

**magplip**

Marius Gröger

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WRITTEN BY	Marius Gröger	February 12, 2023	

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# Chapter 1

## magplip

### 1.1 magPLIP

magPLIP -- SANA-II device driver parallel IP

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PLEASE READ THIS IF YOU'RE UPGRADING

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## 1.2 magPLIP - Upgrade Information

Upgrade Information

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Please read this section carefully if you have some older revisions of PLIP or magPLIP installed. Especially users who currently work with magPLIP 37.2 or older should take care for some configuration changes.

PLIP 38.xx users should read the complete document from it's top to the end.

Upgrading from the old PLIP

Upgrading from ParNET

Upgrading from magPLIP releases 37.1 or 37.2

Upgrading from magPLIP releases 37.3 to 37.5

## 1.3 magPLIP - Upgrading from the old PLIP

Upgrading from the old PLIP

~~~~~

There might be a little confusion about the various PLIPs floating around. magPLIP was derived from PLIP 38.12 and has virtually been completely rewritten. Today both packages are in no way compatible, only the cable wiring is identical. So you may switch between both networks and check out which one suits your needs at best. If can't make up your mind, I would like to recommend magPLIP to you:

- ~it is updated quite regularly
- ~the work of several people coordinated by one guaratees a high level of functionality and fitness for it's purpose
- it is extensively documented

Don't worry about version numbers. On the Amiga, device driver version numbers should reflect the operating system requirements. As a SANA-II device only needs a 2.04 system, magPLIP sticks to a 37.x version number. I really don't know why the original version used 38.x.

Both the old PLIP and magPLIP retrieve some of their run-time configuration from a preferences file located in the drawer "ENV:Sana2". To avoid any confusion with the old PLIP, I renamed not only the device's name to magPLIP but also the name of this configuration file. Thus magPLIP will only try to read the file "ENV:Sana2/magPLIP.config".

## 1.4 magPLIP - Upgrading from ParNET

Upgrading from ParNET

~~~~~

ParNET is a stand-alone minimal network that allows to mount remote devices such as floppys, harddisks, etc. on a local machine.

It has nothing to do with any PLIP version ever been made for the Amiga.

ParNET's cable wiring differs from magPLIPs! Don't use ParNET cables with any PLIP version, or your computer's parallel port may be damaged!

I highly recommend to de-install ParNET and to install a TCP/IP package such as AmiTCP/IP or AS225R2 and magPLIP. This will also let you do ParNET-style remote device mountings, and in addition it will give you the full power of the world of internet.

