

# DAISY

## Manual



**Authors: Dr.-Ing. T. Vaupel, M. Berger**

(English translation: Stefano Chiti-Batelli with kind support by Mr. Robert Frowenfeld)

© Copyright Uhlenbrock Elektronik GmbH, Bottrop - Germany

1<sup>st</sup> English edition, March 2003

All rights reserved

Unauthorized reproduction (including partial reproduction) prohibited

**Order number: 60 402**

## DAISY

<b>1. Description</b>	
1.1 Operation modes	4
1.2 Memory function	5
1.3 How to connect it	5
<b>2. Digital mode (DAISY-System)</b>	
2.1 Operation	7
2.2 Drive mode	8
2.3 Turnout mode	14
2.4 Programming mode	16
<b>3. Analog mode (DAISY-System)</b>	
3.1 Operation	18
3.2 Drive mode	20
3.3 Turnout mode	21
3.4 Programming mode	22
<b>4. Software update</b>	
<b>5. Special Options</b>	

## Power 2

<b>1. Description</b>	
1.1 Operation	26
1.2 Technical Data	26
1.3 Cables	26
1.4 Power 2 LED status	26
1.5 How to connect it	27
<b>2. Booster use</b>	27
<b>3. Digital system use</b>	
3.1 How to connect a DAISY throttle	29
3.2 How to connect additional Boosters and LocoNet devices	29
<b>4. Analog system use</b>	
4.1 Power 2 as an analog layout control system	30
4.2 How to connect a Power2 in analog mode	30
4.3 'Locomotive' (electric circuit) selection	31
4.4 Coupling electric circuits	32
4.5 Electric shorts in analog mode	32
4.6 Loopback section control	32
4.7 Power2 as DCC Digital Turnout Booster	33
4.8 Functions in analog mode	34

All registered trademarks belong to their respective owner/company.

## 1. Description

Besides being a smart add-on throttle for digital Command Stations, the DAISY can also be connected to a Power2, thus yielding a complete digital (as well as analog train control) system – and is referred to as the “DAISY-System”. The DAISY software can be updated anytime.

### 1.1 Operation modes

#### DAISY-throttle

The DAISY can be connected to digital Command Stations featuring LocoNet (e.g., the Intellibox, the Twin-Center, the DAISY-System, etc.). The DAISY can be used to control all locomotives supported by the Command Station it is connected to. It can also be used to control up to 256 turnouts or signals.

#### DAISY-System (digital mode)

Used as a digital control system, the combination of DAISY-throttle plus Power-2 constitutes a multi-protocol digital Command Station for the Motorola old and new format (locomotive addresses 1 through 255) and for the DCC format (14, 28 and 128 speed steps; locomotive addresses 1 through 9999). Locomotives of all these protocols can be freely “intermixed” *at the same time on the same layout*. Furthermore, if all locomotives are of the DCC format, it can also be used to control, through locomotive address zero, an analog locomotive (a locomotive not equipped with a digital decoder). Turnouts and signals decoders can be either of the Motorola or of the DCC format. DCC decoders can be programmed using either CV or Register mode.

#### **Important! Important! Important! Important! Important!**

Analog locomotives used with the DAISY-System in digital mode emit a low level whistle because a high frequency current **always** flows through their motors.

*This current damages some type of motors, for example coreless motors (e.g., Faulhaber, Escap, etc.) and some types of small N-scale motors. These motors must be used with a digital decoder if they are to be run on digital layouts.*

If in doubt, please ask the locomotive manufacturer in order to find out whether the locomotive (motor) is compatible with this kind of operation on a digital layout.

#### DAISY-System (analog mode)

This is a new feature previously not available with any other product. The DAISY-throttle, used with one or more Power2's, provides a comfortable and expandable system for controlling analog layouts (locomotives and trains not equipped with digital decoders).

Locomotives driven by the power output of each Power2 are controlled by a pulsed high voltage current (PWM – Pulse Width Modulation). This allows for smoother operation at low speeds.

The function keys available on the throttles – keys which would normally only be used in a digital environment – can now be used to: select among several acceleration and deceleration factors, activate a “switching speed” (half of normal speed), choose motor type (PWM frequency: low for normal motors, high for coreless motors), etc.

The DAISY-System in analog mode can be expanded to up to 63 independent electric circuits, each connected to and powered by its own Power2. Each current circuit can be controlled by one or more throttles (e.g., DAISY, FRED, IB-Control, etc.).

Furthermore it is also possible to configure one Power2 so as to interpret the turnout/signal commands issued by throttles or other devices (e.g., IB-Switch, Switch-Control, etc.) and convert them to digital commands for DCC accessory decoders. This allows for analog train operation and digital turnout/signal control.

## 1.2 Memory function

As the power to the layout is turned off, DAISY memorizes

In digital mode:

- the last selected mode (drive or turnout)
- the last selected locomotive
- the last selected turnout address range assigned to the function keys

In analog mode:

- the last selected electric circuit (Power2)

## 1.3 How to connect it

### **Analog mode - driving a ‘conventional’ layout, i.e., an analog (non digital) layout**

If a DAISY throttle is to be used for controlling a conventional layout, then it should be connected to the “LocoNet” connector of the last Power2 (also check the Power2 manual), using the provided spiral cable.

### **Digital mode (DAISY-System)**

If a DAISY throttle is to be used as a digital Command Station for driving a digital layout, then it should be connected to the “DAISY” connector of the first Power2 (also check the Power2 manual), using the provided spiral cable.

**Important** During use as a digital Command Station, the DAISY must not be removed from the “DAISY” connector of the Power2.

### **Throttle mode**

If the DAISY is to be used as an add-on throttle, then it must be connected to the Command Station using a suitable LocoNet connection. In case the Command Station is a DAISY-System, any additional DAISY throttle should be connected to the "LocoNet" connector of a Power2 (or to a cable extension/connector coming from there).

If necessary, one can "branch" LocoNet as required (so as to allow for connection of more devices or throttles). This can be done, e.g., using our "LocoNet multiple outlet box" (art. Num. 62 250).

**TIP** While used as an add-on throttle, the DAISY can of course be unplugged (disconnected) and re-plugged (re-connected) to LocoNet as required.

**Important** Please use only Uhlenbrock or so called "standard" cables for connecting the DAISY. Using the incorrect type of cable, or a cable improperly configured may cause damage to the DAISY

## 2. Digital mode (DAISY-System and DAISY throttle)

Used as a digital control system, the combination of DAISY-throttle plus Power-2 (which we call "DAISY-System") constitutes a multi-protocol digital Command Station for the Motorola old and new format (locomotive addresses 1 through 255) and for the DCC format (14, 28 and 128 speed steps; locomotive addresses 1 through 9999). Furthermore, if all locomotives are of the DCC format, it can also be used to control, through locomotive address zero, an analog locomotive (a locomotive not equipped with a digital decoder). Turnout decoders can be either of the Motorola or of the DCC format. DCC decoders can be programmed using either the CV or the Register mode.

