

## AR<sub>duino</sub> SIG<sub>nal</sub> dcc DEC<sub>oder</sub>



The DCC decoder for  
Arduino UNO/MEGA  
for all light signals for everybody  
(with a DCC central station)



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## Introduction

The use of an Arduino microcomputer in model railroad construction is well known to many.

However, the actual use of the computer is for most people a bridge too far. Programming or making simple adjustments to a program is seen as a big problem.

As a result, the Arduino remains the domain of a very limited group with more technical knowledge.

That is a pity, because with the Arduino you can automate your whole model railway cheaply.

To make the Arduino accessible for everyone, I have made a program for a light signal DCC decoder based on an Arduino (ARSIGDEC). With the ARSIGDEC, all conceivable signals can be applied to your layout. The only limitation is that a maximum of 8 LEDs per signal can be used and also a maximum of 10 aspects per signal.

With ARSIGDEC it is no longer necessary to write just one letter of Arduino code.

There is a version for the MEGA2560, the Nano and the UNO.

The Uno/Nano version has a maximum of 8 signals or 16 LEDs in total.

The MEGA version has a maximum of 32 signals or 65 leds in total.

The DCC shield can be used for both Arduinos.

As with any other DCC decoder, the ARSIGDEC still has to be configured.

This configuration is usually wrongly called programming. To avoid confusion we use the term programming to write the Arduino code and configure the term to execute the program.

In this configuration, the signals are set up.

The ARSIGDEC operates in two different 'states'.

In **configuration mode**, the signals can be 'set' using one character commands from the keyboard. The ARSIGDEC communicates with the computer via an USB cable.

No DCC signals are needed for this.

By means of a specific command ('E'), the ARSIGDEC switches to the **operating state**. (aka Normal mode)

In the operating state, the signals are controlled with the DCC signal. A USB cable is no longer needed.

## The decoder

For the decoder itself, you have three options:

- An Arduino UNO or MEGA2560 with the DCC shield.
- An Arduino NANO with a homemade DCC circuit.
- The DCCNext decoder as described at <https://www.arcomora.com/dccnext>.

## New in version 4.2

For the MEGA, the number of available ports has been increased to 65.

This is because the new SMD DCC shield is smaller than the old one, so fewer pins are covered.

Using the new DCC shield is therefore necessary.

For the UNO, nothing changes

## ArCoMoRa

Arsigdec is part of the Arcomora concept. That stands for Arduino Controlled Model Railway.

Mardec, a DCC accessory decoder, is also part of this as well as the LocoNext, a configurable LocoNet feedback unit with Arduino. See also: [www.Arcomora.com](http://www.Arcomora.com)

All ARSIGDEC features one by one:

- Controlling a maximum of 8 signals(UNO) or 32 signals (MEGA) per Arduino.  
or
- A maximum of 16 leds (UNO) or 65 leds (MEGA)
- A signal may contain up to 8 leds. Parallel connected leds count for one.
- A signal can have up to 10 different aspects
- A signal can be configured manually. For each aspect and for each led you can specify its action: on , off or flashing.

**In this way you can configure almost all signals in the world.**

- Support of Dutch 'P-signals' (red<->green change with automatic intermediate yellow)
- Contains a database with the most important signals in Europe. You don't need to configure these signals. Just select a signal number from the database.
- Configurable on/off times when flashing.
- Configurable fading time per signal(100-800 ms.)
- Configurable maximum brightness per led. So no more to bright or to weak leds and experimenting with resistors.
- Suitable for signals with common anode and common cathode.
- Interactive, via screen and keyboard, configuring of the signals. That is independent of your DCC Central and no puzzling with complex CV's.
- No need to use the Arduino IDE (development environment)
- Assign a random DCC address (1-4096) for each signal.
- One DCC address controls two different aspects.
- Subsequent addresses are used for more aspects.
- A test option. All signals are showed
- A documentation option shows all settings.
- Assign an alpha numeric administrative note to a signal
- A reset option that clears all settings from memory.
- Option to correct the address offset of a Roco central (MM, z/Z21
- A help options shows all commands.
- A log option in which all configuration sessions are saved.
- Independent of used bus structure (S88, LocoNet, XpressNet)  
But in operation mode it uses only DCC.

## What do you need?

### The hardware

Here you have a number of options.

#### Option 1: An [Arduino UNO](#) or [Arduino Mega2560](#)

A shield is an add-on board for an Arduino. Arcomora supplies a shield that converts the DCC signal to a signal for the Arduino.

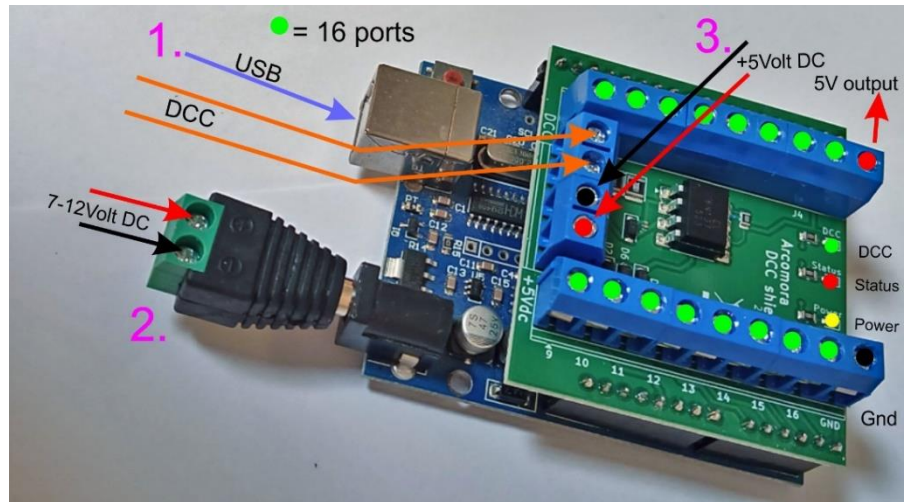
It is an SMD board, so almost all components are already on it.

This board can be ordered with the order form on:

[www.Arcomora.com/order](http://www.Arcomora.com/order).

If not in stock, the delivery time can be a few weeks.

You also have to buy an Arduino yourself.



#### Option 2: The DCCNext decoder



More information: [www.Arcomora.com/DCCNext](http://www.Arcomora.com/DCCNext).

This DCCNext can be ordered with the order form on:

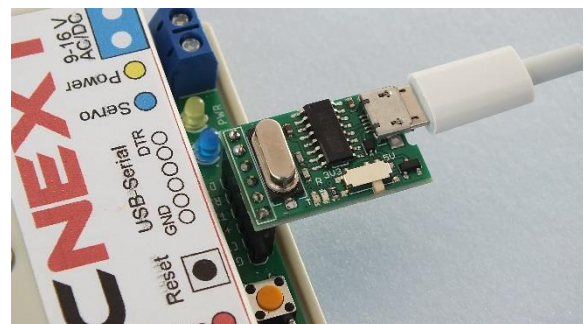
[www.Arcomora.com/order](http://www.Arcomora.com/order).

This decoder integrates an Arduino processor (ATMEGA328P) with a power supply and the DCC circuit and is therefore a combination of an Arduino UNO and the DCC shield.

A separate USB interface (CH340) provides the connection to the PC.

This decoder contains 16 screw terminals, to which signals can be directly connected.

The presence of a DCC signal is indicated by an LED.



