has the correct size in memory.
To ensure those data to be cleared you must use the CLEARXCODE or CLEARXDATA. But this create an executable which is valid only on machins having V37 or higher (This is a mix of the ATTRIBUTES and the XHUNK commands.)

The XRELATIVEDATA sub-command will create an XDATA only with the relative data hunk. XDATA instruction override the use of XRELATIVEDATA. This instruction is usuly more powerful than the one of Slink because lk will re-order data hunks to search for the best configuration.

If an executable file does not run properly you may try to run lk on that executable, without the XCODE/XDATA options. Any hunk which was truncated will be restored.

The KEEPXDATA instruction enables a link of executable files with lk without a change to their near data hunk. This instruction is not necessary when you link object files.

All those instructions are only valid to produce executable files. However, all can be used on executable files to reduce some of their hunks.

See also:
ATTRIBUTES
CODE2BSS
DATA2BSS
FRAGBSS
FRAGCODE
FRAGDATA
OFFSET
SMALLBSS
SMALLCODE
SMALLDATA
SINGLEBSS
SINGLECODE
SINGLEDATA
Become Registred

1.152 lk V1.04 - (Xref)

Page 11-125

XREF <filename>
Default: OBJECT

Defines a file where the resulting references tables will be saved. All symbols, files, references, etc... are saved. lk have some options to disable or enable some of those tables to appear in that file.
Symbols in resulting table may be preceded by a sign to indicate their origin:

<none>	any object file
*	library file(s)
+	overlay file(s)
?	DEFINE instruction (See)

Some specific keywords are especially designed for XREF files and are listed here:

MAP
defines the contains of the external file
PLAIN
forbids printer characters
FANCY
enables printer characters

```
    WIDTH
      defines the width of an item
    HEIGHT
      defines the height of a page
    MARGIN
      defines margins
    SWAPFH
      swap foot and header lines
```

Note: This function is executed even you are creating a file of type library. But in that case you may not have really nice and useful informations.

See also:

- FANCY
- <filename>
- HEIGHT
- MAP
- MARGIN
- PLAIN
- SWAPFH
- WIDTH
- Become Registred