Developed to simplify the wiring of reversing loops on two-rail DC layouts using NMRA Digital Command Control by allowing you to operate your trains through a reversing section/loop without manually changing locomotive direction or track polarity.

- maximum current draw in the reversing loop: 5 A
- functions when the first wheel on either rail crosses the gap
- designed for safe use on both common rail and two rail wired layouts
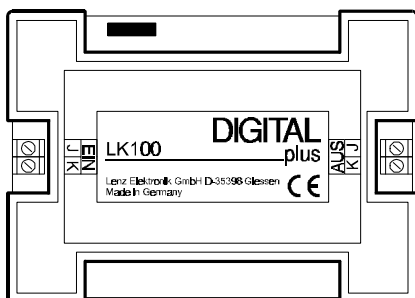- for digital operation only.

Information
LK100 Reverse Loop Module

Art. No. 12100

DIGITAL
plus

November , 1997

The problem with reversing loops:

Every user of 2-rail DC knows the 'reversing loop' blues:

Including a reversing loop in a 2-rail DC layout leads to a short where the reversing loop ties into the main line.
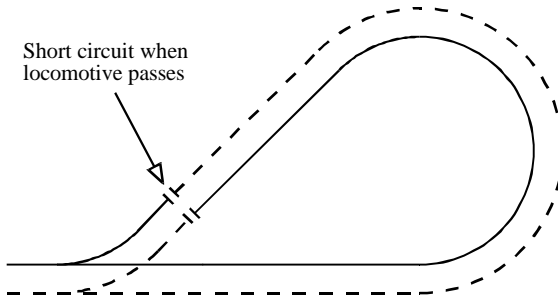
Short circuit when locomotive passes

Figure 1: Basic Reversing Loop

The only way to prevent this short circuit is to insulate both sides of the track. A single two-rail gap is not enough, since a passing engine will short the rail through the electrical pick-up on both sides of the gap. Therefore, the track has to be gapped on both sides of the reversing loop. You must still has to ensure that the rails are not short circuited upon entry or exit of the reverse loop.

Usually, the polarity is selected such that there is no short circuit upon entry into the loop. While the train is in the loop, the polarity is changed, so that there is no short circuit at the exit of the loop.

On conventional layouts, this leads to a problem: Changing the polarity in the reversing loop will change the direction of the train, since the train's direction is dependent on the track polarity. Therefore, the direction also has to be changed at the power pack, so that the train keeps moving in the same direction. In any case, the train has to be stopped while traversing the loop.

On **NMRA DCC** operated layouts, the direction of the train is independent from the polarity on the track, therefore, the polarity of the reversing loop can be changed without stopping the train or changing it's direction.

Function of the LK100:

The LK100 adjusts the polarity in the reversing section automatically for the passing train.

This happens in a simple way:

If the polarity is not correct when the train enters the reversing loop, the LK100 detects the short generated by the wheels of the locomotive and changes the polarity instantly. (see figure 2) This happens so fast, that it is undetectable during the movement of the train. The short is removed, and the train can enter the reversing loop. This short can be detected even if only a single wheel of the locomotive bridges the gap.

When the train leaves the reversing loop at the other end, the ensuing short is detected by the LK100 and the polarity is adjusted accordingly. (see figure 2)

IMPORTANT:
The LK100 is not suited for two-rail DC layouts powered by conventional 12 volt DC!
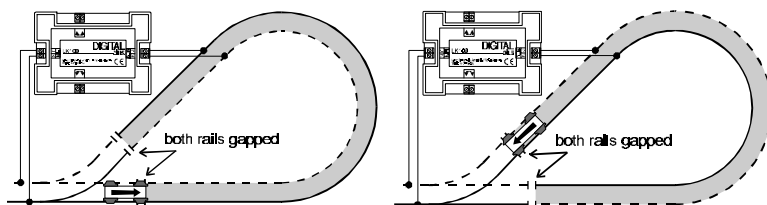

Figure 2: Locomotive enters and exits the reversing loop section

Installing the LK100:

The wiring of the LK100 is very simple and shown in figure 3.

The easiest source for the inputs of the LK100 is from the track near the reversing loop. Please connect the terminals "J" and "K" on the input ("EIN") side of the LK100 to the track.

