Information

LZ100 Command Station

Version 2.3

Art. No. 20101

DIGITAL
plus

December, 1996

Getting started

To get started with DIGITAL plus, you need:

* Command Station LZ100
* Hand Held Controller LH100
* Power Station LV100
* Locomotive equipped with a DIGITAL plus locomotive decoder, or with another NMRA-DCC compatible locomotive decoder (or an Arnold Digital or Märklin Digital= decoder)
* Transformer providing 16 volt AC and 50VA output

The DIGITAL plus units have removable multi-pin connectors with screw terminals, to make connecting wires easy. Wire Command Station LZ100 and Power Station LV100 together as shown in Figure 1. Terminals **U** and **V** on Command Station and Power Station are the connection points for the transformer.

Connect terminals **C**, **D** and **E** on the Command Station with the corresponding terminals on the Power Station.

Terminals **J** and **K** on the Power Station are for the connection to the track (See Figure 2 and 3).

Plug the connector of the Hand Held Controller LH100 into the round 5-pin DIN terminal on the back of LZ100, marked "XBUS."
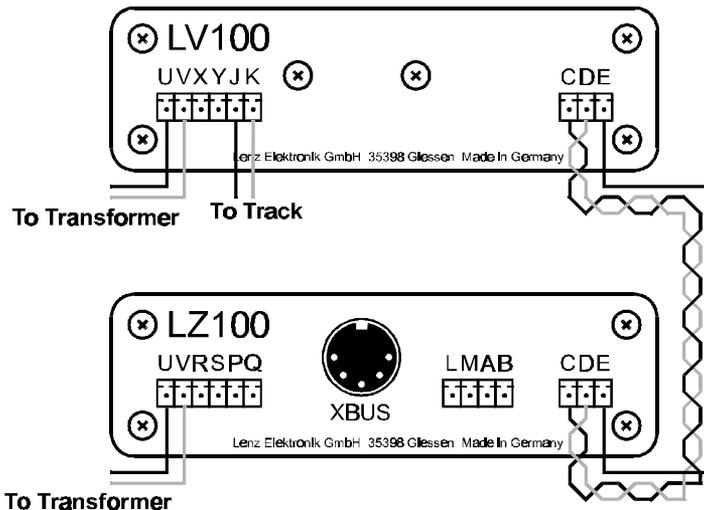

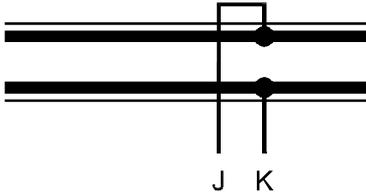**Figure 1: Connecting LZ100 to Power Station LV100**
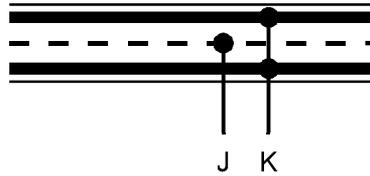
Figure 2: Connecting to 2-Rail   **Figure 3: Connecting to 3-Rail**

After connecting all the units, plug the transformer into a power outlet. The display of the Hand Held Controller will briefly show "LH100", then it will display the address of the most recently used locomotive, along with its data. On first use, the display will show locomotive address 3 (factory set).

If your digital locomotive has another address, then press "Cl" key on the Hand Held Controller. Next enter the desired locomotive address on the keypad and verify it by pressing the "Enter" key.

Now you can control the speed of your digital locomotive with the following keys:
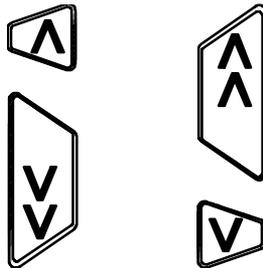
If you want to change your locomotive's direction of travel, first set the speed to step 0, then press the hexagonal key. The new direction will be shown in the display.

With the "0" key you can turn the locomotive headlights on and off (if connected). See your LH100 manual for more details.

System design of DIGITAL plus

DIGITAL plus is a digital multi-train control system for all model railroad scales. It was developed in close cooperation with model railroaders. The basis for its development was the digital systems Arnold Digital and Märklin Digital=, also developed by Lenz Elektronik GmbH. Figure 4 shows the simple and clear system design of DIGITAL plus.

