

DLDBTT

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	<i>TITLE :</i> DLDBTT		
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WRITTEN BY		January 17, 2023	

REVISION HISTORY

NUMBER	DATE	DESCRIPTION	NAME

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Chapter 1

DLDBTT

1.1 Dreamline Designs' Bugs, Tips and Tricks guide.

Dreamline Designs presents
The bugs, tips and tricks guide v1.2

Released 21-07-95.

Introduction

What is this?

News

News subjects/changes since v1.1

Disclaimer

Contacting us

How to reach us.

Missing info

List of missing information.

Authors

List of the authors of this document.

LCR-Project

Info on the Library-Call-Registers project.

Bugs reports.

Autodocs

Bugs in autodocs.

Includes

Bugs in includes.

Libraries

Bugs in libraries.

RKM

Bugs in the ROM Kernel Manuals.

Other books
Bugs in other books.

Tips'n'Tricks.

Assembler tips

dos.library

mathffp.library

1.2 Introduction to this document.

This Document has it's roots in Dreamline Designs internal ↔
NewsLetter. Here
we, among other things, report found errors in the Autodocs, the includes,
the ROM Kernel Manuals and other books. I have decided that we should share
this information with other developers. Furthermore this document contains
some tips and tricks.

If You have knowledge of any bugs we haven't discovered, feel free to

contact
us.

If anyone should have any public information on electronical media about
some of the blank areas such as the mfm.device or the dos.library please
mail them to me and I'll include them in the next version of this document.
See the

list
for a more specific list of undocumented areas.

From v1.2 the archive comes with the LCR-Project. (LCR=Library-Call-Registers)
This project is a set of includes which can be used by assembler-coders when
using librarycalls. See more info in the
LCR-Project
section.

1.3 Updates since v1.1

-Rewrote the Tips for the dos.library/Info()

-Reported some bugs in The Amiga Guru Book, seems like the biggest problem is
the index. :)

-A couple of bugs found in the Autodocs.

-A couple of bugs found in the RKM: Libraries.

- Added the LCR-Project to the archive.
This is a help for assembler-programmers when calling library-functions.
Read more in the docs for the project.
- Rewrote RKM: Devices/Wrong labels a bit.
- Corrected a couple of bugs in this guide, sorry guys. :)

1.4 List of undocumented areas of the AmigaOS.

This is a list of undocumented areas of the AmigaOS. If you have ANY public information stored on electronic media from the list below, please mail them to me so I can include this in the next version of this document.

- Devices: Includes, autodocs and general information on the mfm.device and the ramdrive.device.
- dos.library: General information on the dos.library. The dos.library is completely left out in the RKMs Third Edition.

C/PASCAL/E/OBERON/AMOS/BASIC-PROGRAMMERS WANTED FOR WRITING!!!

This document is mostly for assembler-coders, we need some other coders to report bugs in their books.

Please share your knowledge with the rest of the developers.

1.5 Disclaimer

Dreamline Designs cannot in any way be held responsible for any problems of any kind the use of this information can cause or has caused.

You may freely distribute this document. If you have any kind of comments, suggestions or new bugs please report them to us instead of just add them and spread the modified document.

1.6 How to reach Dreamline Designs.

You can reach us at the following places:

Stargate, Dreamline Designs BBS

Address

1.9 The authors of this document.

The following people has reported bugs or written parts of this document.

Rasmus K. Ursem, Dreamline Designs.
 Karsten T. Niemeier, Dreamline Designs.
 Jakob V. Hansen, Dreamline Designs.
 Dennis Franck.

1.10 The Library-Call-Registers project from Dreamline Designs

Info on the LCR-project (Library-Call-Registers) from Dreamline ↔
 Designs.

Idea and concept by Rasmus K. Ursem, Dreamline Designs.

Introduction
 Introduction to the LCR-Project.

Copyrights
 Copyrights, disclaimer and distribution.

Current Status
 Current status of the project.

Using the includes
 How to use the includes.

Future
 Future development of the LCR-Project.

1.11 Introduction to the LCR-Project.

INTRODUCTION

This is a set of includes used by assembler-programmers when accessing libraries. The include contains all register referring for all the libraryoffsets. An Example:

```
*** _LVOAllocMem() ***
_LVOAllocMem_Size      equir d0
_LVOAllocMem_ByteSize  equir d0
_LVOAllocMem_Attributes equir d1
_LVOAllocMem_Att       equir d1
_LVOAllocMem_Requirements equir d1
_LVOAllocMem_Result    equir d0
_LVOAllocMem_RFail     = 0
_LVOAllocMem_RU        = 2
```

What can this be used to? Well, the 2 major advantages.

-You don't have to open your autodocs every time you want to get the

registers used for a library-call or the fail-code.

-Your code will be easier to read and understand.

1.12 Copyrights, disclaimer and distribution.

COPYRIGHT

The LCR-Project is copyrighted ©1995 by Rasmus K. Ursem, Dreamline Designs. All rights reserved. It is distributed with the Bugs, Tips'n'Tricks guide from Dreamline Designs.

DISCLAIMER

Dreamline Designs cannot in any way be held responsible for any errors caused by using these includes. However, they have been tested and should be ok.

DISTRIBUTION

You may freely spread the archive on any media, put on coverdisks or in PD-libraries as long as nothing is changed.

