

# INSTRUCTION MANUAL



**MX31**  
tethered,

**MX31FU**  
radio cab  
with MXFU base module

and

**MX31ZL**  
system cab

## EDITION

Production start, September 2005, SW-Version 1.01 --- 2005 09 01  
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 --- 2006 07 01  
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 MX31ZL: 3.0 Decoder update and sound-loading with the USB stick --- 2008 09 15  
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## IMPORTANT NOTES to SOFTWARE and SOFTWARE UPDATES:

Software that determines the characteristics and functions of this product is stored in a FLASH-EPROM.

The current version may not yet be capable of all the functions mentioned in this manual. Installing new software versions later can add new functions or correct recognized errors.

**Current software** is available at no charge from [www.zimo.at](http://www.zimo.at) (UPDATES). The software can be installed with the help of the program "ZST" (Zimo Service Tool) and a ZIMO command station MX1 "model 2000" or MX1EC. The ZST program is also available for download from the above web site at no charge. A solution for updating systems with older command stations is in development.

Updates can also be performed by ZIMO at the expense of the customer (handling and shipping fees). There is of course also no charge for the software itself. Updates performed by ZIMO are not considered a warranty repair.

### 3. Connecting cab's to command station

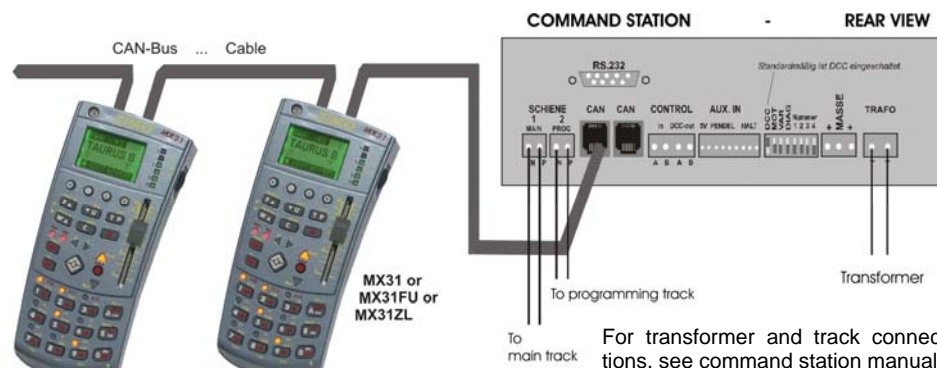
The **MX31** (or **MX31FU** via MXFU) are designed to operate with a **ZIMO MX1 model 2000, MX1HS or MX1EC command station**. Certain restrictions apply when the MX31 is used with older command stations like the MX1/N and MX1/MULT. A larger number of cabs (not exactly defined but more than 20) can be connected to one command station.

**MX31, MX31FU (used as tethered), MX31ZL (used as “normal” cab):**

The cab contains two identical sockets (internally parallel) for the CAN Bus (MX31ZL has only one socket) connection to the command station. All cabs connected to the system (including different types) are connected in parallel, usually by connecting a cable from the command station (MX1, MX1HS or MX1EC) to the first cab and from there on to other cabs, as shown below.

### Tethered cab MX31 and radio cab MX31FU:

Current consumption (at 20 – 30 V CAN Bus power) .....	20 - 50 mA
Current consumption of the MX31FU while charging the batteries.....	max. 150mA
Dimensions $W_{front} - W_{rear} \times H_{front} - H_{rear} \times L$ .....	58 - 69 mm x 23 - 39 mm x 150 mm
Weight MX31.....	135 g
Weight MX31FU .....	205 g



Prefabricated cables in standard and custom length are available from ZIMO (see pricelist), but can easily be homemade. The cable, connectors (50 per package) and the required special pliers are also available from ZIMO. As an alternative to daisy-chaining the cabs, a 6-conductor wire can be installed with outlets around the layout. Distribution boxes are also available (see ZIMO pricelist). **See Appendix: CAN-Bus cable!**

Permissible power from stabilized DC power supply.....	15 to 24V
<b>Preferably the supplied or other available ZIMO power supply should be used; if a third party power supply is used it must be one that is electrically separated from main power and short circuit protected. If in doubt check with the supplier.</b>	
Adjustable track output .....	10 to 22V
Continuous track output, internally regulated *) .....	(default 3A) 3A
internal regulator bypassed .....	(default 4A) 4A
Maximum track power, peak (5 sec) .....	(default 5A) 5.5A
Available CAN Bus power for other cabs .....	400mA

(good for about 5 MX31 cabs or 1 MX31 radio cab when charging battery)

Dimensions  $W_{\text{front}} - W_{\text{rear}} \times H_{\text{front}} - H_{\text{rear}} \times L$  ..... 58 - 69 mm x 23 - 39 mm x 150 mm

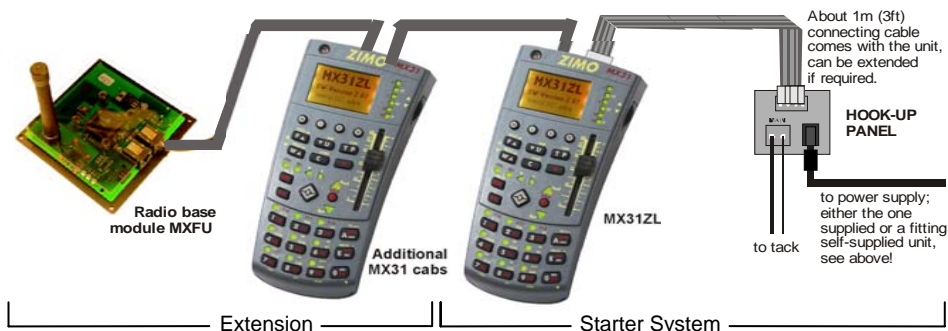
Weight MX31ZL ..... 170g

\*) The MX31ZL contains a switching voltage regulator to control track voltage. With it the desired track voltage can be dialed in (via the MENU, see chapter "MENU"); the selected track voltage must of course be below the output voltage of the power supply (i.e. with a 19V power supply: stabilized track power between 10 and 18V is possible). This internal regulation produces a certain amount of heat, which limits continuous power to the track (see above: "internally regulated"). The internal regulation can be turned off, which sends full power from the power supply to the track (i.e. 19V power supply -> 19V track power). This produces less heat and higher track power is possible (default setting from SW version 2.06).

The **MX31ZL** comes with a power supply, hook-up panel, 4-conductor wire between cab and hook-up panel, USB cable for computer hook up, USB adapter to plug in a memory stick and operating manual.

**System Cab MX31ZL (used as stand-alone system):**

Use only a **stabilized power supply** for the MX31ZL (preferably the one that comes with the unit, see note to the left), **under no circumstances** a normal transformer, neither a model railroad power pack nor any other (not even a transformer with a DC output)!!





## DAYLIGHT SENSOR

Automatically adapts the display illumination and LED indicators to the available light.

Left side – **MX31FU**: For charging the battery with an external transformer, as an alternative to charging the cab through the CAN bus and for “back-up power” (when battery is empty), connected to the track for example.

Left side – **MX31ZL**: USB plug&play connector (client & host).

## DISPLAY

Relevant information is displayed in various graphic renditions depending on the operating mode selected. The display of the “OPERATOR” mode is “cleaned-up”, while the “EXPERT” mode shows as much information as possible.

The basic display pattern is:

- Active mode shown in top black bar (LOCO, SWI, PROG...), clock;
- Current object displayed in large font (address, names etc.);
- EXPERT mode: center black bar displays feedback information (radio, “bidirectional communication”);
- EXPERT mode: two display areas. Lower display half is used for applications like previewing recall memory, operating a second engine or displaying function icons.

GREEN background – LOCO MODE

RED background – SWITCH MODE

YELLOW background – INPUT MODE: Address, menu, list of names, programming and more.

## SOFTKEYS M I II III

Soft keys have different meanings depending on operating mode and state and will be made visible in the display:

- The M key activates in most cases a menu - depending on the level either status related, system related or cab related.
- I, II, III switches between operating mode (GUEST, EXPERT etc.), selects the kind of information displayed in the lower display (recall memory, second address, pictogram etc.).

## UPPER KEYPAD F U T P ...

F, W: Activates entered address, also serves as scroll key (instead of scroll wheel); starts programming procedure (operations mode) when used together with E key.

U: “Stealing” address from other cabs; rotates through consist.

T: Consist activation/deactivation (Incl. Turnout ladders), protocol selection

C: “Cancel” key; when programming: CV selection

## MN and RG keys with associated LED's

**MN** (= MAN): Overrides signal controlled speed influence („asymmetrical DCC-Signals” as well); key E-MN pressed together starts service mode programming.

**RG**: Half speed key and/or shunting functions.

**SHIFT KEY** ↑: Shifts to capital letters, functions F10 and up (together with number key), emergency stop (together with stop key) and more.



**Rear – MX31, MX31FU**: two CAN bus sockets for connection with command station, other cabs or modules.

**Rear – MX31FU (additionally)**: Accepts antenna supplied with cab.

**Rear – MX31ZL**: single CAN bus socket and connection (4-pin plug-in connector) for POWER SUPPLY and TRACK.

## 6-LED LIGHTBAR

- Light moves up or down to indicate the direction the slider has to be moved to “catch” the actual speed of a newly acquired engine and during a stop or emergency stop.

- Display of “signal controlled speed limits” sent back by the decoder (bidirectional communication) and more.

## SCROLL WHEEL

Scroll and select data from recall memory, name tables, menus; also used to control a second engine, analog functions and sound parameters in sound decoders.

## SLIDER

Controls speed of current engine or consist when in DRIVING mode (LOCO), but also in ACCESSORY (SWI) or other modes for the last activated engine address.

## DIRECTION KEY WITH LED's and STOP KEY

**R**: Direction key can also be used, like the slider, outside the DRIVING mode. Direction indicated in relation to engine (Fwd/Rev) or layout (East/West; taken from bidirectional communications data).

**S**: Stop key for single address (press once); Emergency stop (press several times!), turns track power off (after emergency stop) and turns track power back on after short circuit.

## “A” KEY

Activates addresses in table display or deactivates current address (in EXPERT mode press ↑-A); common “ENTER” or “ACCEPT” key during programming and other procedures; “YES” key; “ON” switch for radio cab, when operated in radio mode.

## “E” KEY

Initiates programming procedures or “E” procedures (when immediately followed by or pressed together with another key); common “END” or “ESCAPE” key to end programming, “E” procedures, menu etc.; “NO” key as opposed to “A” key; Turns off radio cab when pressed together with “A” key.

## NUMBER KEYS with LED's above

Depending on operating mode: Input of addresses, names, all numerical values (during programming, definition); Actuate functions (F0, F1 etc), accessories, turnout ladders, AOS' and so on; LED's show state of function, AOS activation etc.

## 4. Change Display Language

The following information is applicable to all MX31 as well as the MX31ZL.

Chances are that the cab you hold in your hands has been delivered with the German language enabled. Since it is hard for anyone not fluent in German to find the proper menu point where the language can be changed we added this chapter ahead of the Quick Guide.

There are different languages to choose from. Most cabs come with at least two languages installed: German and English. Other languages can be downloaded from the ZIMO web site [www.zimo.at](http://www.zimo.at) such as French, Italian, Dutch, Norwegian and Swedish. For more information on language file installations, see the "Software Update" chapter at the end of this manual.

Languages can be selected in the cab menu (in German the "Dieses Gerät Menü"), which is located in the lowest menu level.

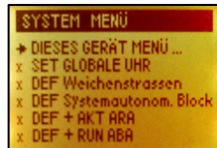
The menus can be accessed with the small round "M" key



Press this key once to switch the display to the "FAHR Menü" (or LOCO menu):



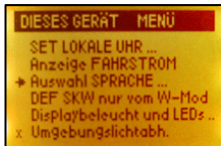
Without moving the scroll wheel, press the "M" key again to advance to the "SYSTEM Menü":



and again to get to the "Dieses Gerät Menü" (or cab menu):



Now use the scroll wheel on the right side of the cab and scroll down to "Auswahl SPRACHE". Accept the selection with the "A" key.



The currently used language is checked in the "MENU Sprache". Use the scroll wheel to move the arrow down to "English". Accept the selection with the "A" key. "English" is now checked off as the current language. Press the "E" key repeatedly to exit the menus.

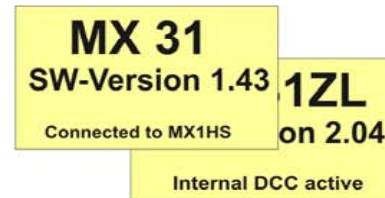




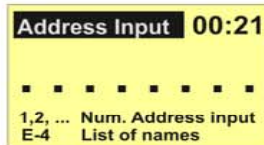
## 5. QUICK GUIDE

### First time use, Power-up, Address input

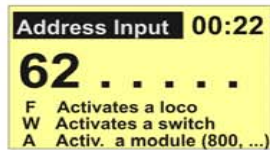
During system power-up: Start page indicates software version and connection status. This page is not available in radio mode.



Switches automatically to driving (LOCO) or switching (SWI) mode (the mode that was used last) after 2 sec (sooner by pressing any key); or to the address input screen when used for the first time.



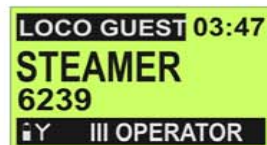
The address input page is also available by deactivating ("A" key or ↑-A) the driving (LOCO) or switching (SWI) mode.  
Enter loco, accessory or module address, further steps will be prompted (F,W or A key).



After activation with the F key (twice, for engine address) or W key (for accessory address), the screen switches to the driving (LOCO) or switching (SWI) mode.



### LOCO Mode



GUEST (from SW-Version 1.12)

GUEST mode: Cab is locked for a specific object; Address or name can not be deactivated and replaced with another address.

Switch back from GUEST to OPERATOR mode: either direct with soft key III or after being prompted enter a secret code; the secret code is entered in the menu (THIS CAB, CHANGE PIN).



Use the driving (LOCO) mode to operate an engine; the accessory (SWI) mode to activate a group of turnouts while operating the last activated engine; Deactivate with the A key before entering a new address.

Switch from OPERATOR → EXPERT with Soft Key III;  
Switch from EXPERT → OPERATOR with Soft Key III or Menu.

Usually, the lower half of the EXPERT window displays a recall memory preview for loco or accessory addresses (Alternate with Soft Key II); Select with scroll wheel and activate direct from preview with the A-key. Switches need to be allocated to soft keys first.

In the center bar: track voltage / amps and system messages.



### OPERATOR and EXPERT - Assignment and use of names:

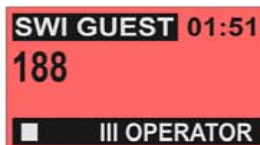
The display shows a numerical address (1 - 10239) as long as no names are given; Use the E-procedure "NAM" (press "E" followed by "4") or use the menu to assign or edit names. The assigned name is now shown in large letters (including address number) in the normal driving mode (LOCO), the accessory mode (SWI) as well as in the tabular recall memory display.

The LIST of NAMES can be called up anytime the cab is in the address input, LOCO or SWI mode, by pressing the E-4 keys together. Use the "A" key to activate a chosen name (F or W) from this table.

### OPERATOR and EXPERT - Consisting without names:

Using the T/H key adds a T or H to an address (shown in the display to the right of the address) and is used to build address groups (T for consists or H for switch ladders).

### SWI Mode



### Planned (with SW update):

Consisting using names  
LOCO CONSIST SWI LADDER

### EXPERT

Consist and individual engine names are displayed; otherwise similar to normal LOCO mode.



Key description changes with page content

The center bar shrinks to a line to display more consist members, if no bidirectional or system messages are available.



A group display as shown above is only possible if a consist or switch ladder name has been given first in the LOCO or SWI mode. The individual engine or turnout names (or address numbers if no names are given) are shown below the consist or switch ladder name.

The engine in consist mode (LOCO CONS) shown without brackets is the one accepting all commands (speed, direction, stop, functions etc.), all others displayed in brackets accept only common commands (speed, direction, stop etc. but no functions, unless defined differently via menu).

The "U" key switches between group members (moving bracket) of a consist or switch ladder, the "C" key deletes a member ("SUB"); the "T" key adds a new member to a group ("ADD") from the recall memory (provided the recall memory is active in the lower screen half).

NOTE: Consist or switch ladder operation without names is of course possible in both LOCO and SWI mode as soon as a "T" or "H" is assigned to the respective addresses.

