Tower Cab

For controlling DCC accessory decoders
Interfaces to control panels
Dispatcher controlled switching chains
Compatible with all X-Bus based NMRA DCC systems

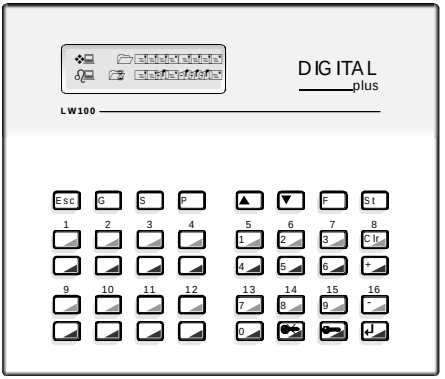
Information
LW100

Version 1.0

Art. No. 25100

DIGITAL plus

October, 1997



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General information about LW100

In the DIGITAL plus system you can control 256 turnouts, signals or other magnetic devices with the aid of accessory decoders. You reach each device to be controlled via its number, its address.

The LW100 enables you to directly access each of these devices without entering the numbers of the decoders address, just by simply pressing a key.

A group of 16 addresses at a time is directly reachable with the 32 keys on LW100. If other addresses need to be reached, you simply change the group.

Beyond this direct control of turnouts, the device is equipped with several options for train route control. It allows you to throw or set several magnetic devices after each other with one key stroke. Such a *switching chain* can not only be started by entering a number, but also depending on occupied or free track blocks on your model railroad. These switching chains are stored even after the device is powered down.

The LW100 is thereby (along with the interface LI100) an important aid in automating operations on your layout.

Please note that this is the first release of the LW100 software and it is only in German. This manual provides translations to the German displays. A software upgrade is being developed that will be in both German and English. A free upgrade will be provided once this revised version is available.

Connecting the LW100

On the back of LW100 you find the following removable screw terminals:

U, V:

Power supply for LW100. The maximum input voltage of LW100 is 18 V AC or DC. The preferred voltage is 12-16 volts AC or DC. You need a transformer that at this voltage will deliver 11 volt amps of current.

L,M,A,B (XBUS):

Connect these terminals with the corresponding terminals on command station LZ100. Please refer to the information in the operation manual for LZ100 on how to wire the XBUS. LW100's XBUS factory set address is "29". Please make sure that no other device connected to the XBUS uses this address, or change the address of LW100.

G,Z,I,O:

These are the connections for input and output modules for setting up a graphic control display. Information for them is found in their operation manuals.

Make the connection to LZ100, then connect the power supply. When you connect the power (plug the transformer into wall outlet), the display of LW100 will at first show:

LW100 Vers. 1.00
von LENZ 06/97

If the connection to command station LZ100 was done correctly and LZ100 is in operation, then after a short time the display will change to:

Einlesen aller
Ausgabemodule

[reading all output modules]

This shows you that the device is testing if output modules are connected

Einlesen aller
Eingabemodule

[reading all input modules]

While this display is visible, LW100 checks if input modules are connected. The next displays tell you that LW100 now is checking the stored feedback data from LZ100

Einlesen aller Rückmelderdaten

[reading all feedback data]

Einlesen aller Weichendaten

[reading all turnout data]

The following display will depend on which of your accessory decoders are feedback capable and which are not. With a feedback capable accessory decoder, the actual position is displayed with “+” or “-”. With non-feedback capable accessory decoders, the last control command from LW100 is shown. If LW100 has not yet sent off a control command for a particular turnout address, then this display will show a dot.

When this operation is complete, you will see:

v: 1 ++++ ++++
b: 16 ++-+ ---+

Here the display of “+” or “-” will differ depending on the turnout positions read out on your layout. If you are not using any feedback capable decoders, then the display will show only dots when first powered up.

Your LW100 is now operational.

Throwing individual turnouts

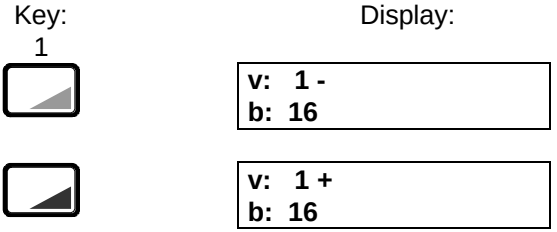
After turning it on, LW100 is now in the operation mode “throw individual turnouts”. In this mode you can directly set magnetic devices that are connected to your accessory decoders by pressing a key.

LW100 has 16 pairs of keys for this purpose, see illustration 1.

In individual throwing, use the numbers printed on the keyboard shell for the numbers of the turnouts. The print on the keys themselves refers to use in another mode.

When you press the red or green key 1, then the turnout with address 1 changes its position.

The position of the turnout is shown on the display.



(only the relevant display items are shown)

If you push the red or green key 16, then the turnout with address 16 will change its position.

If you for instance want to throw turnout 17, then you must change the keys to the next group of turnouts.

Changing the group

You have 2 ways to change from one group of 16 to the next group:

1 Change using the arrow keys

2 Enter the group number

Which method you use will depend on your personal preference.

Changing with arrow keys

Each time you press of one of the arrow keys, you always change one group number up or down. You will always see on the display which address range of turnouts you now control directly with the keys. After turning power on, it is turnouts 1-16.

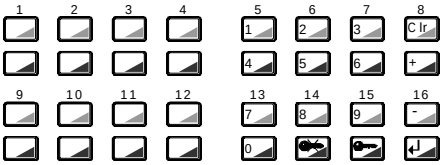
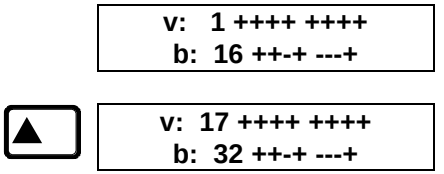
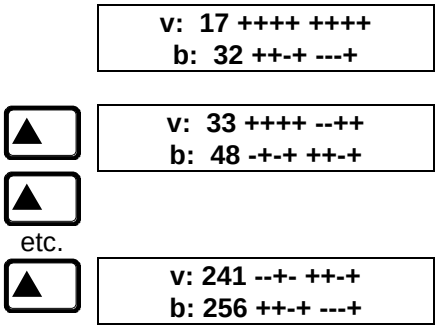


Illustration 1: The keys for throwing turnouts

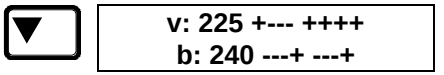
If you now press the “arrow up” key, then you change to the next higher group:



Now you can control the turnouts with addresses 17-32. Each additional pressing of the key changes the address range up (maximum to address 256):



Pressing the “arrow down” key will change back to the next lower group:



(the turnout positions shown here will not necessarily correspond to your display)

Entering the group number

Press the key “G” and hold it down. Now press one of the keys 1-16 (shell numbers) to select the desired group. While pressing the 2 keys, the display will show which turnouts belong to the group:

Example 1:

You press key “G” and hold it down:

Key:	Display:
G	**Gruppe Num.: ?** **[group number: ?]**

Now also press key '2':

Key:	Display:
2	**Gruppe Num.: 2** **Adresse 17...32** **[Group number: 2** **address 17...32]**

In the upper right you now see the group number, in the lower row you see the valid address range for this group (here 17-32).

If you want to select this group, release both keys and the display changes to:

v: 17 ++++ ++++
b: 32 ++-+ ---+

Example 2:

You want to throw turnout 18, LW100 is at the moment showing turnouts 1-16 in the display. Therefore press key “G” and key “2”. On the display you now see that group 2 controls turnouts 17-32. Release the keys and you can throw turnout 18 by pressing key pair 2.

Because the display shows which addresses belong to the currently selected group, you do not need to calculate the needed group when you want to throw a particular turnout.

Display of turnout position

The display of the turnout position takes place depending on the accessory decoder used.