### 2.1 Operation

- (1) Large 4-digit display for showing all system information
- (2) Rotary encoder used as a speed knob for controlling the loco speed and also for loco selection, turnout address selection and for value/parameter input during programming
- (3) Driving direction indicators (triangular LEDs)
- (4) [Stop]: layout Power Off/On toggle
- (5) Turnout key for activating turnout mode and for turnout/signal address selection
- (6) Programming key for performing DCC programming procedures and for the setup of DAISY operational parameters (Special Options)
- (7) Locomotive key for drive mode selection and for locomotive (address) selection
- (8) Function keys [f1] through [f4]. These keys control locomotive functions in drive mode, while they control turnouts in turnout mode
- (9) [Off] key for turning the locomotive lights off
- (10) [function] key for turning the locomotive lights on



#### Speed knob

The speed knob is used for controlling the locomotive speed. Turning the speed knob clockwise increases locomotive speed, while turning the speed dial counterclockwise decreases locomotive speed. If the locomotive is stopped or if it has already reached its maximum speed, further rotations in the corresponding direction are ignored.

If you select a locomotive which is moving, the throttle automatically displays the locomotive speed and let's you control the locomotive

starting from that speed – the same applies, of course, for all locomotive functions (e.g., the locomotive lights, functions, etc.).

### **Driving direction**

The locomotive driving direction can be changed by pressing the speed dial. The current driving direction is shown by the two triangular LEDs next to the [Stop] key. The LED pointing to the right lights up if the loco driving direction is “forward”. No LED will appear lit if the selected locomotive has the “Motorola old” format.

If the loco direction is changed by pressing the speed dial, the locomotive first stops, then changes its driving direction.

### **[Stop] key**

The [Stop] key can be used for turning off/on power to the layout. If the layout power is off, the display shows 4 blinking decimal points. If the layout power is off due to a short, then the display shows the outer and the middle decimal points blinking in an alternating pattern.

### **[function] and [off] keys**

The [function] key turns on the lights of the currently controlled locomotive, while the [off] key turns them off. If the locomotive lights are off, pressing the [off] key turns them on only as long as the [off] key remains pressed.

### **[f1] through [f4]**

In drive mode, these keys allow controlling special functions F1 through F4 of the currently selected locomotive. Pressing one of these keys toggles the status of the corresponding function. The four LEDs above those keys show the current status of the corresponding function.

After pressing the [Locomotive] key, these four LEDs show the status of functions F5 through F8 (and, keys [f1] through [f4] can be used to control those – as long as the [Locomotive] key remains pressed).

However, if the DAISY is either part of the DAISY-System (i.e., it is connected to a Power2 through its “DAISY” connector) or is connected as add-on throttle to a DAISY-System, then functions F5 through F8 are not supported — and, therefore, cannot be controlled.

In turnout mode, these keys allow controlling four turnouts at a time. The four LEDs show the status of the corresponding turnout, indicating either ‘green’ or ‘red’.

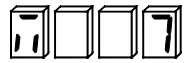
## **2.2 Drive mode**

The drive mode of the DAISY is activated by pressing the [Locomotive] key. In drive mode one can drive locomotives, change their speed and/or driving direction and control their lights and additional functions. One can also select a different locomotive for control through the DAISY.

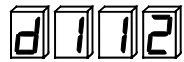


If the DAISY is connected to a Power2 through its “DAISY” connector (and, therefore, is part of the DAISY-System), then it is also possible to setup the loco type and address.

In drive mode, the display shows the loco type and speed, for example:



Motorola format locomotive driving at speed 7



DCC format locomotive driving at speed 112

### 2.2.1 Locomotive Selection

The DAISY has 16 memory locations for storing locomotive addresses. The default configuration is such that these contain addresses 1 through 16 in Motorola new (“Mot2”) format. By pressing the [Locomotive] key (while in drive mode), one can select among the 16 memory positions (i.e., the 16 locomotive addresses).

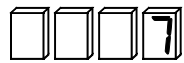
Any one of the 16 memory locations which has been deleted (i.e., which does not hold any locomotive address) will not be shown during this locomotive selection process.

This is how to proceed:

- Press the [Locomotive] key. The display indicates:



- Release the [Locomotive] key. The display indicates the currently selected locomotive address, e.g.:



- Rotate the encoder in order to view the other 15 memory locations (excluding those which may have been erased, of course).
- Select the desired loco by pressing the [Locomotive] key – or abort locomotive selection (regaining control of the previously selected locomotive), by pressing either the [Turnout] or [Prog] keys.

### 2.2.2 How to edit or erase a locomotive address

The locomotive addresses can be edited or erased. In order to do this, the DAISY has to be connected to a LocoNet Command Station (e.g., an Intellibox, a Twin-Center, etc.) or to the “DAISY” connector of a Power2.

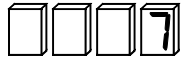
**Attention** It is not possible to edit or erase the locomotive addresses on a DAISY throttle connected as an add-on throttle to a DAISY-System.

#### How to edit only non-erased memories

- Press the [Locomotive] key. The display indicates:



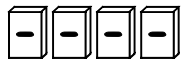
- Release the [Locomotive] key. The display indicates the currently selected locomotive address, e.g.:



- rotate the encoder in order to select the memory position you wish to either edit or erase.
- press the [Locomotive] key and keep it pressed. The display shows:



- After about 2 seconds the locomotive address starts blinking.
- Release the [Locomotive] key: both direction LEDs will be lit.
- Rotate the encoder in order to edit the locomotive address. A faster rotation results in a bigger address change. You can use the [Off] key in order to erase the address. The display would then indicate:



**TIP** It is not possible to store the same locomotive address twice (that is: the same locomotive address in two different memory locations). In fact, each locomotive address which is already stored in an other memory will be shown with all decimal points turned on and the DAISY will not accept any command to memorize that address (again).

**TIP** DAISY-System (digital mode): if all digital locomotives have been set to the DCC format, then it is possible to drive an analog locomotive (i.e., a locomotive not equipped with a digital decoder) through the address 0. That address will automatically be set to the type "DC". If such a locomotive address is defined, then the DAISY does not generate any Motorola locomotive digital signal anymore.

- Confirm address editing or deletion by pressing the [Locomotive] key – or abort locomotive address editing by pressing either the [Turnout] or [Prog] keys.

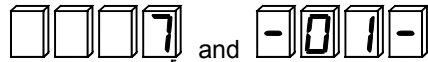
**How to edit all memory locations (including the eventually erased ones)**

- Press the [Locomotive] key and keep it pressed. The display shows:



- After about 2 seconds the locomotive address will be displayed.

