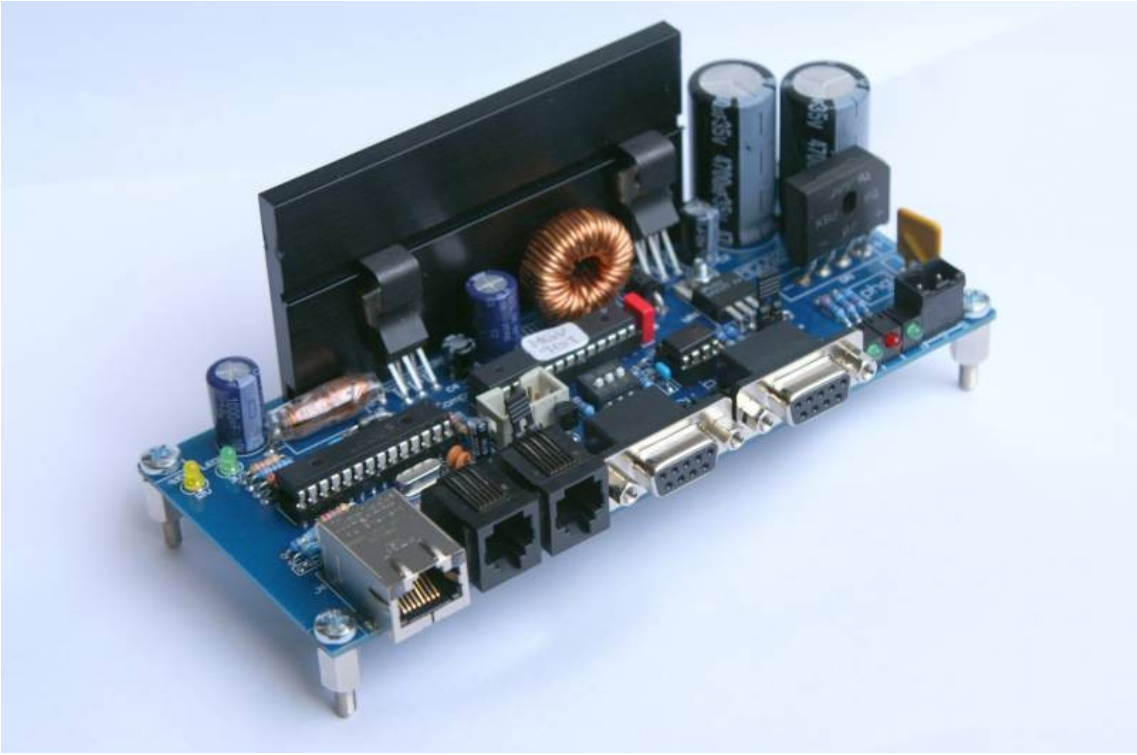
Manual for MGV101



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Translation : Peter Giling

Giling Computer Applications
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CONTENTS

INTRODUCTION

How the idea of MGV101 has started.

There was a need to have an easy connection between Rocrail and LocoNet.
Existing solutions, like MGV85 adn LocoBuffer use the serial port (also known as COMM port).
Only a few years ago, most computers were equipped with on pr two of these ports.
But now a-dys not only lpatops do not have this anymore, also dek-top computer makers fail to install it anymore.
They calim that a goor substitue for this comport is USB.
There are good examples of USB-to serial converters, but in practice it proofs to be not the ultimate reliable solution for railroad communication.

The RJ45 Ethernet connector have become one of the always available conections in every computer.
That ignited the idea to develop the MGV101.
By connecting the computer with the MGV101 through the use of Ethernet , we have a solid state connection right on our hands.
Connection is to be made with a standard Ethernet-cable.

This connection between computer (with Rocrail running) and LocoNet (MGV101) can be realised in several ways:

- with a ´direct´ cable connection .
- With a connection to the LAN (Local Area Network).

Both connection options are described in the next pages.

The latest situation is that MGV101 is made for communication with UDP.
The version, to be used to program into U1 is V3.0. (Situation may 10,2011).

This version is also programmed in the chip, that comes with a complete parts package, available from Giling Computer Applications (GCA).

About this manual

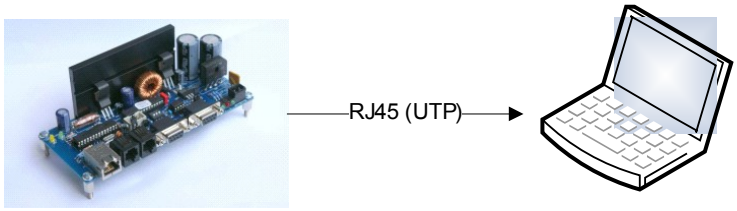
This document is ment to support users while connecting MGV101.
In this manual , the most common configurations are explained.
For any questions or malfunction reports, please put a message at http://www.phgiling.net.
This also include any comments on the contents and/or layout of this manual, and also for suggestions to improve this manual.

Ongoing , more info can be found on RocRail forums .
(http://forum.rocrail.net -> Hardware -> MGV/PHG) .
Also on the website www.rocrail.net, much info can be found about MGV units, mainly all developed by Peter Giling of GCA.

Connection possibilities

Direct connection

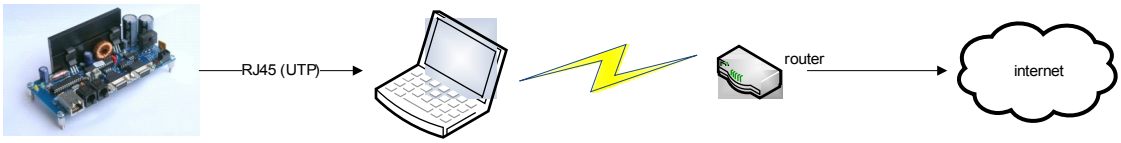
A direct connection MGV101 to LAN-port (UTP connection) of any computer or laptop is possible using a standard network-cable. The Train controller software (RocRail) is installed in this computer.



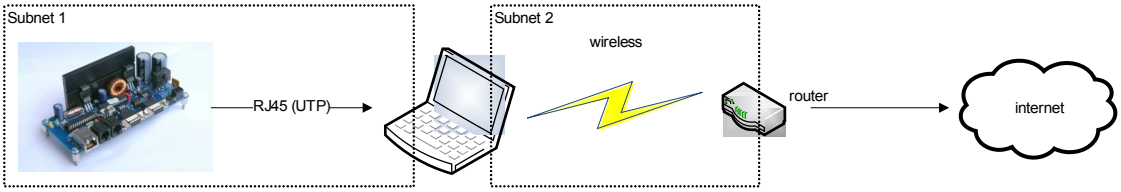
If this computer is dedicated to only using Rocrail, and there are no other Ethernet connections (including WLAN (wireless LAN) or router or modem, the following settings are used:

MGV101	Put the dipswitches all OFF. See Chapter .
Computer	Set the network adapter to a solid IP-adress 192.168.0.1, Subnetmask 255.255.255.0. See chapter , paragraaf .
RocRail	Zie chapter .