Display with non-feedback capable accessory decoders

Here the display corresponds to the last command sent from LW100. This means that the actual position of the turnout does not necessarily coincide with the display, since it is possible that a turnout was thrown by hand or from another device on the XBUS. If LW100 has not given a command for a particular address, then a dot is displayed

```
v:  17 +-+- --++
b:  32 ..+. ---+
```

In the example above, turnouts 25, 26, 27 and 28 are connected to a non-feedback capable accessory decoder. Only turnout 27 has received a command from LW100, therefore a “+” is in the display. Turnouts 25, 26 and 28 have not received commands from LW100 yet, therefore dots in the display.

Display with feedback capable accessory decoders

Here the display is updated from the feedback of the accessory decoder. In this case you will see when a turnout is thrown by hand or another device connected to XBUS. Aside from using feedback capable accessory decoders, a prerequisite is the correct connection of the feedback inputs and the feedback bus (R,S) of that accessory decoder. Please refer to the manual for the accessory decoder.

Locked turnouts

If you want to throw a turnout that is locked by an executed switching chain, then you get this display after pressing the key

```
W.  1 verriegelt
durch Folge   1

[T. 1 locked by switching chain 1]
```

This shows you which switching chain has locked this turnout. More on locking switching chains further below.

General information on switching chains

Throwing individual turnouts is only a small part of the LW100's capability. The greater capability of the device lies in the ability to call up so called *switching chains*. This brings up the question:

What is a switching chain?

Simply put: The throwing of several turnouts after each other, without you having to select each individual turnout and throwing it by pressing a key. Or in a more technical way: a linking of switching commands for accessory decoders.
First an example: Look at the following track layout in illustration 2:
For the moment we will ignore whether this layout exists in reality or not. If a train is to move from D to G, then it travels over turnouts 4, 3, 5 and 6 (turnouts 5 and 6 could of course also be a double crossover, but since it generally would have two drives, we will consider a double crossover as two separate turnouts in this situation). You must now throw the turnouts to the correct position, one after another, that is first turnout 4 to “diverge”, then turnout 3 to “diverge”, then turnout 5 to “diverge” and finally turnout 6 to “straight”. Quite a few keys that you must press.
A switching chain can relieve you of this work, by doing the “key stroking” for you. You only have to start the switching chain with a few keys, or it starts automatically.

How is a switching chain called up?

There are several ways to call up a switching chain:

1) In the simplest case by entering the number of the switching chain on LW100

2) Call up a switching chain through a single keystroke on a graphic control display, or also through using start and goal buttons.

3) Train controlled call up, that is without your action. This is the basis for automatic operations on your DIGITAL plus controlled layout.

If the requested switching chain (by whichever method) is actually carried out (set), can be made dependent on *setting*

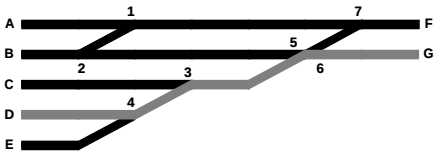


Illustration 2

conditions.

When is a switching chain set?

There are 2 possibilities:

1. A switching chain is set immediately, independent of any *setting conditions*, unless this switching chain comes across a locked turnout (by another switching chain).
2. The switching chain is only set when *setting conditions* are met, unless this switching chain comes across a locked turnout (by another switching chain).

It is up to you if you program a switching chain with or without setting conditions

What is a setting condition?

A *setting condition* for a switching chain could be:

"Track 4 must be free"

In practice this means that after the switching chain is called up it is only set when this track is free, and the setting condition therefore is met. If the track is occupied, the switching chain is also not set, since the setting condition is not met.

For LW100 we must define this setting condition in a bit more technical manner. After all, LW100 must know which track is number 4. The occupancy status of tracks is, as you know, registered by an occupancy detector (LB100) and sent on to the command station by the feedback encoder (LR100). The command station in turn informs all devices connected to XBUS–including LW100– of this occupancy status.

Let us assume that the occupancy status of track 4 is sent via LB100 to input number 1 of a feedback encoder with the address 19. We will now also define "occupied" as "+" and "free" as "-".

The formula used by the LW100 for the setting condition is thus

RM19/1-

Once the switching chain is set, one may wonder how long the thrown turnouts and set signals now have to remain in this position and not be changed. We call this condition *locking*.

When is a switching chain locked?

A switching chain, where the individual turnouts are not to be changed until a certain event, is a locked switching chain.
If a switching chain is locked or not can depend on different factors:

1 After calling up a switching chain by entering the switching chain number, you can lock it with a keystroke

2 A switching chain called up by train control, and that has release conditions, is always locked.

If the turnouts are to be set differently later, then the lock must be released.

What is a release condition?

A release condition is the event, until the occurrence of which, the turnouts must remain locked.

When is a switching chain released?

In operation, the thrown turnouts must only be thrown again when the train movement over them has taken place, that is the train is at its destination. The arrival of the train would be the release condition.

If the release condition is met, then the locking of the switching chain is released, the position of the turnouts and signals can again be changed.

Important note on locking:

LW100 can only lock turnouts internally. A turnout locked by LW100 can not be changed by that same LW100 after being locked.

You can still throw this turnout from another device on the XBUS, i.e. a hand held controller, the interface or a second LW100. Please make note of this in your model train operation.

Your first switching chain

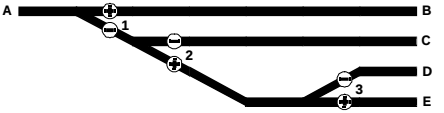


Illustration 3: Example of a track layout

To let you quickly get started programming switching chains, you can now program your first switching chain using the following tutorial. The terms used are familiar from the preceding sections.

For best results, build the track layout shown in illustration 3 with 3 turnouts and an accessory decoder LS110 (or LS100).

Program the LS110 to address 1 and connect turnout 1 with output 1, turnout 2 to output 2 and so on. To get the same turnout position displays as in the example, make note of the following:

Connect the turnouts to LS110 (LS100) so that the turnouts after pressing the “red” key (on LW100) or “-” key on LH100 are set in the position that will show with a “-” on the layout plan. Check by pressing the corresponding keys on the keyboard!

In the example, we will program a switching chain that sets a train route from “A” to “D”.

For the turnout positions this means:
Turnout 1 “-”
Turnout 2 “+”
Turnout 3 “-”

A short note: ESC/ENTER? always has the same meaning:

With ESC you interrupt the sequence and go back to the last step–you answer the question posed with “no”;

with ENTER you confirm your input and go on to the next step–you answer the question posed with “yes”.

And now to the example:

Press key “P” on LW100. This changes the mode to programming of switching chains. From now on the keys with white print are the ones to use for input!

Key: Display:

Bitte Folgennr.
eingeben _
[please enter the
chain number _]

LW100 expects the entry of the switching chain number. You can enter numbers between 1 and 64. Enter the desired number, for this example 1:

Bitte Folgennr.
eingeben 1_
[please enter the
chain number 1_]

If you made a mistake, you can clear the entry with the “CLR” key, when everything is correct, you confirm the entry:

Folge ist leer
[chain is empty]

Since you (presumably) have not entered a switching chain under number 1 yet, the message is that the chain is empty, that is it contains no commands. This display will automatically go away after a short time and you will see:

S-Befehl Nr. 1
kein Eintrag!
[Switching command #1
no entry!]

Now you must enter the turnout numbers, referred to as “elements”, and their position, in order. LW100 expects the entry of element 1. Since there are no elements in this chain yet, the second line shows that there is no entry for element 1.

Your first element is turnout 1, therefore press key 1 (marking on key):

S-Befehl Nr. 1
Weiche eing.:1_
[Switching command #1
turnout entered:1_]

Confirm with ENTER. If you made a mistake, press “CLR” and reenter the 1:

Stell.Weiche 1
+ ger, - geb
[Throw turnout 1
+ straight, - diverge]

Now LW100 also wants the desired position from you:

Since the turnout in the example is to be set to “diverge”, press the “-” key, and on the display your selection will be shown:

S-Befehl Nr. 1
Weiche 1 gebog
[Switching command #1
turnout 1 diverge]

The first element of the switching chain is now entered. To enter the next, press “ENTER”

S-Befehl Nr. 2
kein Eintrag!
[Switching command #2
no entry!]