## Software

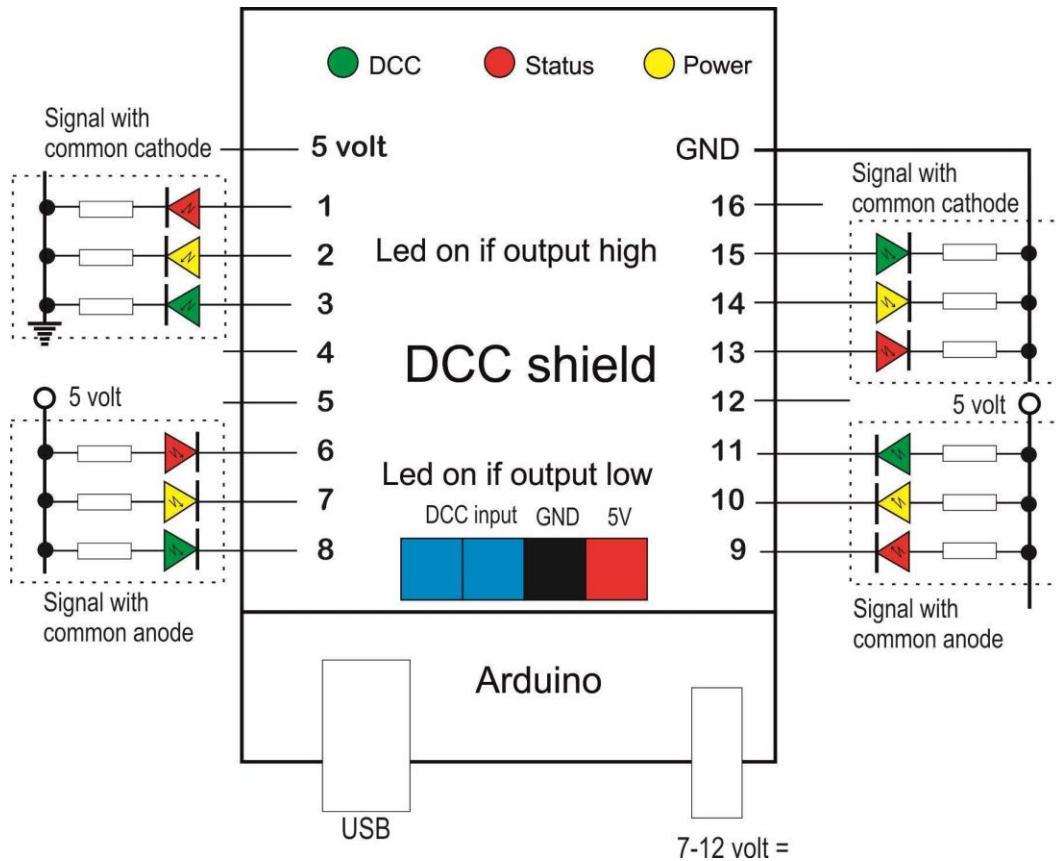
Of course, software is also required.

1. During the software installation, the ARSIGDEC program is placed on your PC as a pre-compiled binary file: ARSIGDEC.hex (UNO) and ARSIGDECM.hex (MEGA)
2. To get this on the Arduino you need to upload the programs. This means that ARSIGDEC is transferred from your PC to the Arduino via the USB cable. This upload is done automatically with a shortcut on the desktop.
3. A separate 'terminal emulator' is used for communication with ARSIGDEC. (Putty.exe) This is also started with a shortcut. This allows output of the program running on the Arduino to be displayed and also input from your keyboard to ARSIGDEC can be sent.
4. In addition, drivers are required. If you have already installed the Arduino IDE (Integrated Development Environment) you probably already have one. For Chinese clone Arduino's you need special drivers, the so-called CH340 driver.

All these four components are placed on your PC in a single installation.  
Just click and GO!

[DOWNLOAD HERE THE ARSIGDEC SOFTWARE](#)

## Connection sample for UNO



Signals can be connected directly to the shield or the DCCNext with a low ballast resistance. Many factory signals already contain a resistor. These are usually too large because they are intended for 16V.

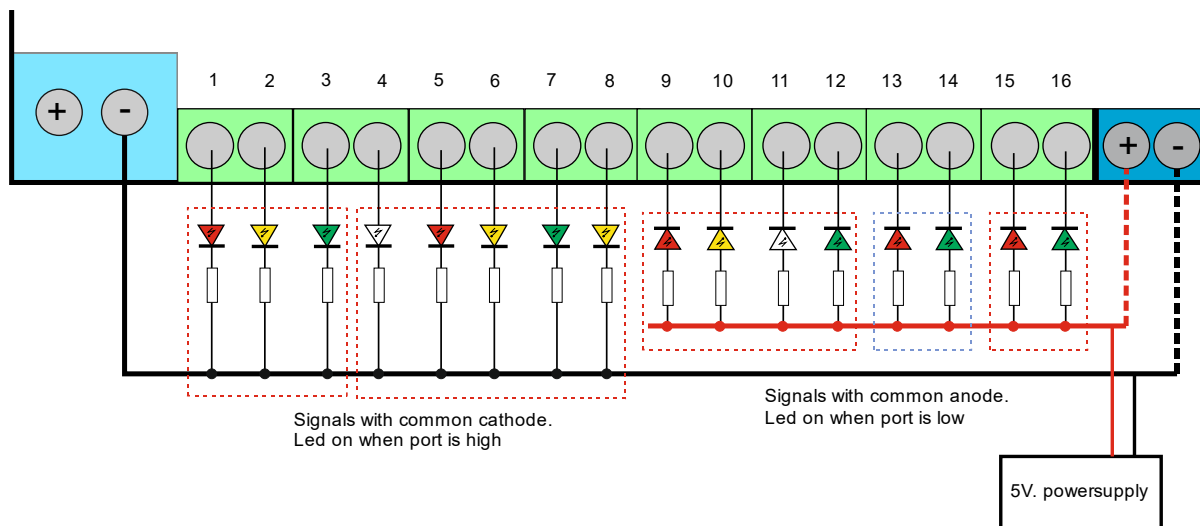
**NOTE: each LED must have its own resistor**

Remove these resistors as well as any existing diode. Replace the resistors with values of 330 ohms. The brightness can be adjusted with Arsigdec.

On both the shield and the DCCNext you can feed the LEDs with the 5V output.

But for the MEGA2560, you have to use a separate 5V power supply.

## Connection sample for DCCNext



## Configuring your ArSigDec

After the software is installed properly you can start to configure the Arsigdec.

Click on the shortcut *Arsigdec*.

At the very first time you start *Arsigdec*, the drivers will be bound to the USB port to which the Arduino is connected.

### Please Note:

- Every numeric input must be closed with <enter>.
- Only one-character commands don't require an <enter>
- For most inputs the current value does not change with only <enter>.  
The current value is shown between brackets.
- In configuration mode the yellow led on the DCC shield (or the built-in led on pin 13) is always on.
- In operation mode this led is off.
- Turn on the Numlock key on the numeric keypad.
- You may use lower and upper characters for commands.
- Use **ONLY** **backspace** key to correct a numeric input.

A command can now be entered. The very first time you start the ARSIGDEC, or after a full reset, you have to enter a number of default settings including an administrative number for this ARSIGDEC. This number identifies the decoder.

These are the default values as they can be changed with the I-command. See at I-command.

At each start of the configuration an overview of the configuration will be shown automatically.

You can change these settings later with the I-command.

**NOTE:** Turn off the function Railcom/Rail communication in the z21!

For configuring with ROCRAIL see: [www.youtube.com/watch?v=dic4zqEXa8o=dic4zqEXa8o](http://www.youtube.com/watch?v=dic4zqEXa8o=dic4zqEXa8o)

## The commands

There are two types of commands

- General commands
- Signal specific commands

That's why the configuration has two modes.

By entering a '?' you see the available commands for the current configuration mode.

The configuration mode always starts with the general command mode.

You only see the commands that belong to the current state.