- At this point, if the rotary encoder is not operated, the display alternately shows the locomotive address and the memory position, e.g.:



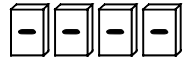
any memory position which has been erased will display as having the “address”:



- Press the [Locomotive] key and keep it pressed. The display shows:



- After about 2 seconds the locomotive address will begin to blink.
- Release the [Locomotive] key: both direction LEDs will be lit.
- Rotate the encoder in order to edit the locomotive address. A faster rotation results in a bigger address change. You can use the [Off] key in order to erase the address. The display will then indicate:



- Confirm address editing or deletion by pressing the [Locomotive] key – or abort locomotive address editing by pressing either the [Turnout] or [Prog] keys.

**TIP** The 1<sup>st</sup> memory position can be edited; however, it cannot be erased.

### 2.2.3 How to edit the locomotive format (type)

It is possible to edit the locomotive type associated with any of the 16 memory positions. In order to do that, the DAISY throttle must be connected to the “DAISY” connector of a Power2.

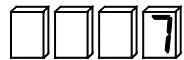
**Attention** It is not possible to edit a locomotive type if the DAISY throttle is connected as an add-on throttle to a LocoNet Command Station (e.g., to an Intellibox).

#### How to show the current format (type) of a locomotive

- Press the [Locomotive] key. The display indicates:



- Release the [Locomotive] key. The display will show the currently selected locomotive address, e.g.:



- Press the [function] key. The display shows the type of the currently selected locomotive, e.g.:



- Press the [function] key again. The display shows the address of the currently selected locomotive, e.g.:

□□□7

- Press the [Locomotive] key to go back to drive mode.

The possible locomotive types are shown as:

70E1

Motorola old

70E2

Motorola new

d□14

DCC 14 speed steps

d□28

DCC 28 speed steps

d128

DCC 128 speed steps

-dC-

analog locomotive

(can only be selected through address 0)

#### How to edit the current format (type) of a locomotive

- Press the [Locomotive] key. The display indicates:

L0C0

- Release the [Locomotive] key. The display will show the currently selected locomotive address, e.g.:

□□□7

- Rotate the encoder in order to select the memory position you wish to either edit or erase.

- Press the [Locomotive] key and keep it pressed. The display shows:

E d 1 E

- After about 2 seconds the locomotive address will begin to blink.
- Release the [Locomotive] key: both direction LEDs will be lit.
- Press the [function] key. The display shows the type of the currently selected locomotive, e.g.:

70E1

- Rotate the encoder in order to select a different locomotive type, e.g.:



- Confirm type editing by pressing the [Locomotive] key – or abort type editing by pressing either the [Turnout] or [Prog] keys.

#### 2.2.4 How to dispatch a locomotive address

It is possible to use a DAISY throttle in order to “pre-select” (dispatch) a locomotive address for later control by a throttle which does not feature any locomotive (address) selection capability (e.g., a FRED in dispatch mode or a Profi-Control). Through this procedure, the desired locomotive address can be saved in a so-called “dispatch memory”, from which a device can read it later.

##### This is how to proceed:

- Press and release the [Locomotive] key. The display will show the currently selected locomotive address.
- Press the [Off] key and keep it pressed. The display indicates:



- Release the [Off] key. The locomotive address has been dispatched.

#### 2.2.5 Connecting additional throttles to a DAISY-System (digital)

If FRED's or Profi-Control's are connected to a DAISY-System (in digital mode), then one can use the function keys f1 through f4 (FRED) or f1 through f8 (Profi-Control) in order to select a locomotive. The locomotives which can be selected are those which have been memorized in the first four memory positions of the DAISY-System. That is:

Memory position	1	2	3	4
FRED	f1	f2	f3	f4
Profi-Control	f1 or f5	f2 or f6	f3 or f7	f4 or f8

## 2.3 Turnout mode

A DAISY throttle can control up to 256 accessories – turnouts, signals, etc.

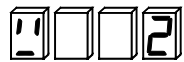
### 2.3.1 How to control a turnout or a signal

Press the [Turnout] key to switch from drive to turnout mode.

While in turnout mode, you can use the f1 through f4 keys to toggle the status of a turnout or signal. The four LEDs above the f1 through f4 keys show the current turnout or signal status: red (thrown) or green (closed).

The fact that the 4 LEDs indicate a ‘red’ or ‘green’ status – as opposed to ‘yellow’ or off – can be used to tell the mode (turnout or drive) in which the DAISY throttle is currently operating.

Each closure of the [f1] through [f4] keys will be shown on the DAISY display: the accessory address which has been toggled will be shown as long as the key remains pressed. For example, the display will show:



(the first symbol represents the letter “W”, to indicate “Weiche” the German word for turnout).

While in turnout mode, the currently selected locomotive can still be controlled through the rotary encoder and by pressing the [function] or [Off] keys.

### 2.3.2 How to change the controlled turnout address range

The DAISY default is to have the keys [f1] through [f4] control turnout addresses 1 through 4. However, this can be changed.

**This is how to proceed:**

- While in turnout mode, press the [Turnout] key. The display indicates the turnout address controlled by the [f1] key (i.e., the “base address”), e.g.:



- Rotate the encoder in order to select the desired new “base address”. The base address can be edited in steps of 4 units. For example, a single step (rotation) in the clockwise direction will indicate:



the highest possible value is 253.

- Press the [Turnout] key in order to confirm selection of the new “base address”. The display will now revert to indicate the speed of the currently selected locomotive.

### 2.3.3 How to change the turnout format (type)

A DAISY-System can control Motorola (default) or DCC accessory decoders. All controlled accessories (turnouts, signals, etc.) must be of the same type: either all Motorola or all DCC. A mixed type operation of accessory decoders is not possible.

The format of the accessory decoders can be changed only while the DAISY throttle is connected to the “DAISY” connector of a Power2.

**Attention** It is not possible to edit the turnout format (type) if the DAISY throttle is connected as an add-on throttle to a LocoNet Command Station (e.g., an Intellibox).

#### This is how to proceed:

- While in turnout mode, press the [Turnout] key. The display will display the turnout address controlled by the [f1] key (i.e., the “base address”), e.g.:



- Press the [function] key. The currently selected turnout format (type) is displayed, e.g.:



- Rotate the encoder to select a different turnout format, e.g.:



- Press the [Turnout] key to confirm turnout type selection, or press the [function] key to go back to turnout base address selection without changing the turnout type.

**Attention** If an analog locomotive is being controlled through address 0, then operating Motorola turnouts or signals will result in the analog locomotive performing a short “jump”, possibly in the opposite driving direction. This can be avoided by using DCC accessory decoders.

## 2.4 Programming mode

The programming mode can be used to program (configure) locomotive or turnout decoders and for changing configuration parameters of the DAISY throttle. Decoder programming is only supported if the DAISY throttle is connected to the “DAISY” connector of a Power2.