Here too there is not yet an entry. You now enter the next element, turnout 2. Press key 2 (key cap lettering).

S-Befehl Nr. 2
Weiche eing.:2_
[Switching command #2
turnout entered:2_]

And confirm with ENTER. Again there is a request for position, this time enter “+”, then you see

S-Befehl Nr. 2
Weiche 2 gerad
[Switching command #2
turnout 2 straight]

Now the second element of your switching chain is entered.

From here on we limit ourselves to showing the keys that you have to press to enter the last element, turnout 3. To the right of

the keys you see a picture of the display the way it looks after pressing the key.

S-Befehl Nr. 3
kein Eintrag!
[Switching command #3
no entry!]

S-Befehl Nr. 3
Weiche eing.:3_
[Switching command #3
turnout entered:3_]

Stell.Weiche 3
+ ger, - geb
[Throw turnout 3
+ straight, - diverge]

S-Befehl Nr. 3
Weiche 3 gebog
[Switching command #3
turnout 3 diverge]

After you have entered element 3, once more press “ENTER”

S-Befehl Nr. 4
kein Eintrag!
[Switching command #4
no entry!]

LW100 moves on to input of the next element.

In this example we do not want to enter another element, and end the entry of commands by pressing the key “ENTER”

St-Bedin.Nr. 1
kein Eintrag!
[Setting condition#1
no entry!]

Now you are asked for setting conditions. Since in this example we do not want to enter any such conditions, continue with ENTER

Al-Bedin.Nr. 1
kein Eintrag!
[Release condition#1
no entry!]

Similarly, release conditions are not needed here, so press ENTER. A question asking if you want to program additional switching chains follows:

weitere Folgen?
Ja = ENTER / ESC
[additional chains
Yes = ENTER/ESC]

In this example none, therefore you end the programming with ESC. LW100 is now again in the mode “direct throwing of turnouts”. So that you can see and hear something when testing the switching chain, first set the turnouts in the wrong positions, that is

Turnout 1 '+' Key 1 green
Turnout 2 '-' Key 2 red
Turnout 3 '+' Key 3 green

Now you must call up the switching chain. Press

Folge Nummer:_
[Switching chain:_]

and now enter the number of the switching chain

Folge Nummer:1_
[Switching chain:1_]

LW100 now asks you if the switching chain is to be locked:

Folge Nummer:1_
verrieg. ?
[Switching chain:1_
locked?]

We do not want that at this time, therefore press

Folge Nummer 1
ist gestellt
[Switching chain 1
is set]

If you did everything correctly up to this point, then all turnouts now have the desired positions. You can of course also see it on the display

v: 1 -+-
b: 16

(only the relevant parts of the display are shown)

Congratulations! You have succeeded in programming your first switching chain and call it back up. We have purposely used the simplest form of chain in this example and not added in entering setting and release conditions, or auto triggering.
Switching chains that contain setting and release conditions require a bit more preparation before the actual programming. More about that in the next section.

Programming of switching chains

If you have not yet read through the section “Your first switching chain” and tried the example, then we suggest that you do so now. That will make it easier to understand the following explanations.

Step by step programming–the theory

Programming a switching chain always happens with the following steps:

1. Enter the switching chain number:

Each switching chain has its own number. With this number it can be recalled on LW100.

2. Enter the switching commands

Here you enter the desired position of turnouts and signals. You can enter a maximum of 16 commands. As commands, both individual commands as well as other switching chains are allowed (see the section “Nested switching chains”).

3. Enter setting conditions

Here you can enter up to 4 feedback conditions that must be met before the switching chain is set. All conditions must be met at the same time!

You do not have to enter setting conditions if you do not need them.

Even when no setting conditions are entered, LW100 will check if another, already set and locked ("conflicting") switching chain will be changed by the new one. In that case, the switching chain will not be set and you get an error message on the display.

If all setting conditions are met, but a switching chain can not be set because of a conflicting switching chain, then LW100 waits for the release of that "conflicting" switching chain. If at the time its of release the setting conditions are still met, the switching chain in the waiting loop will now be set.

4. Enter the release conditions

Here you can enter up to 4 feedback conditions that must be met to release the switching chain again. All conditions must be met at the same time!

You do not have to enter release conditions. In that case the switching chain will not be automatically locked after setting.

5. Auto triggering

Here you determine if a switching chain is to be called up only via the LW100 keys or a graphic control display, or also automatically, for instance through occupancy detection of moving trains.

If automatic operation is active, the switching chain will automatically be called up as soon as the setting conditions are met, and then locked. If you have not entered any setting conditions, then the auto triggering can not be activated.

Important Note while programming:

As you have noticed, most of the work is in preparing a switching chain. Special care is needed for setting and release conditions.

Do not enter conditions that will never be met! A faulty release condition could mean that the connected switching chain can be called up, but never released! This would mean that the turnouts contained in that switching chain no longer can be controlled through the LW100 keyboard, or from other switching chains. Those switching chains would for ever be in a “holding pattern”, and an automatic operation would possibly block itself!

Stop operation of your layout during programming or while editing switching chains! Only in that way can you ensure that during testing of a switching chain, a turnout is not thrown under a moving train. Or you may wonder why a switching chain is not locked, as a release condition has already been met by a moving train.

The setting of turnouts and signals, that is the sending of commands via the command station to the individual decoders, happens sequentially. For each command a certain time is needed. Therefore put the most important commands at the top of the switching chain.

Preparation for programming

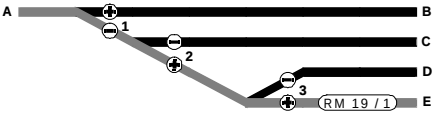


Illustration 4: Track plan for the example chain

To avoid situations that could lead to being “stuck”, it is advisable to write down the entire switching chain *before programming* it. That way you can more readily see the interdependence of one chain with another. This is especially important when you have nested switching chains, since you can otherwise easily loose the overview there.

We have developed a programming sheet that you can use to first lay down a switching chain in writing. You will find a copy master in the appendix of this book

Let us start with a switching chain that contains both a set and a release condition. We will use the same layout as above, with the addition of an occupancy detection block, whose feedback condition is determined via occupancy detector and feedback encoder. If you have built your “test layout”, then add onto it a

LB100 and a LR100. Program the LR100 to address 19 and connect the feedback output “O” of LB100 with input 1 contact 1 of LR100.

The placement of the occupancy detection section is shown in illustration 4.

The train route to be set is shown in gray in illustration 4. In illustration 5 you see the filled out programming sheet for the switching chain.

The programming sheet allows you to enter 2 switching chains next to each other. That way you can more readily see interdependencies between the switching chains.

Switching chain #:		
switching commands		
#	Address	+/-
1	**1**	**-**
2	**2**	**+**
3	**3**	**+**
4		
5		
Setting conditions:		
#	Feedback #:	+/-
1	**19/1**	**-**
2		
3		
4		
Release conditions:		
#	Feedback #:	+/-
1	**19/1**	**+**
2		
3		
4		
Auto trigger		
No		

Here are the switching commands needed for the switching chain: Turnout 1 to “diverge” (-), turnout 2 to “straight” (+), and turnout 3 also to “straight” (+).

Here are the setting conditions entered. For the example chain, only one setting condition is needed, here it is “Feedback address 19, input 1 free (-)”.

The condition that has to be met before the thrown turnouts can be released, is “Feedback address 19, input 1 occupied (+), the chain thus will stay locked until the train arrives.