## 1.5 magPLIP - Upgrading from magPLIP releases 37.1 or 37.2

Upgrading from magPLIP releases 37.1 or 37.2

~~~~~

The configuration file format has slightly changed with release 37.2 regarding the meaning of the TIMEOUT parameter. Additionally, the old parameter ARBITRATIONDELAY is still supported but not longer used.

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The TIMEOUT is now a real time value to be given in micro-seconds. This gives the user a better control over the device's timeout behaviour as well as making configuration file copying to other machines easier.

## 1.6 magPLIP - Upgrading from magPLIP releases 37.3 to 37.7

Upgrading from magPLIP releases 37.3 to 37.5

No problems should occur if you already use a magPLIP release from 37.3 to 37.5. The configuration file format has not changed. The documentations has undergone some minor changes, reaching from correcting spelling errors to adding a few new sections. Read it if you have the time to do, ignore it if you are already happy with your set-up.

Release 37.4 introduces the ability to use MTUs higher than 8192. The maximum MTU (no pleonasm :-)) is now 128KBytes.

Release 37.7 introduces 2  
     SANA-II special statistic counters  
     that are  
 non-standard. See also  
     Caveats

Release 37.8 fixes a bug which prevented magPLIP from working with multiple protocol stacks simultaneously.

## 1.7 magPLIP - Description

Description

What is PLIP ?

PLIP means Parallel Line IP, and means to run an IP network over the parallel port of a computer. However, IP is only the most popular sort of network which PLIP may be used for. In fact, as all other SANA II devices it is not bound to a particular protocol stack, and it is quite imaginable to run an Internet protocol and, for instance, an Appletalk protocol over the same line.

To avoid confusion with other PLIP releases which can be found on Aminet I named my version magPLIP, referring to the initials of my name.

1994 saw the last release of the original Amiga PLIP device, which was written by Oliver Wagner and Michael Balzer. I was not fully satisfied with this last release, and so I was happy to have the source code and started rewriting it. The deeper I crept into the source, the more of the original code was thrown out. magPLIP is compatible to the original regarding the cable wiring. However, it is not compatible in



the sense that it can communicate with machines that have the old PLIP installed. You need to replace older PLIP-software in order to successfully run magPLIP.

The original documentation of the plip.device published by Oliver Wagner and Michael Balzer reads:

"PLIP is a network device driver conforming to the SANA2 standard. It allows linking of two Amigas using their parallel ports. [...] The complete low level transfer protocol is integrated in the device driver, including port arbitration handshaking and interrupt driven reads. Although the transfer process itself is cpu intensive, the device needs no cpu resources when no transfer is in progress.

PLIP is intended as a low-cost networking solution, since the capabilities of the parallel hardware are somewhat limited. However, it gives much better results than SLIP and leaves the serial port free."

This gives a quick impression what PLIP and magPLIP are intended for.

Support for slow Amigas

My version of PLIP has been written also keeping an eye on the employment of slow, MC68000 based Amigas. (I believe I'm not the only person who wants to blow again a bit of life in his old computer.) It seems to me that the other PLIP releases had some difficulties in this field, mainly arising out of badly chosen system thread priorities.

Starting with release 37.2, the low-level transfer routines are written in assembly language. This gains another 25% speed improvement. The conversion to assembly was done by Jan Kratochvil and Martin Mares.

## 1.8 magPLIP - Features

Features

~~~~~

- Much more line security through machine independent timeout handling
- Compatible with original wiring
- MTU configurable up to 128KBytes
- SANA-II special statistic counters
- ~Works fine also with 68000 based systems
- Slightly changed protocol, allowing to be more flexible and extensible
- Option to omit CRC checks
- Much better configurable then the original

- Major code cleanup, including the removal of assembler fragments, globals, errors
- Several protocol stacks may use magPLIP simultaneously
- ~Distributed as Freeware, complete source code is supplied

## 1.9 magPLIP - Requirements

### Requirements

- AmigaOS Release 2.04 or better
- ~A networking package using the SANA-II network device interface. Suitable network packages include AmiTCP/IP, Envoy, and AS225R2.
- ~2 Amiga computers to be connected via magPLIP. A PC will NOT do as a network node, see [here](#) why.

## 1.10 magPLIP - Installer Script

### Actions taken by the Installer-script

Copy the device code to the proper place:

```
AmigaShell> copy DEVS/Networks/maglip.device AMITCP:DEVS/Networks/
```

Then copy the configuration file to it's places:

```
AmigaShell> copy ENV/Sana2/magPLIP.config ENVARC:Sana2/
AmigaShell> copy ENV/Sana2/magPLIP.config ENV:Sana2/
```

Finally, you may want to copy the documentation somewhere. Simply drag it's icon where you want to.

## 1.11 magPLIP - Installation

### Installation

Installing network drivers is really no fun, as you might already know.

Rather than writing an installer script with artificial intelligence I decided to split the installation procedure into the installation of the

binaries and a manual part.

The first part is best done by the supplied installer script. If you still want to do the installation manually then follow the steps described

herein

.

The second part must be done by hand. As I guess the only hands around currently are yours, follow these steps:

I explain here what to do if you want integrate magPLIP in an AmiTCP/IP Release 4 based network. Other network packages and older AmiTCP/IP releases will require similar actions to be done. Please consult the according user manual to find out what you should do in such cases.

On both systems you want to connect, load the file AMITCP:db/interfaces into you favorite text editor. Add the following lines:

```
maglip0 DEV=AMITCP:DEVS/Networks/maglip.device UNIT=0 P2P NOARP ...
                                               WRITEREQ=32 IPREQ=32
maglip1 DEV=AMITCP:DEVS/Networks/maglip.device UNIT=1 P2P NOARP ...
                                               WRITEREQ=32 IPREQ=32
```

Don't type in the ellipsis, instead concatenate the lines to one.