**Important** Decoder programming commands will be repeated by **all** boosters connected to the DAISY-System. Therefore, it is important that only the locomotive(s) which you wish to program/configure should be sitting on the rails. Other locomotives must be temporarily removed from the layout.

### This is how to proceed:

- Press the [Prog] key. The display indicates:



- Release the [Prog] key. The display indicates the programming/configuration option used last:



CV (direct) programming



Register programming



Special Options edit

The remaining 3 digits show the number of the CV, Register or Special Option which has been selected last.

- Press the [function] key as required for the desired programming/configuration option to be shown
- Rotate the encoder to select the desired CV, Register or Special Option number
- Press the [Prog] key to select that particular CV, Register or Special Option
- In case of a CV or Register, the display will indicate either 0 (zero) or the value which has been written to a CV or Register last. Please note that this is not necessarily the current value of the selected CV or Register. In case of a Special Option, the display will indicate the current value of the selected Special Option.
- Rotate the encoder to select the desired CV, Register or Special Option value

**TIP** The value can be displayed in hexadecimal format by pressing the [function] key. It will revert to decimal format as soon as that key is released.

- Start CV, Register or SO programming by pressing the [Prog] key.
- The ongoing of CV and Register programming is indicated by “walking dashes” on the display
- You can leave programming mode at any time by pressing either the [Locomotive] or the [Turnout] key



### 3 Analog mode

If the DAISY throttle is connected to the LocoNet connector of a Power2 and if the “DAISY” connector of the Power2 is left unconnected, then the DAISY-System (DAISY throttle plus Power2) is in analog mode: it can be used for controlling an analog layout.

If the analog layout features more than one “electric circuit” (or section), then it is possible to link (“daisy-chain”) several Power2 Boosters - up to a maximum of 63 Power2’s. This is done by connecting the LocoNet connector of the “previous” Power2 to the “DAISY” connector of the “next” Power2. Implicitly, this defines an order among the Power2’s: the first Power2 (the Power2 with number “1”) is the one which does not have anything connected to its “DAISY” connector. The next Power2 (the one which is connected, through its “DAISY” connector, to the “LocoNet” connector of Power2 #1) is Power2 #2, etc.

All LocoNet devices must be connected to the “LocoNet” connector of the last Power2.

Each Power2 drives its own section of the analog layout (“electric circuit”). Each throttle connected to the LocoNet connector of the last Power2 can control any Power2.

Additionally, it is possible to configure the last Power2 so that it will interpret turnout commands being issued on LocoNet (e.g., by an IB-Switch, a DAISY throttle or an IB-Control) and generate the corresponding digital commands which can be used to drive digital turnout decoders. This allows for digital control of the turnouts of an analog layout.

Obviously, if this option is used then that last Power2 cannot be used for driving a section of the analog layout – since, indeed, its power output is being used for driving the digital turnout decoders.

**Important** Digital locomotives (i.e., locomotives equipped with a digital decoder) should not be used on an analog layout powered by a PWM power supply (such as a Power2 in analog mode). Any digital locomotive used in this manner will not function and even risks being damaged if the PWM voltage is too high (which is not the case with a Power2).

### 3.1 Operation

- (1) Large 4-digit display for showing all system information
- (2) Rotary encoder used as a speed knob for controlling the loco speed and also for loco (electric circuit) selection, turnout address selection and for value/parameter input during throttle configuration
- (3) Driving direction indicators (triangular LEDs)
- (4) [Stop]: layout Power Off/On toggle
- (5) Turnout key for activating turnout mode and for turnout/signal address selection
- (6) Programming key for performing DCC programming procedures and for the setup of DAISY operational parameters (Special Options)
- (7) Locomotive key for drive mode selection and for locomotive (address) selection
- (8) Function keys [f1] through [f4]. These keys control locomotive features in drive mode, while they control turnouts in turnout mode
- (9) [Off] key: ends circuit-coupling
- (10) [function] key: starts circuit-coupling



#### Speed knob

The speed knob can be used for controlling the locomotive speed. Turning the speed knob clockwise increases locomotive speed, while turning the speed dial counterclockwise decreases locomotive speed. If the locomotive is stopped or if it has already reached its maximum speed, further rotations in the corresponding direction are ignored.

If you select a locomotive which is moving, the throttle automatically displays the locomotive speed and let's you control the locomotive starting from that speed – the same applies, of course, for all locomotive functions (e.g., the locomotive lights, functions, etc.).

#### Driving direction

The locomotive driving direction can be changed by pressing the speed dial. The current driving direction (that is: the track polarity) is shown by the two triangular LEDs next to the [Stop] key. The LED pointing to the right lights up if the loco driving direction is "forward".

If the loco direction is changed by pressing the speed dial, the locomotive first stops, then changes its driving direction.

### **[Stop] key**

The [Stop] key can be used for turning off/on power to the layout. If the layout power is off, the display shows 4 blinking decimal points.

### **[function] and [off] keys**

The [function] key starts the coupling of two electric circuits. This allows a locomotive to smoothly pass from one electric circuit (supplied by a specific Power2) to a different electric circuit (driven by a different Power2). The coupling also transfers all locomotive features (e.g., acceleration and deceleration factors) from the first to the second Power2. The [off] key is used to terminate the coupling, effectively decoupling the two Power2's.

### **Functions in analog mode**

In drive mode, the function keys (f1 through f4) can be used to control features pertaining to the driving characteristics of analog locomotives. Each Power2 (each electric circuit) has its own setting, which is independent of the setting applied to other Power2's.

#### **[f1], [f2] acceleration/deceleration delay**

[f1] off, [f2] off = minimum acceleration/deceleration delay  
[f1] on, [f2] off = low acceleration/deceleration delay  
[f1] off, [f2] on = medium acceleration/deceleration delay  
[f1] on, [f2] on = maximum acceleration/deceleration delay

(Note: minimum delay means that a locomotive will react very quickly to speed changes).

#### **[f3] switching speed (i.e., half speed)**

[f3] off = normal speed  
[f3] on = switching speed (half of normal speed)

#### **[f4] enable/disable acceleration/deceleration delay**

[f4] off = acceleration/deceleration delay is enabled  
[f4] on = acceleration/deceleration delay is disabled

#### **[f5] motor control (low or high frequency)**

[f5] off = low frequency (104 Hz) PWM (Pulse Width Modulation)  
(e.g., for normal motors)  
[f5] on = high frequency (16.7 KHz) PWM (Pulse Width Modulation)  
(e.g., for coreless or Faulhaber motors)

#### **[f7] loopback control (check Power2 manual)**

[f7] off = closing the contact changes driving direction  
          opening the contact changes driving direction  
[f7] on = closing the contact changes driving direction  
          opening the contact does **not** change driving direction

In turnout mode, these keys allow controlling four turnouts at a time. The four LEDs show the status of the corresponding turnout, indicating either 'green' or 'red'.