The LCR-Project comes with the tips'n'tricks guide from Dreamline Designs, and should be distributed with this.

1.13 Current Status of the project.

CURRENT STATUS

LCR_Exec.i 100% done

LCR_Dos.i Not complete but the most used functions is supported.

1.14 How to use the includes.

USING THE INCLUDES

You simply include them as all other includes.

```
incdir includes:
include LCR/LCR_Exec.i
```

Say you want to allocate some memory, without using LCR_Exec.i you have to

```
...
move.l #1000, d0
move.l #MEMF_PUBLIC, d1
move.l 4, a6
jsr _LVOAllocMem(a6)
...
```

Well it is shorter than

```
...
move.l #1000, _LVOAllocMem_Size
move.l #MEMF_PUBLIC, _LVOAllocMem_Attributes
```

```
move.l 4,          a6
jsr    _LVOAllocMem(a6)
...
```

But you don't have to check your autodocs for the registers and the source is, IMHO, easier to understand.

1.15 The future of the LCR-Project.

FUTURE

The LCR-project will be updated along with new versions of the Bugs, tips'n'tricks guide. The Next version will contain a 100% done LCR for the dos.library.

If you want to help us with this project you are VERY welcome. (it's kinda boring converting an autodoc to a LCR-include.) You don't have to be a coder to help us, anyone who can use a texteditor can do it.

If you are coding libraries other coders can use you can support us a lot by sending us the LCR for your library. We'll of course include it in the next version of the guide.

1.16 Known bugs in autodocs.

Known bugs in the Autodocs.

General bugs

General bugs in the autodocs from Commodore.

System-libraries.

exec.library

dos.library

mathffp.library

mathtrans.library

User-libraries.

xpkmaster.library

1.17 General bugs in the autodocs.

General bugs which can be found in many of the autodocs.

Missing registers
Missing registers under the SYNOPSIS-line.

1.18 Missing registers in the autodocs.

Some of the autodocs from CBM miss some registers below the SYNOPSIS-line. Especially the Result register is missing. This is probably because most of the results is recieved in D0.

Example of the missing result-register.

mathtrans.library/SPAcos()

SYNOPSIS

```
fnum2 = SPAcos(fnum1);
                d0.l
^
\_ d0 is missing.
```

Rasmus K. Ursem, Dreamline Designs.

1.19 Bugs in the autodocs for the exec.library

Known bugs in the Autodocs for the exec.library.

```
AddTask()

CreateIORequest()

ObtainQuickVector()
```

1.20 Missing result register.

Here is missing the mentioned result-register d0. The line should look like this:

SYNOPSIS

```
ioReq = CreateIORequest( ioReplyPort, size );
d0                a0                d0
```

Rasmus K. Ursem, Dreamline Designs.

1.21 Missing result register.

Here is missing the mentioned result-register d0. The line should look like this:

SYNOPSIS

```
AddTask(task, initialPC, finalPC)
d0      A1      A2      A3
```

Rasmus K. Ursem, Dreamline Designs.

1.22 ObtainQuickVector()

First of all, some versions of the autodocs doesn't have this entry. The bug is not really a bug, but more a matter of standards in the autodocs. If your autodocs have this entry, the NAME section probably looks like this:

NAME

Function to obtain an install a Quick Interrupt vector (V39)

According to the standards of the autodocs the entry should look like this.

NAME

ObtainQuickVector -- Function to obtain and install a Quick Interrupt vector. ↵
(V39)

Rasmus K. Ursem, Dreamline Designs.

1.23 Bugs in the autodocs for the dos.library

Known bugs in the Autodocs for the dos.library.

WriteChars()

GetPacket()

QueuePacket()

1.24 Dos.library/WriteChars

Here is missing a D2 under the buflen.

SYNOPSIS

```
count = WriteChars(buf, buflen)
D0      D1      D2
```

Rasmus K. Ursem, Dreamline Designs.

1.25 Dos.library/GetPacket()

This node is completely left out. Probably because the function is replaced by other dos functions. You should use WaitPkt() instead. Information can be found in the Amiga System Programmers Guide at page 347.

Rasmus K. Ursem, Dreamline Designs.

1.26 Dos.library/QueuePacket()

This node is completely left out. Probably because the function is replaced by other dos functions. You should use SendPkt() instead. Information can be found in the Amiga System Programmers Guide at page 347.

Rasmus K. Ursem, Dreamline Designs.

1.27 Bugs in the autodocs for the mathffp.library

Known bugs in the Autodocs for the mathffp.library.

SPTst()

SPDiv()

1.28 SPTst

RESULT

....

Integer functional result as:

+1 => fnum > 0.0

-1 => fnum < 0.0

0 => fnum = 0.0

This isn't correct. SPTst() will never return -1. As the normal integer tst it only tests the operand against Zero. The correct output should be like this:

I recently found this in another book and decided to check up on the subject, unfortunately I am wrong, SPTst does really return -1 if the value is negative. Sorry about that.

Rasmus K. Ursem, Dreamline Designs.

1.29 SPDiv

Here is missing some very important information. The authors forgot to specify which number was divided by which.

SPDiv -- Divide two floating point numbers.

....