Illustration 5: Example of a filled out programming sheet

Step by step entry–the practice

Enter the switching chain number

Programming of a switching chain always starts with key “P”

Key: Display:

Bitte Folgennr.
eingeben _
[Please enter switching
chain # _]

Bitte Folg.Num.
eingeben 1_
[Please enter switching
chain # 1_]

Switching chain numbers 1-64 are allowed. An entry that is out of range will cause an error message:

Wert unzulaess.!
Wert 1...64 erl!
[Value not allowed!
Values 1...64 allowed]

Clear this error message
with key "Clr"

After entering the chain number and confirming it with “ENTER”, LW100 will check if there is already a chain with this number. If that is the case, you will see:

Folge nicht leer
? ENTER/CLR/ESC
[Chain not empty
? ENTER/CLR/ESC]

Confirms this message.
You can then change
(edit) the existing chain.

clears the chain

Esc interrupts the entry, you return to the direct throwing of turnouts

If the chain is empty, you see the following display:

Folge ist leer
[Chain is empty]

With the “ENTER” key you now get to entering the switching commands.

Enter the switching commands

When entering the switching commands, you always enter the number of the turnout first. The valid range of turnout numbers is 1 to 256, that is the total accessible range in DIGITAL plus. An entry error receives an error message:

Wert unzulaess.!
Wert 1..256 erl!
[Value not allowed!
Values 1...256 allowed]

Clear this error message with key "Clr"

S-Befehl Nr. 1
kein Eintrag!
[Switching command 1
no entry!]

This display is shown any time when the chain that you want to program is empty. That means that there are not yet any switching commands in the switching chain. You can enter a maximum of 16 switching commands, in the upper line of the display you always see at which position you currently are.

As an example, the entry of turnout 68 will then look like this:

S-Befehl Nr. 1
Weiche eing.:6_
[Switching command 1
Turnout entered: 6_]

S-Befehl Nr. 1
Weiche eing.:68_
[Switching command 1
Turnout entered: 68_]

Stell.Weiche 68
+ ger, - geb
[Throw turnout 68
+straight, -diverge]

For the example earlier on you would enter turnout 1:

S-Befehl Nr. 1
Weiche eing.:1_
[Switching command 1
Turnout entered: 1_]

Stell.Weiche 1
+ ger, - geb
[Throw turnout 1
+straight, -diverge]

After entering the turnout number, you are asked for the desired turnout position:

The position “+” is defined as straight, the position “-” as diverging. For this to function correctly, your turnouts must be connected to the accessory decoder LS100/110 in such a way that when the “+” output is activated, the turnout is set to straight, and when the “-” output is activated the turnout is set to “diverge”. If that is not the case, then you may need to switch the wires on LS100/110, or live with the entry of “+, straight” on LW100 meaning that your turnout is set to “diverge”.

The correct entry procedure:

S-Befehl Nr. 1
Weiche 1 gebog
[Switching command # 1
Turnout 1 diverge]

At this point you can interrupt your entry with the “ESC” key. You will then return to the beginning of the entry of this switching command. With the “ENTER” key you confirm your entry.

S-Befehl Nr. 2
kein Eintrag!
[Switching command # 2
No entry!

Now you can enter the next switching command in your chain. If without entering another switching command, you press the key

you immediately go to entering setting conditions. Instead of switching commands you may also call up other switching chains, so called “nested switching chains”. More on this in a further separate section.

Enter the setting conditions

After entering the switching commands you automatically get to the entry of setting conditions. A maximum of 4 setting conditions can be entered. If you do not want to enter setting condition(s), then the chain can only be called up by using the keys on LW100 or a graphic control panel, not from train control via feedback positions. If no setting conditions are entered for a switching chain yet, you will see this message on the display.

St-Bedin.Nr. 1
kein Eintrag
[Setting condition # 1
no entry!]

LW100 now expects the entry of setting conditions. If you do not want to enter setting conditions, then press the “Enter” key. You will then go directly to entry of release conditions. The switching chain example is to be set when track ‘E’ is free. From this

follows that the switching condition reads feedback encoder 19/1 '-'. Start entering the condition by pressing key 1, then followed by key 9 for feedback encoder address 19:

St-Beding.Nr 1
R-Melderadr: 1_
[Setting condition # 1
Feedback address: 1_]

St-Beding.Nr 1
R-Melderadr: 19_
[Setting condition # 1
Feedback address: 19_]

If you have entered everything correctly (the "Clr" key clears the most recently entered digit), then confirm it with "Enter"

R-Melder Nr. 19
Eing.Nr.:
[Feedback unit # 19
Input #:

Now you must indicate the input on the feedback encoder. Each feedback encoder address is assigned 8 inputs. In our example this is input number 1:

R-Melder Nr. 19
Eing.Nr.: 1
[Feedback unit # 19
Input #: 1]

Now LW100 awaits the determination of the condition, occupied ("+") or free ("-"):

Eing.Nr.: 1
+ bel., - frei
[Input #: 1
+ occupied, - free]

In our example the block section is to be free, so enter a '-' here:

ST-Beding.Nr 1
Rmeld: 19 Pos:1-
Setting condition # 1
Feedback: 19 Position:1-]

If all entries are correct, confirm with "Enter", otherwise interrupt with "Esc". You then return to the entry of this condition.
This concludes entering the first setting condition. If you now want to enter the next condition, then press the key

You are then asked to enter setting condition number 2.
If you do not want to enter all 4 setting conditions, then press the "ENTER" key and go directly to entry of release conditions.

Enter release conditions

The entry of release conditions follows the same procedure as the entry of setting conditions. Here too you are asked in turn by LW100 to enter feedback encoder address and desired condition of the inputs.

If you do not want to enter any release conditions, then skip this part with "Enter".

Enter the auto triggering

A check for auto triggering will only take place when setting conditions have been entered. You then determine with this entry if the fulfilling of the setting condition(s) alone is enough to call up the switching chain (auto ON), or if the switching chain is only to be called up by the keys on LW100 or a connected graphic display control panel (auto OFF).

Automatik: aus
+ ein, - aus
[Auto: OFF
+ on, - off]

With a new switching chain, where no entry was made, LW100 will assume that the auto triggering is to be turned off.

If you want to turn on auto triggering, then press the '+' key:

Automatik:
eingeschaltet
[Auto:
on]

If you want to turn off the auto triggering, then press the '-' key.

Automatik:
ausgeschaltet
[Auto:
off]

Note:

In this example turning on the auto triggering makes no sense. The auto on function would call up the switching chain whenever feedback encoder 19/1 is free and keep it locked until feedback encoder 19/1 is occupied!

With this you have made the last entry for this switching chain. The display now shows:

Weitere Folgen?
Ja = ENTER / ESC
[Additional chains?
Yes = ENTER / ESC]

If you want to program additional switching chains, then confirm with "Enter", otherwise use "Esc" to return to the direct throwing of turnouts.

Calling up and setting switching chains

Calling up with the switching chain number

Calling up a switching chain with chain number 1 happens in the following steps:

Folge Nummer:_
[Chain #:_]

Folge Nummer:1_
[Chain #:1_]

Folge Nummer:1_
verrieg. ?
[Chain #: 1_
locked?]

If you want to lock the chain, then also press key:

Folge Nummer:1_
ist gestellt
[Chain #:1_
is set]

If the chain is not to be locked after setting it, then use key:

Folge Nummer:1_
ist gestellt
[Chain #:1_
is set]

The lock stays until the release condition(s) has been met. If you did not enter any release conditions , then you must use the keys of LW100 to unlock the chain again.

Auto triggering

The automatic triggering of a switching chain happens without actions on your part. The tower cab continually looks to see if the conditions entered for its switching chains are met or not. If all the conditions for a switching chain are met, then the chain is called up. The tower cab then checks if other locked switching chains prevent the setting of it. If that is not the case, then the commands stored in the switching chain are carried out.

Verifying turnout positions

Using the feedback capable LS100, the position of turnouts can be returned as feedback. This feature can be used by LW100 when throwing a switching chain. After throwing each turnout, it

will check if this turnout is connected to a feedback capable accessory decoder or not.

If the turnout is connected to a LS100, then the carrying out of the command will be tested against the returned feedback information. If the turnout could not be thrown into the correct position, then LW100 stops the further carrying out of the switching chain. In that case it is of course not locked. On the display you will then see this message

Folge Nummer:1_ **Folge fehlerhaft** **[Chain #:1_** **Chain error]**

It will always display the switching chain just being called up.