This tells AmiTCP/IP that there are two PLIP devices, only one of which you will actually use, however.

To tell AmiTCP/IP which interface you want to use, load the file AMITCP:bin/startnet into you favorite text editor. Search the line where the default value for the parameter "IFACE" is set. It should look like this:

```
.def IFACE slip0
```

On one of your systems, change this line into

```
.def IFACE maglip0
```

On the other system, change this line into

```
.def IFACE maglip1
```

It is of absolutely no matter which one you assign which maglip unit. The only really important thing is that you must use both units, if you use the standard PLIP

wiring

as introduced by the original

authors, and which I recommend for compatibility reasons and safety.

It is possible that PLIP doesn't immediately work correctly ith your system configuration. If this is the case, please read the

Configuration

section. There you will find a lot of items you may use to adapt PLIP to your system.

## 1.12 magPLIP - Wiring

### Wiring

~~~~~

In order to establish the physical connection between your Amigas, you will have to create a special wire. Do this very carefully, since a little fault may destroy your parallel port hardware.

On all Amiga models except the Amiga 1000 you need a male DB25 connector.

On an Amiga 1000 you need a female connector.

The cable length should not exceed 4 meters.

System 1	System 2
D0-D7	D0-D7
BUSY	BUSY
POUT	POUT
GND	GND
ACK	STROBE
STROBE	ACK

You can look up the pin assignment in your Amiga User Manual, Appendix A. Note that this cable differs from

ParNet  
! Double check before

using!

You may also cross the BUSY and POUT lines, in this case you must use the same magPLIP unit on both sides. However I don't recommend this, since you gain nothing by this.

There has been a schematic picture contributed by Colin Thompson. Please choose the viewing tool according to your AmigaOS Version.

Display a schematic picture using Display (AmigaOS 2.0)

Display a schematic picture using MultiView (AmigaOS 3.0)

## 1.13 magPLIP - Configuration

### Configuration of magPLIP

~~~~~

After being started, magPLIP reads it's configuration file located in ENV:Sana2/magPLIP.config. This file should consist of a single line on which the following standard AmigaDOS template is applied:

---

TIMEOUT/K/N, PRIORITY=PRI/K/N, MTU/K/N, BPS/K/N, RETRIES/K/N,  
SENDCRC/S, CD=COLLISIONDELAY/K/N, AD=ARBITRATIONDELAY/K/N,  
NOSPECIALSTATS

TIMEOUT (optional keyword argument / number)

PLIP polls the parallel port while transmitting or receiving any data byte. This value lets you specify after how much micro-seconds any transfer should be considered to be failed. magPLIP will abort it immediately and report a line error to the upper network layer (e.g. AmiTCP/IP). This parameter is good toy for peoply tracking down network errors.

Defaults to 500000  $\mu$ s = ½ s.

Minimum is 500  $\mu$ s.

Maximum is 999999  $\mu$ s.

PRI=PRIORITY (optional keyword argument / number)

Priority of the PLIP server task. A high value will decrease response times for communication. On 68000 based systems this should be a higher value than 20, otherwise some intuition actions such as window movement could make the driver miss packets.

Defaults to 0.

Minimum is -128.

Maximum is 127.

MTU (optional keyword argument / number)

Maximum-Transfer Unit. Must be the same for both communication ends! This value is the largest packet size which can be transmitted in one go.

It is important to understand the role of the MTU correctly. The upper network layer (typically an Internet Protocol), is responsible to create a series of packets out of the data which has to be transmitted. Therefore, IP ``knows'' the MTU of the network interface and creates appropriate packets. Choosing the ``right'' MTU depends in some way of your intended application. Simple internet services such as telnet, rsh or ping won't be affected by a large MTU, because the packets which are used for these protocols all fit into 1 or 2 KByte-Packets.

However, if you use one system, say, as a file-server using NFS, the Amiga netfs, FTP, or an HTTP server, there will be the need to transfer larger blocks of data. A higher MTU is in this case recommendable.

Defaults to 1024.

Minimum is 256.

Maximum is 128KB.

BPS (optional keyword argument / number)

A dummy Bit-Per-Second value reported to SANA-2 user when being asked for it. Quite useless, I guess, but left for compatibility.

Defaults to 100000.

Minimum is 1.

