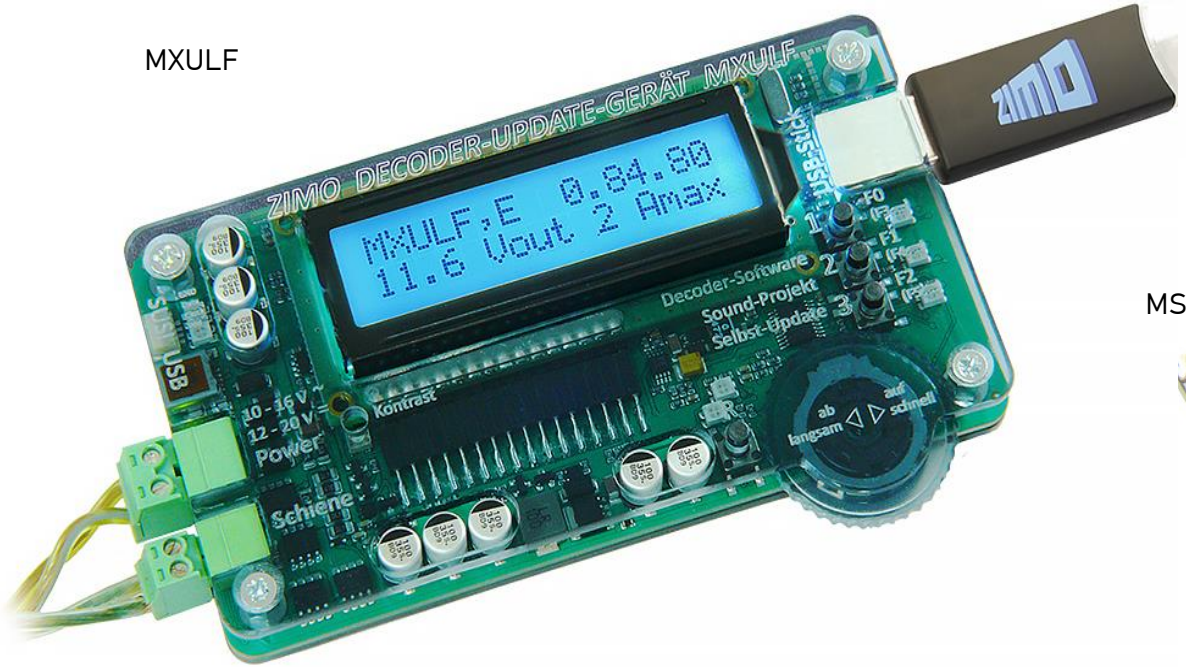
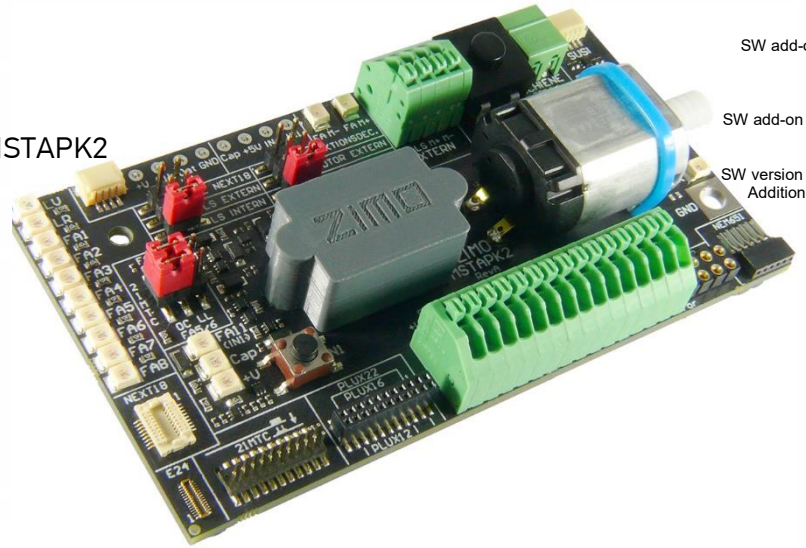
INSTRUCTION MANUAL

MXULF



MSTAPK2



EDITIONS:

First delivery in December 2011 -	2011 12 20
until April 2012	
SW add-on 2 — SW version 0.22 –	2012 11 10
SW add-on 3 — SW version 0.32 –	2012 12 20
SW add-on 4 — SW version 0.40 –	2013 03 12
SW add-on 5 — SW version 0.50 –	2013 08 20
0.56.03 -	2013 11 20
	2014 03 13
Dortmund 2014 edition	2014 04 06
SW version 0.61 ---	2014 05 20
	2014 10 10
	2015 01 22
SW add-on 6 -	2015 07 05
	2015 08 24
	2015 11 25
	2016 03 11
SW add-on 0.70 -	2016 08 01
	2016 08 18
	2016 09 01
SW version 0.85 -	2020 01 20
Addition MS -	2020 02 20
	2020 06 01
	2020 07 30
	2022 06 30
	2024 04 24

Decoder Update and Sound loading device

MXULF *

and:

Test- and Connection Board ***MXTAPS, MXTAPV***

As well as ***MSTAPK, MSTAPG***

* From now on, the MXULFA, like the previously available model without display, will be referred to simply as MXULF.

1. MXULF Features

The MXULF has the following tasks and capabilities:

- Software update of all ZIMO decoders of the generations MX... and MS/MN..., either from USB stick or from computer (programs ZSP, ZCS), in case of MS... only without PC.
- Loading of sound projects into all ZIMO decoders of the generations MX... and MS..., either from USB stick or from computer (programs ZSP, ZCS), optionally via rail (decoder built into locomotive) or via SUSI interface (1/10 time requirement).
- Special measures such as "Power Cycle Update" for cases where MS/MN decoders have been "software destroyed" by malfunctions during the normal update process or by other means.
- Simultaneous sound loading of several decoders via SUSI interfaces connected in parallel (via several MXTAP or MSTAP boards, or special multi-update boards for applications in series production).
- CV programming and CV reading, optionally in OP MODE (Operational Mode, POM) or SERV MODE (by type of programming track), with simplified display for decoder ID reading and load code writing.
- Testing decoders or vehicles, mostly after software update or loading of a sound project: Driving operation and switching of functions via control elements and display of the MXULF, also test operation in the context of repair work; however, the MXULF is NOT a replacement for a digital command station.
- Interaction with the test and connection boards MXTAP.. to MSTAP.. where decoders with standard interfaces (PluX, MTC, Next, NEM651, NEM652) are plugged in or wired decoders are connected to terminals and tested (by means of motor, loudspeaker, function LEDs, etc. installed there).
- Self-update of the MXULF via USB stick.
- **Synchronous update** (loading software parallelly) for accessory decoders MX820, MX821
- Operation of MXULF via the USB device interface (alternative to flash drive). Software updates, sound loading, configuration of and testing decoders from the computer via programs like ZCS, PfuSch and TrainProgrammer enable comprehensive and comfortable possibilities to improve ZIMO decoders, also, and especially, for larger fleets.