The reversing loop, insulated from the rest of the layout on both ends, is connected to the terminals "J" and "K" on the output. ("AUS") side of the LK100.
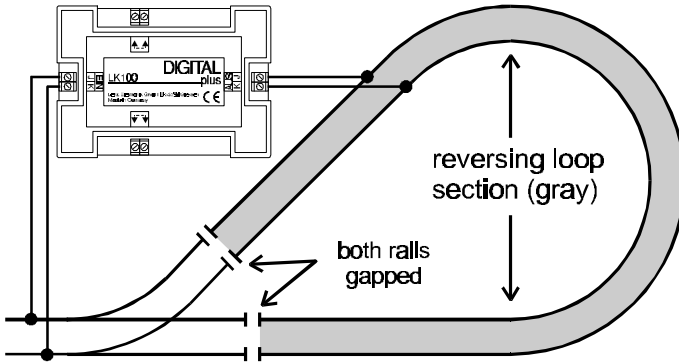
Figure 3: Connecting the LK100

The reversing loop section (the section supplied by the output of the LK100) has to be as long as the longest train on the layout, independent from the actual track configuration used!

Wiring Dogbones, Wyes, and Turntables:

Using the LK100, Wyes, Dogbones and turntables can also be wired without any problems.

Please remember that the reversing loop (the section controlled by the LK100), shown gray in the figures, has to be as long as the longest train on your layout. The track is shown as a thick line in the figures.
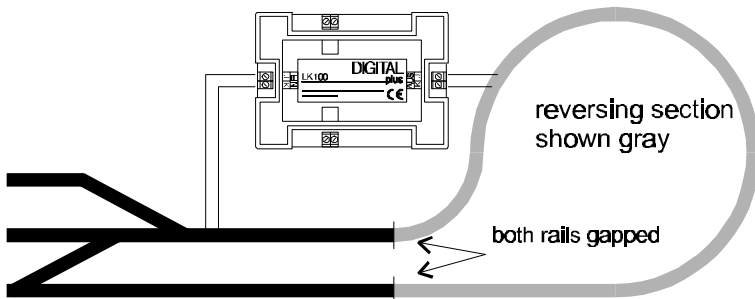

Figure 4: Using the LK100 for a dogbone layout.

Figure 4 illustrates the wiring and layout for a dogbone. Only one end of the dogbone is shown, the other end has to be wired similarly.

Figure 5 illustrates one example for wiring a layout with a wye. An alternative is to have the tail track of the wye controlled by the LK100.
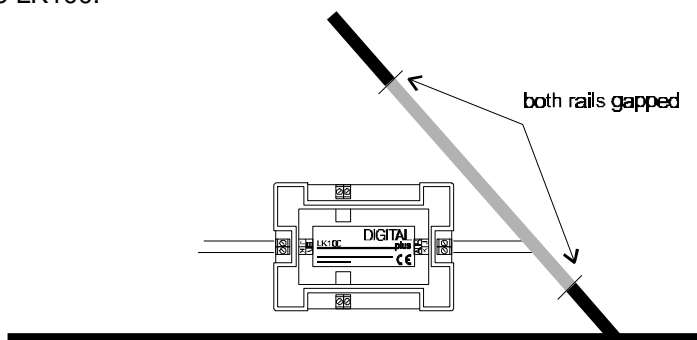

Figure 5: Using the LK100 in a wye configuration

Figure 6 illustrates the wiring for a turntable. Rotating the turntable by 180° can lead to a short at the turntable tracks. To prevent this, the turntable can be wired through an LK100.

The LK100 will promptly reverse the polarity, removing the short on entry and exit to the turntable.
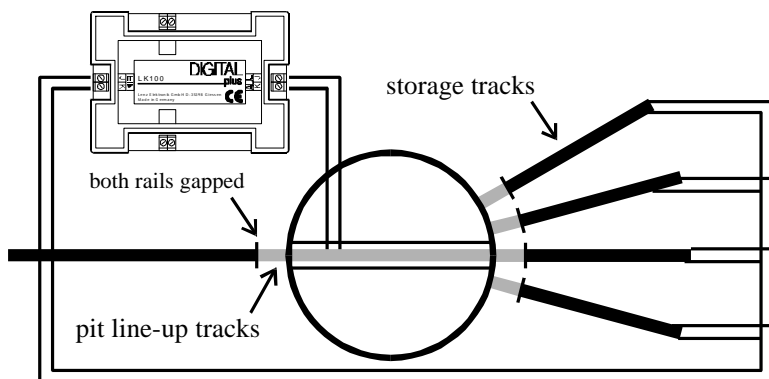

Figure 6: Using the LK100 to supply track voltage to a turntable.

On a conventional layout, only the track lined up with the turntable is supplied with track voltage. Using Digital Command Control, it is possible to activate lights and smoke generators on locomotives parked in the service area. To use these features, all tracks need to be powered.

The pit line-up tracks for the turntable pit are often sold as accessories for the turntable and are wired to the turntable track. In this case, insulate both rails on all approaching tracks and supply the track voltage for the turntable from the LK100. The approach and storage tracks can then be wired directly to the DCC track power.