## 3.2 Drive mode

The drive mode of the DAISY is activated by pressing the [Locomotive] key. In drive mode one can drive locomotives and modify operating parameters of the selected locomotive (electric circuit).

In drive mode, the display shows an “A” for “analog mode” plus the current loco speed (0=stopped through 126=maximum speed). For example:



In the following paragraphs the term “locomotive” will sometimes be used instead of “electric circuit”.

### 3.2.1 Electric circuit Selection

In analog mode, the DAISY System can be used to control up to 63 different electric circuits (through an equal number of Power2's).

The DAISY throttle default is to control the first electric circuit: #1.

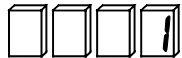
The [Locomotive] key can be used to either activate drive mode (e.g., from turnout mode) or, if already in drive mode, to select a different locomotive.

This is how to proceed:

- Press the [Locomotive] key. The display indicates:



- Release the [Locomotive] key. The display indicates the currently selected electric circuit, e.g.:



- Rotate the encoder to select a different electric circuit.
- Confirm the selection by pressing the [Locomotive] key – or abort selection (regaining control of the previously selected electric circuit), by pressing either the [Turnout] or [Prog] keys.

### 3.2.2 Coupling electric circuits

The DAISY System allows one to couple the electric circuit in which a locomotive is currently driving with the next electric circuit: the electric circuit in which the locomotive is going to operate, after leaving the current electric circuit. This allows a locomotive to move from one electric circuit (layout section) to a different one.

**This is how to proceed:**

- While controlling the first electric circuit, press the [function] key
- Press the [Locomotive] key in order to start the locomotive selection process

- Rotate the rotary encoder to select the target electric circuit
- Press the [Locomotive] key to confirm the selection
- Press the [function] key to couple the target electric circuit with the first one. As you do this, the target electric circuit will get the same configuration as the first one: locomotive speed and additional parameters (such as: acceleration delay) will be identical
- Once the locomotive has moved within the target electric circuit (layout section), press the [Off] key in order to de-couple the two electric circuits

### 3.3 Turnout mode

If the last Power2 of a chain of Power2's in analog mode has been configured (check Power2 manual) for control of digital turnouts, it can be used to control up to 1024 digital turnouts (of which, of course, only the first 256 will be controllable through the DAISY throttle).

**Attention** Only DCC turnout decoders (DCC accessory decoders) are supported.

#### 3.3.1 How to control a turnout or a signal

Press the [Turnout] key to switch from drive to turnout mode.

While in turnout mode, you can use the f1 through f4 keys to toggle the status of a turnout or signal. The four LEDs above the f1 through f4 keys show the current turnout or signal status: red (thrown) or green (closed).

The fact that the 4 LEDs indicate a 'red' or 'green' status – as opposed to 'yellow' or off – can be used to tell the mode (turnout or drive) in which the DAISY throttle is currently operating.

Each closure of the [f1] through [f4] keys will be shown on the DAISY display: the accessory address which has been toggled will be shown as long as the key remains pressed. For example, the display will show:



(The first symbol represents the letter "W", to indicate "Weiche" the German word for turnout).

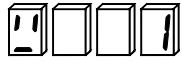
While in turnout mode, the currently selected locomotive can still be controlled through the rotary encoder.- Furthermore, the [function] and [Off] keys can still be used for electric circuit coupling.

#### 3.3.2 How to change the controlled turnout address range

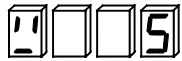
The DAISY default is to have the keys [f1] through [f4] control turnout addresses 1 through 4. However, this can be changed.

**This is how to proceed:**

- While in turnout mode, press the [Turnout] key. The display indicates the turnout address controlled by the [f1] key (i.e., the “base address”), e.g.:



- Rotate the encoder in order to select the desired new “base address”. The base address can be edited in steps of 4 units. For example, a single step (rotation) in the clockwise direction will indicate:



The highest possible value is 253.

- Press the [Turnout] key in order to confirm selection of the new “base address”. The display will now revert to indicate the speed of the currently selected locomotive.

### 3.4 Programming mode

With a DAISY System in analog mode, the programming mode of a DAISY throttle can only be used for changing configuration parameters of the DAISY throttle itself.

**This is how to proceed:**

- Press the [Prog] key. The display indicates:



- Release the [Prog] key. The display indicates:



Special Options edit

The remaining 3 digits show the number of the Special Option which has been selected last.

- Rotate the encoder to select the desired Special Option number
- Press the [Prog] key to select that particular Special Option. The display will indicate the current value of the selected Special Option.
- Rotate the encoder to select the desired Special Option value

**TIP**

The value can be displayed in hexadecimal format by pressing the [function] key. It will revert to decimal format as soon as that key is released.

- Change the SO value by pressing the [Prog] key.
- You can leave programming mode at any time by pressing either the [Locomotive] or the [Turnout] key

## 4 Software update

The DAISY system software can be updated anytime through an Intellibox. This requires connecting the DAISY throttle, using the provided spiral cord cable, to the "LocoNet-T" connector of an Intellibox, etc.

The procedure is very similar to the software update of an IB-Control.

### **This is how to proceed:**

- Disconnect all devices from the Intellibox
- Connect the DAISY throttle with the LocoNet-T connector of the Intellibox using a LocoNet cable
- Connect the Intellibox to a suitable COM port (serial port) of a PC – e.g., COM1 or COM2 – using a one-to-one serial cable
- Start the DAISY update program (DYUPDATE.EXE) and follow the on-screen instructions

Information regarding DAISY software updates will be made available on our internet site:

<http://www.uhlenbrock.de>

## 5 Special Options

The DAISY Special Options can be edited using the DAISY "Programming mode".

Special Option	Description	Range	Default
0	Software version number (cannot be edited!)	-	-
1	DAISY serial number (cannot be edited!)	-	-
9	0=turnout positions not saved (analog mode) 1=turnout positions saved (analog mode)	0-1	0
11	LED brightness while operating as a DAISY-System: 0 = maximum brightness 3 = minimum brightness	0-3	0
12	LED brightness while operating as an add-on throttle: 0 = maximum brightness 3 = minimum brightness	0-3	1
13	Dynamic effect (rotary encoder) for 28 and 31 speed steps locomotives: 0 = off 15 = maximum dynamic effect	0-15	5
15	0= DAISY-System (digital) does not generate any Motorola signal 1= DAISY-System (digital) always generates a Motorola signal	0-1	1
16	0= DAISY-System (digital) does not generate any DCC signal 1= DAISY-System (digital) always generates a DCC signal	0-1	0
17	Dynamic effect (rotary encoder) for 128 speed steps locomotives: 0 = off 15 = maximum dynamic effect	0-15	8
23	Maximum 'on' time for accessory decoders: 0 = as long as the corresponding key is pressed 1-15 = 0.3 through 2.3 seconds in equal steps	0-15	4

All Special Options can be reset to the factory settings by keeping the [Stop] key pressed while either turning on the DAISY-System or plugging the DAISY throttle into LocoNet.