SYNOPSIS

```
    fnum3 = SPDiv(fnum1, fnum2)
    D0          D1      D0
```

The missing part:

```
fnum3 = fnum2/fnum1
```

Rasmus K. Ursem, Dreamline Designs.

1.30 Bugs in the autodocs for the mathtrans.library

Known bugs in the Autodocs for the mathtrans.library.

In all the node the result register is missing. However I assume that the results can be received in D0.

Rasmus K. Ursem, Dreamline Designs..

1.31 Bugs in the autodocs for the xpkmaster.library

Bugs found in the autodocs for xpkmaster.library.

```
XpkExamine()
```

1.32 XpkExamine()

This can be found in the autodocs for the xpkmaster.library/XpkExamine()

....

INPUT

```
tags - Pointer to an array of struct TagItem. You may use
      either a XPK_InBuf, a XPK_InName, XPK_InFH or XPK_InHook
      tag.
```

The author left out the fib input. The entry should look like this.

INPUT

```
fib      - Pointer to a XpkFib structure.
tags     - Pointer to an array of struct TagItem. You may use
           either a XPK_InBuf, a XPK_InName, XPK_InFH or XPK_InHook
           tag.
```

Rasmus K. Ursem, Dreamline Designs.

1.33 Bugs in the includes.

General errors in the includes.

```
Libraryoffsets
Specific errors in the includes.
```

```
Libraryoffsets/dos_lib
```

1.34 Bugs in the libraryoffsets for dos.library.

Because the GetPacket() and QueuePacket() is no longer supported these are left out.

Rasmus K. Ursem, Dreamline Designs.

1.35 Huge problem in the libraryoffsets

In most of the includes for libraryoffsets for assembler is missing the lines that prevents double assembling of includes.

E.g from Dos/dos.i these lines are at the top.

```
IFND DOS_DOS_I
DOS_DOS_I SET 1
```

... rest of include ...

and 'ENDC' at the last line.

When including a libraryoffset-include twice the assembler will resond with the error "Double Symbol". To fix your includes you have to add some of these lines yourself. We suggest the following names.

```
LVO_<Libraryname>_I
```

For dos.library these lines will be as follows:

```
IFND LVO_DOS_I
LVO_DOS_I SET 1
```

... rest of include ...

ENDC

Rasmus K. Ursem and Karsten Niemeier, Dreamline Designs.

1.36 Bugs in the libraries.

No non-mentioned bugs in the libraries from CBM is found.

1.37 Bugs in the RKMs.

Bugs and missing parts of the RKMs.

RKM Libraries
Third Edition.

RKM Devices
Third Edition.

1.38 Bugs in the RKM Libraries Third Edition

What about the dos.library?
Page number

401

500

1.39 What about the dos.library?

CBMs "Amiga ROM Kernel Reference Manual: Libraries" has a huge bug. Somehow the authors of this book completely forgot the dos.library.

This is very annoying because neither the autodocs or the includes say much about e.g. the packets.

Anyway, A friend of mine told me that Commodore has "leased out" writing about dos.library to another company, AFAIR called Bantam.

Rasmus K. Ursem, Dreamline Designs.

1.40 Gadtools.library

Just below the subtitle "GADGET REFRESH FUNCTIONS" there is 3 lines. The last sentence is:

"Alternately, they may be added to a window after it is open by using the functions AddGList() and RefreshGList()."

Using AddGList() will, in this connection, crash the computer.

Jakob V. Hansen, Dreamline Designs.

1.41 Exec messages and ports.

At the top of page 500 this C-structure is placed.

```
struct      Node mp_Node;
UBYTE      mp_Flags;
UBYTE      mp_SigBit;
struct task *mp_SigTask;
struct      List mp_MsgList;
```

According to the includes (exec/ports.h and in asm, exec/ports.i) the correct structure should look like this:

```
struct      Node mp_Node;
UBYTE      mp_Flags;
UBYTE      mp_SigBit;
void        *mp_SigTask;
struct      List mp_MsgList;
```

Rasmus K. Ursem, Dreamline Designs.

1.42 Bugs in the RKM Devices Third Edition

Missing devices

Wrong labels

Page number

310

311

1.43 A couple of missing devices.

CBMs "Amiga ROM Kernel Reference Manual: Devices" has left out at least 2 more or less important devices. This is the mfm.device used by PCx: and

and the ramdrive.device used by RAD: However in general you can say that the mfm.device works allmost the same way as the trackdisk.device, but no function is documented, and AFAIK no includes or autodocs exists. The ramdrive.device used by RAD: isn't documented either, however such IO-commands as TD_GETNUMTRACKS or any non-standard device IO commands cannot be used.

Rasmus K. Ursem, Dreamline Designs.

1.44 Case sensitive labels.

Though the book the authors uses labels with cases that doesn't match the case of some (my) version of the includes. example:

```
In the book:          io_Data
In the includes:      IO_DATA
```

Case sensitive assemblers can of course not assemble these labels. (I haven't checked this for the C-includes.)

NOTE: This should only be important to assembler programmers because the book is written with C in mind, and the labels in the book is "C-Labels".

Rasmus K. Ursem, Dreamline Designs.

1.45 Controlling the drive motor.

Just below the middle of this page just above the example is a sub-chapter starting with this:

```
You control the drive motor by passing an IOExtTD to the device with CMD_MOTOR
or ETD_MOTOR.
```

The bug:

```
CMD_MOTOR does not exist this should be replaced with TD_MOTOR.
```

Rasmus K. Ursem, Dreamline Designs.