NOTE: Due to ongoing development of the MXULF software, there are sometimes slight differences between the operating instructions and the actual behavior of the MXULF; in particular, display representations sometimes anticipate planned software versions.

2. Technical Data

Supply voltage at input "Power" .. **12 - 20 V DC** (power supply unit or rail current from digital command station) or 10 - 16 V AC (in case of problems: use DC!)

for software update and loading sound of large-scale decoders .... **min. 16 V DC!**

Maximum supply on output "Schiene" (track) (stabilized to 12 V) ..... 2 A

Dimensions (L x W x H) ..... 125 x 65 x 12 mm

3. The USB stick for use with MXULF

A USB stick compatible with the MXULF is used as a data carrier when updating the decoder and loading sound projects; alternatively, however, these tasks can also be performed without a USB stick, directly from the computer (via USB cable).

The self-update of the MXULF is only possible with the help of a USB stick on the MXULF.

A "ZIMO USB stick" is included with each MXULF; however, other sticks can also be used.

If a USB stick does not (or no longer) work with MXULF (this will be more often the case with third-party sticks), the USB stick must be reformatted to "FAT32" on the computer (see Windows ...).

On the USB stick (root directory) are stored (in connection with MXULF):

- If a self-update of the MXULF is to be made:
  from the ZIMO website (*www.zimo.at*) under *Update & Sound / Decoder Update Device MXULF*,
  from a (usually the latest) .zip file of the type (example) *MXULF_ver_0_83_55.zip*
  the unzipped files **MXULF.ulf** and **MXULF.bin** (these files have the same name in all versions).
- If a decoder software update (for one decoder or for several decoders) is to be executed:
  from the ZIMO website (*www.zimo.at*) under *Update & Sound / Update - MS decoder* or *Update - MX decoder*,
  from a .zip file (usually the latest one containing the decoder group in question) of the type **MS_4_202.zip**
  the unzipped file (single file in the .zip) of the type **MS_4_202.zsu**: the so-called **decoder software collection file**.
  The term "collection file" means that new software versions are included for a variety of decoder types; in the above example for all MS sound decoders (but not for MX decoders); there may also be collection files for MX and MS decoders on the website, as well as collection files for subsets (e.g. MX non-sound decoders). During the update process, MXULF and decoder ensure that the correct update file is applied.
- When a sound project is to be loaded:
  from the ZIMO website (*www.zimo.at*) under *Update & Sound / ZIMO Sound Database*
  the desired ready-to-use sound project of the type (example) **OeBB_16-KkStB310_ZIMO_8Bit_S01.zpp**

NOTE: in case of a (chargeable) "coded" sound project, a "load code" must be programmed into the decoder in question before the actual sound loading process. See Info under *ZIMO Sound Database*.

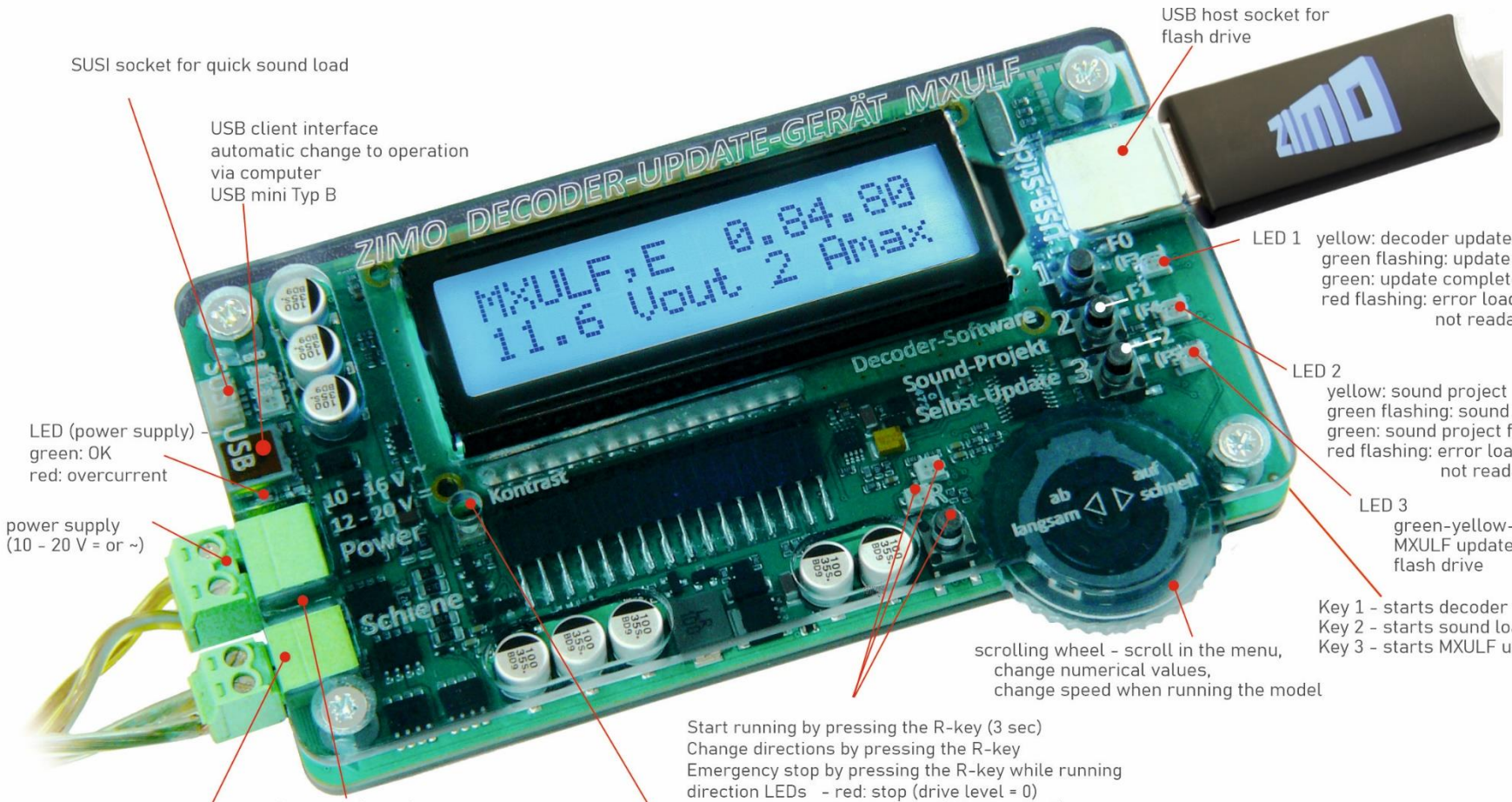
The above-mentioned files can be mixed and stored in any number on the USB stick (root), i.e. several .zsu files together with several .zpp files. However, a selection must then be made directly on the MXULF before the actual update or loading process; see the following descriptions

4. Switching on the MXULF and connecting a decoder

"**Power**": Connect power supply unit or transformer according to technical data, preferably the one supplied, to the MXULF.
→ *LED „Power" green.*

The display shows "MXULF", the hardware revision (e.g. "E" or "E+"; **+** stands for the optimized RailCom-detector hardware, no matter if originally installed or by subsequent upgrade, which is offered in 2021/22); Software version, voltage on rail, max. current.