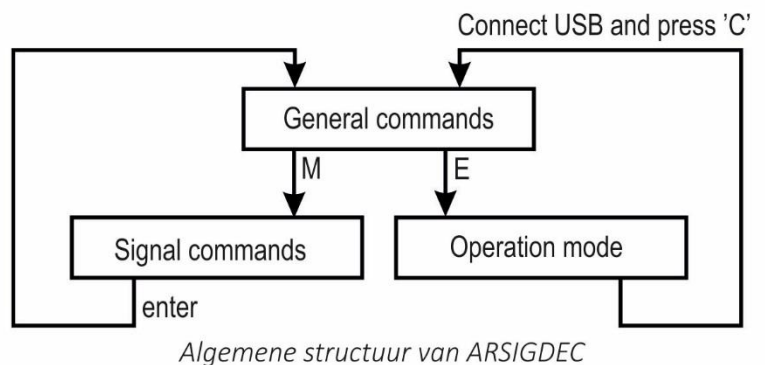
Each command consists of a single letter and does NOT need to be closed with <enter>.

The letters are based on the English description of the function of each command.

Some general commands can also be given in the signal state.

After booting in the configuration state you can only enter general commands.

Signal commands can be entered after the M-command. You will then first be asked to enter a signal to be modified.



## Adding signals

### Basic configuration rules:

- A signal can have 2 up to 8 leds. Parallel connected leds count for 1.
- On an UNO there is a maximum of 16 leds per Arduino. So a maximum of 8 signals with 2 leds or 2 signals with 8 leds.
- On an MEGA there is a maximum of 59 leds per Arduino.
- One signal has a maximum of 10 aspects
- One DCC address can set two different aspects. So for 6 aspects you need 3 DCC addresses.
- The lowest address is called the 'base' address.
- Additional required addresses are one or more higher than the base address. So a signal with 6 aspects might have a base address of 200 (aspects 1 and 2) with additional addresses 201 (aspect 3 and 4) and 202 (for aspects 5 and 6)
- The base address of each signal can be chosen freely.

Adding a signal is part of the general commands.

You can add a signal in two different ways:

#### 1. Configure manually.

You must first specify the number of leds and aspects for a signal. Then Arsigdec asks you for the aspects. For each aspect you must specify the state of each led. The state can be on, off or flashing.

Use the N-command for this configuration type.

#### 2. Signal from the signal database.

Search in the addendum the number of the sign that you want to add. The database contains a number of the commonly used signals. Arsigdec will automatically 'fill in' the required settings for that sign.

Use the S-command for this configuration type.

## ?-Command

Shows an overview of the available general commands:

```
Specify action (D/E/M/N/R/I/S/T/Y/?): ?
Main signal commands:
D = Document all signals
E = Exit to Normal mode
M = Modify/Test/Set a single signal
N = add New signal
R = Reset all signals
I = Set Initial values (Number/Offset/Shield)
S = add Standard signal
T = Test all signals
Y = set Yellow time for Dutch P-signals
```

## N-Command (New, manual configuration)

With the N-command you can configure a signal yourself.  
This configuration consists of a number of steps.

```
Specify action (D/E/M/N/R/I/S/T/Y/?): N
Now configuring signal number 3
Type <enter> to cancel the configuration
How many lights do you want for this signal ?
Enter value from 2 to 8: 4
How many aspects do you want for this signal ?
Enter value from 1 to 10: 5
Set DCC base-address for signal 3
Enter value from 1 to 2048: 45
Address range set from 45 to 47 for signal 3 with 5 aspects and 4 lights.
Specify 4 leds for aspect 1: xxxx
Specify 4 leds for aspect 2: xfox
Specify 4 leds for aspect 3: fxxx
Specify 4 leds for aspect 4: oxff
Specify 4 leds for aspect 5: xxxo
Flash timer (on/off) set to 400/400 msec.
Specify administrative note for this signal: S4
Administrative note set to S4
Fading on, with fade time of 700 msec.
Signal 3, Type: 0, on address 45-47
4 leds on ports: 0(90%) 0(90%) 0(90%) 0(90%)
Admin. note: S4, Flashing: 400/400 msec.
Connection type set to common ANODE
Fading on with fade time of 700 msec.
Aspect 1: xxxx, on address 45-R
Aspect 2: xfox, on address 45-G
Aspect 3: fxxx, on address 46-R
Aspect 4: oxff, on address 46-G
Aspect 5: xxxo, on address 47-R
Is this configuration OK? Y/N [N]: y
Led 1 is assigned to port 7
Led 2 is assigned to port 8
Led 3 is assigned to port 9
Led 4 is assigned to port 10
Signal 3 succesfully added
Specify action (D/E/M/N/R/I/S/T/Y/?): █
```

1. First Arsigdec asks for the number of leds. Parallel connected leds count for one and must be connected to the same Arduino pin.  
THIS NUMBER CAN NOT BE CHANGED LATER.
2. Then the number of aspects is asked. An aspect is a combination of leds that are on, off or flashing. There is a maximum of 10 aspects  
THIS NUMBER CAN NOT BE CHANGED LATER

3. As third step Arsigdec asks for the DCC base address. Depending on the number of aspects additional addresses will be reserved automatically. If this address range conflicts with the address range of another signal on the same Arduino you will receive a warning.
4. Now you can specify the several aspects. You do that by specifying for each led whether it should be **on** or **off** or **flashing**.  
This is specified by the characters **x** or **o** or **f**  
Meaning:
  - X or x: led is off**
  - O or o: led is on**
  - F or f: led is flashing**
 The first character is for the first led, the second for the second led etc. You can only specify x,X,o,O, f or F. The number of characters must match the number of leds.  
After the last character you must end with <enter>. Make corrections with <Backspace>.
5. If one or more signal aspects contain a flashing LED, the standard flashing times are automatically assigned. The default is 400 msec 'on' and 400 msec 'off'.  
The default values can be changed with the O command.  
The values per signal can be set with the M- and O-command.
6. You can assign an administrative code of 4 characters to a signal. E.g. P12 for P-signal number 12.  
This can be changed later with M N-command.
7. ARSIGDEC will automatically apply the default setting for the connection type (common anode or cathode).  
You can change the default value with the C command.  
The values per signal can be set with the M C command
8. The fading is also automatically set to the default values.  
The default value can be changed with the F-command.  
The values per signal can be set with the M- F-command or with the M T B-command.
9. The maximum brightness is also set according to the standard values.  
The default value can be adjusted with the B command.  
The values per led can be set with the M L command or with the M T B command.
10. All questions are now asked. When you are satisfied with the settings you have made, enter 'Y' in the OK question.
11. Now ARSIGDEC will first assign pin numbers to the LEDs. So you have to connect the LEDs to these pins. After this all settings will be stored in the memory of the ARSIGDEC.

**NOTE:**

The first signal will automatically get the basic address as specified in point 3. So if e.g. the base address is 220, then address 220-R is the address of the first signal. The second signal is then automatically 220-G

## S-Command (Standard signal)

With the S-Command you can select a predefined signal from the built-in database.  
Look at the last pages for a list of available signals.

```
Specify action (D/E/M/N/R/I/S/T/Y/?): s
Now configuring signal number 2
Type <enter> to cancel the configuration
Which standard signal do you want to add ?
Enter value from 1 to 30: 8
Set DCC base-address for signal 2
Enter value from 1 to 2048: 23
Address range set from 23 to 24 for signal 2 with 3 aspects and 3 lights.
Specify 3 leds for aspect 1: oxx
Specify 3 leds for aspect 2: xoo
Specify 3 leds for aspect 3: xxo

Specify administrative note for this signal: S2
Administrative note set to S2
Fading on, with fade time of 700 msec.

Signal 2, Type: 8, on address 23-24
3 leds on ports: 0(90%) 0(90%) 0(90%)
Admin. note: S2
No flashing
Connection type set to common ANODE
Fading on with fade time of 700 msec.

Aspect 1: oxx, on address 23-R
Aspect 2: xoo, on address 23-G
Aspect 3: xxo, on address 24-R

Is this configuration OK? Y/N [N]: y

Led 1 is assigned to port 4
Led 2 is assigned to port 5
Led 3 is assigned to port 6

Signal 2 succesfully added

Specify action (D/E/M/N/R/I/S/T/Y/?): █
```

Adding a standard signal is the same as with the N-command. However steps 1 and 2 are replaced by a question for the signal number in the database.