## Power 2

## 1. Description

### 1.1 Operation

The Power2 is a small and smart add-on Booster for both digital as well as analog layouts.

It can be used:

- along with a DAISY throttle (connected to the Power2 “DAISY” connector) to form the “DAISY-System” in digital mode: a multi-protocol digital Command Station
- as an add-on Booster for digital Command Stations (either through a LocoNet connection or through the 5-pole Booster connector)
- as an analog train control system, when used with one or more LocoNet throttles (e.g., a DAISY throttle, an IB-Control, a FRED, etc.)
- as an additional power unit for driving one more sections of an analog layout
- as an intelligent “DCC turnout booster” (e.g., allowing DCC turnout operation of an analog layout)

### 1.2 Technical Data

Max AC input voltage:	18 V
Output voltage range (adjustable):	15 V - 20 V
Max power output (current):	2 A
Max current output for LocoNet devices:	300 mA
Suggested transformer:	16 V / 45 VA
LocoNet output:	with Booster signal

### 1.3 Cables

Please use only original Uhlenbrock LocoNet cables or so-called “standard” LocoNet cables. Failure to do so may cause a short circuit when a train or a locomotive travels between layout sections powered by different boosters.

### 1.4 Power 2 LED status

The Power2 LED indicates the Power2 status:

- **LED is always on**

The Power2 is “on” (the power output has not been turned off)

- **LED is normally on. It is briefly off every 2 seconds**

The power output has been turned off

- **LED flashes 4 times per second**

A short, an overload or an overheating condition has been detected (the power output has been turned off)

- **LED is normally on. It is briefly off every 1 second**

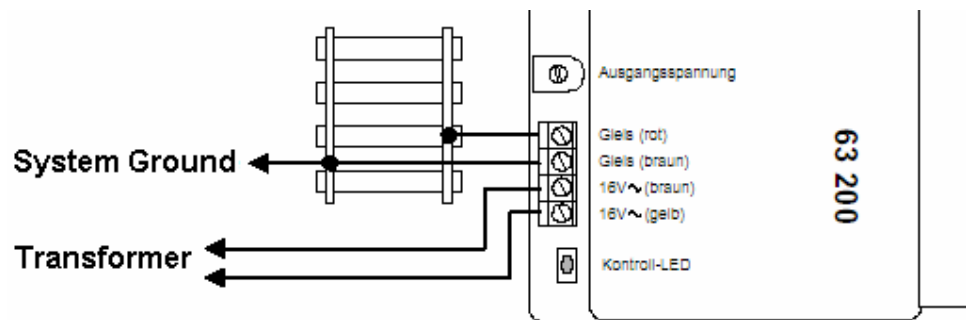
A short or an overload condition has been detected on either the LocoNet or the “DAISY” connector (the power output has been turned off)

## 1.5 How to connect it

### 1.5.1 Rails

The rails are to be connected to the screw connectors labeled “Gleis (rot)” (German for: “rail (red)”) and “Gleis (braun)” (“rail (brown)”).

**TIP** If more than one booster is going to be used, then care must be taken to make sure that the system ground (brown) is always connected to the same rail.



In the case of 3-rail layouts, the “Gleis (braun)” cable must be connected to the (outer) rails and the “Gleis (rot)” cable must be connected to the center rail (studs).

### 1.5.2 Transformer

The transformer should be connected to the screw connectors labeled “16V~(braun)” (braun = brown) and “16V~(gelb)” (gelb = yellow).

The output voltage can be adjusted in range 15V through 20V by using the small trimmer (potentiometer) labeled: “Ausgangsspannung” (Output Voltage). The output voltage is about 15V when the trimmer is rotated fully clockwise. It is about 20V when the trimmer is rotated fully counterclockwise.

**Important** All Power2’s **must** be powered up at the same time, or else the auto-numbering procedure of the Power2’s (for analog mode) cannot be correctly executed. This can be achieved, e.g., by using a “power strip” to connect all transformers to the mains power supply (110V, 220V or whatever applies at your location).

## 2. Booster use

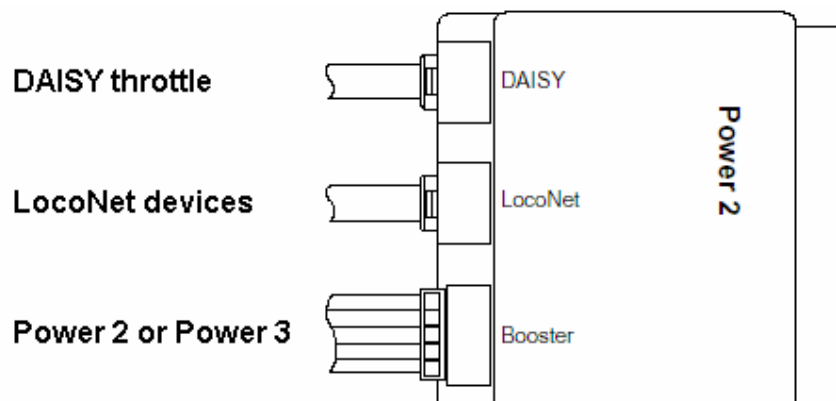
If a Power2 is to operate as digital booster, then it must be connected to the Command Station either through LocoNet, using the “DAISY” Power2 connector, or through a 5-pole Booster cable, using the “Booster” connector.

### 3. Digital system use

If used with a DAISY throttle, the Power 2 can be used as a digital Command Station to operate digital layouts.

#### 3.1 How to connect a DAISY throttle

If the DAISY throttle will be used along with a Power 2 to operate a digital layout, then it must be connected to the “DAISY” connector of the Power 2. The connection **must** be done using the supplied spiral-cord cable.



**Important** During use as a digital Command Station, the DAISY must not be removed from the “DAISY” connector of the Power2.

#### 3.2 How to connect additional Boosters and LocoNet devices

If more boosters need to be connected to a DAISY-System, then they can be connected either to the “Booster” connector or to the LocoNet connector. In the latter case, all additional Boosters must be connected “directly” to the LocoNet connector (using, e.g., our “LocoNet multiple outlet box”, art. Num. 62 250). Please note that additional boosters **must not** be connected “in series” (daisy-chained) to the LocoNet connector. Additional LocoNet devices can then be connected to any of these additional boosters.

If there is only one Power2, then all LocoNet devices should be connected to the “LocoNet” connector of that Power2.

The maximum current drawn by devices connected to the “LocoNet” connector of a Power2 must not exceed 300 mA. If more current is required, a suitable “LocoNet power supply” must be used (e.g., our art. N. 63 100).

---

## 4. Analog system use

### 4.1 Power 2 as an analog layout control system

The Power2, along with a LocoNet throttle (e.g., a DAISY throttle, an IB-Control, a FRED, a Profi-Control etc.), can be used to control an analog layout.