### Planned:

Switch ladder and individual switch names are displayed; otherwise similar to normal SWI mode.



Key description changes with page content

### Planned:

A consist or switch ladder name can be assigned, by using the E-procedure "NAM" (E + 4), on a member of such an address group.

### Planned:

Dual cab control

### OPERATOR

### Planned:

In the LOCO mode, the scroll wheel can be assigned as speed regulator for a second address selected from the recall memory with "DCAB" (Dual Cab).



X DCAB (Soft key III) reverts to single engine control.

The last engine activated is still controllable while in accessory mode with speed, direction, stop etc. but the engine is not being displayed. Activating DCAB for this engine in the recall memory shows the name and address in the lower half of the display.



X DCAB (Soft key III) deletes engine display.



## Recall memory, Name tables

**Access the recall memory table:** In LOCO or SWI mode press the "A" key twice. Use thumb wheel, slider or F/W keys for scrolling. Activate a selection with the "A" key.

LOCO RE-MEM			
> 3224	T	D	
CROCODILE		M	
423	T	D	
TAURUS		D	

**Access the list of names:** from LOCO and SWI mode with E-4 (key "E" and "4" simultaneously). Activate with the "A" key.

LIST OF NAMES			
MAIN STATION	WHN		
CROCODILE	F	D	
> MIKADO	F	M	
TAURUS	F	D	

Recall memory and list of names is the same in EXPERT mode as in OPERATOR mode but holds more lines.

LOCO RECALL			
3224		D	
CROCODILE		M	
423		T	D
> TAURUS		D	
ARLBERG EXPRESS		TN	
STEAMER		T	D
9539		D	

LIST OF NAMES			
> MAIN STATION	WHN		
CROCODILE	F	D	
LEFT ENTRY		W	D
MIKADO	F	M	
TAURUS	F	D	
VINDOBONA	F	D	

### OPERATOR and EXPERT

#### The recall memory list:

Separate for driving (LOCO) and accessory (SWI) mode; up to 30 addresses each, filled and displayed in deactivation order.

**List of names:** All names in system, of any length in alphabetical order; activate from list with A key.

## Menus

Certain functions are accessible via menu only, others either via menu or direct (E...).

OPERATOR and EXPERT menus are identical.

The M key leads to the hierarchically structured menu: Enter from LOCO or SWI mode for all driving or accessory jobs, continue if necessary to the SYSTEM menu for system functions and on to single product groups, among them THIS CAB (MX31).

Scroll with thumb wheel or "F/W" keys; select with "A" key. Exit the menu with the "E" key (press repeatedly when in lower levels).

LOCO MENU I HELP			
> SYSTEM MENU			
OPERATOR MODE	#		
EXPERT MODE			
GUEST MODE			
RECALL MEMORY	A+A		
LIST OF NAMES	E-4		
E-PROCEDURES	E...		
SERV. MODE PROG	E-MAN		
OP. MODE PROG	E-F		
RG, MAN, FU def assign ...			
OS DEF + RUN	E+U		
SW-LADDERS RUN (not DEF)			
AOS RUN (not DEF)			
*****			

SYSTEM MENU I HELP			
> ABOUT THIS CAB			
CLOCK LOCAL + GLOBAL			
COMMAND STATION			
BOOSTER			
RADIO-MODULES			
MX8 - MODULES			
MX9 - MODULES			
*****			

ABOUT THIS CAB MENU			
> SET LOCAL CLOCK			
DISPLAY TRACK POWER			
700/800/900 ADDRESSES			
LEADING ZEROS			
T/H ELEMENTS			
RAILCOM DISPLAY			
TIMEOUTS			
LANGUAGE			
CHANGE PIN			
SOFT KEYS			
*****			

The menu entries change with SW updates; they are not exactly as shown here!

## E - Procedures

Initiate the E-procedures from the LOCO or SWI mode by pressing key "E" + number key (in sequence, not together; number key marked with the kind of E-procedure desired) or using the menu.

Scroll between selections or press suggested number or name; accept and exit with "A" key or escape with "E" key.

LOCO E-PROC	
> FU NORMAL	
PULSE CHAIN	
Y A Accept E Escape	

### OPERATOR EXPERT

LOCO D R 9 03:43 S 93			
STEAMER			
E - PROCEDURES			
> FU NORMAL			
PULSE CHAIN			

EXPERT mode displays split window with E-procedure in lower window half.

LOCO D R 9 06:14 ARL			
LEFT ENTRY			
E - PROCEDURES			
NAME			
ALT: LEFT ENTRY			
NEU:			

## Decoder - Programming

### SERVICE MODE

Enter from LOCO or SWI mode by pressing the "E" + "MN" key together; only for programming at the programming track!

Read out address first (2 x "A" key) or program address (enter address, "A" key); switch to CV programming with "C" key; CV's: select CV then read-out or program.

SERV MOD PROG	
ADDR = 395	
CV 121 = 25 READ	
^ BIN =	
E End	

### OP. MODE

Enter from LOCO or SWI mode by pressing the "E" + "F" or "E" + "W" key simultaneously; for programming on the main track!

Program reverts to CV programming immediately because addresses cannot be changed in this mode. CV's: select, read out (if RailCom) and program CV's as in service mode.

FAHR OP. PROG	
ADDR = 395	
CV 121 = 25 READ	
^ BIN =	
E End	

### Planned:

Programming (service, op. mode) with command line storage (only in EXPERT mode):

- There are 4 lines available in the lower window half (normal operation continues in upper part of window).

- Basically the same as in OPERATOR mode and with MX21 cab. Programming inputs also scroll upwards but remain available even if they disappear from window. The binary line is added or deleted as always with the ↑ key; the binary line also scrolls upwards.

- Use the scroll wheel to re-select data that moved upwards (">" points to the selected line).

- A re-selected CV value flashes, indicating that it can be overwritten.

- When a new value is entered to an "old" line (with "A" or digit keys), ACK, READ or other acknowledgments disappear at first; a new CV number can now be entered (probably rather unusual but sometimes expedient) or a CV number confirmed with the A key; the value (now flashing) can now be overwritten.

- Acknowledgments: ACK, READ (same as in service mode); PROG (unconfirmed programming), BI-ACK (bidirectional programming acknowledged), BI-READ (bidirectional read-out), NO READ (in place of value, because no bidirectional communication data was received).

## Planned: Defining OS

>> only in EXPERT mode

Enter via menu or E, U (OS) to get to the various forms of Operating Sequences.

LOCO D R 9 03:43 S 93			
STEAM ENGINE 6239 T			
OS DEF + RUN			
B	1 SHUTTLE	2 BLOCK	
	6nn ARS		
	7nn SWI LADDER		
	79n ARS		

When defining a switch ladder, the switch positions will be logged.

LOCO D R 9 03:43 S 93			
STEAM ENGINE 6239 T			
OS DEF SWI LDDR 723.6			
B	165.4 LI		
	812.3.2 RE		

Activate a switch ladder group address either with DEF-RUN (split window with active loco), or by entering and activating of the group address (initially shown in one screen, same as a single switch address)

LOCO D R 9 03:43 S 93			
STEAM ENGINE 6239 T			
SWI LADDER R5			
723			

LOCO D R 9 03:43 S 93			
STEAM ENGINE 6239 T			
OS DEF AOS S'RUN 793.3			
B	5 START - STOP		
	6 PAUSE - RESUME		
	7 EV RELEASE		
	8 EV SIMUL		

Sample run actuation for AOS, shown in lower window half, is identical to MX21.

LOCO D R 9 03:43 S 93			
STEAM ENGINE 6239 T			
OS DEF AOS S'RUN 693			
B	5 START - STOP		
	6		
LOC 32 ROUT 3 v 62			

## SW UPDATE

MX31ZL only

The MX31ZL is connected to a computer and the "ZIMO Service Tool (ZST)" is started.

After communication is established, the display switches to the update progress with indications to the currently running activity:  
SW update of this cab  
SW update of other cab  
Decoder SW update  
Decoder sound install  
and so on.

**MX31ZL**  
Connected to ZST

SW Update: This Cab

## DECODER UPDATE with the USB stick

The USB stick containing one or more decoder collection file is connected to the MX31ZL with the help of the USB adapter; go to SYSTEM MENU and select USB-STICK DEC-UPD to start the update process.

USB-STICK DECODER-UPD			
>	ds080603.zsu	208 K	
	ds080705.zsu	214 K	
	ds080820.zsu	235 K	

A Accept E Escape

Selecting a file from the update file list stored on the USB stick.

USB-STICK DECODER-UPD			
>	Autom Update-Auswahl		
	MX620	V 8.3	
	MX63	V 34	
	MX64	V 34	
	MX69	V 18.3	
A Accept E Escape			

Select a decoder and continue following the on-screen prompts.

Start-up procedure of a new system (cab connected to command station)  
or a cab containing no data.

## 6. Power up the MX31/MX31FU for the first time

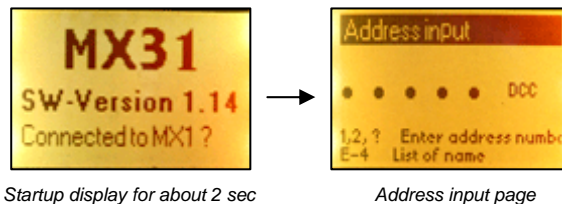
The cab is powered up automatically whenever it is connected to the CAN bus of a live command station. The cab first enters

- the start up screen displaying the software version and the connection status;
- if a radio cab MX31FU, together with a MXFU radio base module is connected to the same CAN bus, the cab displays the radio channel as set in the MXFU and the radio code number, which is automatically picked by the MXFU. This confirms the initialization of the radio cab, meaning that it will only be able to communicate with this command station but not with other command stations of nearby layouts.

About 2 seconds later the cab automatically switches to the

- address input screen (see chapter „Address input“).

It is possible that the cab may switch directly to the driving (LOCO) or turnout (SWI) mode if a test was performed on the cab earlier and the content wasn't deleted before shipping. In such a case, the address input page is reached by pressing the A key (=deactivates address) or pressing (repeatedly if required) the C key (=deletes the address from memory).

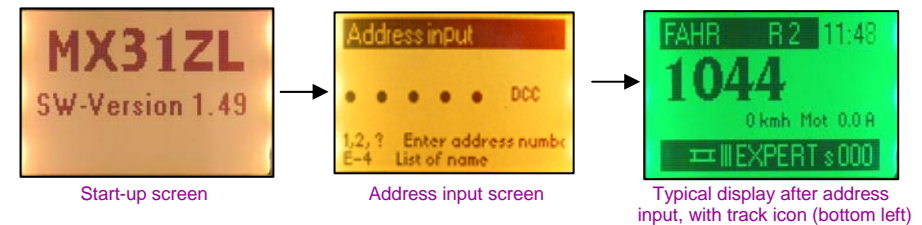


Start-up procedure of a new System Cab or one that contains no data  
(MX31ZL with proper power supply, without command station).

## 7. Power up the MX31ZL for the first time

After power up (i.e. connecting the power supply),

- the System Cab MX31ZL first displays the start up screen, which displays its own software version and the note "Internal DCC active", which means that the MX31ZL is active as a stand-alone system and shortly after that (about 2 sec) the cab switches to
- the address input screen (see chapter "Address input").



The System Cab MX31ZL is almost identical in operation and display as a "normal" cab. The "internal command station" is recognizable in only a few details. Among them: the start-up screen itself and the "track icon" in the lower bar of the normal operating screen. There are also special menu points, like the one for the track voltage adjustment.

Normal restart procedure (without previous deletion of cab content) of a MX31 cab, MX31FU radio cab and System Cab MX31ZL:

## 8. "Normal" power up OPERATOR, EXPERT

The cab is powered up automatically whenever it is connected to the CAN bus of a live command station and the MX31ZL System Cab when it is connected to a live power supply, with the exception of the radio cab MX31FU operated in radio mode, which is turned on with the A key.

With the

- **MX31 and MX31FU tethered or MX31ZL with its own power supply** – the first screen shown is the start up screen, displaying the software version and the connection status; shortly after (or immediately by pressing any key) it switches to the mode that was active before the cab was powered down, that is usually to the driving (LOCO) or accessory (SWI) mode (see below).
- **MX31FU in radio mode** – switches immediately to the mode that was active before the cab was powered down, that is usually to the driving (LOCO) or accessory (SWI) mode (see below).



This chapter does not replace the quick guide above or the in-depth and detailed explanations that follow. It is for the novice user to quickly get acquainted with the basic functions of the ZIMO cab for driving and programming. The cab however offers a lot more functions and possibilities that are described in more detail elsewhere in this manual!

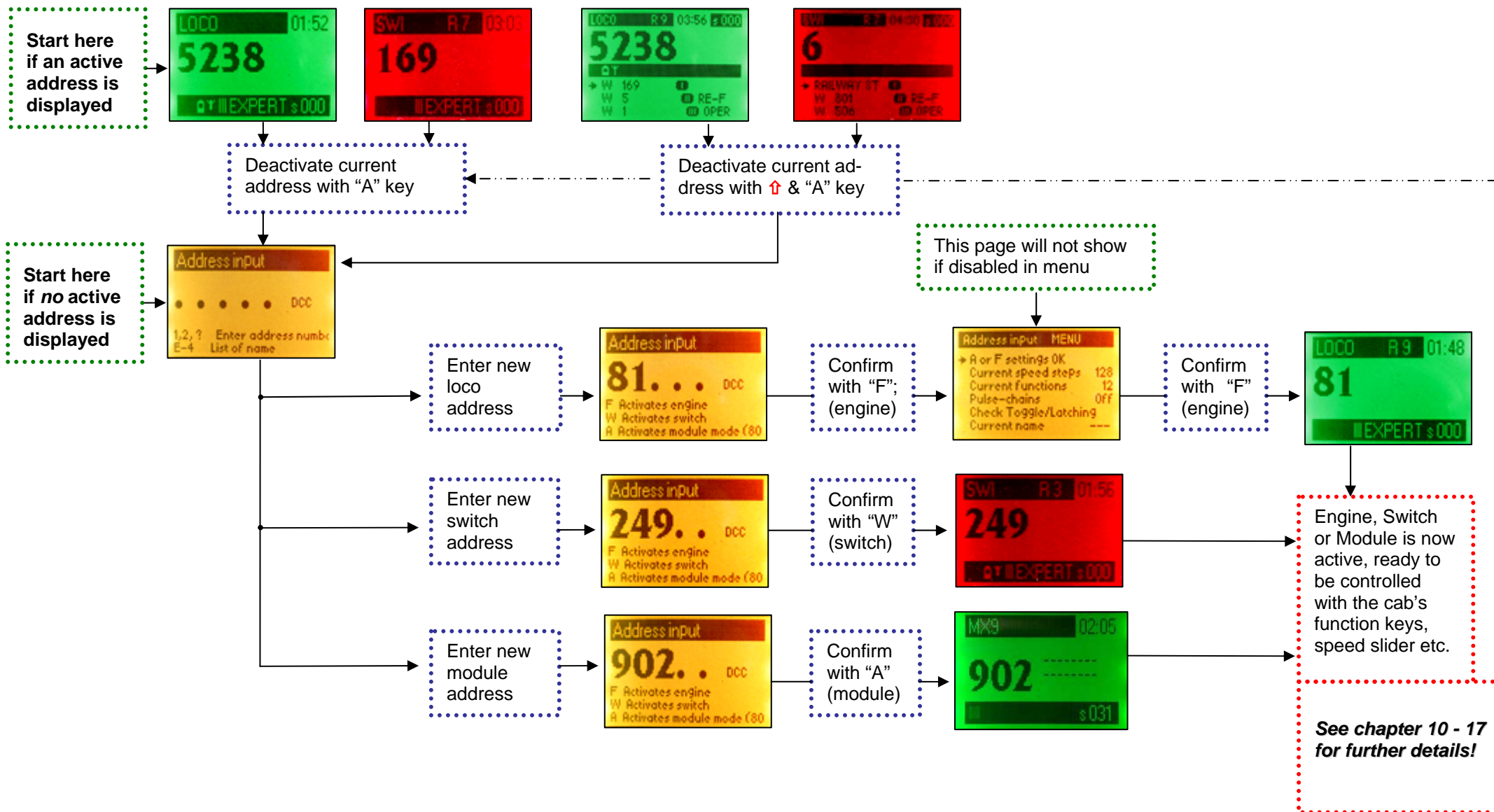
## 9. Basic cab use

...for driving, switching...