DIGITAL plus is compatible with NMRA-DCC systems and their locomotive and accessory decoders. If you have older Arnold Digital and Märklin Digital=, you can use locomotive decoders and accessory decoders from these systems with DIGITAL plus. Also, if you have devices from these systems (control 80, keyboard, etc), then you can continue to use them with the original central unit= and the Translation Module LC100 together with DIGITAL plus.
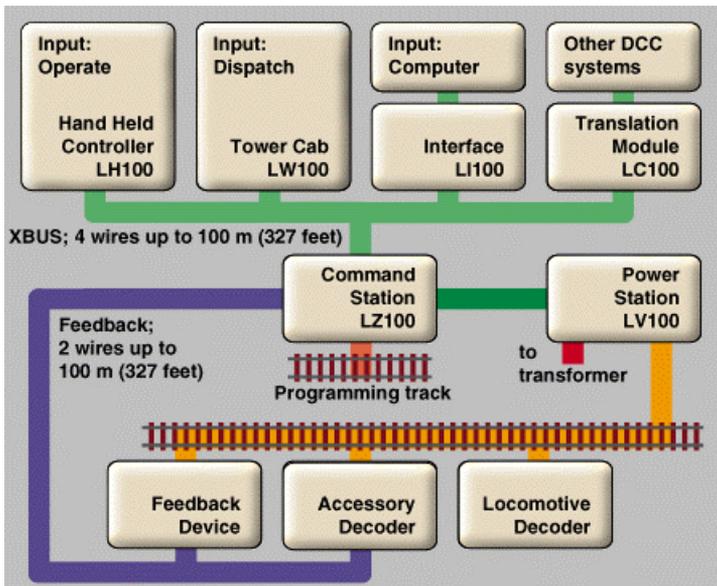

Figure 4: DIGITAL plus System Overview

If you encounter compatibility problems with components you already have, please contact us. We will do our best to resolve such problems.

The capabilities of DIGITAL plus are to a large extent determined by a program running inside the unit, the software.

The advantage of this approach is that new functions can be adopted simply by changing the software. It is not necessary to purchase new units. This way it is easier to implement suggestions for improvements from model railroaders.

Command Station LZ100

The core of the system is Command Station LZ100. It coordinates the input devices (Hand Held Controller LH100, etc.) and is also responsible for data processing. Information is exchanged between Command Station and input devices via a 4-wire cable, the XBUS. The Command Station generates the control signals for Power Station LV100, which combines them with the necessary power and sends them to locomotive and accessory decoders.

Therefore, the Command Station has no boosted output to connect to tracks. Accordingly it only needs a small transformer (15VA), which could be one you already have from a starter set. If you use a more powerful transformer, you can connect the Command Station and the Power Station to the same transformer.

Connecting the Command Station

Command Station LZ100 is connected to the AC output of the transformer with 2 wires at terminals **U** and **V** (see Figure 5). If you use the digital transformers 6002 (Märklin) or 86002 (Arnold), you use their yellow and brown terminals.

Connect the programming track to terminals **P** and **Q**. This track must be completely isolated from the rest of the layout.

At terminals **C** and **D** the data signal needed by the Power Station is available. These terminals are connected with the corresponding terminals on the Power Station with a twisted pair wire (see Figure 5).

You can easily make a twisted pair wire from two normal single wires that you twist together.
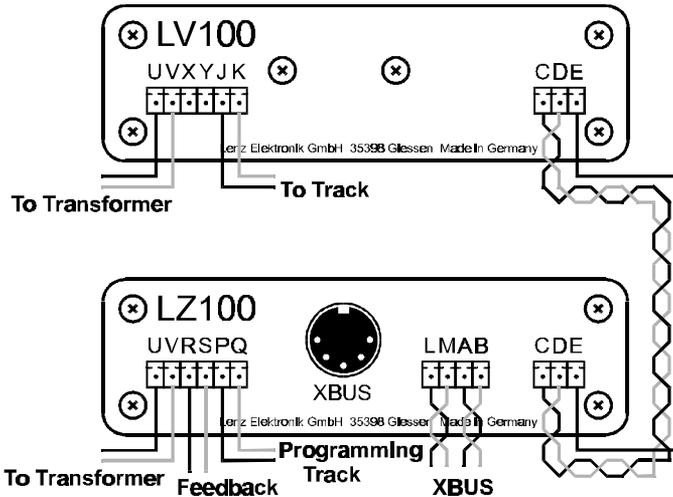
Figure 5: Complete Connections of Command Station and Power Station

If terminal **E** on the Command Station is connected to terminal E on the Power Station, the Power Station is able to provide feedback about overloads. The Command Station will then turn off all other Power Stations and send the corresponding information to Hand Held Controllers and other input devices.