Direct wireless connection from MGV101 to Computer



If computer is also usede for other taks than just Railraod controller, i.e. LAN or Internet traffic, it is best to separate the traincontrol communication to MGV101 from the other network communication.
This can be accomplished by using two subnets.
This way it can be avoided that MGV101 has to deal with datatraffic, which has nothing to do with Traincontrolling.

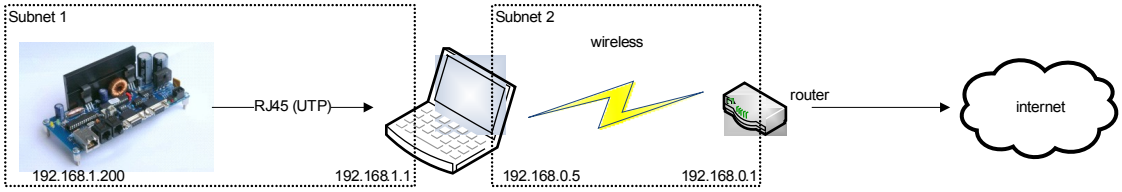


To determine what kind of settings are to be used for ´train´ Subnet, it is firts important to find out the settings of the other subnet.
This is mostly done by using IPCONFIG in a DOS environment. (see chapter).

When the subnet for (wireless) connection with router (or cable- or ISDN modem) has, for example, the value of 192.168.0.xxx, the ´train´subnet needs another adress, for example 192.168.1.xxx.
The different components have to be set as follows:

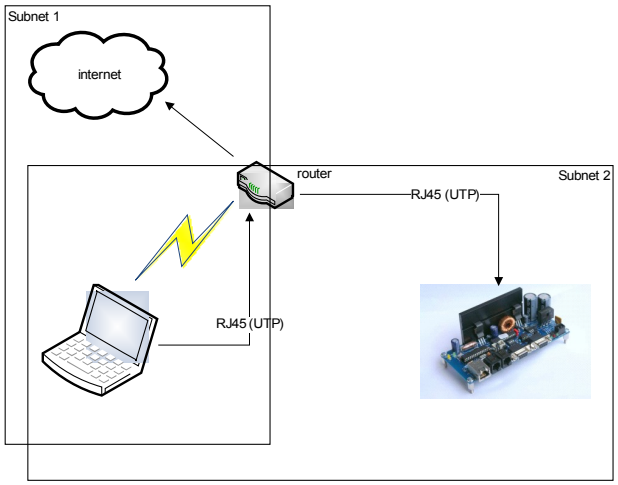
MGV101	Set the dipswitches according the list from www.rocrail.net to use , for example, (192.168.1.xx; MGV101 gets in this setiing the IP-adress 192.168.1.200). See chapter .
Computer	Set the adapter , used for communication with MGV101, to a (solid) IP adress in the same adress range as MGV101 (i.e. 192.168.1.1). The settings of the other adapter (the WLAN connection for example) remain unchanged.See chapter , paragraaf .
RocRail	See chapter

With the data from the explained example above the situation lokks like this:



Connection with LAN

Connection MGV101 to a notwork component like a router, modem or switch is also an option.
In this case the computer with transontrol programm and the MGV101 are connected to the network each with a cable. Lso this situation requires a separation between traincontrol data and all others network traffic.



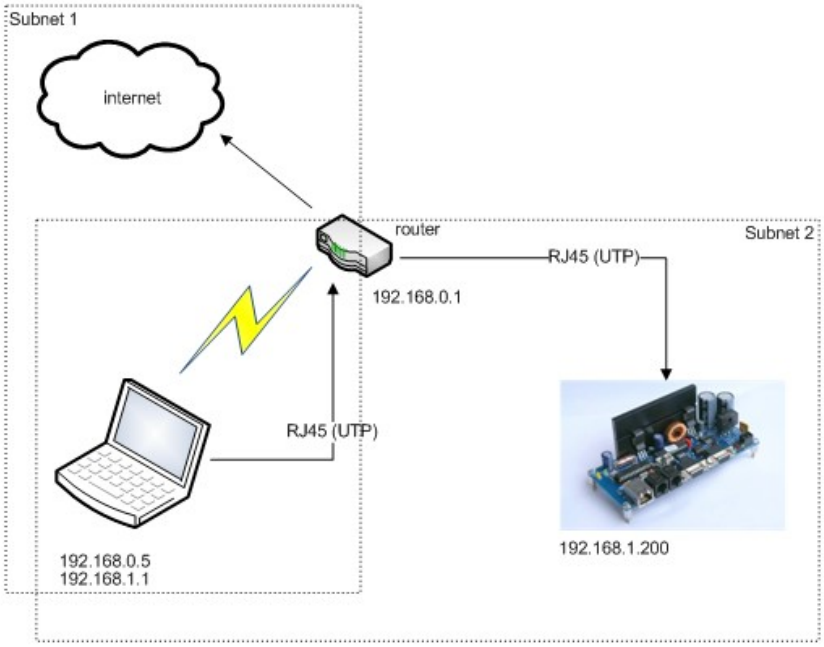
In thie pictures above, the two possibilities are shown.
In both situations, the netwotk traffic between Traincontrol software and MGV101 on one side, will be separated from all other networkl communication. ([1]).
This means that the netwok adapter in the computer is set to two different subnets, one for normal network traffic, and one for the traincontroller.

[1]) Het is natuurlijk ook mogelijk om één van de netwerk-adapters (bijvoorbeeld de bekabelde verbinding) te gebruiken voor het 'normale' LAN-verkeer, en de andere adapter (draadloos) voor de verbinding met de MGV101. In dat geval zijn de instellingen zoals beschreven in paragraaf .

