Information

LV100

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DIGITAL plus

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Power Station LV100

The Power Station LV100 supplies power to the track. It should be located close to where the power is fed into the track, to keep the wire connection to the track as short as possible.

During power station operation, an LED on the front is lit. In case of a Power Station overload, the LED turns off. The DCC signals necessary to operate the LV100 come from the Command Station. The power necessary to operate the LV100 must be provided from a separate AC transformer for model railroads.

Connecting the Power Station

Connect the transformer to terminals **U** and **V**. For HO scale and smaller, the transformer output voltage should be 16V AC or DC. In order for the Power Station to give off its full 3A current, the transformer also needs

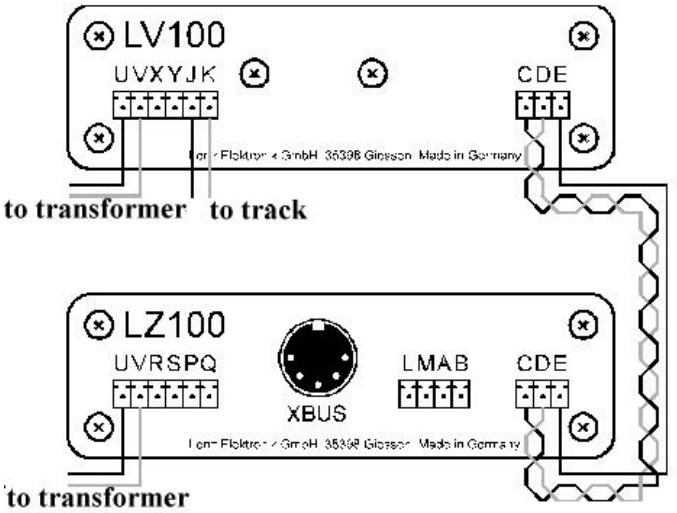

Figure 1 Connecting LV100 to Command Station LZ100

to be able to deliver an output current of at least 3A (50VA). Use a suitable, UL listed transformer designed for model trains. The allowed maximum effective output voltage of the transformers must not exceed 18V AC or DC.

The track is connected to terminals **J** and **K** (see Figures 2 and 3).

The Power Station receives command information from the Command Station via terminals **C** and **D**. These terminals are connected to the corresponding terminals on Command Station LZ100 with a 2-wire cable. To reduce radio interface, these wires should be twisted (see Figure 1).

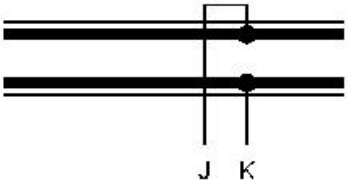

Figure 2 Connecting 2-rail track

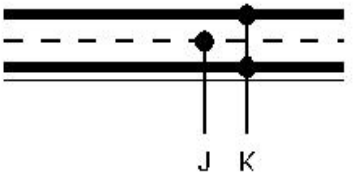

Figure 3 Connecting 3-rail track

When you connect terminal **E** with the corresponding terminal on the Command Station LZ100, the Command Station will receive feedback in case of a Power Station overload. This information is then passed on to all handheld controllers. The display on Handheld Controller LH100 will show "OFF" (AUS) followed by “ON F1” (EIN F1).

If you have connected additional Power Stations to the Command Station, they will turn off their layout sections as well. You can turn the power supply for the layout back on via the handheld controller (see LH100 section "Emergency Stop/Emergency-Off").

If you do not connect terminal **E** with the Command Station, then only the Power Station that is overloaded will turn off its power supply to its layout section. After a certain time (When the Power Station has cooled down again) the Power Station automatically turns the power supply back on. If the overload still is present, it will turn off again after an additional short time.

The output current of the Power Station is limited by an electronic fuse circuit to approximately 3A.

Installation considerations

Use only wire of sufficient gauge to connect to the tracks (minimum 18 gauge) and twist the wires to reduce radio interference. The Power Station should also always be placed as close to the track connection as possible. For extended track sections, you will need additional power feeds at regular intervals.