Display of locked switching chains and unlocking

You can have the numbers of all switching chains that are currently locked displayed:

Folge 1 **verriegelt** **[Chain 1** **locked]**

You now get the number of the first locked chain on the display. With the “arrow up” key you can page through the list of locked switching chains. When you get to the bottom of the list, the first chain will be displayed again.

Folge 16 **verriegelt** **[Chain 16** **locked]**

Folge 19 **verriegelt** **[Chain 19** **locked]**

Folge 1
verriegelt
[Chain 1
locked]

You can now unlock the displayed switching chain.

Folge 1
Folge entriegelt
[Chain 1
unlocked]

Use “ESC” to end the display of locked switching chains.

Unlocking a chain by calling it up

With the following key sequence, you can unlock a locked switching chain again:

Folge Nummer:_
[Chain #:_]

Folge Nummer:1_
[Chain #:1_]

Folge Nummer:1_
entriegeln?
[Chain #:1_
unlock?]

Folge Nummer:1_
Folge entriegelt
[Chain #:1_
Chain unlocked]

Display of locked turnouts

Besides displaying locked chains, it is also the possible to show the locked turnouts.

Folge verriegelt
1
[Chain locked
1]

W. verriegelt 1
durch Folge: 1
[Turnout locked 1
by chain: 1]

Here too you can page through the entire list of locked turnouts by pressing “arrow down” several times.
Unlocking individual turnouts is not possible!

Erasing switching chains

When you do not need a switching chain any longer, you can totally remove it from LW100’s memory.

First proceed as in programming a chain:

Bitte Folgennr.
eingeben _
[Please enter
chain # _]

Bitte Folgennr.
eingeben 1
[Please enter
chain # 1_]

Folge nicht leer
? ENTER/CLR/ESC
[Chain not empty
? ENTER/CLR/ESC]

The following actions are now possible:

Confirms the report. You can now change the existing switching chain (edit)

erases the chain

ends data entry, you return to direct setting of turnouts

When you erase the chain with “CLR”, you see:

S-Befehl Nr. 1
kein Eintrag!
[Switching command # 1
no entry!]

You thereby get to the new entry of commands. If you do not want to make any more entries, then end with “ESC” and confirm the question after breaking off the entry with “ENTER”. You will then be back to direct setting of turnouts.

Changing switching chains

In actual operation there is likely to be times when you want to change an existing switching chain. It may be a change in the layout plan that generates new turnout locations, or while testing a switching chain you discover that you entered a turnout position wrong.

Basics about making changes

You can remove (erase) switching commands or setting and release conditions from a switching chain, or add in new ones.

If you want to make a change to an element in a switching chain, your must first erase the element in question (not the whole chain). Then you insert the changed entry at the end.

Please note:

If you erase all switching commands from a switching chain, but do not remove setting or release conditions, the chain is not

empty! Erasing all switching commands is thus not the same as erasing the complete chain!

Example 1: Erasing a switching command

Assume that we want to remove switching command 2 from the exisiting switching chain. You start out as if you want to program a new switching chain:

Bitte Folgennr.
eingeben _
[Please enter chain # _]

Bitte Folgennr.
eingeben 1
[Please enter chain # 1]

Folge nicht leer
? ENTER/CLR/ESC
[Chain not empty
? ENTER/CLR/ESC]

Since you do not want to erase the whole chain, you press “ENTER” and get to the display of the first switching command in the chain:

S-Befehl Nr. 1
Weiche 1 gebog
[Switching command # 1
Turnout 1 diverge]

Since you want to leave this command in the chain, you move on to the next command:

S-Befehl Nr. 2
Weiche 2 gerad
[Switching command # 2
Turnout 2 straight]

To remove this command you press the key "Clr":

Eintrag loesch.?
Ja = ENTER / ESC
[Erase entry?
Yes = ENTER / ESC]

You now have the ability to end the sequence by using “ESC”. To erase the entry you confirm with “ENTER”:

S-Befehl Nr. 2
Weiche 3 gerad
[Switching command # 2
Turnout 3 straight]

The entry is removed from the list of switching commands, all the other switching commands (if they exist) move up one position in the list.

With “ESC” you end the sequence, then confirm the following question with “ENTER” and you can work on the next chain.

Example 2: Adding a switching command

Adding a switching command in a chain is done by adding an additional command to the end of the list. This is however only

possible when you do not already have 16 commands programmed in this switching chain.

Bitte Folgennr.
eingeben _
[Please enter chain # _]

Bitte Folg.Num.
eingeben 1
[Please enter chain # 1_]

Folge nicht leer
? ENTER/CLR/ESC
[Chain not empty
? ENTER/CLR/ESC]

S-Befehl Nr. 1
Weiche 1 gebog
[Switching command #1
Turnout 1 diverge]

Now you are back at the first position in the list of switching commands, command 1. With the “ENTER” key you can now scroll through the whole list:

S-Befehl Nr. 2
Weiche 2 gerad
[Switching command #2
Turnout 2 straight]

S-Befehl Nr. 3
Weiche 3 gebog
[Switching command #3
Turnout 3 diverge]

S-Befehl Nr. 4
kein Eintrag!
[Switching command #4
no entry!]

You have arrived at command 4. Here there is not yet any switching command entered. If you want to add a new switching command, then start to enter this command now:

S-Befehl Nr. 4
Weiche eing.:5_
[Switching command # 4
Turnout entered: 5_]

Stell.Weiche 5
+ ger, - geb
[Throw turnout 5
+ straight, - diverge]

S-Befehl Nr. 4
Weiche 5 gebog
[Switching command # 4
Turnout 5 diverge]

S-Befehl Nr. 5
kein Eintrag!
[Switching command # 5
no entry!]

Now you have added in switching command 4, in this case turnout 5, position diverge. You can now add additional switching commands (up to command 16) or end the entry with “ESC”.

Eingabe abbr.?
Ja = ENTER / ESC
[Interrupt entry?
Yes = ENTER / ESC”

You answer the question with “ENTER” if you do not want to make any further changes to the switching chain. The changes made will be recorded in the memory. You now get back to direct setting of turnouts.

Example 3 Adding a setting condition

Adding a setting condition follows the same sequence as adding on a switching command. In programming of switching chains, as described above, go to the place where the first switching command is shown:

S-Befehl Nr. 1
Weiche 1 gebog
[Switching command # 1
Turnout 1 diverge]

Since you do not want to change the switching commands, use “ENTER” to immediately go to entering of setting conditions. If no setting conditions are entered yet, you will see the note “no entry” at condition 1.

St-Beding.Nr 1
kein Eintrag!
[Setting condition # 1
no entry!]

If you already entered setting conditions, then continue with the key “ENTER” to the next free entry, here presumably setting condition 3

St-Bedin.Nr. 3
kein Eintrag
[Setting condition # 3
no entry!]

Now proceed as described above to enter feedback address, input and position. For instance feedback encoder 29, input 6, position occupied

St-Bedin.Nr. 3
R-Melderadr: 2_
[Setting condition # 3
Feedback addr.:2_]

St-Bedin.Nr. 3
R-Melderadr: 29_
[Setting condition # 3
Feedback addr.:29]

R-Melder Nr. 29
Eing.Nr.:
[Feedback # 29
Input #:]

R-Meld. Num. 29
Eing.Nr.: 6
[Feedback # 29
Input #: 6]

Eing.Nr.: 6
+ bel., - frei
[Input #: 6
+ occupied, - free]

St-Beding.Nr 3
Rmeld: 29 Pos:6-
[Setting condition # 3
Feedback: 29 pos: 6-]

You can now add in additional setting conditions (up to 4 conditions) or end the entry with “ESC”.

Esc	**Eingabe abbr.?** **Ja = ENTER / ESC** **[End entry?** **Yes = ENTER / ESC]**

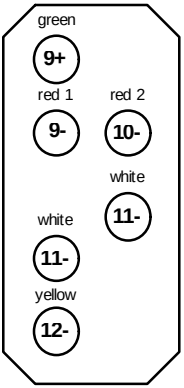
After confirming this question with “ENTER”, you go directly back to the direct setting of turnouts. ESC takes you back to the next setting condition.