The components need to be set according following list:

MGV101	Set DIP-switch of MGV101 to a dedicated subnet (i.e. 192.168.1.xx; MGV101 gets in this case the IP-adress 192.168.1.200). See chapter .
Computer	Set the adapter to two differnt (solid) IP adresse2 (i.e. 192.168.0.5 for 'normal' networkdata, and 192.168.1.1 for communication wit MGV101). See chapter , paragraaf .
RocRail	See chapter

The data form the example above, gives the following configuration:

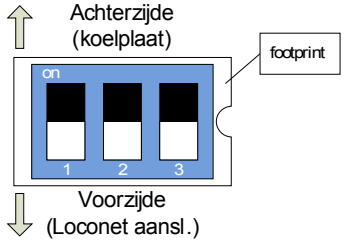


Configuration of the MGV101

Setting the dipswitch

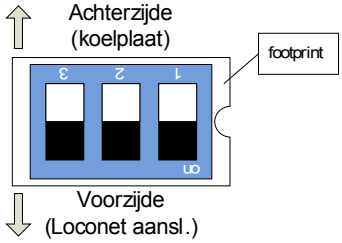
The dipswitch on MGV101 can be used to select several IP adresses.
It selects the IP/adress, the subnetmask, and the base adress of the control PC
In practice there have been som mistaking in how the switch should be positiioned in the Pcboard, so here follows the explanation of both options.

The list below shows the selectable adresses when position of switch is as shown.



1	2	3	IP adress MGV101	Subnetmask	IP adres router
off	off	off	192.168.0.200	255.255.255.0	192.168.0.1
off	off	on	192.168.1.200	255.255.255.0	192.168.1.1
off	on	off	192.168.100.88	255.255.255.0	192.168.100.1
off	on	on	192.168.0.200	255.255.255.0	192.168.0.1
on	off	off			
on	off	on			
on	on	off			
on	on	on	Speciale instellingen (zie)		

And here is the selction table, when switches is positioned 180 in degr turn.



And

1	2	3	IP adress MGV101	Subnetmask	IP adres router
off	off	off	192.168.0.200	255.255.255.0	192.168.0.1
on	off	off	192.168.1.200	255.255.255.0	192.168.1.1
off	on	off	192.168.100.88	255.255.255.0	192.168.100.1
on	on	off	192.168.0.200	255.255.255.0	192.168.0.1
off	off	on			
on	off	on			
off	on	on			
on	on	on	Speciale instellingen (zie)		

Special settings

Starting at frimware version 1.89, it is possible to select your own IP adress for the MGV101, subnetmask en IP adress of the router. When all switches are in ON position, the IP adress settings are read from the internal memory of MGV101 (Eeprom) .

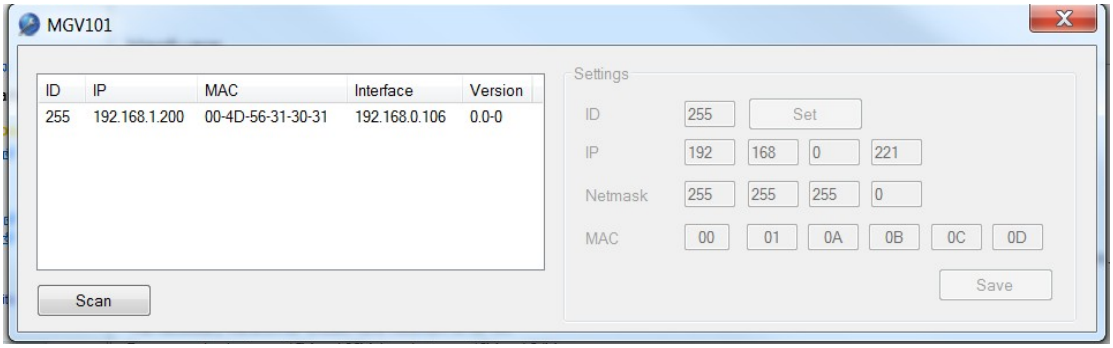
To load these settings into the memory of MGV101, an Eeprom programmer cn be used, for example the already mentioned mySmartUSB Light. A Hex.file is needed to be programmed in the Eeprom. This hex.file can be generated by means of IP_HexGen (downloadable from http://www.phgiling.net).
Also now, we have a much more easy way of doing this. Read the next alalinea.

MgvConfig

Starting at firmware version 2.10 there is a new tool -MGVConfig- to change settings in MGV101. Program is available at the MGV101 page or at http://www.phgiling.net (MGV projects -> Item overview -> MGV101)

How to use MGVConfig.

Start the programm and press the SCAN button. MgvConfig wil search for any connected MGV101. Most users of MGV101 will have only one unit available, but in larger setups, more than one MGV101 in the same network is possible.



Of any found MGV101 the following data are displayed:

- **ID**: the idenificationnumber of MGV101. If there are more than onbeunit available, it will be visible in this screen. For the first start, it might be useful to proceed these instructions for each unit separately.
- **IP**: the IP-adress of the found MGV101.
- **MAC** (Media Access Control address): a uniquee number identifying the network-interface of MGV101. The default MAC for each MGV101 is 00-4D-56-31-30-31. When there are more than one MGV101 units used in the same network, each MGV101 should be set to a unique MAC adress.
- **Interface**: this is the IP-number of the PC , which is communicating with the MGV101.
- **Version:** This shows the version number of the ethernet chip (U2) on MGV101.

Changing the settings with MgvConfig.

When in the left area an IP number is visible, it means that an MGV101 unit is found.
Double clicking the IP number makes the right hand screen available for changes.

- **ID**: See above. The default ID (10) can be changed and then press 'Set'.
- **IP**: See above. The selected IP-adress should be in the same range as that of the control PC. .
  In the example above the adressrange is 192.168.1.xx (x = not important here)
- **Netmask**: this needs to be the same as the netmask used for the control PC.
  This is to be checked by using IPConfig.
- **MAC**: see above. The MAC adress is free selectable, as long as it is unique for every connected MGV101.

Pressing the button ´SAVE´ , the values are stored in the Eeprom of MGV101.
You will have to restart poewer of MGV101 to make this active.

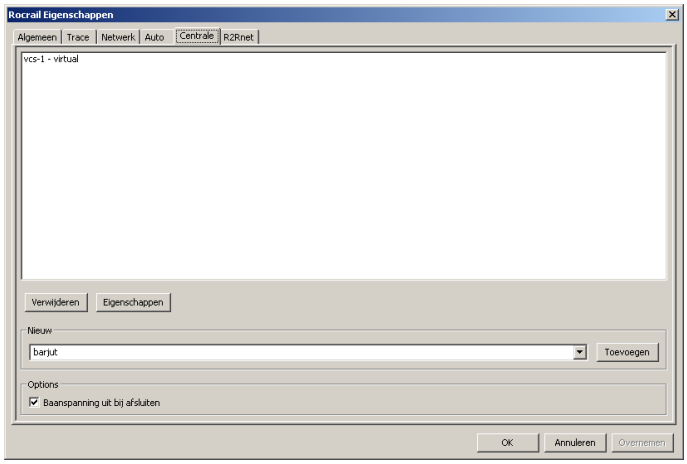
RocRail: Settings

In general.