1.46 Formatting a track.

At the middle of this page just above the example is a sub-chapter starting with this:

```
You format a track by passing an IOExtTD to the device with CMD_FORMAT
or ETD_FORMAT.
```

The bug:

CMD_FORMAT does not exist this should be replaced with TD_FORMAT.

Rasmus K. Ursem, Dreamline Designs.

1.47 Bugs in other books.

Amiga System Programmers Guide
©Data-Becker, 1988.

Amiga ordbogen
©Sall Data, 199?.

Commodore Amiga Maskinsprog
©Data-Becker, 1987.

The Amiga Guru Book (English)
©Ralph Babel, 1993.

Mastering Amiga Assembler
©Paul Overaa, 1992.

1.48 Amiga system programmers guide

Page number

212
Introduction to programming the amiga.

244
Task functions.

266
The Allocmem() and FreeMem() functions.

339
Output().

342
Examine().

344
Info().

347
QueuePacket().

353
Disk layout.

1.49 Introduction to programming the amiga.

At approx line 7 this code is listed:

```
Lea.l    mytask,a0
move.l   #01,8(a0)           ;set type = task
```

This is wrong because the type in the Nodestructure only leaves space for a byte. The lines should be changed to:

```
Lea.l    mytask,a0
move.b   #01,8(a0)           ;set type = task
```

The same mistake is made at approx the middle of the page.

Rasmus K. Ursem, Dreamline Designs.

1.50 Task functions.

At the AddTask() the registers below is like this:

```
Addtask(task,initialPC,finalPC)
      A0      A1      A2
```

This should be corrected to:

```
Addtask(task,initialPC,finalPC)
      A1      A2      A3
```

Rasmus K. Ursem, Dreamline Designs.

1.51 The Allocmem() and FreeMem() functions.

Here is missing a -198 just below the "AllocMem"

Rasmus K. Ursem, Dreamline Designs.

1.52 Output()

Here is missing a d0 and the libraryoffsets below the Synopsis. The Output should look like this.

```
Handle = Output()
d0      -60
```

Rasmus K. Ursem, Dreamline Designs.

1.53 Examine()

Vital information about the alignment of the infoblock is missing here. The infoblock MUST be longword-aligned. (Starting at an address divideable by 4.)

Rasmus K. Ursem, Dreamline Designs.

1.54 Info()

The libraryoffset just below "Info" should be corrected from -104 to -114.

Rasmus K. Ursem, Dreamline Designs.

1.55 QueuePacket()

Here is missing a d0, a d1 and the libraryoffsets below the Synopsis. The QueuePacket should look like this.

```
Status = QueuePacket(Packet)
d0      -168      d1
```

Rasmus K. Ursem, Dreamline Designs.

1.56 Disk Layout.

This part of the book contains a lot of useful info about disk layout, however at the beginning of all the figures this line is written.

Word	Name	Contents	Description
------	------	----------	-------------

This should be corrected for all the figures at the following pages to this.

LongWord	Name	Contents	Description
----------	------	----------	-------------

Just above the figure for the Root-block the authors say that all values are longwords. One should keep in mind that only the numbers below the "Word" column should be multiplied by 4.

Rasmus K. Ursem, Dreamline Designs.

1.57 Amiga ordbogen.

This book written in danish is simply a bug. It is supposed to be a dictionary for the Amiga, but most of the information in the book is simply misguiding and useless. The book is more useful as a gag-book.

Rasmus K. Ursem, Dreamline Designs.

1.58 Commodore Amiga Maskinsprog Dansk/norsk udgave.

General errors in the book
Page Number

69

95

118

119

129

136

1.59 General errors in this book.

- The author has forgotten a tailing `:` on some of the labels. AFAIR the Seka-assembler (and maybe other assemblers) cannot handle labels without `:`
- The assembler directive called "even" is not placed at the proper position in the syntax. Most assemblers today define labels as the first chars of a line, and if this is space or tab there is no label here. In the book the "even" is written at the first position of a source line. Assemblers will not assemble these sources.

Rasmus K. Ursem, Dreamline Designs.

1.60 Hexlong conversion.

Just after the `Loop: label` at the

```
rol    #4, dl
```

This should be longword like

```
rol.l  #4, dl
```

Rasmus K. Ursem, Dreamline Designs.

1.61 Dosname.

Just after the label `dosname` is this line

```
dc.b    'dos.library',0,0,even
```

because even is a so-called assembler directive it probably will cause trouble when assembling is attempted. This should be changed to:

```
dc.b    'dos.library',0,0
even
```

The same 'error' is at page 98.

Rasmus K. Ursem, Dreamline Designs.

1.62 Felt:

At the lower part of the page is a label called felt: This line looks like this in the book.

```
felt:   blk.b                ;reserver 100 bytes
```

The line should look like this

```
felt:   blk.b    100,0        ;reserver 100 bytes
```

Rasmus K. Ursem, Dreamline Designs.