Step 3 asks the base address.

In step 4 the aspects are shown automatically. The number of leds and aspects are read from the database.

You can change the aspects via the M-command followed by the A-command.

Steps 5 to 9 are the same as with the N-command.

Two special signals are the Dutch P-signals. Signal numbers 1 and 2 are reserved for two P-signals.

A P-signal is a signal that shows a short yellow light between the red to green and green to red changes. It is automatically added by Arsigdec and does not require a separate aspect.

The duration of the intermediate yellow light is 700 ms. and can be set with the Y-command.

The aspects of a P-signal can NOT be changed!

## Other general commands

### I-Command (Initial settings)

With the I-command you can reset basic settings as entered at first startup or after reset.

It concerns the following settings:

- An administrative number for this Arsigdec. This number identifies the Arsigdec
- You'll be asked if you're using a Roco Multimaus, z21 or Z21.
- In this case, the ARSIGDEC will automatically perform an address correction.
- The On and Off times are flashing.
- Separately adjustable from 100-2000 msec.
- The standard brightness of the LEDs. Adjustable from 5 to 100%.
- Do you have signals with common anode or common cathode?

These settings are automatically applied when a new signal is added and can be adjusted later (M-command) by signal.

The brightness even per led.

### M-Command (Modify)

With the M-command you change to signal command mode.

In this mode you can change the settings of an individual signal.

Look further at Signal Commands.

### D-Command (Document)

The D command gives an overview of how all signals are set.

Make a screenshot of it and save it on your computer and/or print it on your printer.

You always know how the signal decoder is set. You can also use the log file. Don't forget to write down the colors of the LEDs

```
Specify action (D/E/M/N/R/I/S/T/Y/?): i
Specify number for this ARSIGDEC
Enter value from 1 to 100 (1):
This is your ARSIGDEC #1

Do you use a ROCO MultiMaus or z/Z21 Y/N (N=default):
No Roco address offset

Set default 'ON' flash time in msec. for NEW signals
Enter value from 100 to 2000 (200):
Set default 'OFF' flash time in msec. for NEW signals
Enter value from 100 to 2000 (400):
Default flash timer (on/off) set to 200/400 msec.

Do you want default fading for new signals? (Y/N) [Y]:

Set default fade time for new signals (msec.)
Enter value from 100 to 1000 (300): 600
Fading default ON with default fade time set to 600 msec.

Set default brightness for all signals
Enter value from 5 to 100 (90):
Default brightness set to 90%

Do you use signals with common ANODE or common CATHODE ? A/C: c
Default connection type for NEW signals set to common Cathode

Specify action (D/E/M/N/R/I/S/T/Y/?): i
Specify number for this ARSIGDEC
Enter value from 1 to 100 (1):
This is your ARSIGDEC #1

Do you use a ROCO MultiMaus or z/Z21 Y/N (N=default):
No Roco address offset

Set default 'ON' flash time in msec. for NEW signals
Enter value from 100 to 2000 (200): 400
Set default 'OFF' flash time in msec. for NEW signals
Enter value from 100 to 2000 (400):
Default flash timer (on/off) set to 400/400 msec.

Do you want default fading for new signals? (Y/N) [Y]:

Set default fade time for new signals (msec.)
Enter value from 100 to 1000 (600): 700
Fading default ON with default fade time set to 700 msec.

Set default brightness for all signals
Enter value from 5 to 100 (90):
Default brightness set to 90%

Do you use signals with common ANODE or common CATHODE ? A/C: a
Default connection type for NEW signals set to common Anode

Specify action (D/E/M/N/R/I/S/T/Y/?):
```

## T-Command (Test)

Als je alle seinen hebt ingesteld kun je met het T-commando alles testen. Van alle seinen worden alle seinbeelden ongeveer 5 seconden getoond.

Het T-commando kan ook worden ingegeven als sein commando. In dat geval wordt alleen het betreffende sein getest.

Ingave van 'S' beëindigt voortijdig het testen.

```
Specify action (D/E/M/N/R/I/S/T/Y/?): T
Press 'S' to stop testing after current signal/aspect
Signal 1 set to aspect 1: oxx
Signal 1 set to aspect 2: xox
Signal 1 set to aspect 3: xfx
Signal 1 set to aspect 4: xxo
Signal 1 set to aspect 5: xxf
Signal 1 set to aspect 6: fxx
s-----
Specify action (D/E/M/N/R/I/S/T/Y/?): █
```

## Y-Command (Yellow)

The Y-command sets the default yellow time for a P-signal. It applies to all P-signals.

The default is 700 ms.

```
Specify action (D/E/I/M/N/O/P/R/S/T/Y/?): Y
Set Yellow time for all P-signals (100=1 sec.)
Enter value from 30 to 250 (70): 80
Yellow time for all P-signals set to 800 msec.
Specify action (D/E/I/M/N/O/P/R/S/T/Y/?): █
```

## R-Command (Reset)

The R-command clears all the settings from memory. A confirmation is asked twice.

```
Specify action (D/E/C/F/M/N/O/B/R/I/S/T/Y/?): r
Are you sure you want to clear all values? Y/N (N=default): y
Are you ABSOLUTELY sure? Y/N (N=default): █
```

## E-Command (Exit)

With the E-command the operating state will be started. The USB cable is no longer needed.

You can now use your DCC central to control the signals.

Note that the status LED on the Arduino is now off. This will tell you that the Arduino is in the operating state. For each configured DCC address that is received, the LED will give a short pulse.

You can now remove the USB cable and close the control panel.

In the operating state, the decoder will show every activation of a signal image.

This is useful for testing the operating condition.

Normally you don't have the USB cable anymore and you don't see these messages.

## Back to Configuration

To return to configuration mode, reconnect the USB cable. Then start the configuration program using the desktop shortcut. This will restart the Arduino as you can see by the 3 times short blinking of the status LED and then stays off. Press the 'C'-key in the configuration program. This will put ARSIGDEC in the configuration state and the status LED will light up continuously again.

### IMPORTANT

*After each received DCC command, the new signal image is immediately stored in the memory of the ARSIGDEC. When the Arduino is switched on, the stored states are read again and the signals are reset as they were at the time the Arduino was closed.*

## Signal commands

With the general M-command you can change the settings of an individual signal.

First the number of the signal to change is asked.

The following commands are available now:

### ?-Command

An overview of the available commands is shown.

### B-Command (Base address)

With the B-command you can change the Base address of the signal. The address for the following signal aspects are always subsequent to the base address.

Two different signal aspects are shown with one address

You will receive a warning if it conflicts with the address range of another signal.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 1: b
Set DCC base-address for signal 1
Enter value from 1 to 2048 (1): 230
Address range set from 230 to 231
```

### N-Command (administrative Note)

In your track design you might have numbered the required signals. With the administrative note you can specify this number. It has four alphanumeric characters.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 1: N
Specify administrative note for this signal (): AUS1
Administrative note set to AUS1
```

### A-Command (Aspect)

With the A-command you can change a specific aspect of the selected signal.

The aspects for P-signals can NOT be changed.

If 'flashing' has been added, you will also be asked to set the on/off times.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 1: a
Which aspect do you want to modify ?
Enter value from 1 to 4: 1
Current aspect: oxxx
Flashing added for this signal. Set on/off times.