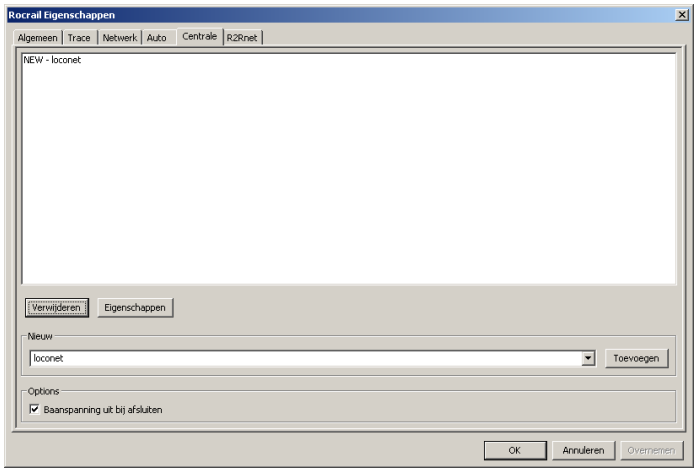
The description in this chapter is based on Rocrail version of May 10, 2011.
Because of the constant development of Rocrail, future screens and descriptions could differ from this manual.

UDP configuration

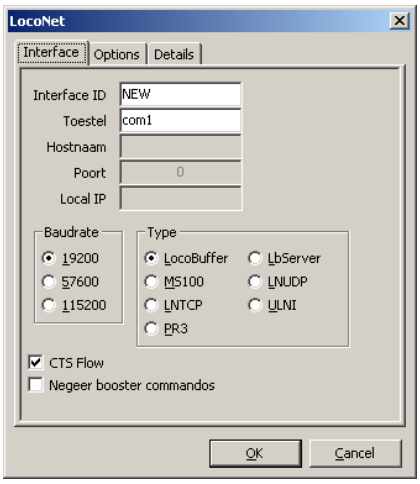
1. The MGV101 shoulb be set as control unit (‘central’). In menu ‘Bestand’ go to ‘RocRail settings’ and select ‘Centrale’.



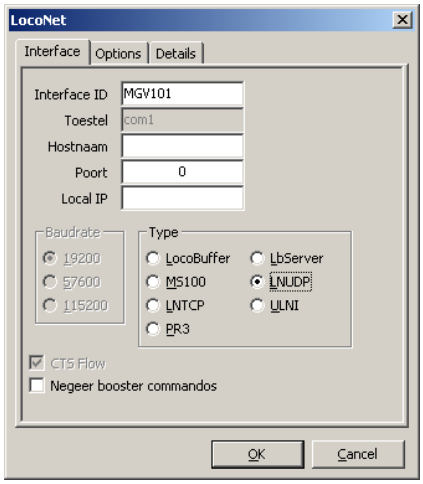
2. Select in ‘New’, ‘loconet’, and press button ADD. If a central named ´virtual OR VS-1´ is still there, remove it.



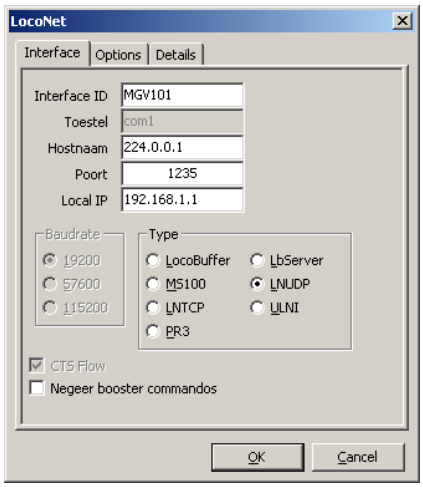
3. Select central ‘loconet’ with left mouse button and press button ‘Properties’.
The next screen is visible:



4. Set in field ‘Interface ID’ the name of the central unit i.e. MGV101.
5. Select type ‘LNUDP’. Some more field come visible now:



6. Set ‘Hostname’ to 224.0.0.1 , and ‘Port’ to 1235. At ‘Local IP’ the IP adress of the control PC is to be given.

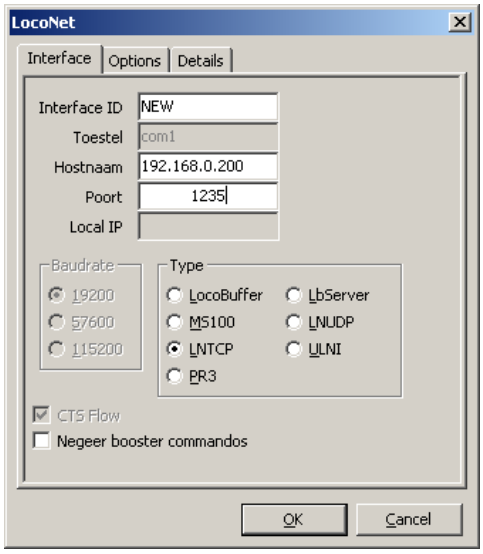


7. Shut down this screen by ‘OK’ . Also proceed the same for the other sub screens.
8. Press the ´store´ button, shut down Rocrail/Rocview, and restart again.

TCP Configuration

The settings for the TCP /options of the firmware are mainly identical to UDP settings.
With a few minor exceptions:

1. Select in ‘Type’ ‘LNTCP’. Some more fields will come visible.
2. Set as ‘Hostname’ the IP-adress of MGV101..
3. Set the value 1235 in ‘Port’.



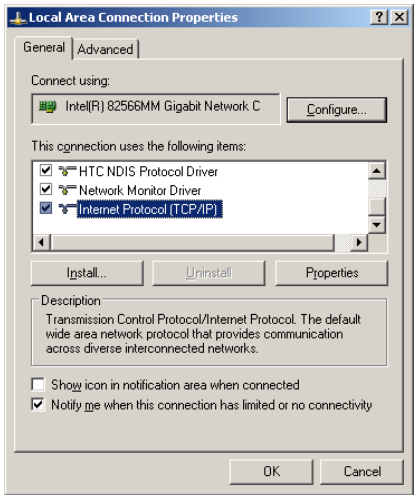
4. Pressing OK will shut down this subscreen. Also do this with he other subscreens.
5. Press the ´store ´ button , close down program and restart RocRail.