Example of a switching chain

In the following section you will find an example for 4 small switching chains.

Excursion: the multi-display light signal

As you know, light signals can be connected directly to an accessory decoder since it can be set to provide constant output for this use.



Ill. 3: multi-display light signal of German Railways (DB)

A multi-display signal as in illustration 6 needs multiple outputs on an accessory decoder. If a certain signal display is to be shown, then you would need to set the individual outputs one after the other. It is easier to use a small switching chain.

Assume that the lamps (or LED's) of the light signal are connected to an accessory decoder LS110, as shown in illustration 6 and in the table below:

LED	**Turnout address**	**Output**
Green	9	-
Red 1	9	+
Red 2	10	-
White	11	-
Yellow	12	-

For the individual displays the following interconnections are needed:

Signal display	**Switching commands**	**No.**
HP1 (green lit): proceed at full speed	9+; 10+; 11+; 12+	10
HP0 (red 1 and red 2 lit): stop	9-; 10-; 11+; 12+	11
HP2 (green and yellow lit): proceed at reduced speed	9+; 10+; 11+; 12-	12
Switching route (red 1 and white lit): proceed for switching unit only	9-; 10+; 11-; 12+	13

You can program these 4 signal displays in 4 switching chains, for instance using the numbers 10 to 13. These 'mini' switching chains can then very usefully be called up from within another switching chain. More about that in the next section.

Nested switching chains

LW100 is able to call up another switching chain from within a switching chain.

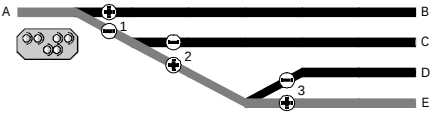
This feature on the one hand increases the number of switching commands in the switching chain, on the other hand, you can save yourself a lot of programming. Gather together switching commands that belong together, for instance the control of a multi-display signal, in small switching chains (example in the previous section). When you need this signal display within a switching chain, then program a nested switching chain.

Programming a nested switching chain

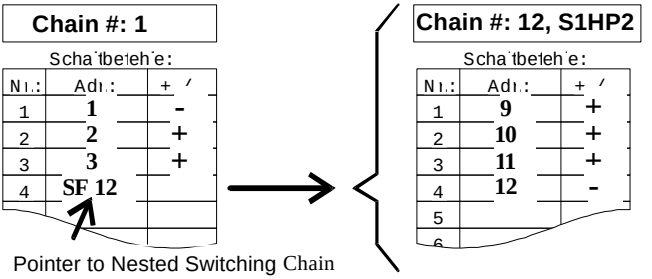
If you program a switching chain, then you can enter the number of a switching chain instead of a turnout number. You create a nested switching chain.

This will be explained with an example. Let us use your first switching chain for this. Also assume that you had to set a multi-display signal, whose individual displays are programmed in small switching chains.

After throwing the turnouts, the signal must also be set to HP2 (proceed with reduced speed)



The programming sheet would appear as shown.



After the already programmed switching chain, there is now a step calling up switching chain 12.

Entering the nested switching chain

You can enter a nested switching chain directly when first programming a switching chain, it is however also possible to do it later. Since you already have programmed switching chain number 1, we will add to it the calling up of switching chain 12.

Proceed as when editing a switching chain, adding a switching command:

Bitte Folgennr.
eingeben _
[Please enter chain #: _]

Bitte Folg.Num.
eingeben 1
[Please enter chain #: 1_]

Folge nicht leer
? ENTER/CLR/ESC
[Chain not empty
? ENTER/CLR/ESC]

S-Befehl Nr. 2
Weiche 2 gerad
[Switching command # 2
Turnout 2 straight]

S-Befehl Nr. 3
Weiche 3 gebog
[Switching command # 3
Turnout 3 diverge]

S-Befehl Nr. 4
kein Eintrag!
[Switching command # 4
no entry!]

At this free position now enter the number of a switching chain instead of a turnout number. These begin with the key “S”:

S-Befehl Nr. 4
Folge eing.: _
[Switching command # 4
Chain entered: _]

S-Befehl Nr. 4
Folge eing.: 1
[Switching command # 4
Chain entered: 1_]

S-Befehl Nr. 4
Folge eing.: 12
[Switching command # 4
Chain entered: 12_]

S-Befehl Nr. 5
kein Eintrag!
[Switching command # 4
no entry!]

If there is already a switching chain with number 12, then after pushing “ENTER”, you can enter additional switching commands (or additional switching chains). Carry out additional programming steps, or end with “Esc”.

If you enter a switching chain that does not contain any switching commands yet, then LW100 will show this:

Folge ist leer
Bitte Eing korr!
[Chain is empty
Please reenter!]

You can now use “Enter” to enter a correct switching chain number (one that is not empty).

Setting and release conditions in nested switching chains

If a nested switching chain contains setting conditions, then all the additional nested chains in it will be checked for their

conditions before it is set. Only when all these conditions are met, is the nested chain set!

We therefore suggest, for reasons of maintaining overview, that only such switching chains that do not need setting or release conditions be used for nesting in another switching chain.

Important note for nested switching chains

As already noted in the preceding section, your must pay special attention to the setting and release conditions in nested switching chains. Differentiate between two important cases:

Contradictory setting conditions

If for instance in switching chain 1 one setting condition is “FE 16/2+” (Feedback encoder 16, input 2, free), then the setting condition in switching chain 2, that is called up from within switching chain 1, must not be “FE 16/2-”. These 2 conditions could never happen at the same time, and the switching chain will never be set.

Calling up the same switching chain

If from within a switching chain you call up the same switching chain again, then you generate an endless loop. If you call up this chain, then the LW100 display will show this message “Switching chain error!”, and will not carry it out.

Special setting and release conditions: turnouts and signals

Changes of status at feedback encoders LR100 and accessory decoder LS100 are automatically passed on from the command station to all devices on the XBUS. Through these automatic updates, the cab tower will find out if the conditions included in a switching chain are fulfilled.

In this case it makes no difference if the automatic information comes from a feedback encoder or an accessory decoder.

It then follows that the position of turnouts and signals can also be used as setting and release conditions. Since this use is more

complicated than the use of “normal” feedback information, we will cover it in a separate section.

Prerequisites

If you want to use the position of turnouts and signals for conditions, then the drives of these components must be fully connected to feedback capable accessory decoders. With “fully connected” we here understand that the feedback inputs of LS100 also are correctly linked with the turnout drive and the terminals R and S are connected with the command station.
If you want to check if a turnout is correctly wired in this sense, then select the group for this turnout address on LW100, so that you get the position of the turnout shown on the display. If you now throw the turnout by hand, then the display must change.

Determining the equivalent feedback address for a turnout address

The feedback information of accessory decoder LS100 and feedback encoder LR100, depending on the addresses, in part use the same memory area in the command station. The information from feedback encoders with addresses 1 to 63 overlaps with the information for turnouts 1 to 256.

For using turnout feedback for setting or release conditions, this has the following effect:

If you want to use the position of turnout 1 as a condition, then you must use the corresponding feedback number when programming.

Example:

A signal is connected to LS100. The turnout address of the corresponding output is 1. As soon as this signal is set to “+” (Hand held LH100) or “green” (LW100), then switching chain 1 is to be set.

To enter the setting condition, you must now determine the feedback address belonging to this turnout address, and the needed position. Also you need to know if you are to enter “+” or “-”.

The following rules apply:

One feedback address covers 4 turnout addresses. On each LS100 there are 4 turnout addresses. The feedback address belonging to these turnout addresses can be calculated from

$$\frac{\textbf{highest turnout address of this LS100}}{\textbf{4}}$$

Example:

LS100 for addresses 117 through 120:
120/4=30

One turnout position occupies 2 feedback inputs. Select the input (always even):

Output LS100	Input LR100
1	2
2	4
3	6
4	8

The desired turnout position corresponds to the feedback situation (that is the turnout position “+” to the feedback condition “+”).