1.63 link

At the upper part of this page there is a routine with a label called readdata: The code looks like this.

```
move.l  dosbase,a6
move.l  filehd,d1
move.l  #$ffffff,d3          ;Læs et vilkårligt antal bytes
jsr     Read(a6)            ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
rts                                           \ /
                                           /
```

This is saying "Read any amount of bytes". However the routine "only" reads 16.777.215 bytes (Max). The line should look like this:

```
move.l  #$ffffffff,d3        ;Læs et vilkårligt antal bytes
```

Which specifies the maximum amount of data the Read() can read.

Rasmus K. Ursem, Dreamline Designs.

1.64 Calculating the offsets.

At the upper part of the page the following is written.

```
offset=(Sektornummer-1)*512
```

This is not correct. Normally we define the first sector on a disk as sector 0, using the above formula will set our offset equal -512 which is wrong for the first sector (0). The line should look like this

```
offset=Sektornummer*512
```

And of course assume the first sector on the disk to be sector 0.

Rasmus K. Ursem, Dreamline Designs.

1.65 Detail-pen.

In this structure is written

```
detail_pen:    dc.w    0
```

this entry is one byte-size so it should be replaced by

```
detail_pen:    dc.b    0
```

Rasmus K. Ursem, Dreamline Designs.

1.66 The Amiga Guru Book.

This book is a MUST for the utility-coder who want to use the dos. ↔
library.

The book contain, among other things, vital info on most of the packets.
(No 3.0+ packets, but that almost doesn't matter since there is only a couple
of them. (ACTION_EXAMINE_ALL_END and ACTION_SET_OWNER))

Rasmus K. Ursem, Dreamline Designs.

Chapter 17.1 The dos.library
Page Number

705

710

711

1.67 Chapter 17.1 The dos.library.

In this chapter on some of the pages is the result sometimes described as

BOOL

D0
[0...15]

I have been doing some testing on this subject and found out that this is not always true. (Testing is done on v39.23 = KS3.0) I have done the testing on the AssignLock() and AssignPath() and they both return a longword success/failure. However it is only relevant for assembler-freaks because C probably takes care of this.

Rasmus K. Ursem, Dreamline Designs.

1.68 Leftout in the index.

Well this is not exactly a bug, but more an annoying "left out".

In the index the author has left out the ACTION_DISK_CHANGE packet. The reason is, AFAIK, because ACTION_DISK_CHANGE is an internal packet, and not used to check for disk-changes. Anyway you can add the following line in your index.

ACTION_DISK_CHANGE page 630.

Here is also described other internal packets.

Rasmus K. Ursem, Dreamline Designs.

1.69 Error in the index.

The Entry "checksum 355 f., 369, 550" should be "checksum 356 f., 369, 550". The subchapter about calculating the checksum is placed on page 356 not 355.

Rasmus K. Ursem, Dreamline Designs.

1.70 Error in the index.

The entry "ComHandler.c, 629 f., 633" has a minor bug. The Source is placed at page 643, not 633.

Rasmus K. Ursem, Dreamline Designs.

1.71 Mastering Amiga Assembler.

I haven't used this book much but a quick browse through the book revealed a couple of bugs. ←

Rasmus K. Ursem, Dreamline Designs.

Page number

56
62
64
65
77
78
109

1.72 Solving simple problems.

Quick instructions:

At the top of the page is written that `moveq` is an 16-bit instruction that sign-extends the contents to a longword. This is written very tricky, to cause total confusion this could be replaced by something like this.

The `moveq` command always affects the data-registers in 32-bit/longword.

It is in other words not possible to do a

```
moveq.w #10, d0
```

At the middle of page these two lines is written

```
move.l #RESULT,A1      Load a1 with address of RESULT
addq   #4, (A1)         Add 4 to the contents of the byte
                        ^^^^
```

This is wrong, should be "word" because the default size of `addq` is word, not byte.

The same mistake is made at the next example.

The whole subchapter leaves the reader with the impression that quick instruction only can be used on words, which is wrong.

Rasmus K. Ursem, Dreamline Designs.

1.73 Solving simple problems.

At the top page in the example the line after the LOOP label.

```
addq.l #1,    a0
      ^
```

This should be the letter l

The same error is in the next example and at page 63.

Rasmus K. Ursem, Dreamline Designs.

1.74 Solving simple problems.

At the second example (CH3-18.s) this line is after the LOOP-label.

```
subq.b d0
```

Should be

```
subq.b #1,    d0
```

Rasmus K. Ursem, Dreamline Designs.

1.75 Solving simple problems.

Example CH3-19.s the 3 first lines look like this.

```
lea    TEXT,    a0    Put address f string in a0
move.b (a0)+,   d0    Copy count and increment pointer
sub.b  #1,      d0    reduce count by 1 for dbra
```

One should keep in mind that Dbra works with 16 bits, and if d0 the lower middle byte isn't 0 (e.g \$ff00) dbra will loop more than the requested. The example should look like this

```
lea    TEXT,    a0    Put address f string in a0
moveq  #0,      d0    Clear d0 for dbra use.
move.b (a0)+,   d0    Copy count and increment pointer
sub.b  #1,      d0    reduce count by 1 for dbra
```

The same error is in example CH3-20.s at page 66.

Rasmus K. Ursem, Dreamline Designs.