CAB in: OPERATOR mode

or

EXPERT mode





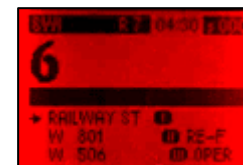
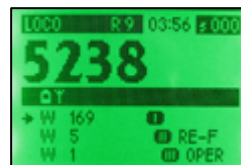
...for programming.

Cab in: OPERATOR mode

or

EXPERT mode

Start here  
with an active  
address displayed

**SERVICE MODE**

Press "E" + "MAN"  
key together

On the programming track

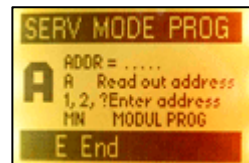
On the main (or programming) track

**OPERATIONS MODE**

Press "E" + "F"  
key together

After an engine has been programmed with a new address, it won't show up in the cab's recall memory until it's entered into the system as explained on the previous page!

Exit with  
"E" key



Type new  
address

To program  
with new  
address:

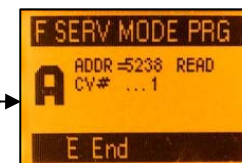


"F" =  
engine

"W" =  
switch



Press  
"C" key



Press "A" key for  
CV suggested or..  
type new CV #



Press  
"A" key

To read out  
address:



Press  
"MN" key

To module  
programming:



or

Exit with  
"E" key

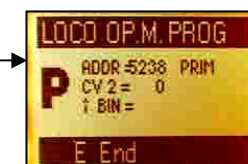
Press  
"C" key

To change to CV  
programming:

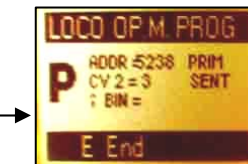
Press "C" key  
for next CV



Press "A" key to  
read CV or..  
send new value



Press "↑" key to  
display Binary dig-  
its. Use "F" keys  
to change digits



Exit with "E" key

After initial power-up or specific application during normal operation;  
MX31 and MX31FU as well as System Cab MX31ZL!

## 10. Address input

### OPERATOR, EXPERT

#### WHEN?

- ▼ at first start-up after the start-up display or
- ▼ only in the OPERATOR mode with the "A" key deactivating the driving (LOCO) or accessory (SWI) mode
- ▼ in all modes including EXPERT mode with **↑-A** (shift and "A" key together), or
- ▼ or from the LOCO or SWI menu (see chapter "MENU").

From the OPERATOR mode



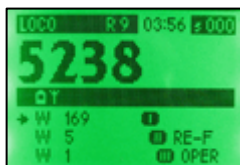
with "A" key →



with **↑-A** keys →

to the address input page.

From the EXPERT mode



#### CAB?

- Display in yellow, waiting for an address to be entered indicated by the dots across the screen, Key-LED's are dark.

#### HOW?

- ◆ Enter an **address** (1 ... 10239 for loco's or 1 – 512 for accessory groups) using the number keys 1... 0; use P key *first* to select the appropriate protocol in case the address about to be activated is for another format than DCC (M = MOTOROLA, D = DCC).

Activate address with the **F** key (mobile decoder) or **W** key (stationary decoder).

- ◆ Special case: Entering a **module address** instead of a decoder address:

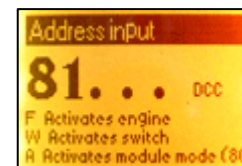
- 800... 863 for MX8 – ZIMO accessory modules  
the address is entered as a four digit (!) number that includes a group number, for example: 814/1, 814/2... where the forward slash is entered automatically
- 900... 963 for ZIMO MX9 track section modules.

Activate addresses for accessory modules or track section modules with the **A** key.

- ◆ Use the **C** key to **cancel** incorrect entries.



Address input page...prompting to



... enter address



... switches to address input menu after activation with the "F" key. (press "F" again to enter LOCO mode)

#### ATTENTION:

The system cab MX31ZL limits the accessory address range from 1 ... 63 ("249" would therefore not be possible)!

Only with a MX1 as command station is the full range of 1 ... 511 accessible.

Future SW updates will extend the MX31ZL to the full accessory address range.



... enter address



... switches to the SWI mode after activation with the "W" key.



... enter address



... switches to the **module mode** after activation with the "A" key

If an address is **activated with the "F" key**, the **address input menu page** appears at first and allows for easy changes to the most frequently changed locomotive parameters right here instead of going to the programming mode first, which could, of course, also be changed later with the E-procedures or through MENU.

**Skip the address input menu** by pressing the **"F" key twice**, if no changes are to be made. The screen immediately jumps to the **LOCO** mode. The address input menu page can be turned off altogether in the "THIS CAB" menu.



Address input menu

Either activate address without changes with the "F" key or use the **scroll wheel** to select an item from the list, press "A" and make changes, return with "A" or "E" and final activation of address with the "F" key.

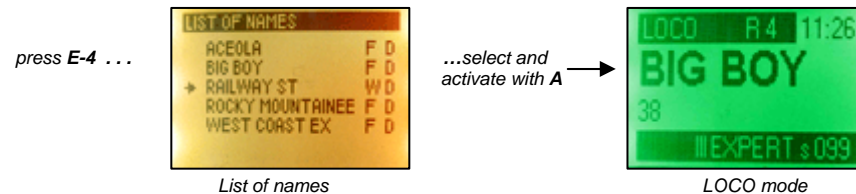


LOCO mode



## WHERE TO?

- ▶ after activating a loco address by pressing the **F key twice** -> **LOCO mode** (green display), or
- ▶ after activating an accessory address with **W key** -> **SWI mode**, display turns red, or
- ▶ after activating a module address with **A key** -> SWI mode (MX8) or MX9 mode.
- ▶ **ALTERNATIVE:** The **name table** can be called up at any time, if names have been entered earlier, with the key combination **E-4** (press and hold E key followed by number 4 key); use the **scroll wheel** (or F and W keys) to select a name and activate with the **A key**. Also see chapter 11: "recall memory and name tables".



- ▶ **Cancel and return** to the last active LOCO or SWI mode:  
- by pressing the **E key** at any time.

## ACTIVATION FAILED?

- ⊗ **Address starts flashing** after attempted activation because this address is already active on another cab, a computer or a PRA (PDA with PRA software) as either a single engine or as a consist. The address may also flash if it is involved in an automated operation with AOS, ARS, or STP etc.:  
⇒ Force take-over with **U key**, or  
⇒ Use **C key** and select another address.
- ⊗ **Module address** (800... 900 ...) **does not activate** (no change-over to SWI or MX9 mode, display remains yellow), because the module in question was not found on the CAN bus:  
⇒ Cancel with **C key** and enter new address, or  
⇒ Exit address input page with **E key**.

## 11. LOCO – mode

## OPERATOR

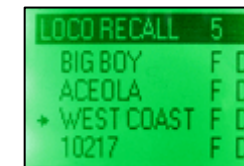
## WHEN?

- ▼ immediately after power-up, if LOCO mode was active before last shut-down, or
- ▼ activating an address with the **F key** during address input, or
- ▼ scrolling through the recall memory using the **F key**, or
- ▼ switching from the SWI mode to the LOCO mode with the **F key**, or
- ▼ activating an address with the **A key** from the tabular display of the recall memory, or
- ▼ activating an address name marked with an "F" from the list of names using the **A key**, or
- ▼ after exiting E-procedures, programming and similar with **A** (Accept) or **E** (End) key.

From the address input page ...

with **F** →

... to the LOCO mode.

From the tabular display ...  
(recall memory, list of names,  
see chapter "Recall memory")with **A** →with **A+A** to recall memory table

## CAB?

- ◆ Green display shows:

Top bar: "LOCO", number of addresses in recall memory and fast clock;  
Center: loco address (or name *and* address), consist indicator "T" where applicable;  
Bottom bar: battery and radio signal strength (only with MX31FU in radio mode), soft key ID's and applied speed steps ("s...");  
Complete cab (keys, slider, LED's) is dedicated to the control of the activated loco.

Use E-procedure **NAM** with **E+4** for assigning **names** to current address, see chapter "E-Procedures"!

Chase lights move up or down (red)



## HOW?

- ◆ If the **LED's** in the light bar next to the display are **scrolling up or down**, follow with the slider in the indicated direction until they stop scrolling. This matches the speed slider to the actual speed of the activated engine. Alternatively move the slider to zero and press the **S key** to stop the train.
- ◆ **Control** the active engine using all cab elements: speed slider, direction key "R", stop key "**S**", keys "**MN**" (MAN) and **RG** (shunting) as well as all number keys (1 ... 0 = F0 ... F9) as function keys; corresponding indicators in the display and with LED's above each key:

- ◇ The **light bar** (6 vertical LED's next to the display) normally moves with the speed slider. It also visualizes system controlled acceleration and deceleration functions, indicates the direction the speed slider has to be moved to "catch" the speed of an acquired engine and displays speed limits (red LED's labeled with L, U, H) provided



the loco decoder sends information back via the bidirectional communication (= RailCom).

- ◇ The **driving direction** is switched with the **direction key R** and indicated in two ways: the usual engine related way with two LED arrows marked "Fwd" and "Rev". The arrows also change colors to indicate active brake and stop functions during change of directions. The second way to indicate direction is layout related and is shown with two smaller LED arrows marked "W" and "E" (for West, East). These indicators are only active if previously set in the LOCO menu or if the required information is received from the decoder with bidirectional communication.
- ◇ To **stop an active engine** immediately, overriding any programmed momentum, use the **stop key S**.

A **broadcast stop** that stops all engines on a layout is issued when pressing the **↑-S** (shift and stop key together) or by **3 x S** that is, pressing the stop key three or more times within 1 second.

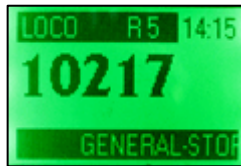
A single stop is indicated with a flashing red LED at the light bar and a flashing "STOP" in the display, a broadcast stop also with a flashing red LED at the light bar and a flashing "General Stop" in the display.

Activating the **↑-S** again (shift and stop key together) while in a broadcast emergency stop mode ("General Stop"), turns **track power off** ("POWER OFF" in display).

**Return to normal operation** by pressing the **stop key S** once from any emergency stop or "power off" mode as well as from short circuits indicated with "SHORT MAIN " or "SHORT PROG"; after a 3 second time period has elapsed since stop key was used to initiated emergency stop.



Single stop (after pressing **S**)



Broadcast stop (after pressing **↑-S** or **3xS**)



Track power off (after **↑-S**)

- ◇ A **fine adjustment** of the speed as set by the speed slider is possible with the help of the **scroll wheel** (from MX31 SW version 1.16 and MX31ZL SW version 2.06 on, but only in OPERATOR mode!). This is a convenient way of raising or lowering the speed by a single speed step, which is often used to influence the motor sound of sound decoders (to trigger load change reactions).

The speed modifications per scroll wheel are limited to a few speed steps (about 5 with 128 speed steps, 1 or 2 with 28 speed steps) and become visible by a modified letter "s" in the right corner of the bottom black bar. A dash above the letter "s" indicates that the speed modification is active. Moving the speed slider, changing the address etc. automatically zeros the fine adjustment.



Normal

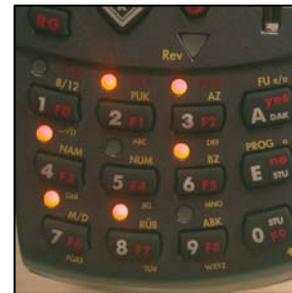
Speed modified with scroll wheel

- ◇ The **RG key** accesses shunting functions and, if not assigned differently, **splits the speed range** of the speed slider in half that is, with the speed regulator at full throttle the loco travels only at half throttle. The **RG** key is defined in the LOCO menu and is most often used for shunting speed functions of decoders (often with F3, F4 or other key) but also to reduce/suspend momentum as per CV #3, 4 etc.



- ◇ The **MAN function, MN key**, eliminates the ZIMO "signal controlled speed influence" or other methods of "location dependent control" (asymmetrical DCC, Lenz "ABC"). The accompanying LED blinks when the MN function is active that is, the speed limits are cancelled. The MAN function is used to drive past red signals during shunting, train movements without routes in secured areas that otherwise wouldn't be possible etc. The MAN function normally sends a special "override speed restriction" command to the decoder but other modes of action can also be assigned to the MN key in the LOCO menu.

NOTE: The **MN** key only works with decoders equipped with that function, at this time (2006) only with ZIMO decoders!



- ◇ The **function outputs** of a decoder (headlights etc) are switched with the number keys that operate as **function keys F0, F1, F2, ...** For **F10, F11, F12, ...** (with future software versions **up to F19**) press and hold the shift key **↑** first.

The LED's above the number keys indicate the state of the outputs (no LED for F9). Each function key can be changed from its default "always on" setting (= press function key turns function on, press again to turns off) to a momentary setting (= function is on only as long as the function key is pressed), with the help of the E-procedure "MD" or via the LOCO menu.

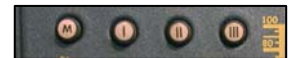
- ◇ With the **T key**, an active locomotive can be added to a **consist**, indicated in the display with a "T" to the right of the address. All locos stored in the recall memory of the cab that are marked with a "T" belong to the same consist and are controlled simultaneously with the speed slider, direction key R, stop key **S**, shunting key **RG** and MAN key **MN**, regardless of which address is currently displayed as active in the display or which loco is the lead loco.



Use the F key to scroll through the individual consist addresses (all addresses marked with a "T") or use the tabular display of the recall memory by double-clicking the A key.

Remove a locomotive from a consist by pressing the T key again with the relevant loco address displayed as being active.

- ◇ The actual meaning of the **soft keys** for most situations is indicated in the display (e.g. EXPERT, GUEST or switching of assigned turn-outs), with the exception of the soft key "M", which usually serves to open the context sensitive menus. For example, pressing the "M" key in the LOCO mode opens the LOCO menu at first and from there branches off to the SYSTEM or CAB menu, if desired.





WHERE TO AND BACK? (current loco remains active and returns cab to the LOCO mode again)

- ▶ Start an **E-Procedure** with **key sequence E-..** (E, followed by the key for the appropriate E-procedure), use the "A" key to accept the changes made and exit E-procedures or use the "E" key to exit without any changes taking place,
- ▶ **E- MN** (press and hold "E" followed by "MN") starts **programming** (see chapter "Programming") in service mode (**SERV MODE PROG** on the **programming track**), exit programming with the "E" key,
- ▶ **E- F** or **E- W** (press "E" together with the "F" or "W" key) starts **programming** (see chapter "Programming") on the main (**OP. M. PROG**), exit with "E" key.
- ▶ The **soft key M** opens the MENU (see chapter "MENU and MENU functions"); return with the E key if no other state is entered with the selected menu item (may need to be actuated several times).

WHERE TO? (current loco address will usually be deactivated)

- ▶ Deactivating current address with the "**A**" key (or **↑-A**) -> changes cab to **Address Input** mode (yellow),  
NOTE: use of A key is only possible in OPERATOR mode – in EXPERT mode use **↑-A**, or
- ▶ Deactivate current address and activate next address from the LOCO **recall memory** with the "**F**" key (which is the loco that was deactivated last) or
- ▶ Deactivate and **delete** current address (from recall memory) with the "**C**" key. Also activates the next address automatically from the recall memory (same as with "F" key), or
- ▶ Deactivate current address with the "**W**" key -> switches to the **SWI mode** (red), whereby the last active accessory address (or switch ladder) will be activated, or
- ▶ Open the recall memory table (**LOCO RECALL MEM**) by pressing the "**A**" key **twice** (press key twice within half a second) -> Tabular display of the recall memory (green), "A" key activates selection and "E" key exits; see chapter "recall memory", or
- ▶ Open the **LIST of NAMES** with simultaneous **E-4** (press "E" ahead of "4" key) or **A+A+4** (in sequence) -> Tabular display of names (yellow) for engine and turnout addresses, "A" key activates selection and "E" key exits; see chapter "recall memory and list of names".



From the LOCO mode with ...

....A key →



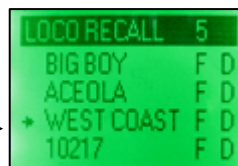
...to the address input page

....F key (rotate through memory) →  
....A + A key (tabular display) →



to other engines in recall memory ...

...direct



...via tabular display

## 12. SWI - mode

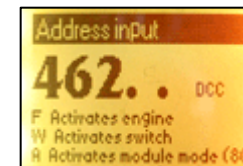
### OPERATOR

There is a similarity between the SWI-mode and the LOCO-mode which means that the operation is much the same. There are, however, some differences as indicated below...

WHEN?