There must not be a capacitor connected to the track for interference control. A capacitor is only needed for conventional operations to prevent radio interference. In DCC operation it corrupts the data format and the error free data transfer is disturbed.

It is normal for the Power Station to get warm during operation. Ensure sufficient airflow around the Power Station to prevent the internal safety circuit from activating during normal operations.

Never allow your layout to operate without supervision! If there is an unnoticed short, the heat build-up could present a fire hazard!

Mixing Digital and Analog Operations

Conventional and digital track sections must be consistently separated from each other by using isolating tracks or isolating rail connectors between the digital and conventional (DC=) track sections (double gapping).

At the gap dividing digital from analog operation, you must take steps to prevent interference between the 2 systems when a locomotive crosses the gap. One approach is to use a Digital Circuit Breaker 86076 from Arnold. If a locomotive bridges the insulated gap, the module immediately interrupts the analog power supply.

Warning:
Mixed digital operations using both rails and catenary (overhead wire) is not allowed. In this mode of operation, if the locomotive is on the track in the wrong direction (for instance after going through a loop), the built-in locomotive decoder could be destroyed by excessive voltage! We suggest you operate with current pickup from the rails (wheel pickups), since that contact is more reliable (and thereby the transmission of the digital signals to the locomotive decoder) than with catenary.

Supplying power to a large model train layout

As in conventionally operated layouts, a sufficient power supply is prerequisite for the safe function of a digital layout.

Locomotives, interior lights in rolling stock, turnouts, signals etc. all get their power from the Power Station, along with their commands. If the devices you have connected to an LV100 together require more than 3.0A, the safety circuit of the LV100 will activate. You will have an overload situation as described in the section "Connecting the Power Station" above.

The current use of your layout is the sum of the following:

- locomotives in operation: depending on scale and load .2 Amps to 2 Amps. In N-scale, calculate ½ Amp, for H0 scale estimate 1 Amp and for larger scales 2 Amps per locomotive, and you will normally have some reserves.
- standing locomotives: without lights 1.5mA, with lights approximately 50mA per light bulb
- rolling stock with lights: per light bulb approximately 50mA

If the output of a single LV100 is not enough to supply the layout, then divide the layout into several power districts. Additional LV100 units then will supply those areas with approximately 3.0A each (one LV per power district)

In the supply area of one LV100, the current load of all simultaneously operating locomotives must not exceed 3.0A (including the current used for lighting in rolling stock).

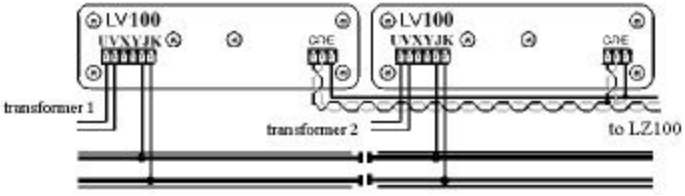

Figure 4 Connecting track voltage when using 2 LV100

The command signals reach additional LV100s through terminals **C** and **D** of the first one. Each LV100 must be connected to its own transformer. The number of transformer/Power Station combinations needed for the layout thus depends on the power needs of your layout.

The power blocks of several LV100 must necessarily have the same polarity. Terminal J of one and terminal J of the next LV100 must therefore be connected to the same rail. Otherwise there will be a short when passing a dividing gap. (See: Figure 4)

Operating large scale layouts

On large scale layouts needing a higher voltage, you can switch the voltage regulator of the Power Station to output a higher voltage. To do so, connect terminals **X** and **Y** of the Power Station with a wire bridge. The output voltage then increases to up to 21V

(at 1A output current). It will in some cases become somewhat lower at higher current loads.

If your locomotives need a higher current than the 3.0A available from the Power Station, you can connect two Power Stations in parallel. Each Power Station is connected to its own transformer. In this case you connect terminals **J** and terminals **K** on both Power Stations with each other (Figure 5). You will then have 6.0A current available to power your trains.

Warning: If you wire your LV100s as in Figure 5 the shorting current is also 6.0A. This could in some cases lead to damage to vehicle wheels or tracks, especially in the smaller scales.