Configuration of the network-adapter

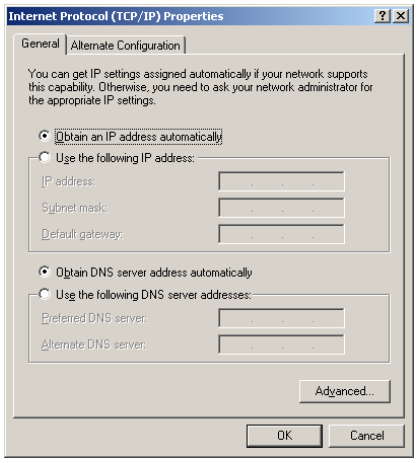
Setting of solid IP-adress (direct connection)

Windows XP

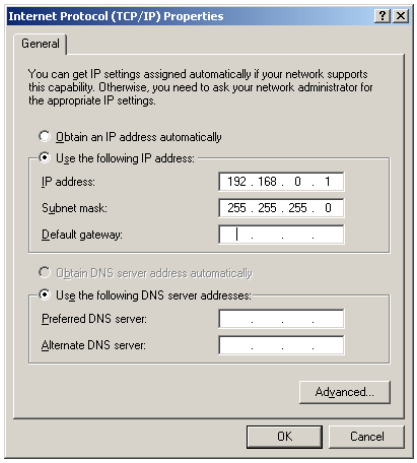
1. Press Start en klik op ‘Control panel’.
2. Doubleclick ‘Network connections’.
3. Select the ethernet adapter, used for communication with MGV101 (‘local area connection’) by pressing the left hand mouse button. The network-adapter will be blue printed.
   Press the right hand mouse button and select ‘Properties’.
   The following screen is visible:



4. Select ‘Internet Protocol (TCP/IP)’. Press the button ‘Properties’.
   The following screen is visible:



5. Select ‘Use the following IP address’ and set IP-adress of the ‘router’ to the same number,as in MGV101 is selected (192.168.0.1) and the subnetmask (255.255.255.0). The field ‘Default gateway’ can be ignored:

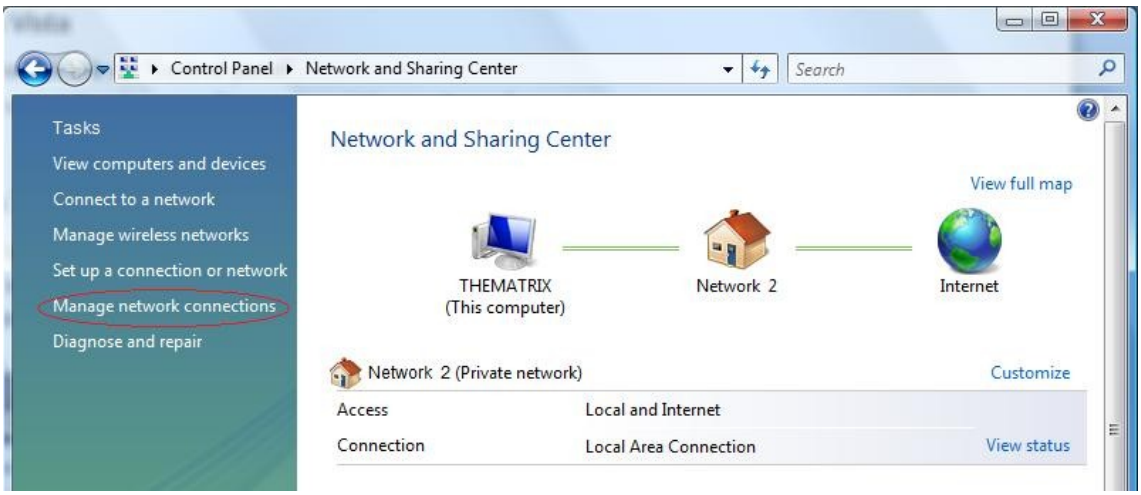


6. Save settings by pressing OK Close the subscreen and proceed this for the other subscreens.

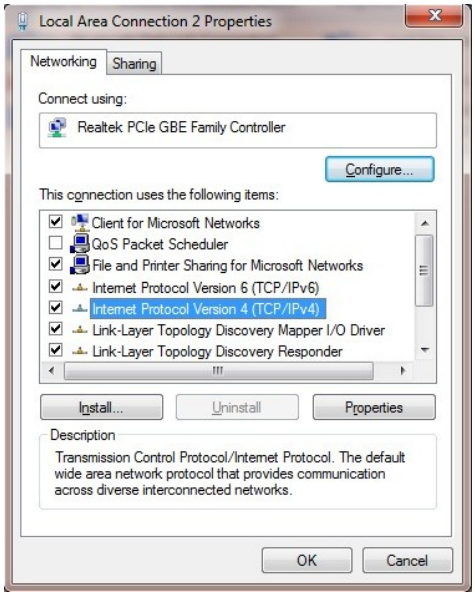
7. Restart computer

Windows Vista

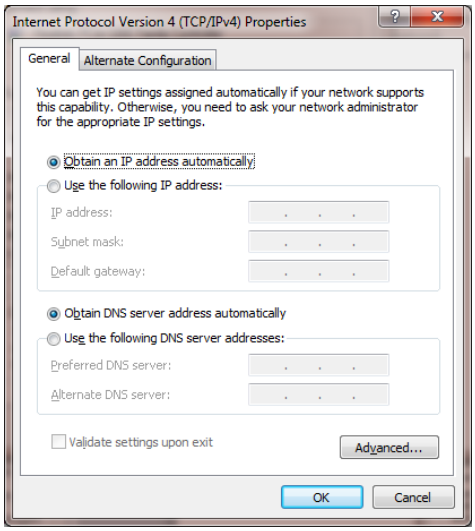
1. Press Start and select ‘Control panel’.
2. Double click in the following subscreen at ‘Network and Sharing Center’.
3. Select in the next subscreen ‘Manage network connections’:



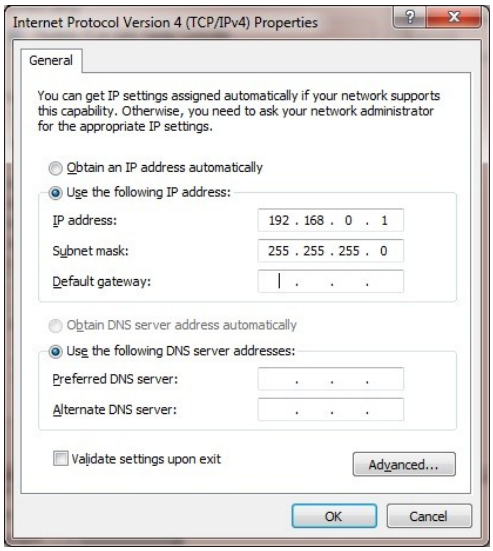
4. Now select the ethernet adapter which is used to communicate with MGV101 (‘local area connection’) The network-adapter will turn blue.
   Press right hand mouse button and select ‘Properties’. Next subscreen comes up:



5. Select ‘Internet Protocol Version 4 (TCP/IPv4)’. Press ‘Properties’.
   Next subscreen is visible:



6. Select ‘Use the following IP address’ and set IP-adres of the ‘router’ which is connected toi MGV101(192.168.0.1) and the subnetmask (255.255.255.0). The field ‘Default gateway’ can be omitted:



7. Save settings by pressing ‘OK’. Close all subscreens.

8. Restart computer.

Windows 7

1. Press ´ Start´ and then ‘Control panel’.
2. Select ‘Network and Sharing Center’ by double click
3. Select ‘Change adapter settings’:

4. Now follow steps 4 t/m 9 of the configuration for Windows Vista.

Settings of two IP-adresses (two subnets)

A network-adapter can be geconfigurated for more than one network-adresses. That makes it possible to control more than one subnets. The setting of mutiple IP-adressen is only possible when the IP-adress of the adapter can be set as ´solid´. This means that DHCP-adresselection for this adapter should be disabled.

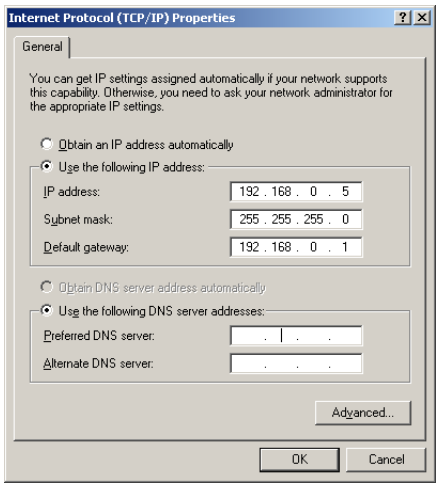
The DHCP-adress selection (the automatic generation of IP-adres) is normally done by the router (or the cable- or ISDN-modem) on which the computer is connected to..Use IPOCONFIG to check this. (see chapter); in the example here the 'DHCP enabled' is set 'Yes', which means that the IP-adress of the adapter is selcted by DHCP .

Most modern routers have an option now for ´adress reservation´ where an adapter is excluded from automatic adress selection by its MAC adresss. In this case this adaplter will have a solid IPadress.
The way settings are made, can differ between the routers. So please read the manual coming with the router.
When a router or modem does not have an option for the adress reservation, the DHCP function must be cancelled, meaning that all the units, connected to the network , shoulsd be set to their solid IP adress .
One other option is to select a unique IP adress, is a number that does not fit into DHCP area.

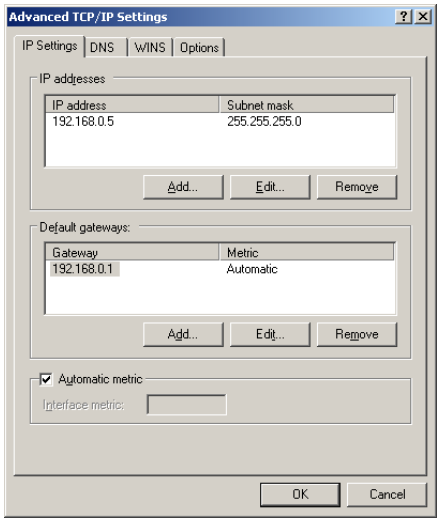
Windows XP

1. Follow steps 1 .. 5 of chapter f uit ('SettingI solid IP-adress').

2. Select 'Use the following IP address' and set a solid IP-adress, subnetmask en Default Gateway same as from control -PC. This IP-adress should be unique, so it cannot be given to any other network device. De values of the subnetmask en de Default Gateway can be found with IPONFIG (see chapter , in this example 255.255.255.0 en 192.168.0.1). The DNS server-adresses can be omitted.

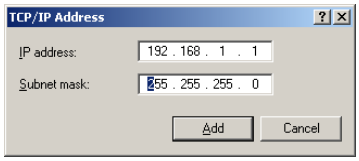


3. Press button ‘Advanced’. The next subscreen comes in view:

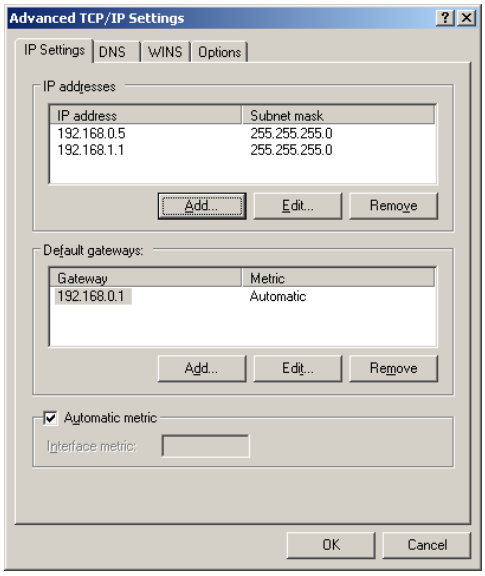


This shows the ´solid´settings from the previeously made steps.

4. Press ‘Add’ under the ‘IP addresses’. In the next subscreen put the same numbers as set with DIP-switch of MGV101 (‘IP adress Router’ en ‘Subnetmask’, see chapter):



5. Press ‘Add’. This adds the second IP-adress to the list of IP-adresses:



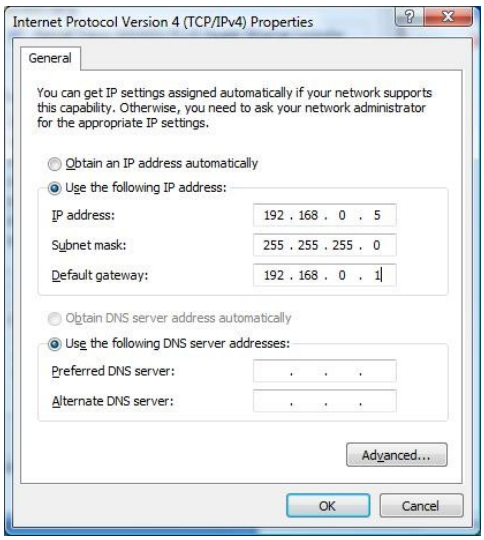
Now, two IP/adresses are visible, one for each subnet.