Connect **rail** to MXULF, decoder to rail,
OR: Connect connection board MSTAP, MXTAP, etc. , plug in/connect decoder there.
→ *LED „rail" yellow*



SUSI socket for quick sound load

USB client interface
automatic change to operation
via computer
USB mini Typ B

USB host socket for
flash drive

LED 1 yellow: decoder update file on flash drive
green flashing: update loading
green: update complete
red flashing: error loading or flash drive
not readable

LED 2
yellow: sound project on flash drive
green flashing: sound project loading
green: sound project finished
red flashing: error loading or flash drive
not readable

LED 3
green-yellow-red flashing:
MXULF update file found on
flash drive

LED (power supply) -
green: OK
red: overcurrent

power supply
(10 - 20 V = or ~)

Key 1 - starts decoder update
Key 2 - starts sound load
Key 3 - starts MXULF update

scrolling wheel - scroll in the menu,
change numerical values,
change speed when running the model

Start running by pressing the R-key (3 sec)
Change directions by pressing the R-key
Emergency stop by pressing the R-key while running
direction LEDs - red: stop (drive level = 0)
green: drive (drive level > 0)
green or red flashing: no feedback
both LEDs red flashing: short circuit / no current

LED (Schiene / track) -
yellow: decoder found on track output
green: decoder update or sound load
red flashing: error while updating / loading

Schiene / track: connection for updating, loading
sound projects or running the decoder

Display-contrast
Adjustment with a small Phillips screwdriver

Actuate function keys F0, F1, F2 by pressing the key 1, 2, 3 (short press)
and display the function status with LED1, 2, 3
Switch to second level by pressing Key2 for 3 seconds
Actuate function keys F3, F4, F5 by pressing the key 2 for 3 seconds
Switch to third level by pressing Key3 for 3 seconds
Actuate function keys F6, F7, F8 by pressing the key 1, 2, 3 (short press)

5. Self-update of the MXULF or MXULF

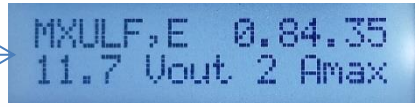
NOTE: Especially in times of market introduction of new decoder types or generations, frequent updating of the MXULF's own software is practical or even necessary.
It is impossible in practice to keep a correct documentation of which decoder in which version is compatible with which software of the MXULF; therefore, it must be recommended to update the MXULF itself at the latest in case of problems.

- Download new **MXULF software** from *www.zimo.at - Update & Sound - Decoder update device MXULF* as .zip file; **unzip** the .zip file, save the two resulting actual update files **MXULF.ulf** and **MXULF.bin** in the **root directory** of the **USB stick**. For this you can use the ZIMO USB stick enclosed with the device (which is already correctly formatted), or any other USB stick; see chapter "USB stick for use with MXULF".

  In the main directory (root) of the USB stick other files may be stored at the same time (especially update or sound files for decoders); for reasons of clarity and reliability files of any kind and in large numbers should not be present on the stick.

  Tip for first time users: only the necessary files on the USB stick (root), in this case MXULF.ulf and MXULF-bin.

- Prepare MXULF: **Disconnect all connections**, **reconnect "Power"** (included power supply unit or rail output of a digital control center) → *LED "Power"green.*
- Insert **USB stick** prepared above
  → *LED 3 flashes red-green-yellow* (if correct files, i.e. .ulf and .bin, are found on the USB stick).
- **Key 3** (long, 3 sec) → **Self-update starts**



NOTE: Key 1 and key 2 lead into the areas of the decoder software update or the sound loading, if suitable files (.zsu or .zpp) are stored on the stick.

- Wait for message "**Booting ... CRC OK**".
  CRC OK" may appear instead!
- **Key 3 → to acknowledge**,

MXULF resets and shows startup screen if automatic reset does not work: Disconnect "Power" terminal briefly.

◄ *For the self-update, only the power supply (at terminal "Power" of the MXULF) must be connected, and a USB stick with the correct files for the update must be inserted.*

Typical arrangement for software update and/or sound loading via " rail "; Decoder installed in locomotive, locomotive on "update track", power supply from power supply unit via terminal "Power", USB stick with the correct files for update and/or sound loading inserted.

6. Decoder software and sound from USB stick

The "**standard procedures**" include: Decoder software update and sound project load

single (or several in a row) ZIMO decoder of the generations MX... and MS...,
either on rail (mostly decoder built into loco) or connected to MXTAP.., MSTAP,
optionally via rail protocol (in loco or ...TAP..) or (sound only) SUSI interface (1/10 time requirement).

Decoder software update via the **rail** with decoder software collection file on the **USB stick**.
Decoder installed in locomotive or connected to a test and connection board MXTAP..., MSTAP ...

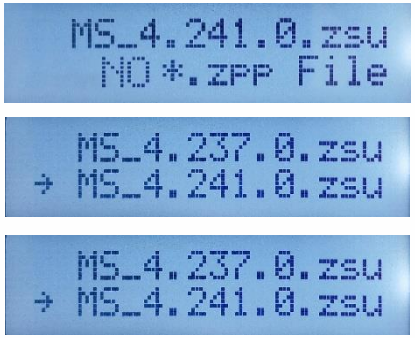
- Prepare USB stick: download a suitable (containing the relevant decoder type; possibly for MS and MX separately) decoder SW collection file from *www.zimo.at - Update & Sound - Update MS decoder* or *Update MX decoder*, unpack it and save it in the root directory of the **USB stick (.zsu file).**

  Tip for first time users: only this one file on the USB stick (root), delete all others (especially older .zsu versions)

- Prepare MXULF: Connect "Power" (power supply or power source according to the technical data) to the MXULF;
  → Start screen on display → *LED "Power" green.*
  Sequence of the following two steps as desired:
- Connect **rail** to MXULF, **vehicle** (with **decoder**) on rail (only vehicle, only decoder)
  OR: Connect MSTAP.. or MXTAP.. board (with decoder plugged in or connected decoder) to MXULF (rail) LED rail yellow

- Insert prepared (described above) USB stick,
  Three variants of the further process depending on the stick content:

  1. if single decoder SW collection file (.zsu file):
     → First line: Name of this file → *LED „1" yellow*
     Key 1 → Start decoder software update
  2. if single sound project on the stick (.zpp file):
     → First line: Name of this file → *LED „2" yellow*
     Key 2 → Starting decoder sound loading
     see next chapter
  3. if there are several files on the stick (.zsu and/or .zpp)
     → First line: → *LED „1 and/or LED „2" yellow*
     Note on keys - selection of the further operation
     Key 1 → to the list of decoder SW collection files (.zsu)
     Key 2 → to the list of sound projects (.zpp files)
     Scroll (scroll wheel) in respective list; cursor on selected file, depending on whether .zsu or .zpp:
     ***Key 1 → Starting** the decoder software update*
     Key 2 → Starting the decoder sound loading
     see next chapter



The decoder update starts ...