At least one bug pr page! Hmmm, the subchapter sure looks like fast work or a sleepy author. :)

1.76 Subroutines and parameter passing.

Below the middle of this page is 3 boxes the first and the last contains this line

```
a7 a6 a5 a4 a3 a2 a1 a0 d7 d6 d5 d4 d3 d2d d1 d0
                ^^^
```

This is of course wrong. should be d2

Rasmus K. Ursem, Dreamline Designs.

1.77 Subroutines and parameter passing.

Just below the middle of this page is these lines

```
movem.l d0-d7/a0-a3,    -(sp)
```

This line is ok.

```
move.l  (sp)+,          d0-d7/a0-a3
```

Here is missing a m in the movem.l instruction, the line should look like this.

```
movem.l (sp)+,          d0-d7/a0-a3
```

The same error is in some of the lines at this page and the next. All lines with a (sp) must be movem.l and not move.l. (NOTE: Only on page 78 and 79)

Rasmus K. Ursem, Dreamline Designs.

1.78 Program design issues.

At the top of this page is the following code listed

```
move.l  #INDIRECTION_TABLE,a5
asl.w   #2,d0                ;Multiply by 4
move.l  (a5,d0.l),a0
jsr     (a0)

asl.w   #2,d0                ;Multiply by 4
move.l  (a5,d0.l),a0
```

These 2 lines can result in some very spooky bugs, say the highword of d0 contains anything else but 0, the last line will get a totally wrong address. What if d0 contains anything larger than \$4000? Wierd and wrong addresses occur. The asl.w should be a

```
lsl.l   #2,    d0
```

or at least a

```
asl.l   #2,    d0
```

Rasmus K. Ursem, Dreamline Designs.

1.79 Tips for Assembler-programmers.

Some Tips for the Assembler-programmer.

Forgetting to cmp
Optimizing Assembler. (This section is for the demo-coder.)

Faster Anding

Memory accesses

Using tables

Faster Multiplication

Faster Floating points

Saving registers

Some words when using Ax's

1.80 Forgetting to cmp before address-registers

The MC680x0 has a tricky thingy when leaving out a `cmp.l #0,Ax` instruction in connection with Address-registers. The tricky thing is:

When working on Address-registers (Ax) the processor doesn't set any flags, however this is only when using Ax in the following way.

```
move.l Testarea,      a0
```

This doesn't set the Zeroflag if Testarea contains 0. Example:

```
move.l DosBase,      a1
beq    .NoDosLibOpen      ;This instruction will never jump
                                ;to .NoDosLibOpen because the zero-
                                ;flag isn't set if DosBase == 0
                                ;a cmpi.l #0,a1 before the beq is
                                ;needed.

move.l 4,            a6
jsr    _IvocloseLibrary(a6)
```

.NoDosLibOpen

Rasmus K. Ursem, Dreamline Designs.

Why addressregisters doesn't affect the condition flags:

The reason is very simple. The Motorola Engineers' actually knew what they were doing. To ensure interrupt-transparency, the processor has to save all the condition flags, the program counter and the data\address registers on the stack, when an interrupt occurs. When an interrupt occurs, the first thing that happens is :

- 1) A word containing the condition flags is pushed onto the stack
- 2) The program counter (PC) is pushed on the stack as a longword

If pushing anything onto the stack would set the condition registers, then you couldn't rely on them, since the status of these registers would be dependent on what you actually pushed onto the stack! Imagine this :

You have a subroutine, where you are executing this instruction :

```
cmp.l #0,d0
```

Now an interrupt occurs. You don't know what's happening in this interrupt, and honestly, you don't care!

Now the interrupt is finished, and gives the CPU Power back to your subroutine, which executes this command :

```
beq.s regd0positive
```

This command depends on the status of one of the condition flags!!! So the condition flags better have to be the same, as before the interrupt occurred! Otherwise, you're fucked!!! Perhaps the Motorola engineers could have let a7 be the only register not to affect the condition registers, but this would cause a lousier performance of the CPU.

I sure hope this is the solution to all your confusion...

Karsten Niemeier, Dreamline Designs.

1.81 A way to do faster anding.

Here is a little hint that can be used when anding small values.

Say we want to copy a data register to another data register and AND this with a value below \$7f. The usual way to do this is:

```
move.l d0,    d1
And.l  #$7f,  d1
```

This can be done like this instead.

```
moveq  #$7f,  d1
and.l  d0,    d1
```

This is faster and the upcode is 2 words smaller. (1 word if we are using words.)

Karsten Niemeier, Dreamline Designs.

1.82 Memory accesses.

A good thing to keep in mind when coding fast assembler-routines is to limit the amount of memory accesses to an absolute minimum. Memory accesses, and especially Chip-memory accesses is extremely slow compared to accessing the data-registers of the MC680x0.

An example: We are coding something that has to set a lot of pixels continuous through the chip-memory, this could e.g. be a CPU-Filled-Vector.

Unoptimized way:

```

...
moveq.l #31,      d6      ;Counter for Dbra
lea      WritePos, a0     ;Somewhere in Chip-mem.
.loop:
Bset     d6,      (a0)    ;Set a pixel in the screen.
dbra    d6,      .loop
...

```

This routine accesses the chip-memory 32 times. (One for each pixel set) It will be approx 32 times (on a 68020+) slower than the following routine because chip-mem accesses eats a lot of time.

```

...
moveq.l #31,      d6      ;Counter for Dbra
moveq.l #0,      d0
.loop:
Bset     d6,      d0     ;Set a pixel in d0.
dbra    d6,      .loop

lea      WritePos, a0     ;Somewhere in Chip-mem.
move.l  d0,      (a0)
...