Nothing works any longer

In spite of all precautions in programming of switching chains it may happen that you trip yourself up with the setting and release conditions and the auto triggering. This tends to lead to that several switching chains are set, locked and because of their numerous turnouts nothing can any longer be set. It is not always easy to find out where the “crash” happened.

Here is a small guide to how to proceed when nothing works any longer:

Step by step error search

Stop operation on your layout using Emergency Stop from the hand held controller.

1. Turn off auto triggering on all switching chains where you have set auto triggering to on. This prevents chains being set without your intervention, and then locked.
2. Page through the chains as described under "Showing locked chains" and unlock them.

Now you can throw the turnouts again.

3. Check your programming sheets for situations that could cause a "hang up", for instance conflicting setting and release conditions. If needed modify the switching chains.
4. Put the switching chains back into auto triggering (where needed) one by one.

With this strategy you should be able to get back to operation, assuming you carefully prepared before programming the switching chains.

Turning off the auto triggering of all switching chains

If you want to turn the auto triggering "OFF" at the same time for all switching chains, you can proceed as follows.

Pull the 2-pin screw terminal (U,V) from the unit. You have now interrupted the power supply to the unit.

Press the keys

F and 

at the same time and keep them pressed. Now reinsert the 2-pin screw terminal (U,V) in the unit.

On the display you will see:

Autom. löschen!!
Automatik aus!
[Erase auto!!]

Release the keys. Now the auto triggering is turned off on all switching chains.

This operation cannot be reversed!

STOP and OFF

You can avoid a collision on the layout with the key 

. You will set off a STOP. With a STOP all locomotives will stop *immediately*, a preset braking momentum in the locomotive decoder is not active. The power supply to rails and internal data processing in the entire DIGITAL plus system stays on. In this condition you have thus stopped the train, but can still throw turnouts and signals. In OFF however, track power is interrupted as well. In this situation you can no longer throw turnouts. Even so this function is useful. It for instance helps when putting a locomotive on the track so you do not have a short circuit.

Stopping all trains on your layout (STOP)

To activate a STOP you press the red key on LW100:

STOP ausgelöst!
AUS: F0, EIN: F1
[STOP activated!
OFF: F0, ON: F1]

All locomotives stop, the track voltage stays on.

If you want to throw turnouts or set signals during this condition, then press the “ESC” key. The display then again changes to show turnout positions. You can now throw turnouts as usual, and also call up switching chains or program them.

IMPORTANT NOTE:

Now you will no longer see on LW100 that your DIGITAL plus system is in STOP mode. To remove the STOP, you first have to press the red “ST” key again

Turning off the power on the track (OFF)

Press the red key on LW100:

STOP ausgelöst!
AUS: F0, EIN: F1
[STOP activated
OFF: F0, ON: F1]

You have now activated a stop. To turn off the power supply press the key “F” and then “0”

STOP ausgelöst!
bitte weiter: F_
[STOP activated!
to continue: F_]

AUS ausgelöst!
EIN: F1
[OFF activated!
ON: F1]

Now power to the track is turned off. Setting of turnouts or signals, or calling up of switching chains is no longer possible.

Resuming operations after STOP or OFF

On the display, you will see either

AUS ausgelöst!
EIN: F1
[OFF activated!
ON: F1]

or

STOP ausgelöst!
EIN: F1
[STOP activated!
ON: F1]

To resume operation, proceed as follows:

Key:	Display:
F	**STOP ausgelöst!** **bitte weiter: F_** **[STOP activated!** **to continue: F_]**
1	**v: 1 ++++ ++++** **b: 16 ++-+ ---+**

STOP and OFF from overload of another device

If a STOP or OFF is activated by an overload on the power station or from another device on XBUS (hand held controller, interface), this will immediately be shown on the display.

AUS ausgelöst!
EIN: F1
[OFF activated!
ON: F1]

or

STOP ausgelöst!
EIN: F1
[STOP activated!
ON: F1]

If you now want to resume operations from LW100, then proceed as described above.

Changing the XBUS address

As you know, each device connected to XBUS has its own address that is needed for data exchange with the command station. Each address must only be present once, since otherwise the data exchange will not work smoothly. With most XBUS devices the address can be chosen freely within the range of 1 to 30. You must then make sure that each of the devices used by you has a unique address.

From the factory LW100 has XBUS address 29. If you already have another device on XBUS using this address, then you can change this address:

Pull the 2-pin screw terminal from the device (or turn off power supply):

Press the key “arrow up” and keep it pressed. 

On the display you will see

```
XBus-Adresse ist
 29   neu   _
[XBUS address is
29   new   _ ]
```

You can now enter a new address, for instance address 23:


```
XBus-Adresse ist
 29   neu   2_
[XBUS address is
29   new   2_ ]
```


```
XBus-Adresse ist
 29   neu   23_
[XBUS address is
29   new   23_ ]
```

If you mistype you can erase the entry with “Clr”. When everything is correct, you confirm the entry

```
Einlesen aller
Ausgabemodule
[Reading all
output modules]
```

Now LW100 will go through the normal start up sequence. The entered XBUS address will remain stored in memory even after turning off the device.

Appendix

Table of turnout addresses and group numbers

To make it easier for you to find the group corresponding to a particular turnout, we have included this table.

G	Turnout addresses
1	1 to 16
2	17 to 32
3	33 to 48
4	49 to 64
5	65 to 80
6	81 to 96
7	97 to 112
8	113 to 128
9	129 to 144
10	145 to 160
11	161 to 176
12	177 to 192
13	193 to 208
14	209 to 224
15	225 to 240
16	241 to 256

Programming sheet for switching chains

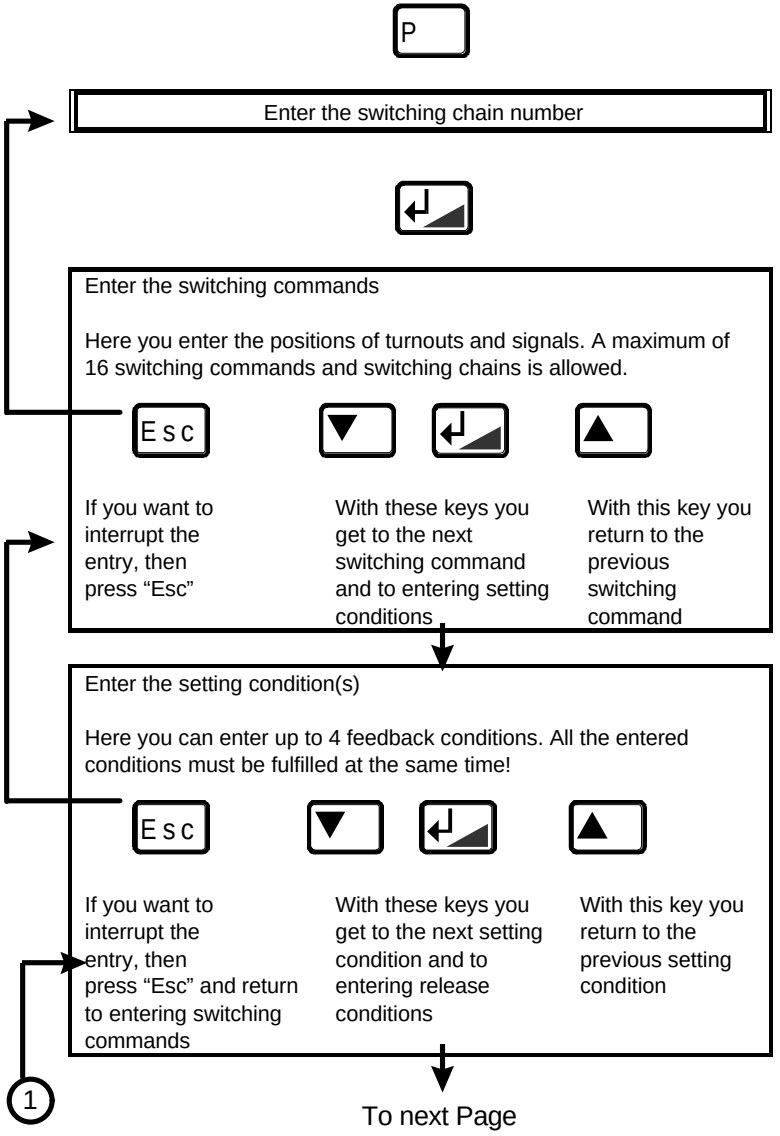
On the following pages, you find a sheet designed to assist you in developing your switching chains. You will recognize the sheet from the examples earlier in this text.