Decoder software update in progress, with logging of the most important steps (clear memory), progress display in %.
When **100%** is reached: Remove the vehicle from the track and - if desired - connect/attach another decoder ,
press **R-key**
Key 1 → start Decoder-Update with .zsu-file.

MX decoder **only:** During update or sound loading the update lock is automatically deactivated. (CV #144 = 0) and analog operation is disabled (CV #29, bit 2 = 0). After finishing the process MXULF tries to set the CVs back to the original values (this may fail!).

Decoder sound loading over the rail with sound project on USB stick

Decoder installed in locomotive or connected to a test and connection board MXTAP, MSTAP...

- Prepare USB-Stick: Download the **sound project** from *www.zimo.at / Update & Sound / ZIMO Sound Database* and save it in the root directory of the USB stick (.zpp file), or multiple .zpp.

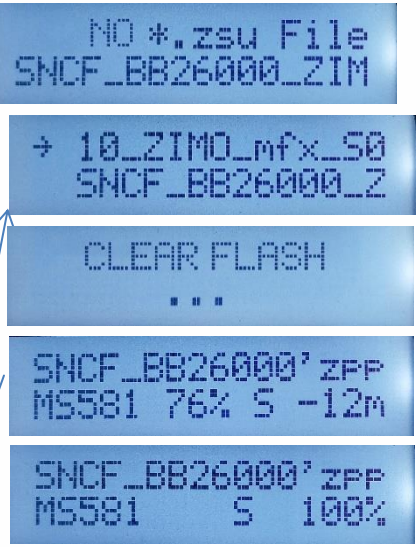
Note: in the case of a (chargeable) "coded" sound project, a "load code" must be programmed into the decoder in question before the actual sound loading process. See info under *ZIMO Sound Database.*

- Prepare MXULF: Connect "Power" (power supply or power source according to the technical data) to the MXULF;
  → Start screen on the display → *LED „Power" green.*
  Sequence of the following two steps as desired:
- Connect rail to MXULF, vehicle (with decoder) on rail (only vehicle, only decoder)
  OR: Connect MSTAP.. or MXTAP.. board (with decoder plugged in or connected decoder) to MXULF (rail)
  → LED track yellow

- Insert **USB stick** (as prepared above) into USB socket

Three variants of the further process depending on the stick content:

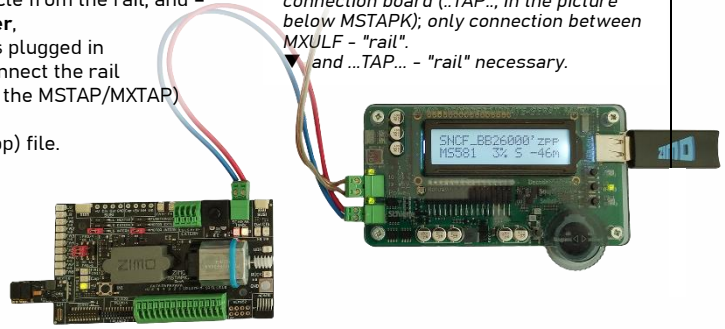
1. If single decoder SW collection file, i.e. .zsu file:
   → First line: Name of this file → *LED „1" yellow*
   Key 1 → Start Decoder-Software-Update
   see previous chapter
2. If a single sound project on the stick, so .zpp file:
   → First Line: Name of this file → *LED „2" yellow*
   Key 2 → Start decoder sound loading
3. If multiple files on the stick (.zsu and/or .zpp)
   → First line: → *LED „1 and/or LED „2" yellow*
   Note on keys - selection of further operation
   Key 1 → to the list of decoder SW collection files (.zsu)
   Key 2 → to the list of sound projects (.zpp files)
   Scroll (scroll wheel) in respective list; cursor on selected file, depending on whether .zsu or .zpp:
   Key 1 → Start decoder software update, resp.
   Key 2 → Start decoder sound loading



- **Loading of the sound project** is running, with logging of the most important steps (clear memory, etc.), progress display in %, for sound loading also time prognosis in min.

When **100%** is reached: remove the vehicle from the rail, and – if desired - connect/set up **other decoder**,
(To avoid a short circuit if the decoder is plugged in incorrectly, it is recommended to disconnect the rail connection using the ON/OFF button on the MSTAP/MXTAP)
press **R-Key**
Key 2 → Start loading sound project (.zpp) file.

Typical arrangement for software update and/or sound loading via "rail"; decoder is located in the matching slot of a test and connection board (..TAP.., in the picture below MSTAPK); only connection between MXULF - "rail".
▼ and ...TAP... - "rail" necessary.



Decoder sound loading via SUSI interface with sound project on USB stick SUSI plug or solder pads directly to decoder or decoder plugged to test-and-connect board

SUSI loading is the fast alternative (approx. factor 10 compared to rail) for decoders which are NOT installed. Normally the slots (PluX, MTC, Next18, ...) on a test and connection board MXTAP or MSTAP are used for contacting; but with wired decoders (also with NEM-651 or -652) wires have to be soldered to the SUSI pads. (Loss of warranty)

- Prepare USB stick (same as for sound loading via rail):
  download the desired sound project from www.zimo.at - Update & Sound - ZIMO Sound Database and save it in the root directory of the USB stick (.zpp file), or several .zpp. files.

NOTE: in case of a (chargeable) "coded" sound project, a "load code" must be programmed into the decoder in question before the actual sound loading process. See info under *program load code*.

- Prepare MXULF (same as for sound loading via rail), if not already switched on:
  Connect "Power" (power supply unit, ...) to MXULF
  → *LED „Power" green.*

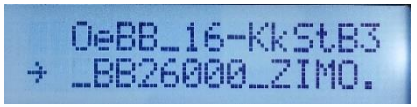
- Connect **connection board** (MXTAP.. or MSTAP..) by SUSI cable (i.e. SUSI connector on MXULF to SUSI connector on MSTAP.. or MXTAP.. board), but NOT "rail".
- **Connect the decoder** to a suitable interface (PluX, MTC, Next18, ... socket strip for large-scale decoders) on MSTAP... or MXTAP..., or, in case of a wired decoder, connect SUSI pads with soldered wires to SUSI pins on MSTAP... or MXTAP....
- **Insert USB stick** (as prepared above) into USB socket
- **R key** (long, approx. 3 sec)→ opens the menu.
  Scroll (scroll wheel) to **"SUSI SOUND Load"**

Two variants depending on stick content:

if single sound project on the stick (.zpp file):

R-Key → Start decoder sound loading

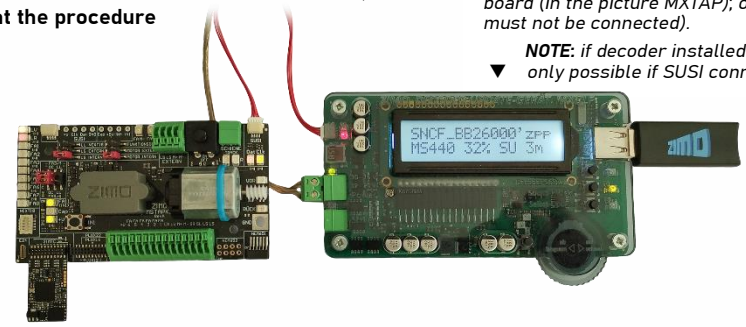
2. When multiple sound projects on the stick:
   List of sound projects
   Scroll (scroll wheel) in list of sound projects, cursor on selected project.
   R-Key → Start decoder sound loading



- **Loading of the sound project** runs, with logging of the most important steps (clearing memory, etc.), progress display in %, time estimate for completion in min.
- When **100%** is reached: R button, remove decoder and - if desired - connect **another decoder**,
  Repeat the procedure

Typical arrangement for sound loading via "SUSI": Decoder is located in the appropriate slot of a ..TAP., -board (in the picture MXTAP); only SUSI cable ("rail" must not be connected).