The **feedback bus** is connected at terminals **R** and **S**. Via this wire, which also must be a twisted pair, the Command Station asks for the state of for example turnouts or track occupancy detectors. For this purpose, feedback units are connected to this (Accessory Decoder with Feedback LS100 or Feedback Encoder LR100). For more details on connecting these units, please refer to the respective manuals.

If the Command Station is correctly installed and wired, and the supply power of the transformer switched on, the LED on the front of the Command Station lights up. If the LED flashes after the power up, then there is a wiring problem on the XBUS.

Data transfer between Command Station and input devices

The connecting wires from Command Station LZ100 to the input units, for instance Hand Held Controller LH100, or the Interface, are referred to as **XBUS**.
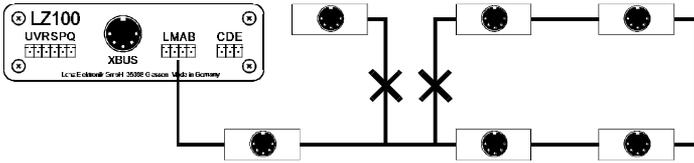
Figure 6: When wiring the X-BUS, wires must not be

allowed to branch or loop

Via this bus, the Command Station and connected devices exchange information. A maximum of 30 devices are allowed on the XBUS. Each of the connected units has its own address, so that data exchange is problem-free.

Directions for how to change the address of Hand Held Controller LH100 or another input device on the XBUS are found in the corresponding manuals.

The XBUS can be connected to the Command Station via either a 5-pin DIN connector or terminals **L**, **M**, **A** and **B**. You can connect the first Hand Held Controller directly to the 5-pin DIN connector on Command Station LZ100.

If you want to connect additional Hand Held Controller LH100 (or other input devices) to Command Station LZ100, then you use terminals **L**, **M**, **A** and **B**. Via the wires at terminals **A** and **B**, the units exchange data with the Command Station. Via the wires at terminals **L** (plus) and **M** (minus) the units are supplied with power.
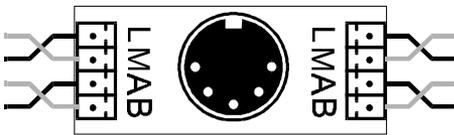
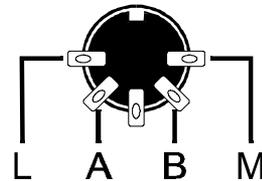

Figure 7: Connecting Panel 21150

Figure 8: Pin Assignments from solder side

From these terminals you run wires (XBUS wire) to the connecting panels (see Figure 7, catalog number 21150). You can also solder the wires yourself to a female 5-pin DIN connector. These connectors are readily available in electronics stores. The pin assignments of the 5-pin DIN connector are shown in Figure 8.

Make sure that you do not accidentally reverse the polarity at terminals L and M by switching wires. This could cause damage to connected input devices.

The XBUS wire must be installed so that the line starts at the Command Station and ends somewhere on your layout. (Daisy chained from Command Station via intermediate input locations to the last input location.) Between the start and end you may insert connecting panels or 5-pin DIN connectors anywhere. You may not route the wire in a hub-spoke pattern or as a closed loop. Under all circumstances you must ensure that the wires that are connected to terminals **A** and **B** are twisted. All wires should have a cross section of at least 0.25 square millimeter. The length must not exceed 100 meter (327 feet).

The ends of the data bus must be connected (terminated) with a resistor (included with the Command Station). The value of the resistor is 120 Ohm.
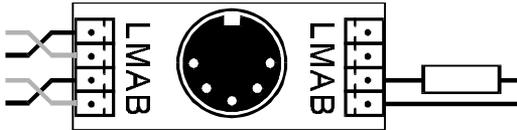

Figure 9: Terminating the X-BUS with a 120 Ohm Resistor

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This equipment complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.