6. Safe these settings by pressing ‘OK’. Repeat thsi for all other subscreens.
7. Restart the computer.

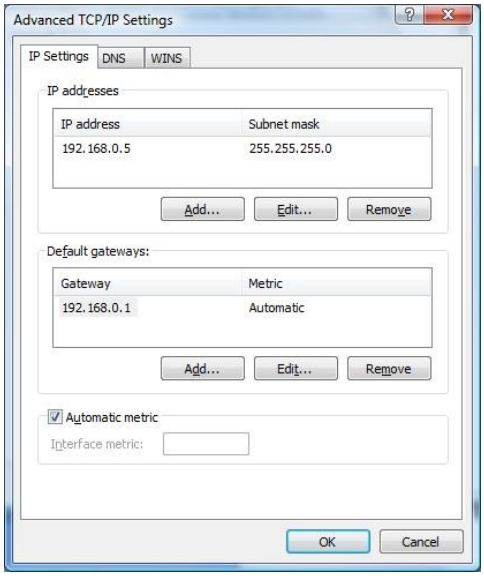
Windows Vista

1. Execute steps 1 t/m 6 of paragraph ('Setting solid IP-adress').

2. Select 'Use the following IP address' and set the solid IP-adress, subnetmask en Default Gateway of the control-PC in. The IP-adress should be unique, meaning that the adress is not given to any other network-device. The values for the subnetmask en de Default Gateway can be found with IPCONFIG (see chapter , in this example 255.255.255.0 en 192.168.0.1).
   The DNS server-adresses are to be omitted.

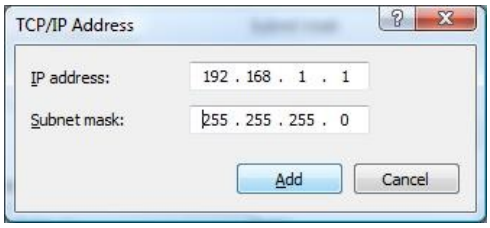


3. Press 'Advanced' for the next subscreen:

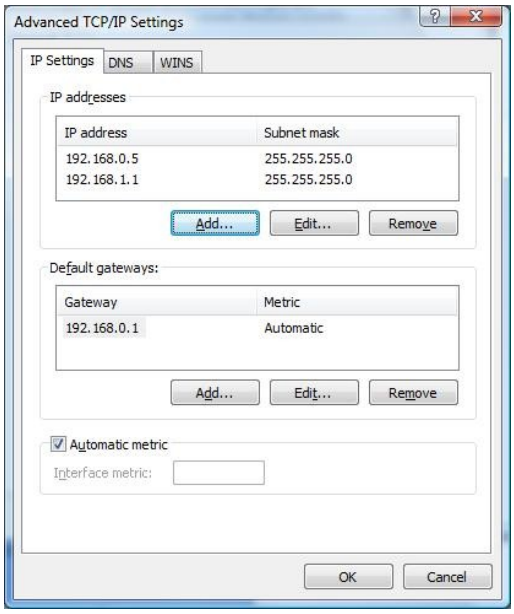


This shows the ´solid ´ settings you just made.

4. Press ‘Add’ below ‘IP addresses’. In this screen, set the same ‘IP adres Router’ en ‘Subnetmask’ numbers, as selected by means of dip/switch of MGV101, see chapter):



5. Press ‘Add’. The second IP-adress is added to the list:



Thsi shows the result of this action.

6. Save settings by pressing OK, and repeat this for all other subscreens.

7. Restart the computer.

Windows 7

1. Execute steps 1 t/m 3 of paragraph (‘Setting solid IP-adress’).

2. The next steps are equal to the description for Windows Vista (see paragraph , step 2 t/m 9)

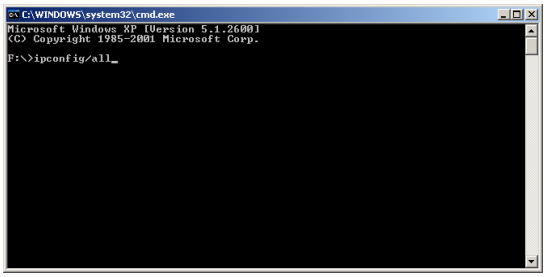
IPCONFIG

Windows XP

1. Open a DOS box Start -> Run.

2. Type ‘cmd’ (omit quotes) in the subscreen, and press ‘OK’ .

3. The DOS box is open now. Just type ‘ipconfig/all’ (no quotes) and press Enter.



A list of network adapters is shown. Mostly more than one.
For the adapter , used for normal network traffic, this example is mostly close to what you will get to see:

```
...
Physical address. . . . . . . . . . . . . : XX-XX-XX-XX-XX-XX
DHCP enabled. . . . . . . . . . . . . . . : Yes
Autoconfiguration enabled . . . . . . . . : Yes
IP address. . . . . . . . . . . . . . . . : 192.168.0.5
Subnet mask . . . . . . . . . . . . . . . : 255.255.255.0
Default Gateway . . . . . . . . . . . . . : 192.168.0.1
...
```

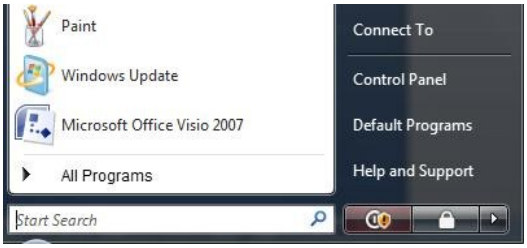
In this example is ‘192.168.0.5’ the IP-adress of the computer and ‘192.168.0.1’ the IP-adress of the router (or cable/ISDN modem).
The first three bytes of the IP-adress and the Default Gateway identify the subnet; in this example the subnet is 192.168.0.xx.

Windows Vista, Windows 7

1. Press Start.

2. Type ‘cmd’ (omit quotes) in the ‘Start Search’ window, and press ‘OK’.

3. In this DOS window type ‘ipconfig/all’ (no quotes!) and press Enter.



The next steps are equal to Windows XP (see previous paragraph).

Programming firmware

Introduction

The MGV101 is using an ATMEGA168 (Atmel) microcontroller. This microcontroller should be loaded (programmed) with a programm ('firmware') that puts the microcontroller in the task we want it to perform, which is the coimmuncation between ethernet (RocRail) and LocoNet kan afhandelen.
The version of the firmware is stating the netwerkprotocol (TCP of UDP) that will be used here.