***NOTE:** if decoder installed in locomotive,*
▼ only possible if SUSI connector is accessible.



7. Decoder software and sound from computer

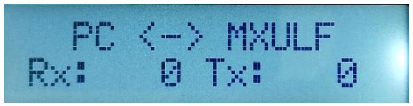
*The same things that are loaded from the USB stick into the decoder (see previous chapter) can also come directly from the computer (via the **programs ZSP** and **ZSC** in different ways and to different extents depending on the expansion state of the programs). In contrast to the use of the USB stick, the **decoder software update** and the **sound project loading** from the computer are not operated on the MXULF itself (but on the computer), which therefore only shows the number of received and sent data on the display.*

So this is also about the **"standard procedures"** for

single ZIMO decoders of the generations MX... and MS...,
either on rail (decoder built into loco) or connected to MXTAP..., MSTAP...,
optionally via rail protocol (in loco or MXTAP ... or SUSI interface (1/10 time requirement).

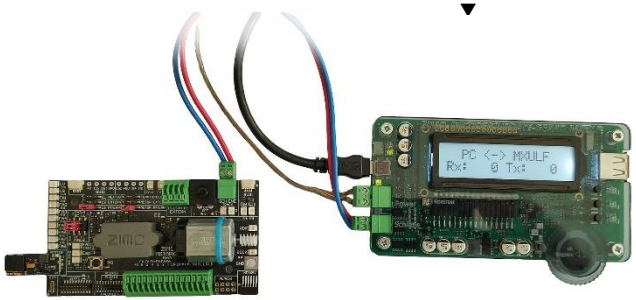
ATTENTION: the self-update of the MXULF is NOT possible from the computer, only via USB stick.

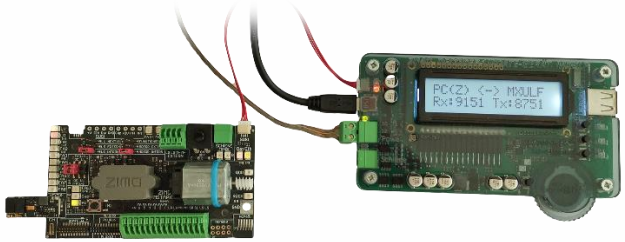
- Prepare MXULF (same as for USB stick operation), if not already switched on:
  Connect "**Power**" (power supply unit, ...) to MXULF.
  → *LED „Power" green.*

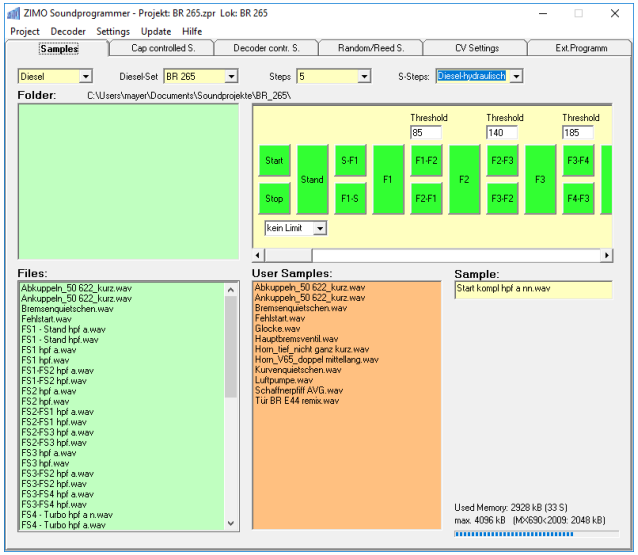


- Execution of the software (ZSP, ZCS, or possibly also other programs); display of the MXULFA logs the data traffic.

The same arrangements as when using the USB stick, except that the USB cable to the computer is used instead of the USB stick. ▼



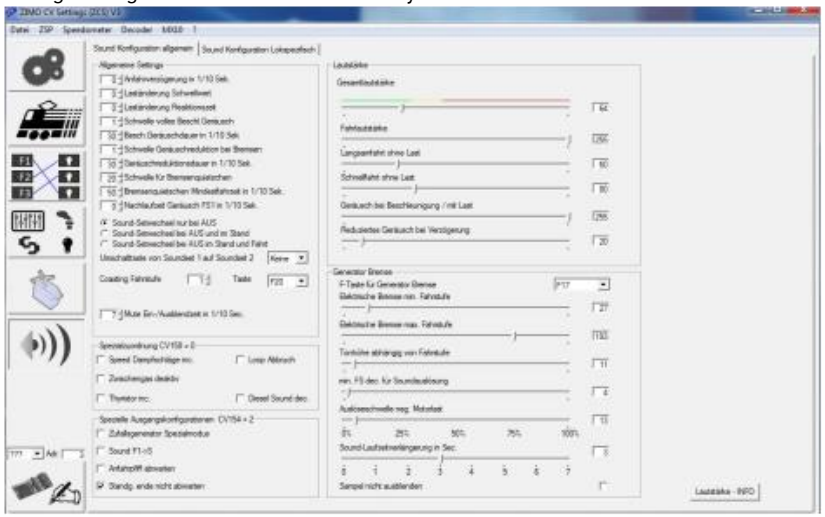


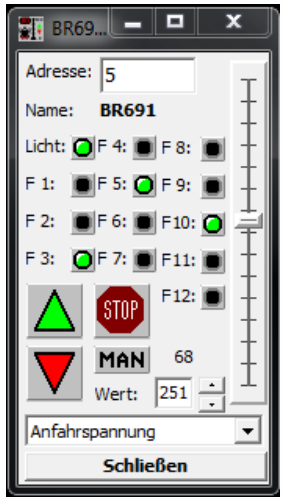


▲ *ZSP ZSP (creation of sound projects, decoder update, sound loading)*:
in the above picture the recordings during software update of a sound decoder MX645; MXULF is recognized as MX31ZL (because MXULF behaves the same way).

Note – Status February 2024
MX decoder updates and sound projects can be loaded via rail using the PC , and sound projects can be loaded via SUSI.
For **MS** decoders, it is currently possible to load sound projects via the PC.