- ▼ immediately after power-up if the cab was in the SWI-mode before the last shut-down, or
- ▼ activating an accessory decoder address from the address input screen with the **W** key, or
- ▼ activating a MX8 module address from the address input screen with **A** key, or
- ▼ scrolling through the recall memory using the **W** key, or
- ▼ switching from the LOCO mode to the SWI mode with the **W** key, or
- ▼ activating an address with the **A** key from the tabular display of the recall memory, or
- ▼ activating an address name marked with a "W" from the list of names using the **A** key, or
- ▼ after exiting E-procedures, programming and similar with A (Accept) or E (Escape) key.

From the address input page. . .  
(accessory decoder address)

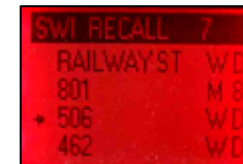


with W →



... to the SWI mode

From the tabular display . . .  
(recall memory, list of names,  
see chapter "Recall memory")



with A →

← with A+A to recall memory table.

From the address input page. . .  
(Module address 800 ... 863)



with A →



... to the SWI mode.

CAB?

- Red display shows:

Top bar: "SWI", number of addresses stored in recall memory (R ...), fast clock,

Center: accessory address (or name and address), switch ladder indicated with an "H" if applicable,

Bottom bar: battery and radio signal strength (only with MX31FU in radio mode), soft key ID's and applied speed steps ("s...");

Number keys 1 to 4 or 1 to 8 (depending on decoder or module type) are used to operate switches, signals etc., for the active accessory address. LED's above keys indicate status of accessories.

The locomotive that was active last remains active in the SWI mode and can be controlled with the speed slider, direction key, stop key, and MN and RG keys. Engine status is indicated with light bar, LED's for direction, MN and shunting (RG); see chapter LOCO – mode.

## HOW?

- ◆ Accessories (switches or signals) are operated with the number keys and the current setting is displayed with the accompanying LED; 4 or 8 keys are used depending on the kind of accessory to be controlled, the kind of decoders or modules and the operating mode selected

- ◇ Each active **accessory decoder address** from **1 to 512 (address range for accessory decoders)**, controls up to **4 paired functions** (switches or red/green signals) that are connected to one or several accessory decoders: Each key from 1 to 4 throws one turnout between left and right; switch position (or signal status) is indicated with LED above respective key in red/green. This is the most frequent and standardized form of accessory operation.

NOTE: The **keys 5 to 8**, which are normally unused for the 4 paired functions, can be assigned for a **second accessory address** in the EXPERT mode, which allows actuation and control of up to 8 turnouts. This saves a lot of unnecessary switching between decoder addresses and makes operation easier and more fun. After a second accessory address has been assigned in the EXPERT mode it can also be used in the OPERATOR mode! See SWI status in **EXPERT – Mode**.

- ◇ An accessory decoder address from 1 to 512 (address range for accessory decoders) can also control up to **8 single functions** (e.g. uncoupler or single light bulbs/LED's of signals), one function for each number key from 1 to 8. This operating mode is programmed for an accessory address with the help of the E-procedure "9" or via the SWI menu.

If single functions are selected, each number key can be set to either the default mode "always on" (= press function key to turn function ON, press again to turn it OFF) or the momentary mode (= function is ON only as long as the function key is pressed), with the help of the E-procedure "MD" or via the SWI menu.

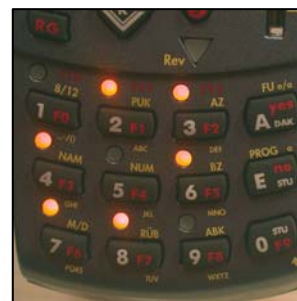
- ◇ Accessory **module numbers between 800... 863** break up into several groups, for example **814/2, 814/3, 814/4**; because an accessory module has 16 turnout outputs (in 2 groups of 8 turnouts each) that can also be used for 32 single functions such as light bulbs/LED's (in 4 groups of 8) if desired. Switching between these groups is accomplished with the **W key** (part of the SWI recall memory).



4 Paired functions



8 Paired functions



8 Single functions

## MX31 Cab, MX31FU Radio Cab, MZ31 System Cab

Each group controls up to **8 paired functions** (turnouts or red/green signals) that are connected to the outputs of that MX8 group: each number key from 1 – 8 controls one switch or signal; position or signal status is indicated with red/green LED.

A group can also control up to **8 single functions** instead (single light bulb/LED, uncoupler etc.). The module outputs will then be divided into corresponding groups, which is defined during the address programming (e.g. 4 groups with 8 single functions each instead of 2 groups with 8 paired functions each), because with 8 single functions each output requires its dedicated key whereas in the paired mode one key controls two outputs. See chapter "Module Programming" and the MX8 manual for details.

If single functions are selected, each number key can be set to either the default mode "always on" (= press function key to turn function ON, press again to turn it OFF) or the momentary mode (= function is ON only as long as the function key is pressed), with the help of the E-procedure "MD" or via the SWI menu.

- ◆ **True position feedback** can be utilized by the cab if the accessory decoder or module supports it and the turnout actuator is equipped with end switches. This feature is activated with the E-procedure M/D (for each key separate).

The feedback information is sent to the MX8 using the CAN bus, via bidirectional communication (= RailCom) or ZIMO acknowledgments in case of accessory decoders. The cab's LED of a thrown turnout keeps flashing until the appropriate feedback is received. Continuous flashing therefore indicates that the turnout didn't operate as expected.

- ◆ The function of each **soft key** is marked in the display for most situations; e.g. switching between the EXPERT and GUEST mode or operating turnouts defined for soft keys etc.

The **soft key M** (almost) always opens the **menu**. Accessing the menu from the LOCO mode always opens the loco menu. From there, other menus can be reached such as the SYSTEM or CAB menu.

The **soft keys I, II and III** can be assigned to selected turnouts (in up to 10 levels that can be scrolled through with the scroll wheel, for a total of 30 turnouts), which can be operated at any time even while in the LOCO mode. The assignment takes place in the CAB menu (under "DEF soft keys for switches", see chapter "MENU and MENU FUNCTIONS"), but (!!!) this menu position is only accessible if the menu was opened from a SWI window.

The soft keys in the EXPERT mode are labeled in the display with the corresponding turnout addresses; in the OPERATOR mode only a simple note that the soft keys are assigned for turnout operation is shown.

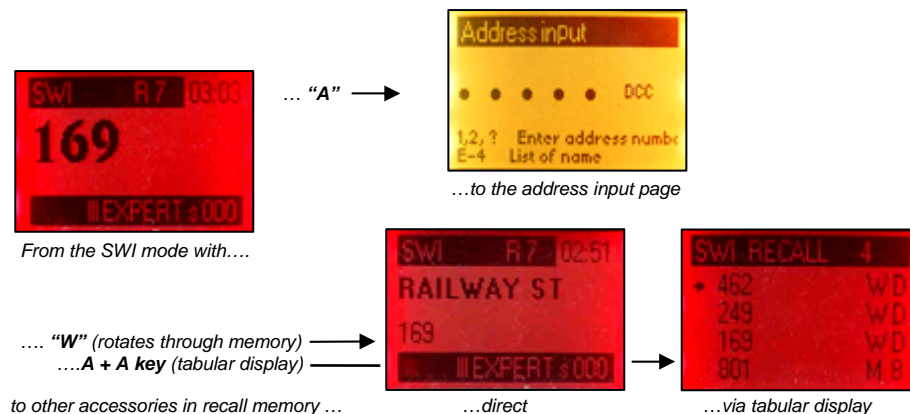
WHERE TO AND BACK? Current address remains active, returns to SWI mode when finished.

- ▶ Start an **E-Procedure** with **key sequence E - ..** (E, followed by the key for the appropriate E-procedure), use the "A" key to accept the changes made and exit E-procedures or use the "E" key to exit without any changes taking place,
- ▶ **E- MN** (press and hold "E" followed by "MN") starts **programming** in service mode (**SERV MODE PROG** on the programming track), exit programming with the "E" key,
- ▶ **E- F or E - W** (press "E" together with the "F" or "W" key) starts **programming** on the main (**OP. M. PROG**), exit with "E" key.
- ▶ The **soft key M** opens the MENU (see chapter "MENU"); return with the E key if no other state is entered with the selected menu item (may need to be actuated several times).



WHERE TO? Current address will be deactivated.

- ▶ Deactivate current address with the **"A" key** (or **↑-A**) -> changes cab to **Address Input** mode (yellow), NOTE: use of A key is only possible in OPERATOR mode – in EXPERT mode use **↑-A**, or
- ▶ Deactivate current address and activate next address from the **recall memory** with the **"W" key** (which is the address that was deactivated last) or
- ▶ Deactivate and **cancel** current address (from the recall memory) with the **"C" key**. Also activates the next address automatically from the recall memory (same as with "W" key), or
- ▶ Deactivate current address with the **"F" key** -> switches to the **LOCO mode** (green), whereby the last active loco address (or consist) will be activated, or
- ▶ Open the recall memory table (**SWI RECALL MEM**) by pressing the **"A" key twice** (press key twice within half a second) -> Tabular display of the recall memory (red), "A" key activates selection and "E" key exits; see chapter "recall memory", or
- ▶ Open the **LIST of NAMES** with simultaneous **E-4** (press "E" ahead of "4" key) or **A + A + 4** (press key A twice followed by the #4 key) -> Tabular display of names (yellow), "A" key activates selection and "E" key exits; see chapter "recall memory and list of names".



## 13. LOCO and SWI handling in EXPERT - Mode

EXPERT-Mode from SW-Version 1.10 !

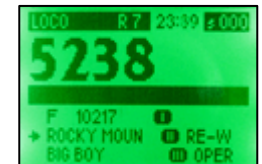
When changing from the OPERATOR to the EXPERT mode, the first thing noticed is that the whole OPERATOR screen shrinks by using smaller fonts so that it will fit in the upper half of the display. The speed regulator position ("s...") will be moved from the lower black bar to the upper. The lower display half can now be used for further information.



LOCO display in OPERATOR mode

Switching from the OPERATOR to the EXPERT mode

with the soft key as prompted in the lower black bar, usually with **Soft Key III**.



LOCO display in EXPERT mode with preview of LOCO recall memory and soft key prompts

If no soft key is indicated for switchover, the MENU can be used instead to change to a different mode! Switching back (from the EXPERT to OPERATOR mode) is also accomplished with a soft key ("OPER") or via the menu.

Using the cab in **EXPERT mode** is **identical** to the **OPERATOR mode** (driving, switching of functions and accessories).

EXCEPTION: **DEACTIVATION** of an active address (to get to the **address input page** in order to enter a new address) is not possible with the "A" key, because this key is used in connection with the recall memory preview, see below. Only the key combination ↑-A (shift and "A" together) deactivates an address!

There are numerous ways to use the free space in the lower display half. Not all of them will be available from the start but will be added one by one with future software updates.

### Recall memory preview with direct activation

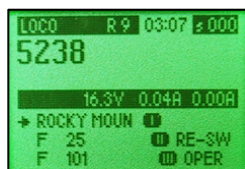
This is the standard application of the EXPERT mode: 3 lines from the recall memory are displayed beneath the center bar, selectively from the LOCO or the SWI recall memory.

See the chapter "Recall memory and list of names" regarding the recall memory's purpose and mode of action!

Use the **scroll wheel** to search through the recall memory preview.

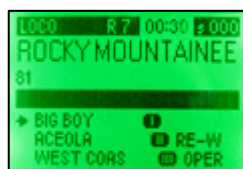
Switch between the LOCO recall memory and the SWI recall memory with the **soft key** indicated in the lower right corner of the display (usually **II**).

Use the **A key** to **activate** a marked address, which brings the address to the upper display half and in control of the operator. If an address from the SWI recall memory is selected, the cab will of course switch from the LOCO to the SWI mode (red display) or the other way around, if applicable.



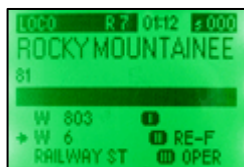
LOCO mode **EXPERT**  
with LOCO recall memory preview

Select and mark with the scroll wheel  
Activate marked engine address  
with the **A** key →



... after selecting and activating of a marked engine address

As above right but  
with the preview  
memory switched,  
using soft key II, to  
show the SWI  
recall preview



LOCO mode **EXPERT**  
with SWI recall memory preview

Select with scroll wheel  
Activate with **A** key →



... after selecting and activating of a marked address

## CAB display of track voltage and power

The track voltage and power measured by the command station (MX1 and MX1HS, separate for each track output) can be displayed in the center bar of the display when in EXPERT mode (See pictures above!).

This must first be activated in the "CAB" menu.

Note: The center bar will also be used for other information with future software versions; most importantly for the bidirectional communication (RailCom)!

## Linking the active address with a secondary accessory address

„Secondary accessory address link“ from SW-Version 3.15 and 2.06 for MX31ZL!

The 4 paired functions of an accessory address in the SWI mode (usually turnouts) require only 4 keys of the cab, keys 5 to 8 remain unused in the OPERATOR as well as in the EXPERT mode.

With the help of the **“secondary accessory address link”** it is possible to activate a second address with **keys 5 to 8** so that 8 turnouts can be controlled and operated at the same time.



Linking such a second accessory address is done, after selection with the scroll wheel from the SWI recall memory preview, with the soft key **“2.-SWI”** (usually I);

The second accessory address is now linked with the active address in the upper display half and both are always activated together. Accordingly, both addresses are displayed together (“xxx + yyy”), if necessary under the name of the first address.



SWI display in **EXPERT** mode  
linked to a second accessory address

The linked accessory addresses  
shown here in the **EXPERT** mode are  
equally valid in the  
**OPERATOR** mode!



SWI display in **OPERATOR** mode  
linked to a second accessory address

Breaking such a link (deleting a linked secondary accessory address) is also possible only in the EXPERT mode with the soft key **“2.-DEL”**.

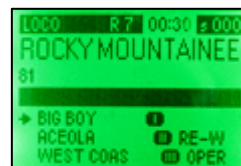
## Use of Soft Key's

First applications (turnout actuations with soft keys) from SW-Version 1.10!

The applicable assignments of the soft key's I, II and III are indicated in the lower right corner of the EXPERT mode display. This is by default the switchover to the OPERATOR mode, switching between the recall memory preview lists LOCO, SWI and more; see previous pages.

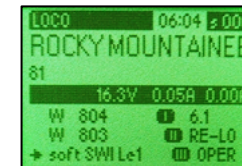
Soft keys can also be defined for other functions, via the menu, which are displayed accordingly at the proper time in the display; i.e. switching of selected turnouts in. See chapter “MENU and MENU FUNCTIONS”, “CAB MENU” and line “DEF S-Keys in SWI mode”.

The soft key assignment may be extended to 10 levels. For example: each soft key can control up to 10 turnouts for a total of 30. The 30 available slots may also be mixed for different functions. Moving between the levels is done with the scroll wheel whereby the available levels are added automatically to the recall memory preview lists that are displayed in the EXPERT mode.



LOCO display in **EXPERT** mode  
with LOCO recall memory preview

Scroll to the end of the preview  
list using the scroll wheel to  
select from the soft key levels.



LOCO display in **EXPERT** mode  
with the same preview list after scrolling down.

If the cursor points to an entry such as “Soft SWI Lev 1”, “Soft SWI Lev 2” at the end of the preview table, the turnouts belonging to this level can be operated immediately with the soft keys.

## Dual control: A second engine independently controlled with the scroll wheel

Implemented with SW version ?

In the LOCO mode EXPERT, showing the LOCO recall preview list, a second engine can be selected with the scroll wheel and activated with the soft key???<sup>1</sup>. The second engine will then be displayed in the bottom half of the display and can be controlled with the scroll wheel. The speed slider and function keys are still assigned for the engine in the upper display half.

Deleting the second engine from the scroll wheel with soft key???<sup>1</sup>

<sup>1</sup> The soft keys will be named when this function gets activated.

## 14. "RailCom" - Messages OPERATOR, EXPERT

RailCom is a registered trademark of Lenz GmbH

The "unprompted RailCom messages" are displayed in the LOCO mode for the active locomotive, provided the decoder is capable of RailCom (and RailCom is activated with CV #29 and CV #28).

In the OPERATOR mode, the **one-line** RailCom message is shown **in a frame** below the loco address or name; the EXPERT mode displays the information **in one line framed by two squares**.

The frame (or squares) informs the viewer how current the message is.

- Frame (squares) drawn solid: message is not older than 1 second,
- Frame (squares) more or less perforated: message is a few seconds old (no new message since)
- Frame (squares) missing: message is 5 seconds old and will soon disappear.