Maximum is  $2^{32}-1$ .

---

RETRIES (optional keyword argument / number)

Number of repetitions when a arbitration error is detected.

Defaults to 32.

Minimum is 1.

Maximum is 127.

SENDCRC (Switch)

If you want to send the packets over the line with a CRC checksum, you should set this flag on the side which's packets you want to check. This may be only one both sides. I personally don't use the CRC feature, as all the problems I got so far came due to timeouts, if at all. Don't sending with CRC brings a little speed improvement.

Please note that the TCP/IP protocol provides an own checksumming of their data, so only the small frame header added by magPLIP will be transferred without checksum. The chance of data corruption is in my opinion quite small.

CD=COLLISIONDELAY (optional keyword argument / number)

If accidently both sides want start sending at the same time, this situation is considered as a collision. In such cases, both sides stop their attempts to obtain the line. Instead, they will wait a specific time and try again. This parameter lets the user tell the device how long this time should be, measured in micro-seconds. If you experience line errors, you may play a bit with this parameter in order to fix them. It is important to mention that the collision delay time should be different for the both peer systems, otherwise there would a higher chance for further timeouts. The default values take care for this.

Defaults to 0  $\mu$ s for unit 0, 2000  $\mu$ s for unit 1.

Minimum is 0  $\mu$ s.

Maximum is 999999  $\mu$ s.

AD=ARBITRATIONDELAY/K/N (optional keyword argument / number)

This parameter is supported but has no more functionality. You should omit it and don't be bothered by this.

NOSPECIALSTATS (Switch)

Setting this switch prevents magPLIP from responding on the SANA-II special statistics inquiry command. The intention of this is that the implemented special statistics are non-official and therefore violate the SANA-II standard in some way. In most cases, however, you should not care about this. I never get problems out of this.

## 1.14 magPLIP - SANA-II Special Statistic Counters

### SANA-II Special Statistic Counters

Release 37.7 introduces a new feature to magPLIP: Using the SANA-II special statistic counter feature, it is possible to inquire certain statistical information of magPLIP, that are special to this kind of network. The SANA-II standard requires, that along with each counter a descriptive text

must be supplied. The following table lists these texts and the counter code number and describes them.

| Name       | SANA-II Code | Description                                                      |
|------------|--------------|------------------------------------------------------------------|
| TX Errors  | 0x01A40000   | Number of transmission errors during packet sendings or receipts |
| Collisions | 0x01A40001   | Number of collisions during the line arbitration phase           |

These counters as well as the standard SANA-II statistics can, for instance, be monitored using the sana2meter tool release 37.2 (available on AMINET:comm/net/s2meter37.2.lha)

See also the

Caveats  
section for potential problems with this feature.

## 1.15 magPLIP - Caveats

### Caveats

This section tries to address some known problems.

I will always try to give the user the necessary technical background to understand the problem and, if possible, to include a work-around.

If any user has found a similar problem which is not mentioned in this document, he or she should contact

me  
in order to append it to this  
section.

magPLIP and intuition

On slow, 68000 based systems the magPLIP server should run at a higher priority than the input task. This way you loose a bit intuition speed during transfers, but you don't get line errors when just moving a window.

magPLIP and SANA-II special statistic counters

The implementation of magPLIP tries to comply as much as possible to the SANA-II networking standard from Commodore. All required features such as packet type tracking are implemented. Some optional features such as packet multicast or broadcast are not supported. However, the special statistics as implemented violate the SANA-II standard in so far, as there are not official special statistic counters defined for a PLIP device. Thus, the implemented special statistic counters are inofficial and have been defined by me arbitrarily. For cases where any problem should occur out of this fact, there has been implemented the

NOSPECIALSTATS option

## magPLIP and SANA-II packet type tracking

During the processing of the I/O command for registering a type to be kept track of by the device, the SANA-II specification defines the error condition that the type is already tracked. MagPLIP will never behave like this; instead it allows multiple users to register type tracking for the same type, maintaining an internal counter for the number of tracking requests. Thus, the tracking registries nest and the tracking will be ceased only if the the last user has untracked the type. Although this violates the SANA-II standard in some way, the modification is fully transparent to all device users. Especially since the tracking information is only read by the users, there is no reason why multiple users shouldn't be allowed to monitor the same type.