ZCS („ZIMO CV Setting", by Matthias Manhart, http://www.beathis.ch/zcs/index.html):
Comfortable tool for decoder configuration with a number of setting windows, especially for modifying sound projects and also for adjusting in real time, i.e. the parameters are modified directly during driving and take effect immediately. ▼



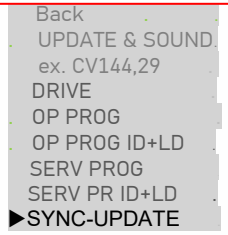


8. Synchronous update for accessory decoders MX820, MX821

This method removes a problem especially known with large-scale layouts: decoders built-in to turnout casings (e.g. LGB) have to be removed and connected individually to a decoder-update-device to load an update.

Using the *synchronous update*, the decoders can stay on the layout, the decoder-update-device MXULF is connected instead of the digital command station and sends the new software to all accessory decoders. Every single accessory decoder then has the possibility to request a repetition by negative acknowledgements, until all decoders have the update installed. Vehicles can usually stay on the tracks during this procedure.

ATTENTION: the MXULF, or the power supply connected, is limited in its efficiency. The current draw of connected consumers (including vehicles which are placed on the layout) as well as the inrush-current at power-up can lead to a shut-down due to a short circuit.



← **Menu after pressing and holding the R-key**
(display only shows 2 lines,
other lines can be reached by scrolling).
reach menu item SYNC UPDATE by scrolling,
start by shortly pressing the **R-key**

First, all accessory decoders on the layout (suitable for the synchronous update) are located and its number is displayed, sorted by decoder family.

NOTE: the searching process can take up to 2 seconds per decoder.

This list of decoder families stays on the display during the whole updating procedure; every line shows the current procedures for the corresponding family.

First decoder family is searched for, found number is displayed → MX820 SEARCH 3

Search complete; marked to show that search is complete → ■ MX820 FOUND 7

The next decoder family (MX821) is searched automatically → ■ MX820 FOUND 7
MX821 SEARCH 2

Search finished → ■ MX820 FOUND 7
■ MX821 FOUND 5

I.e. all lines with a completed search are marked.

Starting updates: Briefly press R-key → Starts update for all families
or after 10 sec timeout → (also) starts update for all families
or scroll to a line and briefly press R-key
→ Starts software update for the selected decoder family
(all other marks are deleted)

Progress is shown → ■ MX820 SY-UP 68%
(Mark flashes during the update, % rises) ■ MX821 FOUND 5

Update complete (number, in brackets number FOUND) is displayed → MX820 OK 6(7)
(Mark is deleted only in the corresponding line) ■ MX821 FOUND 7

press and hold **R-key**: Exits the synchronous update, returns to menu.

9. Driving operation with MXULF

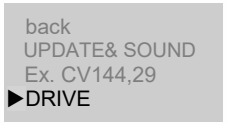
The MXULF is also a small command station with max. 2A This allows test drives to be completed after sound loading or CV programming. You can only drive with the MXULF (version with display).

Operation Display on Display (EXAMPLES)

… after powering on the MXULF → MXULF,E SW 0.22
Display of track voltage (limited to about 12 V) 11.6 Vout

Menu after pressing and holding the R-key (3 sec)

Menu item LOCO either pre-selected or reached by scrolling to LOCO, selection by pressing the **R-key**



After selection by R-key, driving operation is prepared → LOCO read CVs
Address and important CVs (#1, #29, #17, #18, #7, #8, …) are read CV 18 = 184
Sound and lighting is activated automatically after reading CV values.

Address, type (e.g. MX645), SW version are displayed → LOCO Adr 3217
MX645 SW 32.00

or (non-ZIMO) name of Manufacturer ID or: value of CV #8 → LOCO Adr 3217
(at third-party manufacturers only CV #7 is shown as SW version) Hst xxx SW 32

or (if it cannot be read-out) LOCO reading CV not possible

Move speed regulator (**scrolling wheel**) or direction key → before 57 Adr 3217
F0, F1, F2 = 1,1,0

Permanently displayed: Direction of travel (For, Rev), speed step, current function-trio F0, F1, F2; those functions are activated with buttons 1, 2, 3 (press and HOLD button 2 or 3: Switch to F3, F4, F5 or F6, F7, F8)

R-key while driving (=fast stop) → STOPP
F6, F7, F8 = 0,0,1

direction key at standstill (=change of direction) → Rev 0 Adr 3217
F0, F1, F2 = 1,1,0

Press and HOLD button 1, 2 or 3: switch function-trio → Rev 0 Adr 3217
to each F0, F1, F2 or. F3, F4, F5 or. F6, F7, F8 e.g.: key 2 F3, F4, F5 = 0,0,0

press and hold **R-key**: Exits the driving operation, returns to menu.

10. Programming/ reading CVs SERV PROG / OP PROG

The MXULF not only is a module too update ZIMO decoders, but also to read-out and program CVs. The MXULF provides two ways of communication with the decoder:

- **PROG**ramming on the **SERV**ice track: the decoder connected to "Schiene / rail" responds with motor pulses to requests by the MXULF. This method is slow, but in some cases effective.

- **OP**erational **PROG**ramming: more than one decoder can be connected to "Schiene", but only the decoder selected by its address will respond to the MXULF's request. This method is also called PoM (Programming on the Main).

To activate one of the programming modes, press and hold the **R-key** (3 sec) to open the menu, scroll to "SERV PROG" or "OP PROG" and press the **R-key** to change to the programming method.

SERV PROG

SERV PROG CV	After selection by **R-key:** Wait to enter CV number
SERV PROG CV 122 =	enter CV number with scrolling wheel, **R-key**
SERV PROG CV 122 =136 ACK	enter CV value with scrolling wheel, **R-key**, ack. by motor current-Feedback by sending „ACK"
SERV PROG CV 122 =136 NACK	enter CV value with scrolling wheel, but programming failed, therefore „NACK"
SERV PROG CV 122 = 0 READ	or again **R-key** to read out, value is displayed with "READ"
SERV PROG CV 122 = N-RD	or again **R-key** to read out, but doesn't work feedback „N-RD" (= „No Read").
CV 122 =136 ACK CV	program or read further CVs "old" line moves up
CV 122 =136 ACK CV 123 =	
	Press and hold **R-key**: return to menu.

OP PROG

OP PROG Address = 0	After selection by **R-key**: Wait to enter address (with scrolling wheel). It is possible to have more than one decoder on the (programming) track / output "Schiene/rail)", only the one addressed is talked to.
OP PROG CV 122 = 136 ACK	Further procedures like in SERV PROG, but faster, with the same feedback (ACK, NACK, READ, N-RD), and additionally „SENT" (i.e. CV programming complete but not acknowledged).

11. Read / program load code

The load code for sound projects is one of ZIMOs specialties, which originates in a multitude of sound providers. They produce sound projects for ZIMO sound decoders. To load these sound projects onto a decoder, you have to buy a "load code". This not only depends on the sound project's author, but also on the identification number of the decoder.

It is a simple process:

- Read out the decoder ID: CV values #250, 251, 252 and 253. The four consecutive values result in the decoder ID. (Example 14 253 118 224)

- Buy a load code (ZIMO homepage, retailer, sound project's author): 4 numbers.