The disappearing frame (squares) gives the operator some idea about the quality of the communication with the decoder. However, there is also a large dependency in this respect on how often the address is being sent, which again depends on the activities of other cabs, computer etc.



Typical RailCom messages during the initial phase in the LOCO-OPERATOR mode



Disappearing frame around the RailCom line after @ 3 seconds

PLANNED

Typical RailCom messages during the initial phase in the LOCO-EXPERT mode

The content of the RailCom message will change with the SW version of the decoder (and the cab) or with the operating conditions and settings of both the decoder and the cab.

RailCom will be further developed over the coming years, which will bring new applications; the version that is available at the time this manual was written is in a very early stage.

At first (October 2007), RailCom can only be displayed by the System Cab MX31ZL, since it contains the necessary "global RailCom detector". Systems using the command station MX1, MX1HS and MX1EC will be able to display RailCom messages in their cabs once "global RailCom detectors" become available for these command stations.

RailCom in its initial phase will inform about speed and motor load, a little later (with the next ZIMO decoder software) information like actual speed (in km/h) and predicted stop times with consideration to momentum settings.

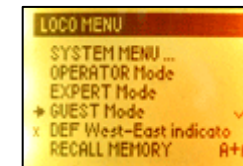
## 15. LOCO and SWI handling in Guest Mode

GUEST- Mode from SW-Version 1.12 !

The GUEST mode can be selected from the OPERATOR mode exclusively via the menu (LOCO or SWI menu). Press the soft key "M", scroll to GUEST mode, select with the "A" key and exit the menu with the "E" key.



LOCO display – OPERATOR



MENU after GUEST selection



LOCO display – GUEST

**A number of functions are locked out** in the GUEST mode:

- Deactivation of current address or input of new address,
- Activation of modules such as MX9, MXDS,
- Switch ladders, AOS etc,
- Recall memory list, list of names, menus,
- E-functions,
- Programming in service mode (E+MAN) as well as operations mode (E+F, E+W),
- EXPERT mode,
- Keys C, T, RG

**NOTE and TIP:** It is still possible though in the GUEST mode to switch to the next loco address or the next group of switches with the keys F or W, provided the recall memory of the cab holds more addresses. If the GUEST mode is to be limited to one address only, delete all other addresses from the cab before entering the GUEST mode!

The GUEST mode can be exited with the help of the **soft key III**, but only after entering a **secret code number (PIN)**! By default, this number is 0 and doesn't need to be entered when prompted to do so (just acknowledge with the "A" key).

An actual secret code number (other than 0) that needs to be entered before exiting the GUEST mode can be defined under PIN in the CAB menu.

A master code number can be obtained from ZIMO if the defined number can't be found.



## 16. Recall memory and list of names OPER., EXP.

### The recall memory (a local memory in the cab):

If a loco or accessory address in a cab is deactivated ("A" key or  $\uparrow$ -A) it does not disappear from the system but remains stored in the recall memory of the command station and the relevant cab (MX2, MX21, MX31....).

By default, the recall memories of the MX31 hold 10 addresses in each mode, LOCO and SWI (the size of the memory can be changed to hold between 1 and 30 addresses with the help of the E-procedure RUB or via the menu). How many addresses the memory currently holds is indicated in the top line of the display ("R...") in both, the LOCO and SWI mode.

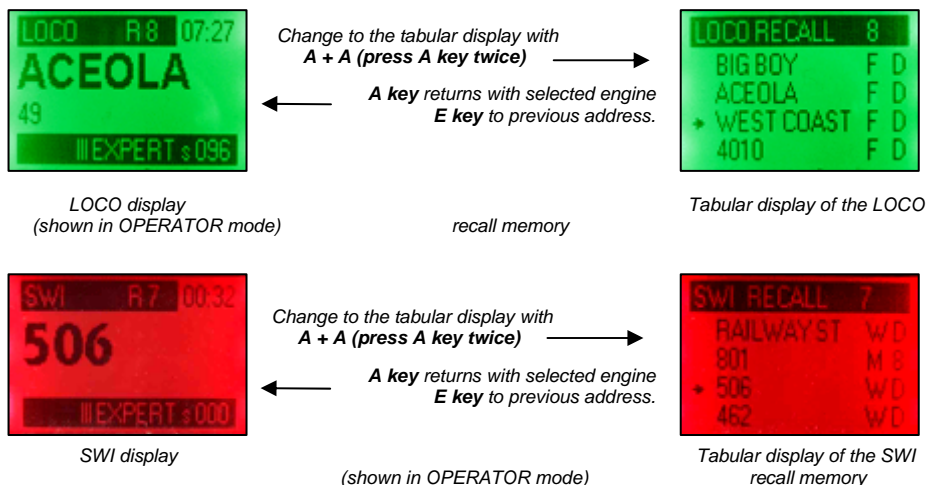
All ZIMO cabs will bring the top address stored in the recall memory to the foreground and activate it with the **F**  $\blacktriangle$  (LOCO mode) or the **W**  $\blacktriangle$  (SWI mode) key while at the same time deactivate the previous address. Repeatedly activating the F or W key rotates through the complete memory bank.

Additionally, with  $\uparrow$ -F  $\blacktriangle$  (shift and F key) or  $\uparrow$ -W  $\blacktriangle$  the recall memory can be rotated through in reverse, which can sometimes be very useful (not functional in version 1.14, will be activated with future SW update).

The **U**  $\blacktriangledown$  key will always get you back to the last active address, i.e. to move quickly and easily between two loco or accessory addresses (not functional in version 1.14, will be activated with future SW update)..

The **C** key deletes the currently active address from the recall memory!

In the ZIMO cabs MX21 and MX31: Pressing the **A** key twice in rapid succession (within half a second) while in an active LOCO or SWI mode switches to a **tabular display** of the recall memory (not available in MX2 cab), listing names and addresses including the data format and if applicable markers for consists ("T") or switch ladders ("H"). The list can be **scrolled up or down** with the thumb wheel (not available with MX2 or MX21 cab) or the **F** and **W** keys and the desired selection activated with the "**A**" key. Using the E key instead leads to the previously active address.



The tabular display can be called up in the OPERATOR mode as well as the EXPERT mode. The presentation differs in the font size and therefore also in the number of lines visible in the display.

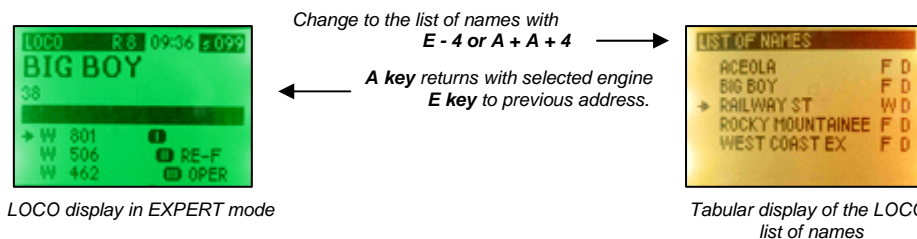
The EXPERT display also shows a "recall memory preview" in the lower display half: 3 lines from the recall memory that can be scrolled and activated similar to the full display view. See chapter "LOCO and SWI handling in EXPERT mode".

### The list of names (currently implemented as a system wide feature):

In contrast to the recall memory, the list of names is *not* divided according to LOCO and SWI information. It shows all names stored in the system on the same page and it shows names exclusively, which means that numerical loco or accessory addresses are not shown in this list.

The list of names is displayed in a table format only and can be called up using the **E-4** keys (E and 4 key pressed together) or with **A + A + 4** (press the A key twice followed by the "4" key). The entries are marked with an "F" (for a loco address) or "W" (accessory address). The cab selects the appropriate mode, either LOCO or SWI, when an entry is being activated with the A key.

The list of names is of particular importance in conjunction with acquiring names from other cabs or the system. It functions as a cache: external names are stored in the list of names from where they can be accessed and activated by any cab and are in this way imported in to a cab's recall memory.



SUMMARY of the SELECTIONS:

- WHEN? (to switch from the LOCO or SWI mode to the tabular display)
- ▼ from the active LOCO mode, with **A + A (2x A key)** to the tabular display of the LOCO recall memory
  - ▼ from the active SWI mode, with **A + A (2x A key)** to the tabular display of the SWI recall memory
  - ▼ from the LOCO or the SWI mode, with **E-4** to the tabular display of the list of names.

CAB?

- Display: green for the LOCO or red for the SWI recall memory table. Full-screen display.
- Display: yellow (List of names); Full-screen display.

HOW?

(in the tabular display)

- ◆ Scroll the table using the thumb wheel, F/ W keys (up/down) or the speed slider.

WHERE TO?

(leaving the tabular display)

- **Activate** the selected address with the **A** key;
- **Return** to the **previous** (last active) address with the **E** key.

## 17. E - Procedures

### OPERATOR, EXPERT

#### WHEN?

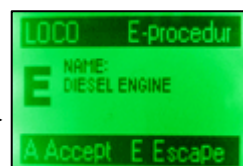
- ▼ from the LOCO mode with the E key and the number key, marked with desired E-procedure
- ▼ from the SWI mode with the E key and the number key, marked with desired E-procedure

All E-Procedures can also be called up using the menu, where the key combinations for above mentioned shortcuts are also shown.



LOCO display in OPERATOR mode

Start of an E-Procedure, for example:  
E-Procedure "NAM" with  
E + 4 keys (in succession)



E-Procedure, in this example:  
name entered after E+4

#### CAB?

- Display color of the selected mode remains (green or red), capital "E" displayed to confirm E-procedure programming, beside it prompting and entry lines of the respective procedure.

The bottom display bar indicates the exit options: A = Accept, E = Escape.

#### HOW?

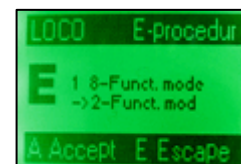
There are a number of different E-procedures available, named after the key that is pressed following the E key.

All E-procedures are started with the **E key**, followed by **another key** that selects a procedure. Keys that offer an E-procedure are marked accordingly just above the key; the two keys are **pressed in sequence, not together!** The relevant information can now be entered or a selection made from the list presented using the scroll wheel and exited with the A or E key.

#### WHERE TO AND BACK?

Exit: with **A key (= Accept)**: Accepts the selections made with the E-procedures and returns to previous mode (LOCO, SWI or MENU); **E key (= Escape)**: Returns to previous mode without implementing selections made with E-procedures.

- ◆ E-procedure **8/12** (press E - 1) – selects between the 8 and 12 function mode for the active loco address; selection for this address remains stored in the system even after address gets deactivated.



This procedure is **no longer relevant** today, if all ZIMO components (command station and decoder) in use were produced **in 2003 or later** – they all operate in the 12 function mode by default. If on the other hand ZIMO decoders from earlier productions are used and functions above F4 and/or the MAN key employed, an adjustment may be required that is, the relevant addresses need to be set to the 8-function mode with the help of the E-procedure 8/12. See the leaflet "8/12 functions" available on the Zimo web-site.

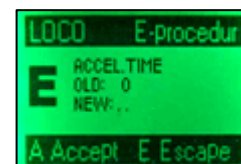
However, this procedure will gain new significance in the future (in the course of 2006) when the new DCC standard with more than 12 functions will be introduced!

- ◆ E-procedure **PUK** (press E + 2) – selects between "normal" and "serial" function actuation, also known as "pulse chain commands"; selection for this address remains stored in the system even after address gets deactivated.



This procedure is **only relevant for older LGB locomotives** equipped with original LGB decoders (built before 2004) that operates function outputs with just one function key (F1) by sending different number of pulses for each function. The ZIMO command station generates this pulse chain command automatically containing between 2 and 8 pulses when function keys F2 – F8 are actuated, if activated with the PUK E-procedure.

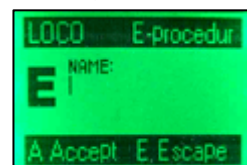
- ◆ E-procedures **AZ, BZ, ABK** (press E + 3, 6 or 9) – Sets acceleration and deceleration rates as well as specific characteristic curves for the active address; selection for this address remains stored in the system even after address gets deactivated.



The acceleration and deceleration rates set with this procedure have nothing to do with the decoder configuration variables (CV #3 and 4), but rather determines the succession rate of speed step commands sent out by the system. Both system and decoder controlled acceleration and deceleration rates supplement each other in the resulting driving characteristic.

Values between 0 and 15 can be chosen for AZ and BZ, which is the time in seconds it takes for an acceleration or deceleration event to occur from a stand still to full speed or the reverse. ABK determines different characteristic curves (shallower curve with values between 1 – 8 in the lower speed range or steeper with 9 – 15) with fixed time elapse according to AZ and BZ.

- ◆ E-procedure **NAM** (press E + 4) – to enter or edit names used for the active loco or accessory address; allocated names remain stored in the system even after address gets deactivated.



If a name is already allocated for this address, it will be shown in the display and can be deleted letter by letter with the "C" key. Enter names with the number keys that act as alpha-numerical keys, same as with telephones.

NOTE: If the E-procedure NAM is started for an address belonging to a consist or switch ladder ("T" marker in the LOCO mode or "H" marker in the SWI mode display), the name entered is used for the consist (or

switch ladder). From SW-Version 1.20.

NOTE: Names containing up to 7 letters are displayed in large font as an active address, with medium font if longer; 12 characters is the maximum that fits in one row but it is possible to use names with up to 24 characters.

- ◆ E-procedure **M/D** (press E + 7) – selects between permanent and temporary function key actuation of the active LOCO or SWI address; selection for this address remains stored in the system even after address gets deactivated.

After entering this E-procedure, use the function keys to be changed to toggle between temporary or permanent actuation; the LED's above the keys indicate the selection made: green for permanent and red for momentary action.

All function keys by default are set to permanent action except for F9, which is set to momentary because there is no indicator-LED available in the MX31 cab.

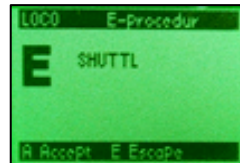


- ◆ E-procedure **RÜB** (press E + 8) – defines the recall memory depth, separate for the LOCO and SWI memory (for the mode this E-procedure was started from).

Every single address (as well as consist) is stored in the recall memory after its deactivation, from where it can be re-activated (in the tabular address display or by directly rotating through the memory with the F or W key). The recall memory holds 10 addresses by default. Once the memory is full, the oldest entry is dropped with every new address added to the memory. The memory size can be changed with the E-procedure RÜB to hold between 1 and 30 addresses.



- ◆ E-procedure **OS** (press E + U) – shortcut to enter the area of operating sequences (can also be reached using the menus), to define new or actuate stored switch ladders, automatic operating sequences (AOS), automatic routing sequences (ARS) and similar features to be introduced in the future. Also see chapter about operating sequences!



- ◆ E-Procedure **STU** (press E + 0) – Selects between 14, 28 or 128 speed steps.

28 speed steps are set by default, which means that decoders set to 28 or 128 speed steps are functioning properly. Not so with decoder set to 14 speed steps (mostly older decoders or LGB; the incompatibility is usually recognizable by the flashing head lights). To take full advantage of modern decoders (128 speed steps) set the cab to 128 steps as well (for each single address with this procedure or for all addresses via the menu).





## 18. Decoder Programming OPERATOR, EXPERT

One part of programming is **assigning** a specific **address** to a loco or accessory decoder. This is done in "service mode programming", which is only possible on the programming track. The other part of programming involves writing or modifying the data content of configuration variables (CV's) to a decoder.

<b>"Service mode"</b>	<b>"Operations mode"</b>
Locomotive (or decoder) on programming track (output "PROG"), Loco at standstill.	Loco (or decoder) on main track ("on-the-main", output "SCHIENE"), Loco at standstill or traveling.
Address <u>and</u> CV programming.	Only CV programming is possible.
Safe programming through acknowledgment.	Unconfirmed programming (certain degree of reliability <del>depending</del> commands repeatedly).
Read-out of addresses and configuration variables possible.	Read-out not possible (CV read-out may become possible in 2006 via bi-directional communication).
Start programming with "E" and "MAN" key.	Start with "E" and "F" or "E" and "W" key.

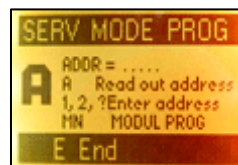
When?