It is debatable whether the corresponding statistic counters should be cleared whenever someone untracks a certain type. SANA-II states that stats are lost on untracking, so some crazy device user might rely on a fresh stat information on tracking the type again.

## 1.16 magPLIP - Troubleshooting

### Troubleshooting

~~~~~

This section will try to give some answers to the user, who failed to get magPLIP working with any special hardware- or software-setup.

Why can't I use my 3rd party I/O-card?

Why can't I connect to Linux/i386 and NetBSD/i386?

I get line errors while moving windows!

I permanently get line errors!

I can't get this damn thing to work at all!

## 1.17 magPLIP - 3rd party I/O-cards

~~~~~

Why doesn't magPLIP work with my 3rd party I/O-card (Multiface

Card, GVP I/O Extender, ...)?

magPLIP accesses the Amiga's parallel port hardware directly. Although this is not the preferred Amiga-way, it is still a legal thing and well supported by the operating system. Should there ever be built a new Amiga,

---



and should it furthermore no longer have a CIA chip inside, the new adapted Kickstart wouldn't grant magPLIP access to a non-existent CIA.

The counterpart to direct hardware access is to use a standardized Amiga device, `parallel.device` in this case. Such techniques are well known for serial port hardware and various `trackdisk.device` emulations. Unfortunately, `parallel.device` has not been designed for the purpose of a computer-to-computer. So it lacks features such as control over data transfer direction and interrupts, which are essential for magPLIP.

The only way to have magPLIP working with a 3rd party I/O-card would be to write individual low-level adapter routines for each hardware.

## 1.18 magPLIP - Why can't I connect to Linux/i386 and NetBSD/i386

Why doesn't magPLIP work with my PC Linux-Box or NetBSD system?

~~~~~

A lot of email has reached me asking why magPLIP doesn't work with Linux or NetBSD. I appreciate this engagement of the users highly.

The situation on the PC side is as follows: Linux offers also a PLIP network device. This device supports also the printer ports of some older PC systems, which were only able to write data on the port but not to read it. The Linux PLIP works around this problem by abusing some non-data lines normally used for control and handshake purposes as data lines. This solution is quite nasty but guarantees usability on all PCs.

The NetBSD OS doesn't yet support any PLIP (correct me if I'm wrong). I have been toying with porting magPLIP to NetBSD/Amiga, but--if this would be done at all--it would still require porting it to NetBSD/i386.

The Amiga PLIP development has been taken a completely different approach, because every Amiga offers a fairly good (means: bidirectional) parallel port.

The questions are:

- It is not desirable to change magPLIP's wiring and operation generally to the Linux's way; it is however conceivable to have a special magPLIP version.
- Another solution is to modify the Linux/i386 PLIP to operate in magPLIP mode.
- A far more interesting question is however: Who will do this? Few people have already signalled their interest in doing the job. Contact me if you want to join this group, and I'll supply you with further information.

## 1.19 magPLIP - Line errors when moving windows

---

I get heavy line errors when dragging windows or screens!

See

caveats

.

## 1.20 magPLIP - Permanent line errors

I get heavy line errors all the time!

There are a lot parameters which influence transmission timing.  
You find an explanation of the in the  
configuration  
section.

- > Especially the TIMEOUT value's setting is likely to be the key to your problem.
- > If you changed the COLLISIONDELAY parameter by hand instead of using the default values, did you properly assign different values for both peer systems?

If you use AmiTCP/IP, it may also help to increase the pool of read- and write requests in the file AMITCP:db/interfaces by altering the values assigned to the WRITEREQ and IPREQ keywords.

If you use the AmiTCP/IP package, you should use the ping command to track down the error:

```
AmigaShell> ping [host]
or
AmigaShell> ping -f [host]
```

The -f option means "flood" and generates as much packets as possible. Invoked simultaneously on both sides reveals almost any error.

## 1.21 magPLIP - General failure

I can't get this damn thing to work at all!

- > Check your  
wiring

.

- > Did you use both units, magplip0 and magplip1 ?
- > Did you update both systems ?

See also :  
    Installation  
    Usage

## 1.22 magPLIP - Known Bugs

Known Bugs

~~~~~  
·~The arbitration is currently not as secure as it should be. If there is anyone interested in things like this, he/she is invited to get in touch with  
    me  
    in order to work it out.