Set 'ON' flash time in msec. for this signal
Enter value from 100 to 2000 (400): 600
Set 'OFF' flash time in msec. for this signal
Enter value from 100 to 2000 (400): 800
Flash timer (on/off) set to 600/800 msec.
```

### D-command (Document)

The D command shows an overview of the settings of only the selected signal.

The type indicates which signal from the database has been used...

The value 0 indicates that it is a self-composed signal.

For the pins used, the maximum brightness is shown in brackets.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 2: d
Signal 2, Type: 0, on address 3-4
3 leds on pins: 8(90%) 9(90%) 10(90%)
No admin. note, Flashing: 400/400 msec.
Connection type set to common ANODE
Fading on with fade time of 300 msec.
Aspect 1: oxx, on address 3-R
Aspect 2: xox, on address 3-G
Aspect 3: xxo, on address 4-R
Aspect 4: xfx, on address 4-G
```

## C-command (Connection type)

With the C-command you can toggle the connection type of the selected signal between common anode and common cathode.

For more info on connection types see the general C-command.

```
Specify action (B/A/C/O/N/D/T/R/?) for signal 1: C
Connection type of signal 1 set to common CATHODE(-)
```

```
Specify action (B/A/C/O/N/D/T/R/?) for signal 1: c
Connection type of signal 1 set to common ANODE(+)
```

```
Specify action (B/A/C/O/N/D/T/R/?) for signal 1: █
```

## T-Command (Test)

The T command can also be entered as a signal command.

You can choose from testing all signal aspects (A) or testing the maximum brightness and fading. (B)

With the **A-command** every signal is displayed for 5 seconds. An aspect with flashing light is displayed for 8 seconds. No yellow transition is shown for P signals.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 2: t
```

```
Test Aspects (A) or Brightness (B) ? a
```

```
Signal 2 set to aspect 1: oxx
```

```
Signal 2 set to aspect 2: xox
```

```
Signal 2 set to aspect 3: xxo
```

```
Signal 2 set to aspect 4: xfx
```

With the **B-command** fading of the signal and brightness of each LED is tested and set interactively.

With 'O' the LED is turned on and off

With 'N' the next LED is tested.

With '+' and '-' the light intensity is adjusted between 5 and 100% in steps of 5%

With 'P' and 'M' the fade time is increased or decreased in steps of 25 ms. Range: 100-800 msec.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 2: T
```

```
Test Aspects (A) or Brightness (B) ? B
```

```
Press 'O' for toggle on/off or press 'N' for next led
```

```
Press '+' or '-' to change the maximum brightness for current led
```

```
Press P(lus) or M(inus) to change the fade time for current signal
```

```
led 1 on pin 8
```

```
Maximum brightness set to 95%
```

```
Fade time set to 325 msec.
```

```
Maximum brightness set to 90%
```

```
Fade time set to 300 msec.
```

```
led 2 on pin 9
```

So a signal must actually be connected for the B command.

This is in contrast to the 'F' and 'L'-command.

## R-command (Remove)

With the R-command you can remove a signal from the configuration again.

A signal to be added next will receive the number of the deleted signal (here 2)

The free pins are also used for the new signal first.

```
Specify action (B/A/C/O/I/D/T/R/?) for signal 2: R
```

```
Are you sure you want to remove signal 2 ? Y/N (N=default): y
```

```
Signal 2 has been removed.
```

## O-Command (On / Off)

With the O command you can set the flashing times of the selected signal.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 1: O
```

```
Set 'ON' flash time in msec. for this signal
```

```
Enter value from 100 to 2000 (600): 700
```

```
Set 'OFF' flash time in msec. for this signal
```

```
Enter value from 100 to 2000 (800):
```

```
Flash timer (on/off) set to 700/800 msec.
```

## F-Command (Fading)

With the F-command you can set fading of the signal.

Entry of "N" turns off fading.

By entering 'Y' you can switch fading on or change the existing fade time.

The entered time is rounded down to a multiple of 25.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 1: F
Do you want fading for signal 1 ? Y/N N
No fading for this signal

Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 1: F
Do you want fading for signal 1 ? Y/N Y

Set fade time in msec.
Enter value from 100 to 600 (300): 400
Fading on, with fade time of 400 msec.
```

## L-Commando (Luminosity)

With the L-command the maximum

brightness of each LED can be set separately.

Enter one of the LED numbers of the used signal. The entered percentage is rounded down to a multiple of 5.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 1: L

Specify led number. <enter>=exit
Enter value from 1 to 5: 1
Specify maximum brightness for led 1 on pin 3
Enter value from 5 to 100 (60): 50
Maximum brightness for led 1 set to 50%

Specify led number. <enter>=exit
Enter value from 1 to 5: 6
Number not valid!
Enter value from 1 to 5: 5
Specify maximum brightness for led 5 on pin 7
Enter value from 5 to 100 (10): 23
Maximum brightness for led 5 set to 20%

Specify led number. <enter>=exit
Enter value from 1 to 5:

Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 1: █
```

## <enter>-Command

With <enter> you ends the configuration of the selected signal. All changes are stored to memory. (EEPROM).

Arsigdec returns now to general command mode.