- ▼ from the LOCO mode with **E-MN** (press E (first) and MN keys together) for programming in „**service mode**“
- ▼ from the LOCO mode with **E-F** (press E (first) and F keys together) for programming in „**operations mode**“
- ▼ from the SWI mode with **E-MN** (press E (first) and MN keys together) for programming in „**Service mode**“
- ▼ from the SWI mode with **E-W** (press E (first) and W keys together) for programming in „**operations mode**“



LOCO display

Starting a service mode programming procedure  
(i.e. from the LOCO mode with E-MN)



Service mode programming display

Starting an operations mode programming procedure  
(i.e. from the LOCO mode with E-F)



Operations mode programming display

CAB?

- Yellow display, capital **"A"** ("A" for Addressing) confirms that "Service mode" programming or **"P"** that "operations mode" programming is active.

HOW?

- ◆ After entering "service mode" programming with keys E-MN (capital **"A"** in display), the procedure starts with the prompt "ADDR = ", which leaves two possible choices:

- ◇ **Punch in an address** and confirm with the **F** key (for a loco decoder) or the **W** key (for an accessory decoder), after which the address is written to the loco (with installed decoder) sitting on the programming track or to a decoder connected directly to the programming output of the command station. A successful programming is acknowledged on the same line in the display with **"ACK"**. An unsuccessful programming is indicated with an "Err ..." message.

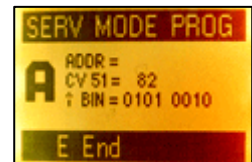
ZIMO decoders initiate a **"hard reset"** when programmed to address "0". NOTE: This is only possible with ZIMO decoders. Decoders of other manufacturers are reset by writing 8 to CV address 8. This procedure is also possible with ZIMO decoders; giving two choices to initiate a hard reset with similar results (see decoder manual for more details).

- ◇ Pressing the **"A"** key immediately after the "ADDR ..." line appears (without punching in an address), causes the command station to read out the address of any decoder connected to the programming output and displays it in the cab display, followed by the confirmation **"READ"**. An error message ("E ...") appears if readout is not possible.
- ◇ You can now overwrite an existing address, exit programming with the "E" key or branch off to **CV programming** with the **"C"** key (see below).

- ◆ "Operations mode programming" (capital **"P"** in display) to program CV's commences immediately after pressing keys E-F or E-W with the line "ADDR .." as well, but is only displayed for informational purposes since the address cannot be changed in operations mode programming.

- ◆ **Programming CV's** is identical in either **"service mode"** or **"operations mode"** (capital **"A"** or **"P"** in display):

- ◇ Most often a CV number is already displayed as a suggestion, which can be accepted by pressing the **"A"** key or deleted (with the **"C"** key) or simply overwritten by **entering a CV number**, accept with



the “**A**” key (which is displayed an added “=”), **key in** the desired **value** and accept again with the “**A**” key.

◇ Programming in “service mode” is acknowledged with the **confirmation “ACK”** or an error message (E...).

◇ Actual **confirmation** in “operations mode” programming will only be possible once RailCom (bidirectional communication) is implemented and only with decoders equipped with this feature. For decoders without RailCom, “**SENT**” is displayed **as** an internal system **confirmation** only.

◇ The **↑ key** switches the cab to **binary programming**, where the display in addition to the decimal values also displays the binary code and the number keys no longer are used to enter digits but to invert Bit values with the 0 .. 7 keys instead with 0 referring to the rightmost least significant bit. The resulting decimal value is continually updated and displayed as well. Pressing the **↑ key** again, exits the cab from the binary programming.

◇ As usual, the **C key** can be used to delete one character at a time on the input line but also to start a **new entry (another CV)** where a new CV number can be entered, value changed etc (after the first CV value has been edited or read out with the “A” key).

◇ The data content of a CV can be **read-out** in “service mode” by pressing the “**A**” key **twice** after the CV number is entered. A successful read-out is confirmed with “**Read**”.

◇ **Read-out** in the “operations mode” is only possible with RailCom (bidirectional communication with decoders equipped with this feature. The procedure is identical to “service mode” programming; “**RC READ**” indicates that the value has been read.



WHERE TO AND BACK?

Returns to the LOCO or SWI mode.

► Exit programming procedures with the **E key**. In contrast to the E-procedures, the E key is the only way to exit the programming procedure, since decisions whether to accept the programming steps have already been made.

#### ⊗ ERROR MESSAGES

E 0: Stand-by voltage at start of programming less than 12 V.

E 1: Voltage test timed out.

E 2: Over current at start of programming (higher than 250 mA)

E 3: Voltage too low for current consumption (rise of more than 60 mA is necessary)

E 4: No decoder acknowledgment (doesn't necessarily mean unsuccessful programming). Could also be because no consumers like head light or motor are connected or the current consumption of those is too low, thus decoder read-out is not possible.

E 5: Over current at programming output end stage

E 9: Selected register does not exist.

## 19. Sound-Selection in ZIMO Sound Decoder

MX31 from SW-Version 1.20; MX31ZL from SW-Version 3.05

### INTRODUCTION:

ZIMO sound decoders are usually delivered with a “**sound collection**” on board. This is a specialty of the ZIMO sound concept, which is only possible due to the large decoder memory: sound samples and parameters for several loco types (i.e. 5 different locos) are stored on the decoder; the desired sound combinations that should be played back in operation can be selected with the cab using special **selection procedures**.

The user is not forced to accept a finished sound but is free to put together sound files for his locomotive according to his own taste by selecting for example from 5 different chuff sets, one of 10 whistles (or several on different function keys) and finally selecting from several bells, compressors, steam shovel or oil burners, brake squeal and so on.

This decoder feature can be utilized by any digital system but it is **much more convenient** with a **ZIMO MX31** cab; also see the decoder manual for more information.

### WHEN?

- ▼ from an active **LOCO** display, press the “M” key to enter the LOCO MENU. Scroll down to **SOUND SELECTION MENU** and accept with the “A” key.

### HOW ?

- ZIMO sound decoders are delivered with typical loco and function sounds already pre-selected so operation is possible right away.

This means that from the various sound groups (i.e. from the “chuff group” or the “whistle group”) certain sound samples are activated as loco sound or function sound.

In case of the “European steam collection” a 2-cylinder steam chuff set is selected (with the chuff frequency matching the wheels roughly but most likely needs further fine-tuning) with automatic blow-off and brake squeal as well as some random sounds at stand still.

Specific “function sounds” are allocated to the function keys, that is, each function key is assigned to a specific “sound group” from which a specific “sound sample” is allocated, which plays back when that function key is pressed. In the case of the “European steam collection” these are:

F2 – Short whistle	F9 – Compressor
F4 – Cylinder blow-off	F10 – Generator
F5 – Long whistle (playable)	F11 – Injector
F6 – Bell	
F7 – Shoveling coal or oil burner	

- Search among the “sound groups” in the **SOUND SELECTION MENU** for the group that is to be edited. For example: Select the chuff group (with the “A” key); in the following step evaluate the various chuff sounds stored in the sound collection and install the one desired.

Selecting **FUNCTION\_SOUNDS** leads to the corresponding sub menu, which allows the selection of one of the single functions by scrolling down to the appropriate line (F1, F2, F3...) and accepting with the “A”



key. With the following step a sound sample can be allocated to the selected function key.

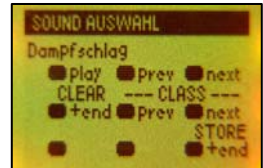
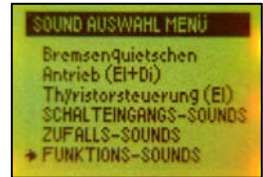
- Once a certain sound group is selected (see above), the actual **sound selection** begins and all sound files from this group can be listen to by using the function keys as shown in the display: Key 1 plays the current sample, key 2 the previous and key 3 advances to the next sample in the group.

In the group “function sounds” or “random sounds” it is also possible to switch between the groups because any kind of sound can be allocated to function keys. Key 5 returns to a previous group and key 6 advances to the next.

- When the desired sound sample is found, it can be activated with **Key 9 (STORE + end)**, which adds the selected sound file to the proper place in the driving sound or function key. At the same time the display returns to the SOUND SELECTION MENU.

In some cases other settings using keys 7 and 8 are possible before leaving the sound selection with the F9 key. Among them is loop selection or for random sounds, whether they are to be played back at stand still or when cruising.

- Press **key 4 (CLEAR + end)** if no sound is to be allocated or to delete the current sound. This also returns to the SOUND SELECTION MENU.
- Press the “**E**” key to exit the SOUND SELECTION without making any changes. This will retain the current sound and returns the display to the SOUND SELECTION MENU.
- Another sound group can be selected for editing from the SOUND SELECTION MENU or exit the menu with the “E” key.



**Also see the operating manuals of the ZIMO sound decoders, chapter ZIMO SOUND – Selection and Programming!**

The CV #300 procedures explained there will be automatically executed with the MX31 procedures above. There is no further need for executing them manually.



## 20. SHUTTLE OPERATION

### EXPERT

The E-procedure "OS" (BAB) is the entry to the definition and/or actuation of "Operating Sequences". At this time (SW version 1.16) only automated shuttle operations are implemented.

This area is reached through the common "E-Procedure": Press the **"E" key** followed by the **"U" key** (= BAB, the German abbreviation for OS), at which time the capital "E" in the display changes to capital "B".

Pressing the number **1 key** starts the **definition procedure for shuttle operations**.

Each command station (MX1, MX1 – model 2000, MX1HS or MX1EC) has at least 4 switch inputs that can be connected to reed switches or similar and cause an automatic direction change to the train assigned for shuttle operation (more precisely: changes direction provided the train is traveling in the opposite direction). Also see the MX1 instruction manual. Special command station CV's are available to set station stop times.

A shuttle train input can be assigned to the active engine address with the digit keys 1 to 4 (1 to 8). The LED above the key indicates the assignment status:

**dark** = not assigned,

**green** = assigned for directional change forward,

**red** = assigned for directional change reverse;

"E" key exits the procedure.



\*) A normal shuttle operation requires that two inputs are assigned to an engine address, for example "pin 1 forward" and "pin 2 reverse". It is thus possible to have 2 automated shuttle trains going independently (if 4 inputs are available). It is also possible to assign more than two inputs to just one engine address.

\*) On the other hand, each shuttle input can only be assigned to one engine address; the existing assignment of an input is automatically deleted without warning if the input is being reassigned to a different address.

\*) For a universal consist only one address is assigned to a shuttle input, which is the active engine address shown in the display during the assignment procedure.

## 21. MENU and MENU FUNCTIONS OPERATOR, EXPERT

MENU from SW-Version 1.10; with future extensions !

The menu leads to different functions, mostly for adjustments and definition procedures at the present level, system level or device level.

WHEN?

- ▼ from the LOCO mode (green display) with the **M key** to the RUN menu,
- ▼ from the SWI mode (red display) with the **M key** to the SWI menu.

Entering the menu structure is *not* possible while the cab displays the recall memory, list of names or while running an E-Procedure, even though the screen is also green or red in these cases.

- ▼ **Multiple M key actuations (2 or 3 times)** lead directly to the SYSTEM or the CAB menu.

CAB?

- Display is yellow with menu selections in table format.

HOW?

(in table format)

- ◆ Use the scroll wheel or the F / W key's (up / down) to make a selection and the **A key** to accept the selection (marked with ">").
- ◆ The **E key** escapes from a lower menu level to the next higher level (i.e. from the CAB to the SYSTEM menu or the SYSTEM to the LOCO or SWI menu).

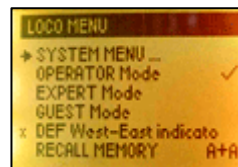
WHERE TO AND BACK?

- The **E key** escapes from a lower menu level to the next higher level (i.e. from the CAB to the SYSTEM menu or the SYSTEM to the LOCO or SWI menu) and **exits the menu altogether** after reaching the highest level (LOCO or SWI).



LOCO mode

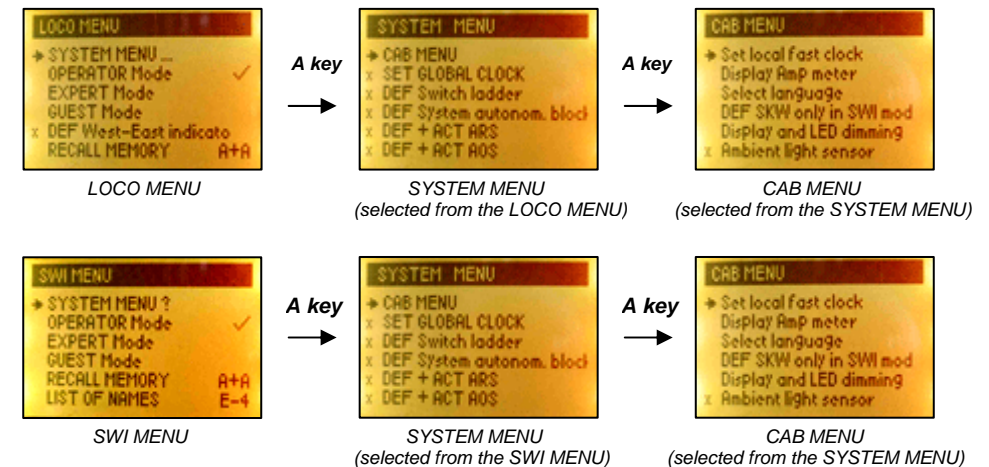
From the LOCO mode  
with the **M key**  
to the menu!  
(likewise from the SWI mode)



LOCO MENU

### THE MENU STRUCTURE:

After entering the menu with the M key, the appropriate LOCO MENU or the SWI MENU appears with all applicable selections. The first line accesses the SYSTEM MENU while the first line in the system menu is for entering the CAB MENU.



x.....is not yet accessible (SW version 1.14) but is planned with future SW version.

### LOCO MENU

- > SYSTEM MENU
- SOUND SELECTION MENU
- OPERATOR mode ✓
- EXPERT mode
- GUEST mode
- x DEF West-East display
- RECALL MEMORY A+A ]
- LIST OF NAMES E-4 ]
- SERV MODE PROG E-MN ]
- LOCO OPER PROG E-F ]
- LOCO „ZINC“ PROG E-C ]
- STU Speed steps E+0 ]
- 8/12 Functions E+1 ]
- PUK Pulse chain E+2 ]
- AZ Accel. times E+3 ]
- NAM Name allocation E+4 ]
- x NUM Number allocation E+5 ]
- BZ Decel. times E+6 ]
- M/D Permanent/Latching E+7 ]
- RUB Memory depth E+8 ]
- ABK Momentum curve E+9 ]

The currently active mode is (will be) marked with a check mark. To change to a different mode, scroll up or down, press the "A" key to mark the new mode and exit with the "E" key.

Definition of the small direction arrows above the direction key.

Enters the recall memory, list of names, programming and E-Procedures.

These functions can also be accessed directly with the key combinations shown in each line.

See the chapters "Recall memory and list of names", "E-Procedures" and "Programming" for the actual procedures!

**SWI MENU**

> SYSTEM MÜN  
 OPERATOR mode ✓ *The currently active mode is (will be) marked with a check mark.*  
 EXPERT mode  
 GUEST mode  
 RECALL MEMORY A+A ]  
 LIST OF NAMES E-4 ] *Enters the recall memory, list of names, programming and*  
 SERV MODE PROG E-MN ] *E-Procedures.*  
 SWI OPER PROG E-F ]  
 NAM Name allocation E+4 ] *See the chapters "Recall memory and list of names",*  
 M/D Toggle/Latched E+7 ] *"E-Procedures" and "Programming" for the actual procedures!*  
 RUB Memory depth E+8 ]

**SYSTEM MENU**Exit SYSTEM MENU in LOCO or SWI with the **E key!**

> CAB MENU  
 x SET GLOBAL CLOCK  
 x DEF Switch ladders  
 x DEF System autonom. block  
 x DEF + ACT ARS  
 x DEF + ACT AOS  
 USB-STICK DEC-UPD *Decoder-Update with the USB-Stick, MX31ZL only!*  
 PROG MX1  
 x PROG Booster  
 PROG Radio module  
 PROG MX8 module  
 PROG MX9 module

**CAB MENU**Exit CAB MENU within SYSTEM menu with the **E key!**

> SET LOCAL CLOCK  
 Display AMP METER  
 Select LANGUAGE  
 MX31ZL: Volt and amps *These points lead to*  
 MX31ZL: RailCom global *submenus and are*  
 MX31ZL: System-CV's *only available with the MX31ZL*  
 RailCom display *Only when MX31ZL operates as a cab*  
 DEF Soft Key's for switches *Defines the soft key's for turnout actuation*  
 Display and LED dimming  
 x Ambient light sensor.  
 x Auto. name propagation  
 x Leading Zero's  
 x Timeout  
 Change PIN  
 RESET CAB

x.....is not yet accessible (SW version 1.14) but is planned with future SW version.