Program these values into CVs #260, 261, 262 and 263.

- Load the sound project into the decoder (see chapter 6).

To read and program the necessary values, the MXULF provides the possibilities already known from chapter 9 "read and program CVs": "PR SERV ID+LD" or "PROG OP ID+LD".

Entering one of the programming modes via the menu: press and hold the **R-key** (3 sec) and select "SERV PR ID+LD" or "OP PR ID+LD" with the scrolling wheel.

SERV PR ID+LD

SERV PROG ID = 221, 56,242,102	After selection by **R-key** decoder ID is read out and displayed (CVs 250-253)
SERV PROG ID = NO-READ	or: After selection by R-key, decoder ID read out failed
SERV PROG LC =	Press and hold **R-key** again to enter load code (CVs 250-253)
SERV PROG LC = 196, 67, 23,	program values, continue/ exit with **R-key** (CVs 260-263)
196, 67, 23,244 LC READ	or: instead of entering, press **R-key** again to read out the load code
196, 67, 23,244 LC ACK	after last value, press **R-key** ACK = ACKnowledgement**,** load code is valid and accepted by the decoder
196, 67, 23,244 LC NACK	or: after last value, press **R-key**, did not work NACK = Not ACKnowledged; usually: Load code not valid or does not correspond to the serial number
	Press and hold **R-key**: return to menu.

OP PR ID+LD

OP PROG Enter addr:	After selection by **R-key** the address is entered, by pressing the R-key the ID is read out automatically.

Otherwise, this procedure is identical (but faster) to the mode "SERV PR ID+LD" (see previous chapter).

12. the decoder connection boards MSTAPK2 resp. -G

MSTAPK2 and MSTAPG are the "newer" test and connection boards (from the MS era); see previous chapter for the (functionally similar) "old" MXTAPS and MXTAPV.

The ZIMO decoder test and connection boards of the MS series were developed in connection with the MS sound decoders, in order to support their possibilities fully (therefore e.g. two loudspeakers for large railroad decoders and PluX-26 decoders, interfaces for the new gauge 0 decoders. etc.).

MSTAP.. and MXTAP.. are nevertheless similar in many respects. MSTAP.. (i.e. the "more modern") test and connection boards are practically universal, applicable for MS as well as for almost all MX decoders (exception: not for MX696); in case of using MXTAP for MS decoders there are restrictions for large scale decoders (only 1 speaker, missing cut points for gauge 0 decoders).

An **important difference** lies in the 21MTC interface. It has been adapted for the MSTAP... to the *VHDM standard (Railcommunity)* adopted in 2016, which has resulted in some significant changes to the pin assignment! The function outputs F05 and F06 have been added. F05 and F06, which can now be used on the MSTAP... as standardised logic level outputs (LL, ZIMO C variant) or as amplified function outputs (OC, ZIMO proprietary D variant) via jumpers, as was previously the case with FA3/FA4.

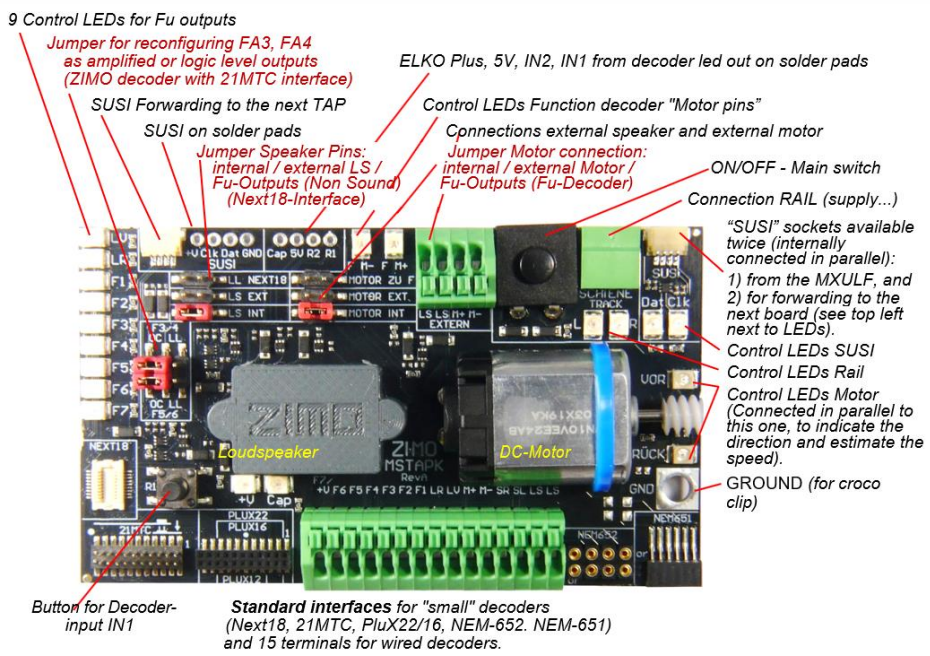
However, because of the greater number of interfaces, in the case of MSTAP. there is no combined test and connection board for all decoders (as there is with MXTAPV), but two types:

MSTAPK2: Test and connection board for **"small" decoders** (interfaces for H0, H0e, TT, N, ...)
MSTAPG: Test and connection board for **large scale decoders** (gauges 0, 1, 2, G, ...) and PluX-26.

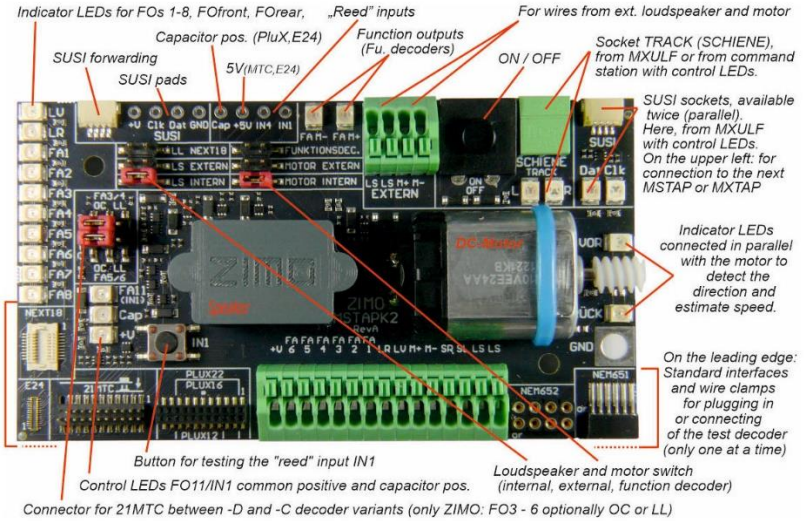
ATTENTION: only ONE interface may be used at a time. This means that **several decoders must NOT** be **plugged** into the various connectors of the MSTAPK2 or -G **at the same time**.

NOTE: Power supply via SUSI cable is sufficient for SUSI sound charging! Do NOT connect the "rail" at the same time!