The locomotives are controlled by a pulsed high voltage current (PWM – Pulse Width Modulation). This allows for smoother operation at low speeds. Furthermore, similarly to what occurs with digital layouts, it is possible to control the acceleration/deceleration delay, to activate switching speed (half speed), to select normal or Faulhaber motor PWM frequency (low or high PWM frequency), etc. All these parameters can be individually set for every Power2 (every electric circuit, i.e., every layout section).

**Important** Digital locomotives (i.e., locomotives equipped with a digital decoder) should not be used on an analog layout powered by a PWM power supply (such as a Power2 in analog mode). Any digital locomotive used in this manner will not function and even risks being damaged if the PWM voltage is too high (which is not the case with a Power2).

Up to 63 isolated electric circuits (layout sections) can be controlled through an equal number of Power2's (powered by an equal number of transformers). All Power2's are connected together using a LocoNet cable – we will shortly describe how to do this. Every throttle connected to LocoNet can take control of each electric circuit (Power2) by using an automatically assigned identification number. Crossing between electric circuits is supported.

It is also possible to configure one Power2 to interpret the turnout/signal commands issued by throttles or other devices (e.g., IB-Switch, Switch-Control, etc.) and convert them to digital commands for DCC accessory decoders. This allows analog train operation and digital turnout/signal control.

The following Uhlenbrock devices can be used to control trains by Power2's in analog mode (of course, throttles from other manufacturers can also be used): DAISY throttle (66 200), FRED throttle (66 000), IB-Control (65 200) and Profi-Control (65 500).

### 4.2 How to connect a Power2 in analog mode

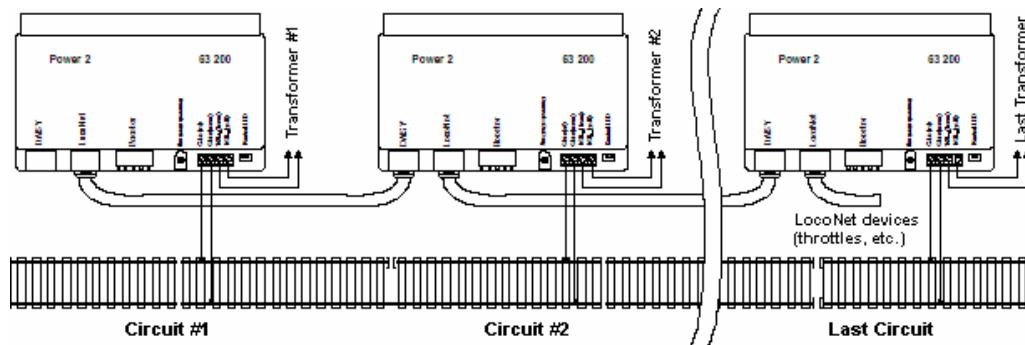
In order to control a section of an analog layout, each Power2 must be connected to the rails (pertaining to the desired layout section) and to a transformer.

The Power2's are connected together as follows. The LocoNet connector of the "previous" Power2 is connected to the "DAISY" connector of the "next" Power2. Implicitly, this defines an order among the Power2's: the first Power2 (the Power2 with number "1") is the one which does not have anything connected to its "DAISY" connector. The next Power2 (the one which is connected, through its "DAISY" connector, to the "LocoNet" connector of Power2 #1) is Power2 #2, etc.

All LocoNet devices must be connected to the “LocoNet” connector of the last Power2.

**Important** The maximum current drawn by devices connected to the “LocoNet” connector of a Power2 must not exceed 300 mA.

When the Power2’s are turned on (which must be done **at the same time** for all Power2’s), an automatic self-numbering procedure is performed. At the end of this procedure, each Power2 will have a unique identification number – this is the number to be used (as if it were a loco “address”) in order to select and control each Power2 from a LocoNet throttle.



**Important** The connection between each pair of Power2’s must be a direct one (using only Uhlenbrock LocoNet cables or so-called “Standard LocoNet cables”). No LocoNet device may be connected between each pair of Power2’s. Doing this will result in a malfunctioning of the auto-numbering procedure.

If a new Power2 is to be added to an existing ‘daisy-chain’ of Power2’s, e.g. for controlling a new electric circuit to be added to the analog layout, then the best solution is to add the new Power2 at the end of the existing ‘daisy-chain’ of Power2’s as this will not modify the automatically assigned identification numbers of the existing Power2’s.

In practice one would disconnect the LocoNet cable (to which all other LocoNet devices are connected – like throttles, etc.) from the “LocoNet” connector of the last existing Power2. Connect that very connector to the “DAISY” connector of the new Power2 and finally connect the LocoNet cable (to which all LocoNet devices are connected to) to the “LocoNet” connector of the new Power2. This way, with the next layout power-on, all Power2’s including the new one will automatically be assigned id’s – with the last added Power2 receiving the highest numbered id.

Throttles which do not feature any “locomotive” (electric circuit) selection capability (like the FRED and the Profi-Control) can be used either in their “expanded mode” (4 loco selection per [f1] through [f4] keys) or in the so-called “dispatch mode”. The former case is described in the next section. The latter case requires the use of a throttle with dispatching capability (e.g., our DAISY throttle or an IB-Control).

Once a “locomotive” (electric circuit) has been selected on a throttle, the speed and direction control functions of the throttle can be used the same way they are used in case of a digital layout – please refer to the throttle manual. Function keys, however, do have a different meaning: please refer to section 3.8 (“Functions in analog mode”).

### 4.3 ‘Locomotive’ (electric circuit) selection

Each LocoNet throttle typically has its own method (user interface) for selecting a locomotive. This section describes the specifics of operating some common LocoNet throttles on an analog layout being controlled through one or more Power2’s. Please refer to the manuals of each throttle type for additional information.

#### **Locomotive selection with a DAISY throttle**

A DAISY throttle connected to the “LocoNet” connector of a Power2 operating in analog mode automatically recognizes this peculiar case and shows an “A” as locomotive type. Locomotive selection is initiated by pressing the Locomotive key – as described in the DAISY manual.

#### **Locomotive selection with a FRED**

In order to be used with a Power2 in analog mode, a FRED has to be configured for “Twin-Center” mode first (please refer to the FRED manual). While configuring it this way, it is possible to select the FRED “number” by using the [f1] through [f4] keys. This number will determine which group of 4 Power2’s that FRED will be able to select:

FRED ID 1: electric circuits (Power2’s) 1 through 4  
FRED ID 2: electric circuits (Power2’s) 5 through 8  
etc.

Alternatively, a FRED may be configured for “dispatch” mode and used along with a LocoNet throttle with dispatching capability.