```
Specify action (L/F/B/A/C/O/N/D/T/R/?) for signal 1:
Signal 1 is changed now.
Specify action (A/D/E/C/F/M/N/O/B/R/S/T/Y/?): █
```

## Summary

**Default values** are set with the general I-command:

Default values are set with the I command:

- Administrative number
- On/Off times for flashing
- Fading
- Maximum brightness
- Connection type (common anode or cathode)

**These settings only apply to newly added signals!**

### Adjustable per signal:

First select a signal with the M command.

B: Basic address

C: Connection type

N: Administrative note

O: On/off times for signal

F: Fade time (no connected signal needed)

L: Maximum light intensity (no connected signal needed)

A: Change aspects

T→A: Show all aspects (requires connected signal)

T→B: Show/set maximum brightness per LED and fading for signal (requires connected signal)

## Additional info

### Startup

If the Arduino starts up flashes the status led 3 times. This indicates the starting.

The Arsigdec sketch restarts when:

- The Arduino is powered on
- You press the reset button
- Putty restarts when in configuration mode.

There is NO restart when switching between configuration and normal mode.

### Logging

The whole configuration dialog is logged in:

*My Documents/Arcomora/Arsigdec/ARSIGDEC\_<date>\_<time>.log;*

where date and time are time of closing Putty

### Arduino Nano, Mega2560

To upload Arsigdec to a Nano or MEGA2560, use the [Arcomora session Manager](#)

For the **Nano**, you **cannot** use the DCC shield.

For the **Mega**, you **can** use the DCC shield.

On the MEGA ports 11 to 16 of the shield are connected to pins 54 to 59 of the MEGA. (=A0-A5)

Arsigdec 4 on a MEGA will drive the pins 54(A0) through 59(A5) as if they were pins 14 through 19.

So you can just use the screw terminals from 14 to 19 as if the shield is on a UNO.

For pins 17 through 59 you just use Dupont cables.

On a MEGA applies (**only version 4.2**):

Ports 1 to 16 are connected to the screw terminals

Ports 17 to 53 are connected to pins 18 to 53.

**Ports 54 to 62 are connected to pins 69(=A15) to 61(=A7).**

**Ports 63, 64 and 65 are connected to pins 14, 15 and 16.**

### Configuring subsequent decoders

After installing the software, Arsigdec can be loaded onto the Arduino/DCCNext using the Session Manager

The Session Manager allows you to upload programmes and create sessions. See the manual for this.

You can also delete sessions and modify com-ports of a session.

[DOWNLOAD HERE THE ARSIGDEC SOFTWARE](#)

Poort*	UNO pin	MEGA pin
1 S	3	3
2 S	4	4
3 S	5	5
4 S	6	6
5 S	7	7
6 S	8	8
7 S	9	9
8 S	10	10
9 S	11	11
10 S	12	12
11 S	A0 (14)	A0 (54)
12 S	A1 (15)	A1 (55)
13 S	A2 (16)	A2 (56)
14 S	A3 (17)	A3 (57)
15 S	A4 (18)	A4 (58)
16 S	A5 (19)	A5 (59)
17 t/m 53		17 t/m 53
54		A15 (69)
55		A14 (68)
56		A13 (67)
57		A12 (66)
58		A11 (65)
59		A10 (64)
60		A9 (63)
61		A8 (62)
62		A7 (61)
63		14
64		15
65		16

S = Screw terminal

Nummer

## Nederland

**1 P-sein met cijferbak**

seinbeeld	kleur / led				adres
	rood	geel	groen	cijfer	
rood 1	O	X	X	X	1-R
groen 2	X	X	O	X	1-G
geel 3	X	O	X	X	2-R
geel+cijfer 4	X	O	X	O	2-G

**2 P-sein zonder cijferbak**

seinbeeld	kleur / led			adres
	rood	geel	groen	
rood 1	O	X	X	1-R
groen 2	X	X	O	1-G
geel 3	X	O	X	2-R

**3 Hoofdsein met cijferbak**

seinbeeld	kleur / led				adres
	rood	geel	groen	cijfer	
rood 1	O	X	X	X	1-R
geel 2	X	O	X	X	1-G
geel knipperen 3	X	F	X	X	2-R
geel+cijfer 4	X	O	X	O	2-G
geel+cijfer knipperen 5	X	O	X	F	3-R
groen 6	X	X	O	X	3-G
groen knipperen 7	X	X	F	X	4-R
groen knipperen+cijfer 8	X	X	F	O	4-G

**4 Hoofdsein zonder cijferbak**

seinbeeld	kleur / led			adres
	rood	geel	groen	
rood 1	O	X	X	1-R
geel 2	X	O	X	1-G
geel knipperen 3	X	F	X	2-R
groen 4	X	X	O	2-G
groen knipperen 5	X	X	F	3-R
rood knipperen 6	F	X	X	3-G

**5 Dwergsein/Verkeerslicht**

seinbeeld	kleur / led			adres
	rood	geel	groen	
rood 1	O	X	X	1-R
geel 2	X	O	X	1-G
geel knipperen 3	X	F	X	2-R
groen 4	X	X	O	2-G

**6 Voorsein**

seinbeeld	kleur / led			adres
	geel	groen	cijfer	
groen 1	X	O	X	1-R
geel 2	O	X	X	1-G
geel+cijfer 3	O	X	O	2-R

## Deutschland

**7 Blocksignal**

Signalbild	farbe / led		adres
	rot	grün	
rot 1	O	X	1-R
grün 2	X	O	1-G

**8 Einfahrtssignal**

Signalbild	farbe / led			adres
	rot	gelb	grün	
rot 1	O	X	X	1-R
gelb+grün 2	X	O	O	1-G
grün 3	X	X	O	2-R

**9 Ausfahrtsignal**

Signalbild	farbe / led					adres
	rot1	rot2	gelb	grün	weiss	
rot1+rot2 1	O	O	X	X	X	1-R
gelb+grün 2	X	X	O	O	X	1-G
grün 3	X	X	X	O	X	2-R
rot1+weiss 4	O	X	X	X	O	2-G

**10 Vorsignal**

Signalbild	farbe / led				adres
	gelb1	gelb2	grün1	grün2	
gelb1+gelb2 1	O	O	X	X	1-R
gelb2+grün1 2	X	O	O	X	1-G
grün2+grün2 3	X	X	O	O	2-R
alles aus 4	X	X	X	X	2-G

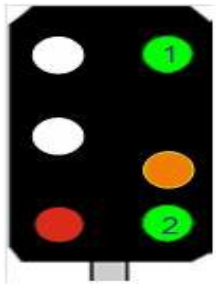
**11 Rangiersignal**

Signalbild	farbe / led		adres
	rot	weiss	
rot 1	O	X	1-R
weiss 2	X	O	1-G

# Österreich

12

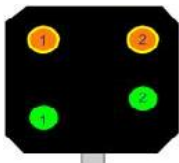
## Hauptsignal



aspect		farbe / led					adres
		rood 1	groen 1 2	groen 2 3	geel 4	wit 1/2 5	
halt/fahrverbot	1	O	X	X	X	X	1-R