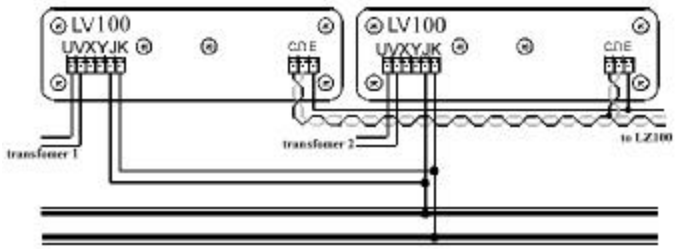

Figure 5 Connecting track voltage for large scale railroads

Connecting a reverse loop

Lenz GmbH produces an automatic reversing module (LK100) which can be used to construct automatic reversing sections. While these units are invaluable in some cases they are not absolutely needed for DCC operations. Following is an example on how a very simple reversing section can be built.

Example:

Using isolated track contacts and a twin-coil relay, the polarity inside a reverse loop is switched such that when crossing the gaps, there is no short. For example; consider Figure 6 when the train travel is in clockwise direction (turnout is set to diverging route).

When passing track contact b1, the polarity of the loop is set to allow the train to cross the gap without a short. As the reverse loop is traversed, track contact 2 will switch the polarity in the loop, and the adjoining gap can be crossed safely. Since in digital

operations the direction of travel is dependent on the locomotive and not track polarity, the locomotive will not change its direction of travel when the polarity within the reverse loop is changed.

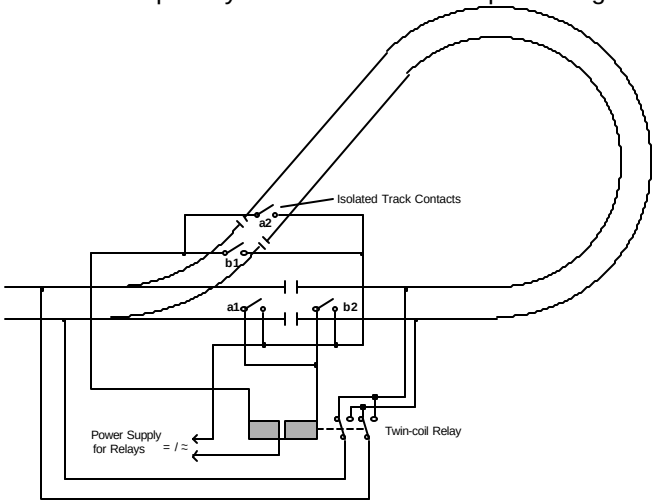

Figure 6: Wiring of Reverse Loops

Traveling the reverse loop counter-clockwise is done in a similar manner, now contacts a1 and a2 ensure that proper polarity is set.

Notes:

The distance between track contacts a2 and b2 must be longer than the longest train that travels the reverse loop.

If the reverse loop is only traversed in one direction, then either contacts a1 and a2 or contacts b1 and b2 are not needed.

The track contacts used in this example can actually be auxiliary contacts set by the switch machine for the switch.

If you wish to traverse the reverse loop with a locomotive without a decoder (analog locomotive), proceed as follows:

- drive the entire train into the reverse loop (the train must be between contacts a2 and b2)
- stop the train and change direction with your handheld (LH100).
- now manually change the polarity in the reverse loop (for example by using push buttons connected in parallel with track contacts a2 and b2)
- continue driving the train through the reverse loop.

You must use this sequence with analog locomotives (non-decoder equipped), since their direction of travel is dependent on track polarity.

Table 1 Troubleshooting

LV100 is not operational (LED does not light up)	Power supply is interrupted, power plug of transformer is not in outlet	Check wiring from transformer to LV100, insert power plug in outlet
	There is a short circuit on the layout	Remove the cause of the short circuit
	There is an overload present	Divide the layout into several supply areas, and supply them from additional Power Stations and transformers.
LV100 is operational (LED lights), but locomotives do not run, turnouts and signals cannot be controlled	The connection from Power Station to track is broken (terminals J and K).	Test and correct connections
	The connection between LV100 and Command Station LZ100 is broken or short circuited (terminals C and D)	

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