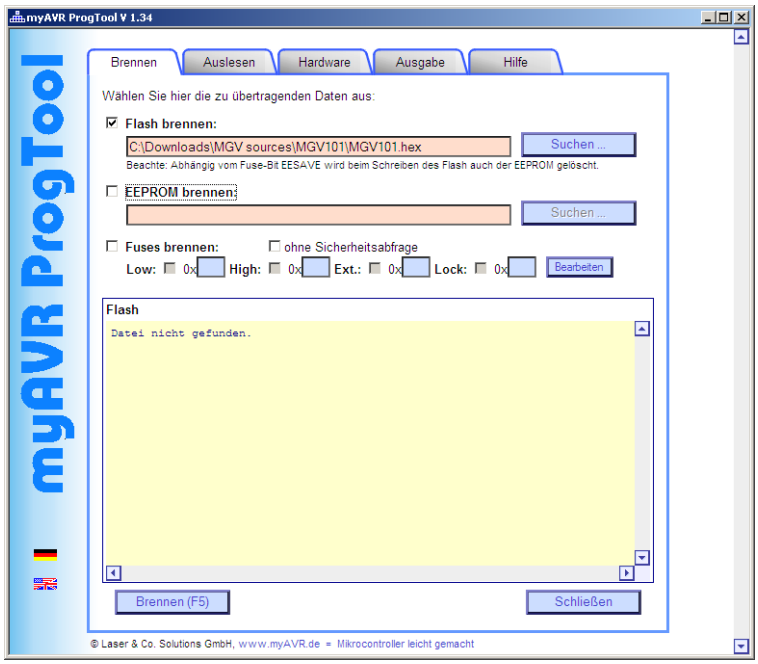
Mostly because of updates (MGV units are other supervision of Rocrail, which means that improvement is daily matter !) , but also because users will start another netwerprotocol.
In those circumstances, new firmware should be loaded .
A so-called programmer is needed to perform this.

For this programming task, a large range of programmers is available.
One of the reasonable priced and good quality programmers is *mySmartUSB Light* (to be oredred from a Conrad, ordernumber 191406-8A or just type *mySmartUSB* in your searchbox on the internet).
This programmer connects to USB and also is equipped with an ICSP connector and cable, direcly fitting into the ICSP connector on MGV101.
This programmer needs software and a driver which can be downloaded from
http://shop.myavr.com/index.php?sp=article.sp.php&artID=200006

The description followin here is based on this programmer and Windows software.

Programming

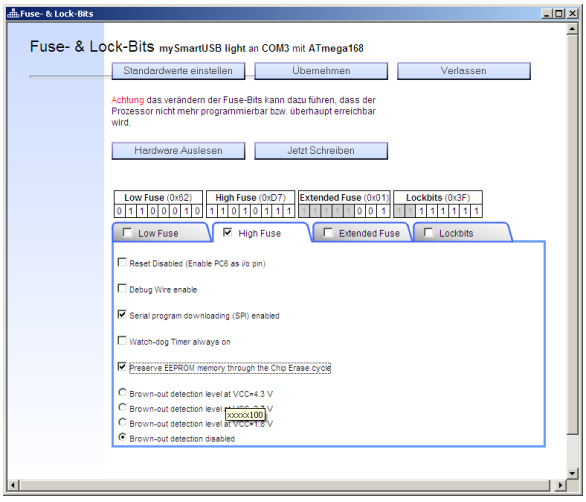
Programming with mySmartUSB Light programmer is not complicated
After activating the driver (according manual on myAVR site) , the mySmartUSB must be connected to USB-port. After this, the computer will recognise mySmartUSB.
Connect the ICSP-cable to the accommodating connector on MGV101.
No other power should be connected, also disconnect LocoNet and Ethernet cables.
After connection LED 2 on MGV101 will be lit, showing that 3.3Volt is connected, supllied by programmer.
Start the programming software:



First select Hardware and select mysmartusb. The programmer will now check the harware.
Select ‘Flash brennen’, press ‘Suchen’ and select the de firmware-version you want to be programmed.
Of course, you need to download and unpack this firmware before it is useable.
It can be found in (http://phgiling.net -> MGV101, of https://launchpad.net/rocrail) .
Press ‘Brennen (F5)’ to start programming. The program will atumaticly check if this was succesfull.
Disconnect the ICSP cable, and start the MGV101 normal.

When special settings are used, (zie paragraph) the option ‘EEPROM brennen’ should be selected.
After that a selection of the appropriate .HEX file is to be selected.

Pressing ‘Brennen (F5)’ will allways remote the current contents of Eeprom in the chip.
To keep these data untouched, the following setting will prevend it:



Press on the main page on ‘bearbeiten’ (line ‘Fuses brennen‘). The screen above will appear.
Check ‘High fuse’ and ‘Preserve EEPROM memory through Chip Erase Cycle’. After that press ‘Übernehmen’ and ‘Verlassen’.

Firmware versions

Until this moment may 11, 2011, there are 4 versions of firmware available.

Versie	Type	Opmerkingen
1.89	TCP	Has the option of IP adress selection. See ('special settings')
1.90	TCP	Equal to 1.89, with e few adds.
2.00	UDP	First UDP-version.
2.10	UDP	Many improvements in according to V2.00. With the addional program MgvConfig, many settings can easyly be accessed and changed.

The difference between TCP and UDP is the used ethernet protocol.
TCP is a protocol which requires a recieve acknowledge, and all data-packages are received in correct order and also checked, if the contants of the package is correct.
The disadvantage of this protocol is that there is a lot of 'overhead'.
The UDP protocol does not generate a receive acknowledge, so is not containing a lot of 'overhead'; thsi protocol is much more suitable for transport of 'datastreams'.
For a more extended explanation of these protocols, we kindly refer to all kinds of information, available from the internet, i.e. http://nl.wikipedia.org/wiki/TCP/IP.

The different versions of firmware has been made during the develop of MGV101.
At first, TCP was chosen for the security, provided by this protocol, to be sure that all data is sned and received.
But in the mean time, UDP has proven to be just as reliable, and sometimes even better.
That is way the progress up until now is made with UDP.

Users of MGV101 are advised to choose for UDP .
The complete packages for MGV101, available from Giling Computer Applications, will be delevered with Version 2.10, unless specificly ordered different.

Faultlist

Probleem	Oorzaak	Controle
MGV101 LEDs 1 and 2 do not lit	No supply	Check with voltmeter the ac-supply on connector J1. If power is there, check fuse F1 (can be hot, meaning short circuit on pcb.!) Also check position of Leds.
The two left LEDs in front of MGV101 remain flashing (TCP version)	No RocRail communication	

We kindly ask for your cooperation to extend this list.
Whenever you run into any problem, please report to peter”phgiling.net.
We will help you, and add the item to this list.
We sure hope that this list will not be expanded a lot.