frei	2	X	O	X	X	X	1-G
frei 60 km	3	X	O	O	X	X	2-R
frei 40 km	4	X	O	X	O	X	2-G
ende fahrverbot	5	X	X	X	X	O	3-R

13

## Vorsignal



aspect		farbe / led				adres
		groen 1 1	groen 2 2	geel 1 3	geel 2 4	
vorsicht	1	X	X	O	O	1-R
frei	2	O	O	X	X	1-G
frei 60 km	3	O	O	O	X	2-R
frei 40 km	4	O	X	O	O	2-G

14

Not used

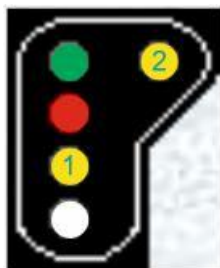
15

Not used

# België

16

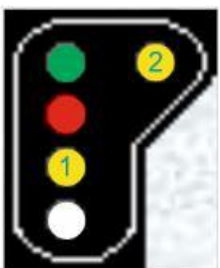
## Hoofdsein normaal spoor



seinbeeld	kleur / led					adres
	rood	wit	geel 1	geel 2	groen	
rood	1	O	X	X	X	1-R
rood/wit	2	O	O	X	X	1-G
dubbel geel	3	X	X	O	O	2-R
groen/geel1 vert.	4	X	X	O	X	2-G
groen	5	X	X	X	X	3-R
groen/geel2 hor.	6	X	X	X	O	3-G

17

## Hoofdsein tegen spoor



seinbeeld	kleur / led					adres
	rood	wit	geel 1	geel 2	groen	
rood	1	F	X	X	X	1-R
rood/wit	2	F	F	X	X	1-G
dubbel geel	3	X	X	F	F	2-R
groen/geel1 vert.	4	X	X	F	X	2-G
groen	5	X	X	X	X	3-R
groen/geel2 hor.	6	X	X	X	F	3-G

18

## Stopsein normaal



seinbeeld	kleur / led			adres
	rood	wit	groen	
rood	1	O	X	1-R
rood/wit	2	O	O	1-G
groen	3	X	X	2-R

19

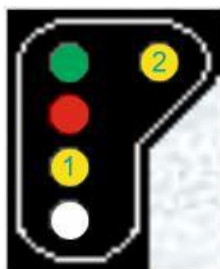
## Stopsein tegen



seinbeeld	kleur / led			adres
	rood	wit	groen	
rood	1	F	X	1-R
rood/wit	2	F	F	1-G
groen	3	X	X	2-R

20

## Hoofdsein + Cijfer normaal spoor



seinbeeld	kleur / led						adres
	rood	wit	geel 1	geel 2	groen	cijfer	
rood	1	O	X	X	X	X	1-R
rood/wit	2	O	O	X	X	X	1-G
dubbel geel	3	X	X	O	O	X	2-R
groen/geel1 vert.	4	X	X	O	X	O	2-G
groen	5	X	X	X	X	O	3-R
groen/geel2 hor.	6	X	X	X	O	O	3-G
dubbel geel+cijfer	7	X	X	O	O	X	4-R
groen+cijfer	8	X	X	X	X	O	4-G
groen/geel2/cijfer	9	X	X	X	O	O	5-R
groen/geel1/cijfer	10	X	X	O	X	O	5-G

21

Hoofdsein + Cijfer tegen spoor



	seinbeeld	kleur / led						adres
		rood 1	wit 2	geel 1 3	geel 2 4	groen 5	cijfer 6	
rood	1	F	X	X	X	X	X	1-R
rood/wit	2	F	F	X	X	X	X	1-G
dubbel geel	3	X	X	F	F	X	X	2-R
groen/geel1 vert.	4	X	X	F	X	F	X	2-G
groen	5	X	X	X	X	F	X	3-R
groen/geel2 hor.	6	X	X	X	F	F	X	3-G
dubbel geel+cijfer	7	X	X	F	F	X	F	4-R
groen+cijfer	8	X	X	X	X	F	F	4-G
groen/geel2/cijfer	9	X	X	X	F	F	F	5-R
groen/geel1/cijfer	10	X	X	F	X	F	F	5-G

22

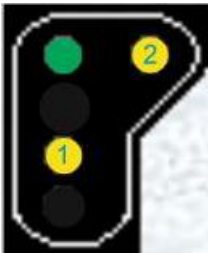
Verwittigungssein+cijfer normaal



	seinbeeld	kleur / led				adres
		groen 1	geel1 2	geel2 3	cijfer 4	
dubbel geel	1	X	O	O	X	1-R
groen	2	O	X	X	X	1-G
groen/geel2	3	O	X	O	X	2-R
groen/geel1	4	O	O	X	X	2-G
groen/geel2/cijfer	5	O	X	O	O	3-R
groen/geel1/cijfer	6	O	O	X	O	3-G

23

Verwittigungssein+cijfer tegenspoor



	seinbeeld	kleur / led				adres
		groen 1	geel1 2	geel2 3	cijfer 4	
dubbel geel	1	X	F	F	X	1-R
groen	2	F	X	X	X	1-G
groen/geel2	3	F	X	F	X	2-R
groen/geel1	4	F	F	X	X	2-G
groen/geel2/cijfer	5	F	X	F	F	3-R
groen/geel1/cijfer	6	F	F	X	F	3-G

24

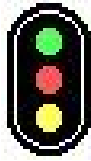
België Cijfer en keper

	seinbeeld	kleur / led	
		cijfer 1	keper 2
uit	1	X	X
cijfer	2	O	X
cijfer+keper	3	O	O
keper	4	X	O

Dit sein kan worden gecombineerd met één van de seinen 16 t/m 19

25

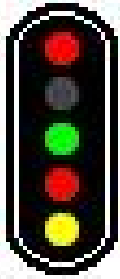
Cible-A



	aspect	couleur / led			adres
		Jaune	Rouge	Vert	
		1	2	3	
Voie libre	1	X	X	O	1-R
Avertissement	2	O	X	X	1-G
Sémaphore	3	X	O	X	2-R
vert clignotant	4	X	X	F	2-G
rouge clignotant	5	X	F	X	3-R
jaune clignotant	6	F	X	X	3-G

26

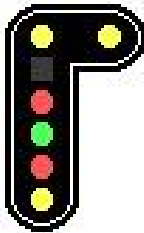
Cible-B



	aspect	couleur / led				adres
		Jaune	Rouge 1	Vert	Rouge 2	
		1	2	3	4	
Voie libre	1	X	X	O	X	1-R
Avertissement	2	O	X	X	X	1-G
Sémaphore	3	X	O	X	X	2-R
Carré	4	X	O	X	O	2-G
vert clignotant	5	X	X	F	X	3-R
jaune clignotant	6	F	X	X	X	3-G
rouge clignotant	7	X	F	X	X	4-R

27

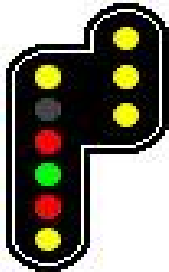
Cible-E



	aspect	couleur / led					adres
		Jaune	Rouge 1	Vert	Rouge 2	2 Jaunes H	
		1	2	3	4	5	
Voie libre	1	X	X	O	X	X	1-R
Avertissement	2	O	X	X	X	X	1-G
Sémaphore	3	X	O	X	X	X	2-R
Carré	4	X	O	X	O	X	2-G
Ralentissement 30	5	X	X	X	X	O	3-R
Ralentissement 30 + avertissement	6	O	X	X	X	O	3-G
Ralentissement 60	7	X	X	X	X	F	4-R
Ralentissement 60 + avertissement	8	O	X	X	X	F	4-G
vert clignotant	9	X	X	F	X	X	5-R
rouge clignotant	10	X	F	X	X	X	5-G

28

Cible-G



	aspect	couleur / led						adres
		Jaune	Rouge 1	Vert	Rouge 2	2 Jaunes H	2 Jaunes V	
		1	2	3	4	5	6	
Voie libre	1	X	X	O	X	X	X	1-R
Avertissement	2	O	X	X	X	X	X	1-G
Sémaphore	3	X	O	X	X	X	X	2-R
Carré	4	X	O	X	O	X	X	2-G
Ralentissement 30	5	X	X	X	X	O	X	3-R
Rappel ralentissement 30	6	X	X	X	X	X	O	3-G
Ralentissement 60	7	X	X	X	X	F	X	4-R
Rappel ralentissement 60	8	X	X	X	X	X	F	4-G
vert clignotant	9	X	X	F	X	X	X	5-R
rouge clignotant	10	X	F	X	X	X	X	5-G

29

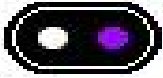
## Disque



	aspect	couleur / led					adres
		Jaune 1	Rouge	Vert	Jaune 4	Jaunes 5	
		1	2	3	4	5	
Voie libre	1	X	X	O	X	X	1-R
Avertissement	2	O	X	X	X	X	1-G
Préannonce	3	F	X	X	X	X	2-R
Disque	4	X	O	X	O	X	2-G
Ralentissement 30	5	X	X	X	X	O	3-R
Ralentissement 60	6	X	X	X	X	F	3-G
Ralentissement 60 + Préannonce	7	O	X	X	X	O	4-R

30

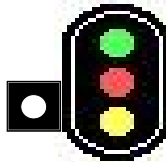
## Cible-I



	aspect	blanc	violet	adres
		1	2	
manœuvre	1	O	X	1-R
carré violet	3	X	O	1-G
manœuvre réduite	2	F	X	2-R

31

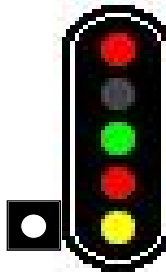