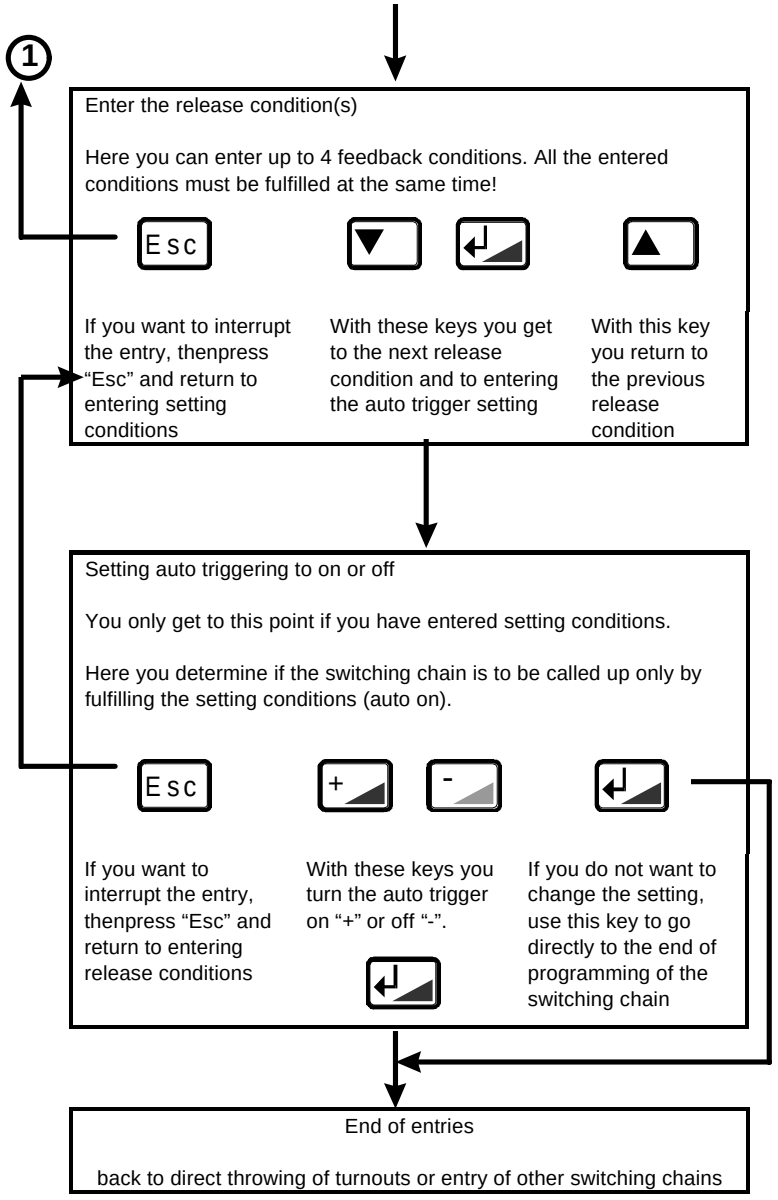
Please copy these programming sheets as needed.

Switching chain #:		
Switching commands		
#	Address	+/-
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
Setting conditions:		
#	Feedback #:	+/-
1		
2		
3		
4		
Release conditions:		
#	Feedback #:	+/-
1		
2		
3		
4		
Auto trigger		

Switching chain #:		
Switching commands		
#	Address	+/-
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
Setting conditions:		
#	Feedback #:	+/-
1		
2		
3		
4		
Release conditions:		
#	Feedback #:	+/-
1		
2		
3		
4		
Auto trigger		

Graphic display of programming of switching chains




1
Enter the release condition(s)
Here you can enter up to 4 feedback conditions. All the entered conditions must be fulfilled at the same time!
Esc
If you want to interrupt the entry, thenpress “Esc” and return to entering setting conditions
With these keys you get to the next release condition and to entering the auto trigger setting
With this key you return to the previous release condition
Setting auto triggering to on or off
You only get to this point if you have entered setting conditions.
Here you determine if the switching chain is to be called up only by fulfilling the setting conditions (auto on).
Esc
+
-
If you want to interrupt the entry, thenpress “Esc” and return to entering release conditions
With these keys you turn the auto trigger on “+” or off “-”.
If you do not want to change the setting, use this key to go directly to the end of programming of the switching chain
End of entries
back to direct throwing of turnouts or entry of other switching chains

Warranty

Lenz GmbH does everything it can do to ensure that its products are free from defects and will operate for the life of your model railroad equipment. From time to time even the best engineered products fail either due to a faulty part or from accidental mistakes in installation. To protect your investment in Digital Plus products. Lenz GmbH offers a very aggressive 10 year Limited Warranty.

This warranty is not valid if the user has altered, intentionally misused the Digital Plus product, or removed the product's protection, for example the heat shrink from decoders and other devices. In this case a service charge will be applied for all repairs or replacements. Should the user desire to alter a Digital Plus Product, they should contact Lenz GmbH for prior authorization.

Year One: A full repair or replacement will be provided to the original purchaser for any item that that has failed due to manufacturer defects or failures caused by accidental user installation problems. Should the item no longer be produced and the item is not repairable, a similar item will be substituted at the manufacturers discretion. The user must pay for shipping to an authorized Lenz GmbH warranty center.

Year 2 and 3: A full replacement for any item will be provided that has failed due to manufacturer defects. If the failure was caused by accidental user installation or use, a minimal service charge may be imposed. Should the item no longer be produced and the item is not repairable, a similar item will be substituted at the manufacturers discretion. The user must pay shipping to and from the authorized Lenz GmbH warranty center during this portion of the warranty period.

Year 4-10: A minimal service charge will be placed on each item that has failed due to manufacturer defects and/or accidental user installation problems. Should the item no longer be produced and the item is not repairable, a similar item will be substituted at the manufacturers discretion. The user must pay shipping to and from the authorized Lenz GmbH warranty center during this portion of the warranty period.

Please contact your dealer or authorized Lenz GmbH warranty center for specific instructions and current service charges prior to returning any equipment for repair.

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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.

CE Keep this operation manual for later use!

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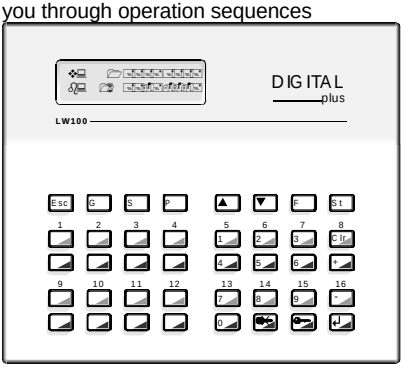
The keys of LW100 in overview

LCD display;
lit, displays turnout positions and guides you through operation sequences



Clears your last entry or switching chain or element of switching chain
"St" (Stop);
stops all locomotives without using braking momentum
"F" function
Branches into sub menus
Arrow keys;
Used to page through your switching chains

"P" (programming);
with this key you start the programming of a switching chain
"S" (switching chain);
calls up a switching chain
"Esc" (Escape)
interrupts your last action
"G" (group)
switches the current turnout group
Turnout keys;
The keys with red and green triangles serve the direct throwing of turnouts at any time the number block is not active
Number block;
Used for programming or calling up switching chains
"Key symbols";
to lock or unlock switching chains
"ENTER" (enter);
your data entry is confirmed and stored in memory
"+","-" (plus, minus)
determine the turnout position in your switching chains
"Cl" (clear);