#### **Locomotive selection with an IB-Control**

There is no need to configure the IB-Control. Electric circuits (Power2’s) can be taken control of through an IB-Control simply by selecting them as if they were locomotive addresses. Please refer to the IB-Control manual for additional information.

#### **Locomotive selection with a Profi-Control**

Each Profi-Control can be used to control up to 8 electric circuits (Power2’s). Which group of 8 electric circuits is controlled is dictated by the LocoNet ID of each Profi-Control:

ID 1: electric circuits (Power2’s) 1 through 8  
ID 2: electric circuits (Power2’s) 9 through 16  
etc.

Please refer to the Profi-Control manual to assign a specific LocoNet ID to a Profi-Control.

Once a LocoNet ID has been assigned, one can use the standard Profi-Control procedure for locomotive selection in order to select among the 8 controllable electric circuits.

Alternatively, a Profi-Control may be configured for “dispatch” mode and used with a LocoNet throttle with dispatching capability.

#### 4.4 Coupling electric circuits

The DAISY System in analog mode allows one to couple the electric circuit in which a locomotive is currently driving with the next electric circuit – that is, the electric circuit in which the locomotive is going to operate. This allows a locomotive to move from one electric circuit (layout section) to a different one.

**This is how to proceed (e.g., using a DAISY throttle):**

- While controlling the first electric circuit, press the [function] key
- press the [Locomotive] key in order to start the locomotive selection process
- rotate the rotary encoder to select the target electric circuit
- press the [Locomotive] key to confirm the selection
- press the [function] key to couple the target electric circuit with the first one. As you do this, the target electric circuit will get the same configuration as the first one: locomotive speed and additional parameters (such as: acceleration delay) will be identical

**Important** In analog mode, the DAISY-System can only process one coupling procedure at a time. This means that the current coupling procedure must have been completed (by pressing the [function] key in the target electric circuit) before that another coupling process can be started.

- once the locomotive has moved within the target electric circuit (layout section), press the [Off] key in order to de-couple the two electric circuits

#### 4.5 Electric shorts in analog mode

If there is a short, then only the Power2 controlling the layout section (electric circuit) in which the short occurs will cut off power to its power output. The Power2 (controlling the section where the short occurred) can be turned back on by:

- Pressing the [Stop] key of a DAISY throttle
- Pressing the [Stop] key of a FRED which is controlling that Power2
- Pressing the [go] key of an IB-Control
- Placing the direction lever of a Profi-Control (which is controlling that Power2) in the “0” position and then back in the desired driving direction position (either forward or reverse).

#### 4.6 Loopback section control

The Power2 is compatible with loopback section controllers offered by most model-railroading manufactures.

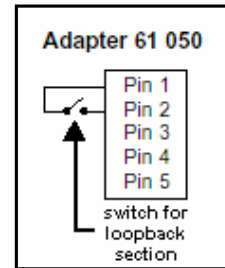
However, the Power2 cannot typically be used with loopback section “automatic controllers”, since these devices usually reverse the polarity *outside* the loopback section. This cannot be done in the case of a Power2: the system ground (the brown wire) must always be connected



to the same rail, so that a crossing from one electrical circuit to an 'adjacent' electric circuit (layout section) will not cause a short.

### Connection

In order to allow connection and use of a loopback controller or half-automatic loopback controller, the Power2 provides an input which can toggle the locomotive driving direction (track polarity). When Pin #1 and Pin #2 of the 5-pole "Booster" connector of a Power2 are connected together, then the Power2 will toggle its output polarity. Depending on the status of [f7], this may also apply to breaking the connection between Pin #1 and Pin #2 – which may be desirable in case of some loopback controllers.



The connection between Pin #1 and Pin #2 may be conveniently done using our Adapter 61 050.

Pin #1 of the Power2 "Booster" connector is the pin which is closer to the Power2 "LocoNet" connector.

**Important** The last Power2 in a chain of Power2's controlling a layout in analog mode **cannot** be used to control a loopback section – check also the next section 4.7 ("DCC Digital Turnout Booster").

## 4.7 Power2 as DCC Digital Turnout Booster

It is possible to configure the last Power2 of a chain of Power2's controlling a layout in analog mode to interpret the turnout/signal commands issued, through LocoNet, by throttles or other devices (e.g., IB-Switch, Switch-Control, etc.) and convert them to digital commands for DCC accessory decoders. This allows for analog train operation and digital turnout/signal control – even an automatic analog layout operation becomes possible, e.g. by using one or more IB-Switch(es) and analog-compatible occupancy detection modules (like our 43 300 and 43 500 modules) along with LocoNet feedback modules (like our 63 350 modules).

Obviously, if this option is used, the last Power2 cannot be used for driving a section of an analog layout since, indeed, its power output is being used for driving the digital turnout decoders.

A Power2 can be configured to operate as a DCC digital Turnout Booster by connecting Pin #1 and Pin #2 of the Power2 "Booster" connector (either using a typical PC style "jumper" or using our adapter 61 050). This connection must be permanent and precede power-up.

Pin #1 of the Power2 "Booster" connector is the pin which is closer to the Power2 "LocoNet" connector.

A Power2 which has been configured for "DCC digital Turnout Booster" operation can control up to 1024 DCC turnout addresses (turnout addresses 1 through 1024).

**Attention** Only DCC turnout decoders (DCC accessory decoders) are supported.

## 4.8 Functions in analog mode

The function keys (f1 through f4) can be used to control features pertaining to the driving characteristics of analog locomotives. Each Power2 (each electric circuit) has its own setting, which is independent of the setting applied to other Power2's.

Function status can be edited through a LocoNet throttle controlling that electric circuit (Power2).

### **[f1], [f2] acceleration/deceleration delay**

[f1] off, [f2] off = minimum acceleration/deceleration delay  
[f1] on, [f2] off = low acceleration/deceleration delay  
[f1] off, [f2] on = medium acceleration/deceleration delay  
[f1] on, [f2] on = maximum acceleration/deceleration delay

(Note: minimum delay means that a locomotive will react very quickly to speed changes).

### **[f3] switching speed (i.e., half speed)**

[f3] off = normal speed  
[f3] on = switching speed (half of normal speed)

### **[f4] enable/disable acceleration/deceleration delay**

[f4] off = acceleration/deceleration delay is enabled  
[f4] on = acceleration/deceleration delay is disabled

### **[f5] motor control (low or high frequency)**

[f5] off = low frequency (104 Hz) PWM (Pulse Width Modulation)  
(e.g., for normal motors)  
[f5] on = high frequency (16.7 KHz) PWM (Pulse Width Modulation)  
(e.g., for coreless or Faulhaber motors)

### **[f7] loopback control (check also section 4.6)**

[f7] off = closing the Pin#1-#2 connection changes driving direction  
breaking the Pin#1-#2 connection changes driving direction  
[f7] on = closing the Pin#1-#2 connection changes driving direction  
breaking the Pin#1-#2 connection does **not** change driving direction