```

This routine only accesses the chip-memory once. Approx 32 times faster than the routine above. (On a mc68020+) The pixelsetting routine will be loaded to the cache and will thus take almost no time.

The example above is of course very simple and, in this case, it would be much faster just to `move.l $ffffffff` directly to the memory.

Rasmus K. Ursem, Dreamline Designs.

1.83 Precalculated tables.

Precalculated tables is often used to speed up routines. The main purpose is to avoid complicated calculation when the routine is running. ←

An example: We are coding something which requires a mulu with 320.

Unoptimized:

```

.Loop:
...
;A nice loop that does a lot of cool stuff.

```

```

mulu.w #320,d1          ;Here is a slow command this might be
                        ;replaced by a table

```

Optimized:

If you know anything about the limits of d0 and d1, you could make an precalculated multiplication table:

```

lea.l    Mulu320Table,a0
move.w   (a0,d1.w*2),d1

```

Also see the special
multiplication
section!

Karsten Niemeier, Dreamline Designs.

2. Example: We are coding a routine that sets pixel on the screen. A sinus affects the y-coord, which means that we have to multiply the sinus with the width of the screen.

Unoptimized table

```

.SinusTable    dc.w    0,0,0,1,1,2,3,3,4,4,4,3,3,2,1,1

```

When you are using this you have to do a

```

...
mulu    #40,    d0
...

```

before you can set the pixel. Instead the table could just look like this.

```

.SinusTable    dc.w    0*40,0*40,0*40,1*40,1*40,2*40,3*40,3*40,4*40,4*40,4*40
                dc.w    3*40,3*40,2*40,1*40,1*40

```

and you don't have to do the

```

mulu #40,    d0

```

Rasmus K. Ursem, Dreamline Designs.

1.84 Multiplication.

NOTE: On the mc68020+, shifting 1 or 8 times takes exactly the same time, because the CPU has a shifter, just as the blitter has!

Generally all multiplications can be written as a combination of some arithmetic operators. Sometimes it's slower to write the multiplication as a combination, than using the mulu command. In these cases, you might use a precalculated table, as stated in section 1, example 2.

Consider these examples:

Example 1, Unoptimized:

```

mulu.w #256,d0
muls.w #256,d1
mulu.w #1024,d2

```

```
    muls.w    #1024,d3
```

Example 1, Optimized:

```
    lsl.w     #8,d0
    asl.w     #8,d1
```

```
    moveq.l  #10,d4
    lsl.w     d4,d2
    asl.w     d4,d3
```

Example 2, Unoptimized:

```
    mulu.w   #320,d0
```

Example 2, Optimized:

```
    move.w   d0,d1
    lsl.w    #6,d0
    lsl.w    #8,d1
    add.w    d1,d0
```

The bitcombination of #320 is %101000000, thats why we shift 6 and 8 times.

Karsten Niemeier, Dreamline Designs.

1.85 Fast self-invented floating points.

Floating point:

Many people uses floating point in their routines. Also many people don't know how to make floating point operations on the processor. The following example is just my way of making it. It uses 16 bit precision, but still some people prefer to use fx. 7 bit precision, since it's a little faster! This example only works on mc68020+, since it uses divs.l!!!

As an example, we could make a linedraw routine:

LineDraw:

```
PRE:  X1Coordinate in d0
      Y1Coordinate in d1
      X2Coordinate in d2
      Y2Coordinate in d3
```

NOTE: The SetDot routine should of course be implemented in the LineDraw routine, but I placed it as a Routine, to make the source easier to read.

```
    cmp.w    #319,d0    ; First, check if any of the coordinates
    bhi     .out        ; exceeds the screen. If any of the coordinates
    cmp.w    #319,d2    ; does, the we just skip the whole routine.
    bhi     .out
    cmp.w    #255,d3
    bhi     .out
    cmp.w    #255,d4
    bhi     .out

    sub.w    d0,d2      ; Calc delta x
```

```

sub.w   d1,d3      ; Calc delta y
cmp.w   d2,d3
bge     .d3g
move.w  d2,d7      ; # Dots to draw!
bra     .cont1
.d3g:   move.w  d3,d7      ; # Dots to draw!
.cont1:  tst.w   d7
        beq     .out      ; If delta is zero, then skip!
        ext.l   d7
swap    d2
swap    d3
clr.w   d2
clr.w   d3
divs.l  d7,d2      ; delta x float
divs.l  d7,d3      ; delta y float

and.l   #$ffff,d0 ; Clear float part of d0 (xcoord)
and.l   #$ffff,d1 ; Clear float part of d1 (ycoord)

.loop:  jsr SetDot   ; SetDot(d0,d1)
swap    d0
swap    d1
add.l   d2,d0
add.l   d3,d1
swap    d0
swap    d1
dbra    d7,.loop
.out:   rts

```

SetDot:

PRE: XCoordinate in d0
YCoordinate in d1

```

movem.l  d0-d2/a0,-(sp)
lea.l    Screen,a0
move.b   d0,d2
not.b    d2
lsr.w    #3,d0
mulu.w   #320,d1
add.w    d0,d1
bset     d2,(a0,d1)
movem.l  (sp)+,d0-d2/a0
rts