## Cible-A avec oeilleton



	aspect	couleur / led				adres
		Jaune	Rouge	Vert	oeil.	
		1	2	3	4	
Voie libre	1	X	X	O	O	1-R
Avertissement	2	O	X	X	O	1-G
Sémaphore	3	X	O	X	O	2-R
vert clignotant	4	X	X	F	O	2-G
jaune clignotant	6	F	X	X	O	3-R
rouge clignotant	5	X	F	X	O	3-G

32

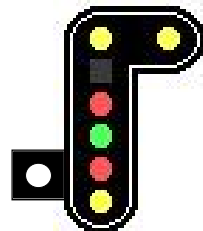
## Cible-B avec oeilleton



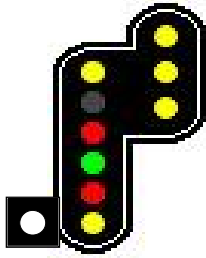
	aspect	couleur / led					adres
		Jaune	Rouge 1	Vert	Rouge 2	oeil.	
		1	2	3	4	5	
Voie libre	1	X	X	O	X	O	1-R
Avertissement	2	O	X	X	X	O	1-G
Sémaphore	3	X	O	X	X	O	2-R
Carré	4	X	O	X	O	X	2-G
vert clignotant	5	X	X	F	X	O	3-R
jaune clignotant	6	F	X	X	X	O	3-G
rouge clignotant	7	X	F	X	X	O	4-R

33

## Cible-E avec oeilleton



	aspect	couleur / led						adres
		Jaune	Rouge 1	Vert	Rouge 2	2 Jaunes H	oeil.	
		1	2	3	4	5	6	
Voie libre	1	X	X	O	X	X	O	1-R
Avertissement	2	O	X	X	X	X	O	1-G
Sémaphore	3	X	O	X	X	X	O	2-R
Carré	4	X	O	X	O	X	X	2-G
Ralentissement 30	5	X	X	X	X	O	O	3-R
Ralentissement 30 + avertissement	6	O	X	X	X	O	O	3-G
Ralentissement 60	7	X	X	X	X	F	O	4-R
Ralentissement 60 + avertissement	8	O	X	X	X	F	O	4-G
vert clignotant	9	X	X	F	X	X	O	5-R
rouge clignotant	10	X	F	X	X	X	O	5-G

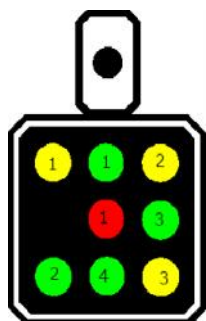


	aspect	couleur / led						oeil.	adres
		Jaune	Rouge 1	Vert	Rouge 2	2 Jaunes H	2 Jaunes V		
Voie libre	1	X	X	O	X	X	X	O	1-R
Avertissement	2	O	X	X	X	X	X	O	1-G
Sémaphore	3	X	O	X	X	X	X	O	2-R
Carré	4	X	O	X	O	X	X	X	2-G
Ralentissement 30	5	X	X	X	X	O	X	O	3-R
Rappel ralentissement 30	6	X	X	X	X	X	O	O	3-G
Ralentissement 60	7	X	X	X	X	F	X	O	4-R
Rappel ralentissement 60	8	X	X	X	X	X	F	O	4-G
vert clignotant	9	X	X	F	X	X	X	O	5-R
rouge clignotant	10	X	F	X	X	X	X	O	5-G

# Switzerland

35

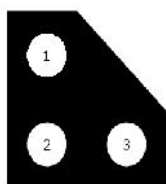
## Combined SBB L Signal



aspect		farbe/led								adres
		1 red 1	2 green 1	3 green 2	4 green 3	5 greem 4	6 yellow 1	7 yellow 2	8 yellow 3	
Hauptsignal stop	1	O	X	X	X	X	X	X	X	1-R
Hauptsignal go	2	X	O	X	X	X	X	X	X	1-G
Vorsignal 60 km	3	X	O	X	X	O	X	X	X	2-R
Vorsignal stop	4	X	X	X	X	X	O	O	X	2-G
Vorsignal go	5	X	X	O	O	X	X	X	X	3-R
Vorsignal 40 km	6	X	X	X	O	X	O	X	X	3-G
Vorsignal 60 km	7	X	X	O	O	X	O	X	X	4-R
Vorsignal 90 km	8	X	X	O	O	X	X	X	O	4-G

36

## Shunting Dwarf Signal



aspect		farbe/led			adres
		white 1	white 2	white3	
Halt	1	X	O	O	1-R
Fahrt	2	O	O	X	1-G
Fahrt mit Vorsicht	2	O	X	O	2-R

37

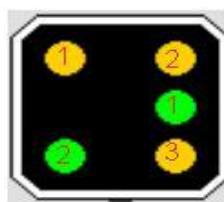
## Main SBB N signal



aspect		farbe / led				adres
		red 1	green 1	yellow 1	number	
Hauptsignal STOP	1	O	X	X	X	1-R
Hauptsignal go	2	X	O	X	X	1-G
Hauptsignal 80 km	3	X	O	X	O	2-R
Vorsignal STOP	4	X	X	O	X	2-G
Vorsignal 80 km	5	X	X	O	O	3-R

38

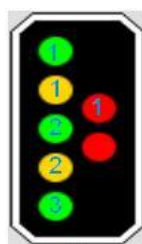
## Vorsignal



aspect		farbe/led					adres
		groen 1	groen 2	geel 1	geel 2	geel 3	
stop	1	X	X	O	O	X	1-R
vrij	2	O	O	X	X	X	1-G
40 km	3	O	X	O	X	X	2-R
60 km	4	O	O	O	X	X	2-G
90 km	5	O	O	X	X	O	3-R

39

## Hauptsignal



aspect		farbe/led						adres
		rood	groen 1	groen 2	groen 3	geel 1	geel 2	
stop	1	O	X	X	X	X	X	1-R
vrij	2	X	O	X	X	X	X	1-G
40 km	3	X	O	X	X	X	O	2-R
60 km	4	X	O	O	X	X	X	2-G
90 km	5	X	O	O	O	X	X	3-R
40 km	6	X	X	X	X	O	O	3-G

## Spain

40

### Maneuvers

color / led

white red

	aspect	1	2	address
Movement authorized	1	O	X	1-R
Stop	2	X	O	1-G
Authorized override	3	O	O	2-R
Pass authorized	4	F	O	2-G
Off	5	X	X	3-R

41

### General 1

color / led

green red yellow

	aspect	1	2	3	address
Via Free	1	O	X	X	1-R
Stop	2	X	O	X	1-G
Stop announcement	3	X	X	O	2-R
Caution announcement	4	O	X	O	2-G
Conditional	5	F	X	X	3-R
Immediate stop	6	X	X	F	3-G

42

### Stations

color / led

green red yellow white

	aspect	1	2	3	4	address
Via Free	1	O	X	X	X	1-R
Stop	2	X	O	X	X	1-G
Stop announcement	3	X	X	O	X	2-R
Caution announcement	4	O	X	O	X	2-G
Conditional	5	F	X	X	X	3-R
Immediate stop	6	X	X	F	X	3-G
Movement authorized	7	X	X	X	O	4-R
Authorized override	8	X	O	X	O	4-G
Pass authorized	9	X	O	X	F	5-R

43

### General 2

color / led

green red yellow blue

	aspect	1	2	3	4	address
Via Free	1	O	X	X	X	1-R
Stop	2	X	O	X	X	1-G
Stop announcement	3	X	X	O	X	2-R
Caution announcement	4	O	X	O	X	2-G
Conditional	5	F	X	X	X	3-R
Immediate stop	6	X	X	F	X	3-G
Selective stop	7	X	O	X	O	4-R
Conditional Selective stop	8	X	O	X	F	4-G

# United Kingdom

44

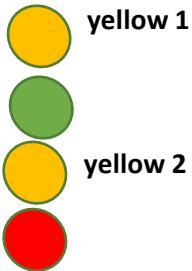


## 3 aspects normal sequence

color / led

		green	yellow	red	
	aspect	1	2	3	address
Proceed	1	O	X	X	1-R
Caution	2	X	O	X	1-G
Danger - Stop	3	X	X	O	2-R

45



## 4 aspects normal sequence

color / led

		yellow 1	green	yellow 2	red	
	aspect	1	2	3	4	address
Proceed	1	X	O	X	X	1-R
Preliminary Caution	2	O	X	O	X	1-G
Caution	3	X	X	O	X	2-R
Danger - Stop	4	X	X	X	O	2-G

46

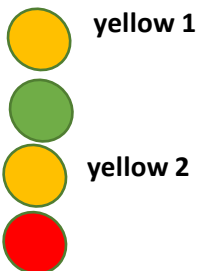


## 3 aspects flashing yellow

color / led

		green	yellow	red	
	aspect	1	2	3	address
Proceed	1	O	X	X	1-R
Caution	2	X	F	X	1-G
Danger - Stop	3	X	X	O	2-R

47



## 4 aspects flashing yellow

color / led

		yellow 1	green	yellow 2	red	
	aspect	1	2	3	4	address
Proceed	1	X	O	X	X	1-R
Preliminary Caution	2	F	X	F	X	1-G
Caution	3	X	X	F	X	2-R
Danger - Stop	4	X	X	X	O	2-G