The following describes only procedures that can be reached exclusively through the menus! Consult the corresponding chapters for E-Procedures (E +...) and programming procedures (PROG ...).

**SYSTEM MENU****Description of selected features****MENU Soft Keys for switches****Soft key allocations for turnout actuation****LEFT ENTRY**

469

Soft Key Scroll Level: 7

I: 469.2 II: - - - III: 63.3

**A Accept E Esc C Clear.**

This part of the menu **must** be entered from the SWI mode; the turnout address remains displayed. The newly defined and selected allocations are displayed in the lower part of the screen.

During soft key definition, the switch addresses can be called to the foreground from the recall memory with the **W key**, just as in the normal SWI mode. NOTE: It is not possible to switch to the tabular display of the recall memory, list of names or to the address input page while in the definition mode!

To assign a turnout (or other accessory) to one of the three soft keys (I, II, III), actuate that turnout with the appropriate number key then press the desired soft key within 2 seconds. The display immediately shows the new assignment.

The turnout can be actuated with the assigned soft key after returning to the LOCO or SWI mode.

Note: It will be possible in future SW versions to assign turnout ladders, so that several turnouts can be actuated with one soft key.

**The soft key levels:** The soft keys can be assigned 10 levels deep for different addresses so that more than just 3 soft key functions become available, i.e.  $3 \times 10 = 30$  turnouts but also mixed with other accessories or the standard key functions.

These levels are accessible in the definitions mode with the scroll wheel and shown in the display; the allocations made apply only to the soft key level currently displayed.

Exiting the definitions procedure:

Key A = Accept	New allocations will be accepted.
Key E = Exit	Allocations (or changes) will not be accepted.
Key C = Clear	Clears (deletes) all soft key allocations in this level.

The **soft keys are available for turnout actuations (in the LOCO or SWI mode)** according to their definition and are identified accordingly in the lower display bar in the OPERATOR mode or in the lower right field in EXPERT mode.

The **soft key level** is generally **selected with the scroll wheel**. If the scroll wheel by default is used for a different function, it must first be switched to this function with the help of the **⇧** (shift) key!

In the EXPERT mode, where the lower display half shows either the LOCO or SWI recall memory preview, the soft key levels can be reached by scrolling to the end of the recall memory table.

See chapter „LOCO and SWI handling in EXPERT mode“!



## CAB MENU

## Description of selected features

**MENÜ Display colors**

> Display green 143  
 Display red 221>  
 Display yellow  
 Key-LED's green 185  
 Key-LED's red 142  
 Key-LED's yellow

**A Accept E Escape**

## Display and LED colors

Selecting the respective line causes the cab to display the corresponding color; moving the speed slider changes the numerical value between 0...255. Yellow is the result of the red/green combinations and therefore requires no separate adjustment.

**MENÜ Ambient light sensor**

dark bright outdoor

> Display 30 100 100  
 FU 30 30 0  
 LEDs 80 80 100  
 FU 50 60 100

**A Accept E Escape**

Planned:

## Display / LED brightness depends on ambient light

All displayed percentages can be reached by scrolling and modified with the speed slider. It is advisable to make changes under actual ambient lighting conditions ("bright", "dark"). It may be practical to turn the display off outdoors or even under "bright" conditions (value 0) in order to save battery power when operating in radio mode.

**MENÜ Language**

> Deutsch ✓  
 English  
 Français  
 Italiano

**A Accept E Escape**

## Display language selection

The stored languages are displayed and the currently selected language identified with a check mark, select a different language with the scroll wheel and actuate with the A key.

**MENÜ Local Clock**

> Set to 00:00  
 Set to \_\_: \_\_  
 Ratio 1: \_\_  
 Display local clock ✓  
 x Display global clock

**A Accept E Escape**

## Select and set the "local fast clock"

The local clock is displayed after entering data in one of the lines and accepting it with the A key.

## CAB MENU

## Special features for the MX31ZL System Cab

**MENÜ ZL Volt & Amps**

> Track voltage (V) 16.4  
 Contin. current (A) 2.8  
 Peak current 5.0  
 UES Cut-off delay (s) 1.0

U: 16.3 I: 0.35 ....

**A Accept E Escape**

## Track voltage, Track power, Power cut-off delay

The individual adjustment points are selected with the scroll wheel and the values set/changed with the speed slider. For the **track voltage**: moving the speed slider all the way to the top sends all the voltage available from the power supply directly to the track, without being regulated internally; which offers the largest possible range for „continuous track power“. The **peak current** allows the temporary overloading (up to 5 sec) of the unit (for loco starts etc.). The **UES cut-off delay** defines a time during a short circuit where the track power is reduced to „continuous power“. If the short circuit is removed during that time, full track power is restored. But if the short persists beyond the delay time, the power to the track is cut off. By default, this time is set to 1 sec but can be changed between 10ms to several seconds.

A longer cut-off delay is for example important in cases of brief shorts created when crossing a frog (should not be a reason for cutting track power). On the other hand, this delay needs to be shorter for N-scale applications where burn damage is possible. The bottom line displays **measured values** such as voltage, amps and more; possibly changes with SW version to include diagnostic and other special applications.

**MENÜ RailCom global**

> RailCom Cutout ON  
 x RailCom Display normal

At first: only ON/OFF, later various adjustments possible

## RailCom (De-)Activation and Display

By default the "RailCom cut-out" is active (ON) that is RailCom able decoders can send messages, which can be read by the "global detector" in the MX31ZL as well as the "local detectors" placed upstream. The cutout in itself is of no significance to and has no effect on decoders without RailCom; **however....**there may well be **non-conforming old and/or cheap decoders** on the market that may exhibit malfunctions due to the cutout. RailCom must be turned off in such cases!

## 22. TEMPORARY: Definitions for TURNOUT LADDERS and AOS's

The procedures described here have not been converted in the current software version (1.10) to the more comfortable MX31 system but were taken over from the predecessor MX2 and MX21 cabs. The following descriptions were also taken from the MX2 manual and are valid for the MX31 as well!

### Defining a turnout ladder (Text from MX2.vp):

**General Notes:** All turnout ladders and routes are stored in the command station MX1; the cabs are only used as input and display units. This makes it possible for defined routes to be called up by any cab but also means that each routing number may only exist once in the system. A total of 890 route numbers (701.1, 701.2, 701.3 .... 789.8, 789.9) are available. How many of them can actually be used depends on the available free memory in the command station and of the complexity of the individually saved routes.

#### Setting a turnout ladder group number:

The turnout ladder group number is an address between 701 and 789 and is entered and activated on the cab just like a regular loco address, with a further number (1 to 9) identifying a single route.

After activating a group address (red display) the LED's above each number key (1 to 9) indicate whether the corresponding route slots are still free or in use:

- Key-LED green: Memory slot empty, ready for a new definition
- Key-LED yellow: Memory slot occupied, new definition is only possible after deleting the current definition.
- (All) LED's flashing red: Memory is full, no new definitions are possible.

To start a desired turnout ladder definition, press the corresponding key (1 to 9) for at least 1 second, after which the key-LED flashes red/green indicating that the cab is in the definition mode.

To delete a stored turnout ladder (indicated by a yellow LED) press the associated key together with the „C“ key; the LED changes to green (= slot free) and pressing the key a second time enters the definition mode.

#### Recording turnout and signal states:

After entering the definition mode (as described above), actuate the turnouts and signals that need to be recorded.

This can be done with the same cab or any other cab. If the same cab is used, exit the group address with the „A“ key, select the desired accessory address and activated with the „W“ key.

Actuating accessories and switching between accessory addresses is identical as in the SWI mode, the actual recording by the system is not perceived by the operator.

Each turnout as well as each signal that is to be part of the route must be switched at least once (but may be actuated as often as required). The last position is recorded in the same order the accessories were operated.

Exiting the definition mode (= saves the recordings):

Select and activate the same group address (701 to 789) again; it may still be active if the accessories were actuated with a different cab.

Press the corresponding key (1 to 9, where the LED flashes red/green) once, the LED changes to yellow indicating that this slot is now occupied with the new route definition.

### Select and actuate a turnout ladder:

Enter and activate a group address (701 to 799).

Any yellow key-LED indicates that a turnout ladder or route is stored and ready to be activated.

Press the key of the desired route (1 to 9). The LED of that route starts flashing yellow indicating that the route is being executed. All components of a route are immediately set to the recorded position, i.e. the turnouts are switched in intervals of 0.5 seconds.

### Defining AOS's (Text from MX21.vp):

#### What are "automatic operating sequences"?

Automatic operating sequences are timely and most often endlessly repeatable executions of loco and accessory commands recorded earlier. All driving (speed, direction, functions) and switching (turnouts and signals) commands issued by a cab are being recorded during a sample run, together with their relative points in time. Additionally, so called "events" are also being recorded, such as track or reed switch inputs (connected to the "AUX. INPUTS" of the command station), which are later used to synchronize the recorded sequence with the actual train movement.

There is room for 90 such recordings in the MX1 command station ("model 2000" or EC); in reality though somewhat less, since the total memory capacity is also limited. Automatic operations are stored in "AOS"- groups with addresses from 790 to 799, with 9 elements to each. It is organized in this fashion to take into consideration the many owners of the old MX2 cab (same address numbers were used for switch ladders).

It is recommended to use at least two cabs to do a **sample run** (one for the AOS procedure and another one to operate the loco and accessories); although it can be done with just one MX21.

**The following procedure is not implemented yet (SW version 1.14). It will be added later.**

**For now, please use the procedure as outlined in the MX1 manual, chapter "16. AOS- Automatic Operating Sequences"!**

- First enter the area of basic operating sequences (OS), by starting the "E-Procedures"; press:

Key "E", key "Ü" ("BAB" above the "Ü" key = OS),

a **capital "B"** is now shown in the display with a table for selecting different kinds of operating sequences.

- Enter a number between 790 and 799 (AOS group) to start recording an automatic operating sequence (AOS).

- By confirming the previously entered AOS group with the "A" key, a new sub menu opens up for: definition (DEF), running (LOCO) and clearing (CLEAR) of individual automatic operating sequences.

- The keyboard is now available to select a desired action, one at a time, with a number key (1...9).

The LED's above the keys indicate the following:

LED above key is green= memory slot is free

LED above key is yellow = holds AOS data

LED flashing red/green = recording of a sample run in progress

See MX1 command station manual for connections, protocols and CV's!

## 23. Radio operation with MX31FU & MXFU

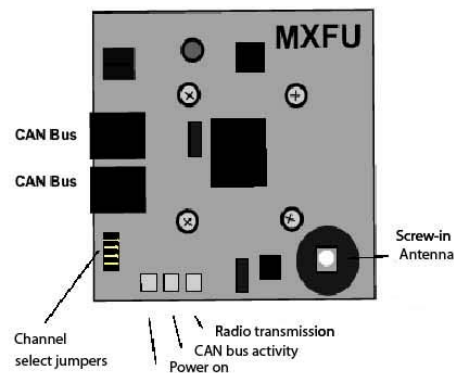
The radio cab is operated in the same way as a tethered version MX31 (except for earlier software versions that couldn't access MX9 modules). The MX31FU is a standard MX31 cab with the necessary radio components, a lithium-ion battery and a charging circuit added. It is also equipped with a complete CAN bus interface so that it can be operated in tethered mode as well.

The lithium-ion battery can be charged either through the CAN bus (when used as tethered cab) or with an external power supply connected to the special socket on the side of the cab.

The radio transmission is bidirectional, which means that the cab is also receiving information from the command station (e.g. current loco status). This allows for secure hand-offs among radio and between cabs.

Bidirectional communication also enables the radio cab to display acknowledgements (with a "communications dot" in the display), coming from the command station to confirm that the data actually arrived there.

One or several radio cabs (MX2FU, MX21FU, MX31FU) can communicate with a **radio base module MXFU**, which is connected to the command station via the CAN bus. Three jumpers numbered "1", "2" and "4" are available to choose from one of a possible **8 radio channels** by selectively removing one or more jumpers. All jumpers are installed in the open position at time of delivery, which is the equivalent to channel 0. There is usually no need to change any of them (except if interference is a problem or if several MXFU are in use).



### IMPORTANT: INITIALIZE the RADIO CAB

#### before the first radio transmission

as well as after every configuration change (data format change in the command station, new radio channel selected on the radio base module etc.); **otherwise communication will not be possible:**

Before the MX31FU can be used in radio mode, both the MXFU base module and the radio cab have to be connected to the CAN bus and briefly operated in tethered mode!

The new cab receives important data from the command station and the radio base module during this initialization process as well as a signature number to ensure the cab only communicates with the command station it belongs to and not with another ZIMO command station that happens to be in close proximity.

A new initialization is of course required when the radio cab is operated together with another radio base module.

### Turning the MX31FU on/off in radio mode:

In contrast to a tethered cab that comes to life automatically whenever the command station is turned on, a cab used in the radio mode needs to be turned on manually by pressing the **"A" key**.

The cab turns off automatically if it sits idle for 10 minutes or the battery is nearly discharged. It can also be turned off manually by pressing the **"A" and "E"** keys together.

### The display in radio mode:

The display is identical to the tethered MX31. However, additional information is shown in most active displays (lower bar in OPERATOR mode):

**Antenna Symbol** - The length of the mast symbol is an indication of the field strength while receiving a radio signal (data and acknowledgments sent back from the radio base module to the cab). Field strength in the opposite direction, cab to base module, is not indicated but will in most cases be the similar.

**Battery Symbol** - Known from many other products, indicates an estimated battery charge level.

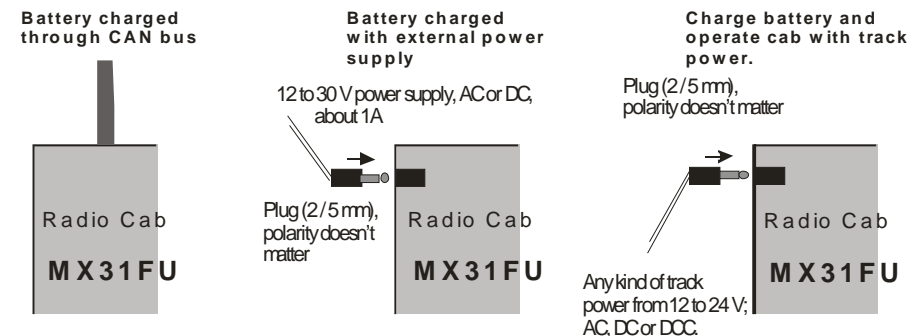


### Charging the MX31FU's built-in lithium-ion battery:

When the MX31FU is operated in radio mode, it receives power from a built-in lithium-ion battery that supplies 3.7V at 1800 mA/h. The cab is supplied with the battery installed. The battery can be replaced after opening up the cab (2 screws on each side) but requires soldering. A battery replacement is only necessary in exceptional cases.

The cab can be operated for about 8 hours with a fully charged battery (time may vary; depends heavily on surroundings, operating duration, illumination etc).

The **battery is being charged** whenever the radio cab is connected to the CAN bus, which also allows the cab to be operated in tethered mode. An alternative power source (10 - 30VDC) can also be used. The built-in fast charger recharges the battery in about 3 hours.



The current state of charge and the charging progress is indicated with a battery symbol in the display.

Should the battery become discharged when operating outside (garden railroad), it can be powered directly from the track (through the socket on the left of the cab) and radio operation resumed!

### Re-charging recommendation.

Recharging the battery after a short operating time (when the battery remains in a reasonably charged state) should be avoided, because it could shorten the life of the battery.



**Noteworthy characteristics when operating in radio mode:**

Whether or not a radio communication is established is indicated to the user, similar as with the tethered cab, by the *communications dot* in the display (OPERATOR mode: left lower corner). When actuating the cab (address activation, speed changes, directional change, function, etc.), the **communications dot** lights up and remains lit until an acknowledgment is received from the radio base module. If the communications dot remains lit for an extended period of time, it indicates that the communication is interrupted (e.g. distance too far or other sources of interference).

“COMM FAILED” is displayed if the communication is down completely.

- If several radio cabs are in operation, they should not be in close proximity to each other; a minimum distance of 1m (3 feet) between two cabs is recommended.

**The Antenna (enclosed with the MXFU and MX31FU):**

The radio base module MXFU should never be operated without the antenna. Screw the antenna to the terminal through the opening in the cover. The radio cab may be used without the antenna for short distances (@ 20m (60 ft.) and only few obstacles). Otherwise please mount the antenna!