```

Comments:

None of this code is optimized, nor assembled! Well, let me explain the theory behind these floating point operations: We use a longword for the floatingpoint number. The lowword is the point part of the number, and the hiword is the number. Fx. the number 1 would look like this : \$00010000. Fx. the number 1.5 would looke like this : \$00018000 etc. To calculate the delta we first scale our input by 2^{16} , and so we does by using the swap command. Then we clear the point part of the number, this we do by clearing the lowword, using the clr.w command. If we fx. have to divide our number by 15, to get a floating point number, then we just use the divs.l command. Consider this example:

```

moveq.l  #30,d0
swap     d0

```

```

    clr.w    d0        ; could be skipped, since we know the lowword is zero!
    divs.l   #15,d0

```

Register d0 now yields \$00008000, which is a half!
 As you can see, administrating floating points in this way, always works, even with negative numbers, since the swap keeps the sign, and in divs.l also keeps the sign! Well, have fun...

Karsten Niemeier, Dreamline Designs.

1.86 Saving registers

Saving registers:

A typical way of saving registers, could be on dbras. Consider this example:

Example 1, UnOptimized:

```

    moveq.l  #10,d6
.lop0: moveq.l  #20,d7
.lop1: ...
    ... (some code)
    ...
    dbra    d7,.lop1
    dbra    d6,.lop0
    rts

```

Example 2, Optimized:

```

    moveq.l  #10,d7
.lop0: swap    d7
    move.w   #20,d7        ;D7 is now $000A0014
.lop1: ...
    ... (some code)
    ...
    dbra    d7,.lop1
    swap    d7
    dbra    d7,.lop0
    rts

```

Naturally, this loop takes a little longer than the other, but it's a lot faster than using a memory word, just because you need a single register! You also have to consider the swaps is only done each 20.th time!

Karsten Niemeier, Dreamline Designs.

1.87 Some words about Ax's

When working on Address-registers the following can be used to optimized code.

The mc680x0 autoexpands operations on Ax's to longwords, it also signextends to longword.

The following examples will illustrate this.

Example 1: Say we have \$ffff in a0 and want to add 2 the code could look like this.

```
move.l  #$ffff, a0
add.l   #2,     a0
```

The result will of course be \$10001, with the above in mind the optimized version would look like this

```
move.l  #$ffff, a0
add.w   #2,     a0
```

Because the mc680x0 autoexpands this to longword the result will be the same as above, and the upcode is a word smaller. This is very useful in loops e.g. when using tables.

This can also give some problems when using Ax's for calculations. Say we want A0 to contain \$0000ffff (= -1.w) we'll have to do a

```
move.l  #$0000ffff, a0
```

instead of just

```
move.w  #-1,      a0
```

because the signbit indicates a negative number the mc680x0 will signextend to longword. (a0 is of course cleared before this.)

Karsten Niemeier and Rasmus K. Ursem, Dreamline Designs.

1.88 Tips for the dos.library

Info()

1.89 Tips when using info()

When getting info about a disk by using the dos.library/Info() the following is useful to know. In the include dos/dos.i this can be found.

```
*      Disk states
ID_WRITE_PROTECTED EQU 80 * Disk is write protected
ID_VALIDATING     EQU 81 * Disk is currently being validated
ID_VALIDATED      EQU 82 * Disk is consistent and writeable
```

This is a part of the structure filled in by Info(). The data received in id_DiskState is a result of the dos.library internal measuring about the disk in the drive. The dos.library first checks the disks writeprotection, second is the validation, and if the disk wasn't write protected or validating, it returns ID_VALIDATED and you can write to the disk.

In other words:

- If a disk is write protected `id_DiskState` will contain `ID_WRITE_PROTECTED` even if it isn't validated.
- If a disk is NOT write protected and NDOS `id_DiskState` will contain `ID_VALIDATING`.
- If a disk is NOT write protected and DOS `id_DiskState` will contain `ID_VALIDATED`.

`Info()` will return `ID_WRITE_PROTECTED` and not `ID_VALIDATING` if they're both positive, `ID_VALIDATING` if the disk is NDOS and not write protected and only `ID_VALIDATED` if the disk is DOS and not write protected.
Hope this makes sense.

Rasmus K. Ursem, Dreamline Designs.

Readers has let me know this part was hard to understand in the previous versions, especially if you don't know your includes by numbers, the numbers I was referring to in the previous versions was the numbers returned in `id_DiskState`. Sorry about that. °)

1.90 Tips for the `mathffp.library`

`SPFix()`
Problems when rounding off numbers.

1.91 Rounding problems with the `SPFix()`

The problem with `SPFix()` is that it returns the truncated value instead of the rounded value. Examples:

FFP-value	Returned by <code>SPFix()</code>
12.3	12
12.5	12
12.9999	12
-3.4	-3
-3.9	-3

This problem can be corrected by adding 0.5 if the value is positive and subtracting 0.5 if the value is negative. This gives the following values in the table above.

FFP-value	Returned by <code>SPFix()</code>
12.3+0.5	12
12.5+0.5	13
12.9999+0.5	13
-3.4-0.5	-3
-3.9-0.5	-4

Rasmus K. Ursem, Dreamline Designs.