Using an Occupancy detector in the Reversing Loop:

If you want to use an occupancy detector LB100 within the reversing loop section, connect the LB100 before the input of the LK100. Figure 7 shows the wiring to the right detector on the LB100. You can also use the left detector on the LB100.
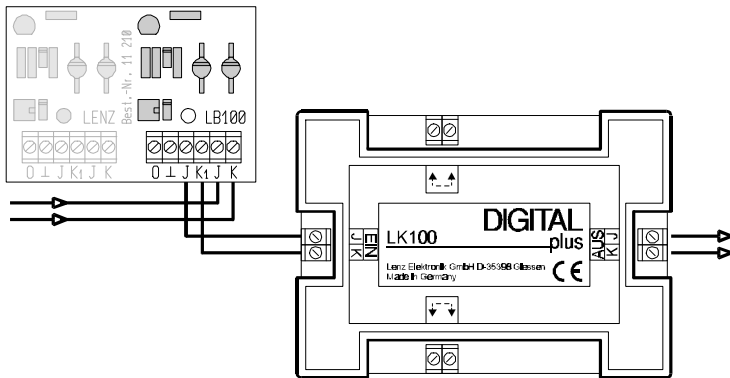

Figure 7: Connecting the LB100 to the LK100

Using a conventional locomotive on the DIGITAL layout that uses an LK100:

When a conventional non decoder equipped locomotive is used in conjunction with a DIGITAL system, DC voltage is added to the DCC track bi-polar track signal. Although the locomotive can be controlled by the DCC command control system, its direction still depends on the polarity of the DC track voltage. If you want to run a conventional locomotive through a reversing loop controlled by an LK100, you should wire the reversing section as shown in Figure 8.
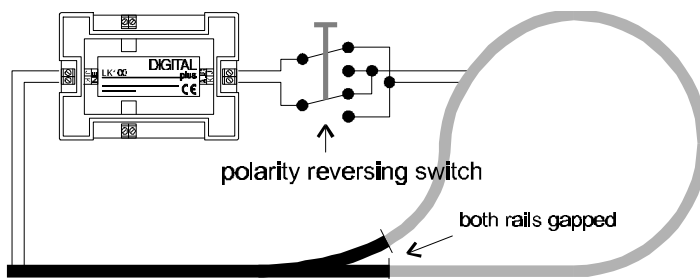
Figure 8: Using conventional locomotives with the LK100

Insert a reversing toggle switch (DPDT) in between the LK100 and the reversing loop. (see figure 8) This toggle switch allows you to manually change the polarity of the reversing loop.

The sequence for a trip through the reversing loop is as follows:

1. The locomotive enters the reversing loop, if necessary, the LK100 adjusts the polarity of the reversing section. Since the polarity does not change for the locomotive, its direction will stay the same.

2. The train powered by the conventional locomotive is stopped once it is completely inside the reversing loop.

3. Now, change the polarity on the track using the toggle switch, and change the direction on the Hand Held.

When the locomotive is started up again, it will move in the same direction as before, and it can leave the reversing loop without creating a short.

Setting the sensitivity of the LK100:

Apart from the terminals "J" and "K" for the input and output, there is a potentiometer on the side of the unit that is used to adjust the sensitivity of the LK100.

The sensitivity of the LK100 has a factory setting that is mid way in the range. If the setting is too high (the pot turned towards the EIN side of the LK100) then the LK100 will be unable to detect the short and thus will not automatically reverse. If the setting is too low, (the pot turned towards the AUS side of the LK100) the

LK100 will tend to chatter, because the locomotive load is triggering the LK100 automatic reversing relays. The adjustment needs to be checked for both low current locomotive and high current trains.
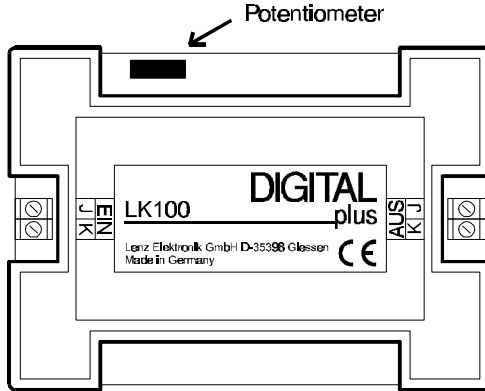
Potentiometer

LK100 **DIGITAL** plus

Lenz Elektronik GmbH D-35398 Giessen
Made in Germany

Figure 9: Setting the sensitivity of the LK100.

Note the Power Station and wiring much be sized so that sufficient power is available in the reversing section in order that high loads present in your largest train do not cause a power brownout or an overload condition.

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