**Actions to take in case of radio communication interference:**

There are 8 frequencies (channels) to choose from, selectable with jumpers next to the CAN bus sockets, in order to eliminate interferences coming from other radio equipment. After a frequency change is made, connect the radio cabs briefly to the CAN bus to initiate communications. See above.

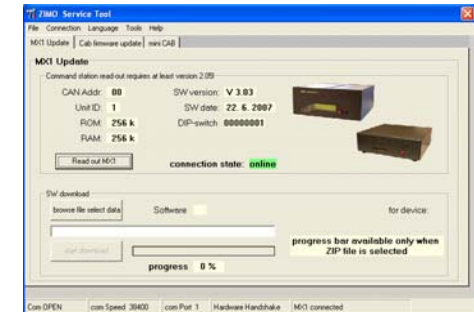
The three jumpers marked “1”, “2” and “4” allow for 8 combinations and therefore 8 different channels to choose from. All jumpers bridged as delivered, results in channel “0”.

The signature number mentioned at the beginning of this chapter can be changed in the MXFU by means of a CV, in case two systems with the same number are operated close by (rather unlikely).

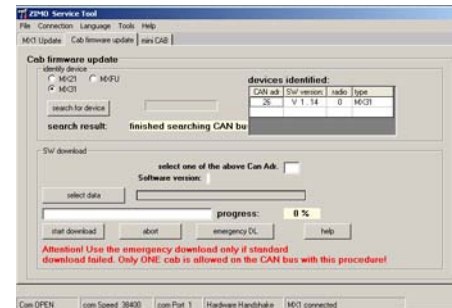
**24. Software Update for MX31, MX31FU**

New software versions for all ZIMO products are published and described at [www.zimo.at](http://www.zimo.at) (UPDATE). All versions can be downloaded at no charge.

To install new software versions the ZIMO Service Tool (ZST) is required on your computer. It can be downloaded from the ZIMO web site [www.zimo.at](http://www.zimo.at) at no charge. Connect the cab (or several cabs) to the command station as usual (MX1, MX1HS, MX1EC) and the command station via a serial data cable with a computer. Start the program “ZIMO Service Tool” (ZST, is also used to update the command station itself). Also see the command station manual and [www.zimo.at](http://www.zimo.at) (PRODUCTS, Software). First establish connections between the computer and command station by clicking on the button “Start with MX1 online”.



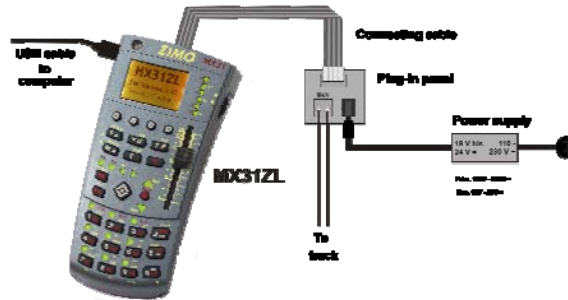
Next, select the page “cab firmware update” and have ZST locate all cabs connected to the CAN bus. Each cab will be listed with its address. Click on the address of the cab to be updated, which copies that address to the “CAN Adr.” field in the bottom half of the update screen. Select the new SW and start the update by clicking on “start download”.



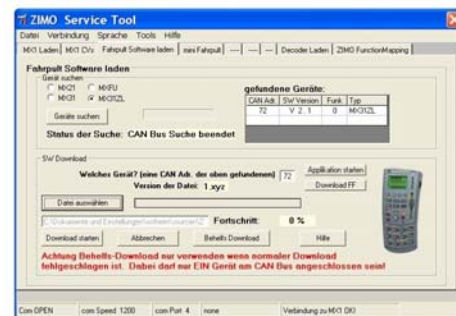
## 25. Software Update for System Cab MX31ZL

Connect the MX31ZL with the computer, with the supplied USB cable. Plug in the power supply. Start the program "ZIMO Service Tool" (ZST) on the computer and click on the button "Start with MX31ZL online".

Note: When the MX31ZL is connected to the computer with the USB cable for the first time the Windows Wizard usually finds the appropriate driver automatically. Should that not be the case, select "Install from a list or specific location (advanced)" in the Hardware Wizard start-up window. In the next window check off "Include this location in the search" and locate the file "C:\program Files\Zimo" after clicking the browse button. The next window displays the available drivers. Select the "MX31ZL USB Port" from the list (if more than one driver is shown). More detailed help is available here: [http://www.zimo.at/web2007/content/MX31\\_USB\\_Config.htm](http://www.zimo.at/web2007/content/MX31_USB_Config.htm)



Start ZST and click on "Start with MX31ZL online".



On the next page "cab firmware update", start the search for cabs connected to the CAN bus (the MX31ZL is considered here a cab, not a command station!!!). Once the MX31ZL is found the update can be started (but also updates of other cabs that were found, which may be connected to the MX31ZL CAN bus). Once the update is finished, the MX31ZL starts up automatically with the start-up screen and starts processing data. Wait at least 5 seconds! At the end of the update process, the USB connection will be terminated automatically! To reconnect, remove the USB cable and close ZST first, then reconnect the USB cable and start up ZST. MX31, MX31FU cabs as well as the MXFU radio base module can all be updated when connected to the MX31ZL.

Attention: The software for the MX31 and MX31FU is not identical to the software for the MX31ZL, not even if the version number is the same.

**Recommended for ZST: Pentium III (>500MHz), Windows XP or 2000.**

## 26. The MX31ZL as Decoder Update Unit

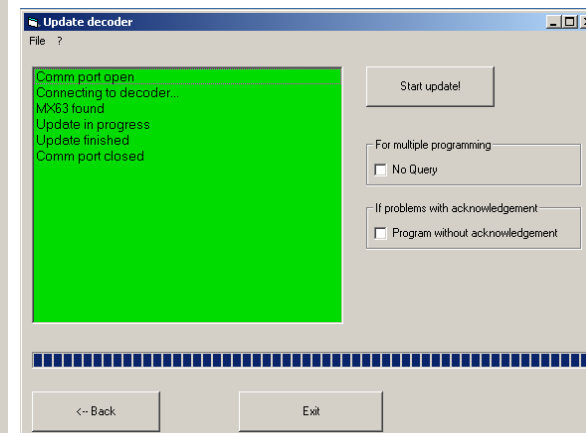
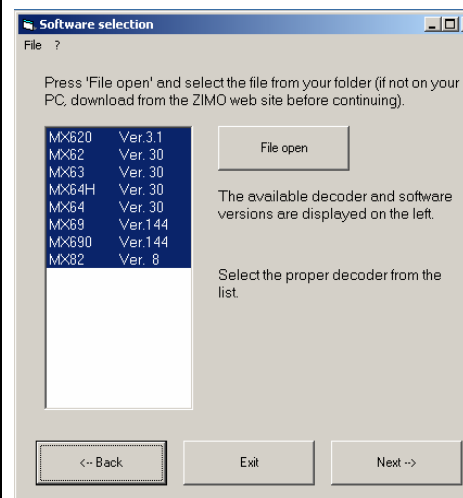
The MX31ZL offers two ways of **updating ZIMO decoder software** and for **sound project** installations: **1)** under the control of a computer (same as with the decoder update module). **2)** with the help of a USB memory stick plugged in to the MX31ZL.

### Decoder software update and sound-load with "ZSP" (ZIMO Sound Program):

Connect the MX31ZL with the computer using the USB cable. The track output is connected to the "update track" (on which the loco sits with the decoder to be updated). Start the ZIMO Service Tool (ZST) and click on "TOOLS", then on "Decoder update...". Follow the ZST prompts. See note in previous chapter if the MX31ZL is connected to the computer for the first time.



This description is temporary, expect changes!



## 27. USB-STICK - Decoder-Update & Sound-Load

### System cab MX31ZL, from SW version 3.0

New software versions can be installed in all updateable ZIMO decoders (loco, accessory and function decoders) with a

- **Computer** (via a decoder update module or MX31ZL, see previous chapter), or
- a **USB stick**, which is plugged into the MX31ZL.

For the latter, “**Decoder update with a USB stick**”, download and copy the latest software collection file from the ZIMO web site to the USB stick first. Plug the USB stick with the help of the USB adapter to the MX31ZL and start updating as many locomotives, one at a time, as needed. The locomotives may be equipped with different decoder types, as long as they are ZIMO decoders.

**NOTE:** *Use only USB sticks with up to 2 GB!*  
*File names on the USB stick must not exceed 8 characters!*

### SW update and sound-load procedure:

- Plug USB stick with the desired SW collection file and sound projects to MX31ZL,
- Place locomotive with decoder to be updated with new SW and/or new sound project to the update track (which is connected with the track output of the MX31ZL),
- Go to SYSTEM MENU in the MX31ZL and select “USB-STICK DEC-UPD”, press “A” to accept (also see chapter “MENU and MENU Functions”, SYSTEM MENU).

#### USB-STICK DECODER-UPD

```
> DEC80508.zsu 453K
  DEC80420.zsu 675K
  DEC80201.zsu 437K
```

This window shows a number of software collection files stored on the USB stick; select with scroll wheel and A-key.

A Accept E Escape .

#### USB-STICK DECODER-UPD

```
> SOFTWARE DIR
  SOUNDPRO DIR
```

A directory structure may also be shown on the USB stick; select one of the directories from which subdirectories can be selected and finally the desired file.

A Accept E Escape .

#### USB-STICK DECODER-UPD

```
> Autom. Update Selection
  MX62 V 32
  MX620 V 7.1
  MX63 V 32
  MX64 V 32
  MX64D V 8.0
```

Software for a large number of ZIMO decoder types, sometimes several versions for the same type (BETA or custom versions) are listed inside a software collection file.

All decoder versions can be selected directly but it is usually simpler to select the first line “Autom. Update Selection” and let the system choose the right software automatically in the next step.

A Accept E Escape .

## MX31 Cab, MX31FU Radio Cab, MZ31 System Cab

#### USB-STICK DECODER-UPD

Locate decoder: v v v

The MX31ZL searches for and identifies a decoder on the update track.

If a decoder is found, go to next step.

If **no** decoder is identified, the search can be repeated with the “A” key. One of the reasons the decoder may not be identified is often the presence of an energy storage capacitor. If that is the case, wait a few seconds before pressing the “A” key! \*)

A Accept E Escape .

#### USB-STICK DECODER-UPD

Decoder found:  
 MX620 V 6.0  
 Address 2634  
 Proceed with update to V 7.1?

The identified decoder is listed together with the current SW version and decoder address.

The data read-out is done with RailCom and is therefore only possible if RailCom is activated in the decoder.

The actual update can now be started or cancelled.

A Accept E Escape .

#### USB-STICK DECODER-UPD

```
MX620 Update to V 7.1
v v v v v v v v
0 % 81 % 100 %
A Accept E Escape .
```

The update progress is shown in the MX31ZL display.

#### USB-STICK DECODER-UPD

```
MX620 Update to V 7.1
UPDATE SUCCESSFUL.
Continue programming
other decoders?
```

The successful update process is confirmed.

The user can now continue updating other locomotives with the same decoder type.

A Accept E Escape .

#### USB-STICK DECODER-UPD

```
MX620 Update to V 7.1
UPDATE FAILED
```

Various error messages are shown indicating a failed update!

A Accept E Escape .

### \*) Decoder-Update with a power back-up capacitor:

If such a capacitor is connected to the decoder (as described in the decoder manual), the decoder memory is often not dumped on time, which is required for the update process to start.

If that is the case, the first update process may fail (“Decoder not found”). After a certain wait time the update can be repeated by pressing the “A” key. The wait time required may be as short as 10 seconds to several minutes, depending on the size of the capacitor as well as the discharge resistor installed.



## APPENDIX: C A N B U S

With most applications that have a maximum of 10 cabs and the total CAN bus length is limited to 150 feet (50m) no special considerations are required when connecting cabs to the command station (For example: no more than 2 cabs at the end of a 150' (50m) cable, no more than 5 cabs at the end of a 60' (20m) cable). If the number of cabs or the total CAN bus cable length exceeds these limits, certain precautions have to be followed such as installing termination resistors (type. 150 – 330 Ohms) between the two center conductors at the end of the CAN bus and/or a separate power supply for the CAN bus. Please contact ZIMO if necessary!

The high charging current is to be considered with radio cabs operated in tethered mode. These should not be connected to unnecessary long cab cables (not more than 5m (15ft) otherwise use a cable with larger conductor wires)!

### 28. Glossary

<b>8/12</b>	E-procedure to select between 8 and 12 functions
<b>ABK</b>	E-procedure to set characteristic curves for AZ and BZ.
<b>ACK</b>	Successful programming step acknowledged
<b>AOS</b>	Automatic Operating Sequences
<b>ARS</b>	Automatic Route Sequences
<b>AZ</b>	E-procedure to set acceleration rate with cab (not CV)
<b>BAB</b>	E-procedure for switch ladders, automatic operating sequences (AOS), automatic routing sequences (ARS) etc.
<b>BI-ACK</b>	Successful "bidirectional" programming acknowledged
<b>BI-READ</b>	Successful "bidirectional" read-out
<b>BIN</b>	Displays CV value as Binary code
<b>BZ</b>	E-procedure to set deceleration rate with cab (not CV)
<b>CAN</b>	Controller Area Network = ZIMO bus
<b>DAK</b>	On the "A" button, stands for "Deactivate"
<b>DCAB</b>	Dual Cab mode, controls two engines simultaneously
<b>FU e/a</b>	"A" key also functions to turn radio cab on/off when in radio mode
<b>H</b>	Indicates Halt (stop) signal on track (light bar)
<b>ICO</b>	Displays icons
<b>L</b>	Indicates (light bar) when speed limit signal is applied
<b>M/D</b>	E-procedure to set function keys to either momentary or permanent "on"
<b>MN</b>	Manual key: overrides stop, speed limits and momentum
<b>NO-READ</b>	No value received from a "bidirectional" decoder
<b>NAM</b>	E-procedure to add names
<b>P</b>	Selects a DCC protocol
<b>PICT</b>	Switches to pictorial
<b>PRA</b>	Personal Railroad Assistant = PDA software
<b>PUK</b>	Sends function commands as pulse chain commands (older LGB only)
<b>READ</b>	CV read-out successful
<b>RG</b>	Shunting key: half speed and/or shunting functions
<b>RÜB</b>	E-procedure to set recall memory depth
<b>RM</b>	Recall Memory depth indicator
<b>RM-L</b>	Recall Memory for loco mode
<b>RM-SW</b>	Recall Memory for switch mode
<b>s</b>	Indicates speed step applied

<b>SSP</b>	Emergency stop of all locos
<b>STP</b>	CTC-Computer software by E.Sperrer
<b>STU</b>	Button markings for quick speed step mode selection/confirmation
<b>T P</b>	Button for building or taking apart consists
<b>U</b>	Button for "hand-offs"
<b>UEP</b>	Short circuit on programming track output
<b>UES</b>	Short circuit on main track output
<b>v</b>	Actual speed reported back by decoder
<b>XDACB</b>	Exit dual cab mode
<b>ZST</b>	Program for updating ZIMO hardware

## 99. Preview of future software versions

### Developments following SW version 1.17 / 3.0:

The most important features still missing in SW version 1.17 (3.0 in the MX31ZL) and improvements to be made:

- Loco, accessory as well as turnout ladder names (as addresses) hand-off to other cabs, command station and computer (the latter for editing and back-up).
  - Extending address range for accessory decoders to 511.
  - Dual engine control (Second engine controlled with scroll wheel).
  - Reorganization of loco consisting and turnout ladders, among others: usage of names for trains (not just locos) and turnout ladders.
  - "RailCom": Display, new type of messages, especially text messages.
  - Further simplification of decoder programming through command line storage.
  - Special display for incremental programming as shown in the MX640/MX690 instruction manuals for ZIMO sound decoder.
  - Special procedures for operating sequences, routes and MX9 operating mode 1.
  - Display and management of booster circuits.
  - Shunting key assignment, possibly during decoder set-up
  - Adjusting procedures for turnout ladders and operating sequences (OS)
  - Turnout ladders in recall memory and use of names for turnout ladders
  - 20 or 28 functions, functions higher than 10 also as momentary functions,
  - possible extension of the RailDriver function
- 
- MX31ZL only: extension of the RailDriver function
  - perhaps updates with USB stick for the MX31ZL itself and other components on the CAN bus
  - MX31ZL only, if requested: FRED hook-up / booster connection.