If you know further bugs, contact  
    me  
    .

## 1.23 magPLIP - Future plans

Future plans

~~~~~  
Perhaps I will implement some more features:

- Some people are currently modify the Linux/i386 PLIP interface driver to provide a magPLIP compatibility mode
- Complete interrupt driven transfer  
    Probably this slows down the thing...
- Online configuration tool  
    What's up, you GUI/Ys out there?  
    Anybody volunteering for this task?

If you have further suggestions, contact  
    me  
    .

## 1.24 magPLIP - History

Development history of magPLIP

~~~~~  
Release 37.8

---

- bugfix: magPLIP can be used by multiple protocol stacks simultaneously.

#### Release 37.7

- Statistical counters for transmission errors and collisions using SANA-II special stats
- Improved documentation
- schematic drawing included that shows the cable wiring

#### Release 37.5

- on early startup time the MTU reported to protocol was not yet the customized value but the default setting; At least Envoy had problems with this bug
- Frame buffer handling is now done dynamically, MTU can be set to values up to 128K. A large MTU increases performance for large data transfers such as in a file-server system.
- Code more robust against initialization errors
- ENV: settings are better checked for validity

#### Release 37.4

- Some documentation changes
- minor changes in the transfer code

#### Release 37.3

- Timeout handling is now system independent and gives a great improvement to configuration and line security
- ARBITRATIONDELAY no longer used, but supported for old config-files

#### Release 37.2

- Performance has been significantly improved due to the transfer routines being rewritten in assembly language
- internal code cleanups

#### Release 37.1

- initial release

#### Technical history of magPLIP

For more technical details, please refer to the source code. In the header section of each source file, you find the pseudo-keyword \$HISTORY: after which follows the complete revision history of this file.

---

## 1.25 magPLIP - Copyright / Credits / Author

Copyright, Credits and Author Information

~~~~~

### Credits

Surely magPLIP would not be what it is today without so much support of a lot of people. Their questions, discussions, critics and personal improvements have helped making magPLIP today's most stable and fast parallel port SANA-II driver.

Oliver Wagner and Michael Balzer have written the original PLIP device, introducing it to the Amiga. At this point my thanks go to these guys particularly for that they supplied the Amiga community with the source code, too. Even though the current source magPLIP has nearly nothing in common with the original, magPLIP would hardly exist without having been able to peek at the original.

I also want to thank Jan Kratochvil and Martin Mares. They wrote the low-level transfer routines from scratch in assembly language. This way they could shorten magPLIP's round trip times by about 25%.

The technical idea behind the timer.device controlled timeout handling as introduced with release 37.3 is the idea of Martin Mares. Thanks a lot.

The MTU bug has been pointed out by John Hendrikxs. Some of his questions inspired me also to rewrite the frame buffer handling.

The schematic drawing for the cable wiring has been contributed by Colin Thompson. I think that it greatly improves and clarifies the wiring section. Colin's original picture has been slightly modified by me to fit in an 8 color NTSC Low-Res screen.

Detlef Wuerkner found and fixed a severe bug lurking inside the code since the first release of magPLIP. This bug would prevent magPLIP from working with multiple protocol stacks simultaneously. Most notably AmiTCP, Envoy and ShapeShifter 3.5 may be used now without mutually excluding the use of each other. Thanks a lot, Detlef!

Finally I wish to thank all those who are not mentioned here but supported me with kind comments, questions and critics.

Again, I ask everyone who has suggestions to magPLIP's implementation or even modified versions of magPLIP to tell me about it in order improve it even more.

Legal stuff

PLIP

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magPLIP

(C) Copyright 1995 Jan Kratochvil & Martin Mares

(C) Copyright 1995-1996 Marius Gröger

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Installer and Installer project icon

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Contact

If you like this software, or have any suggestion how to improve it, or just want to complain about it, feel free to contact me:

Home address:

Marius Gröger,  
Bärstadter Str. 4  
65307 Bad Schwalbach (GERMANY)

Internet email addresses:

mag@sysgo.de  
groeger@goofy.zdv.uni-mainz.de

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