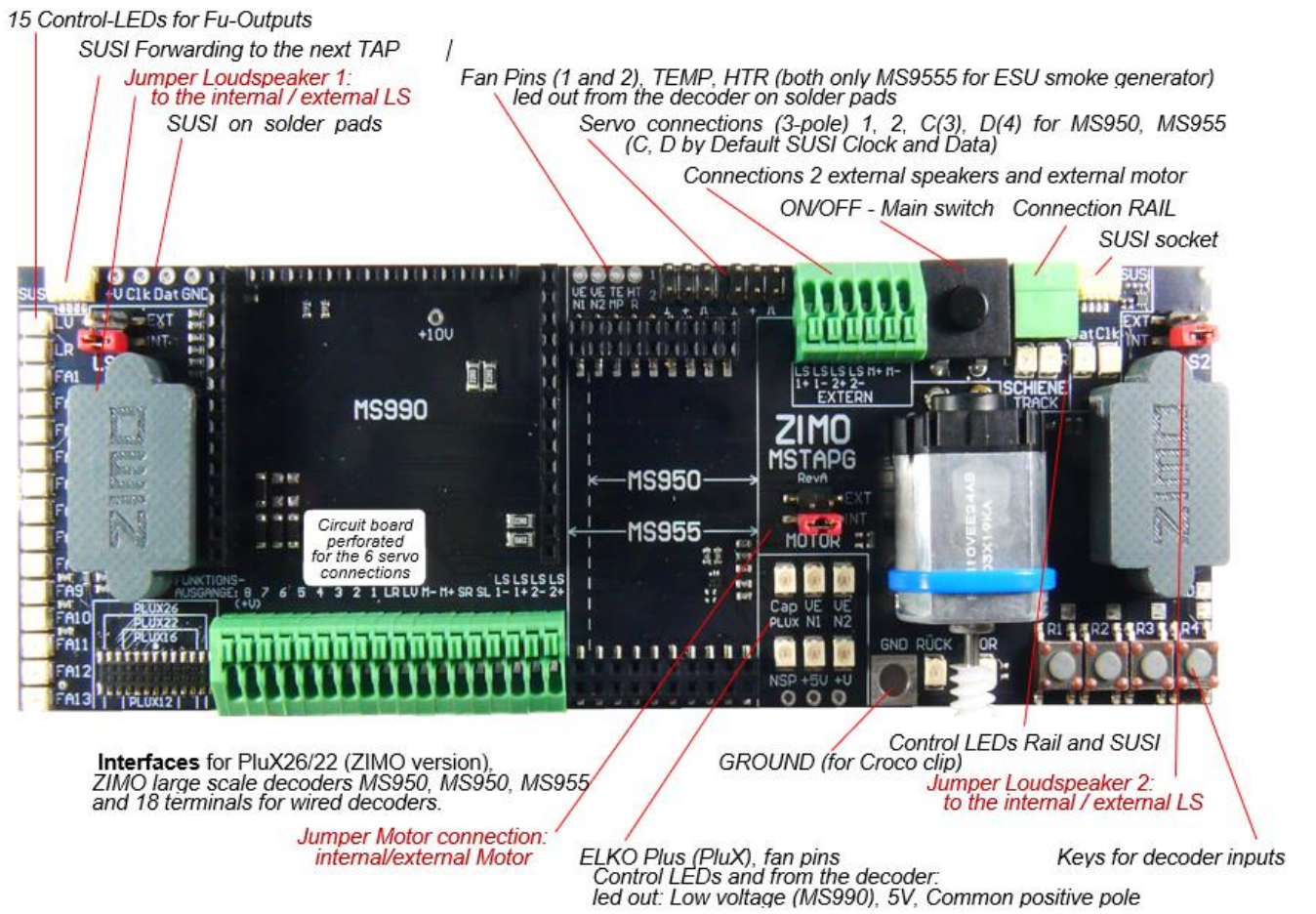
MSTAPK:



MSTAPK(2):

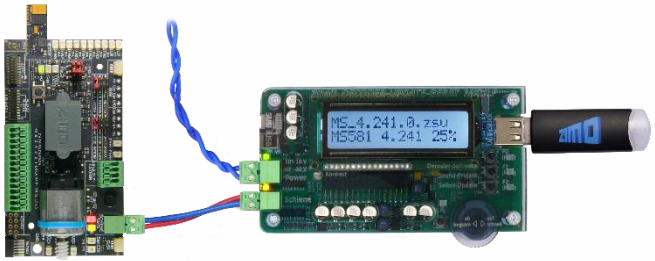


MSTAPG:

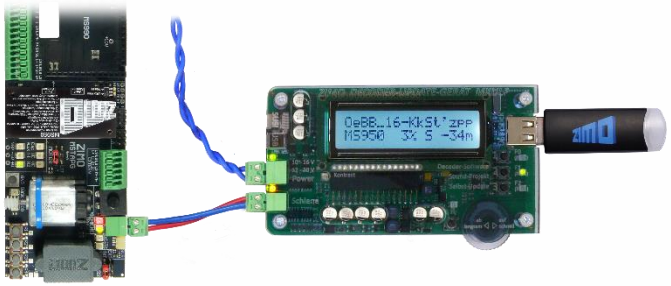

15 Control-LEDs for Fu-Outputs
SUSI Forwarding to the next TAP
Jumper Loudspeaker 1: to the internal / external LS
SUSI on solder pads
Fan Pins (1 and 2), TEMP, HTR (both only MS9555 for ESU smoke generator) led out from the decoder on solder pads
Servo connections (3-pole) 1, 2, C(3), D(4) for MS950, MS955 (C, D by Default SUSI Clock and Data)
Connections 2 external speakers and external motor
ON/OFF - Main switch
Connection RAIL
SUSI socket
MS990
MS950
MS955
ZIMO
MSTAPG
Circuit board perforated for the 6 servo connections
EXTERN
SCHIENE TRACK
MOTOR
Interfaces for PluX26/22 (ZIMO version), ZIMO large scale decoders MS950, MS950, MS955 and 18 terminals for wired decoders.
Jumper Motor connection: internal/external Motor
ELKO Plus (PluX), fan pins
Control LEDs and from the decoder: led out: Low voltage (MS990), 5V, Common positive pole
GROUND (for Croco clip)
Control LEDs Rail and SUSI
Jumper Loudspeaker 2: to the internal / external LS
Keys for decoder inputs

Typical applications MSTAPK2 (or MXTAPG) with MXULF:

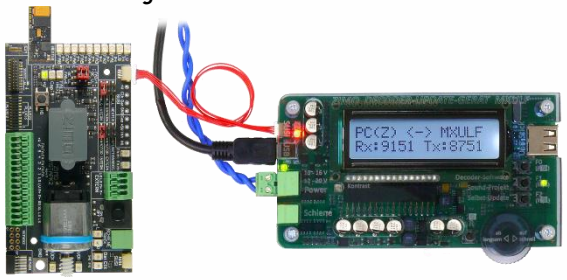
*Power supply for the combination via the "Power" connection on the MXULF, 2-pole cable from "Rail" (MXULF) to "RAIL" (MSTAPK2); a **decoder update** has just been started on the MXULF , the decoder software comes **from the USB stick**.*



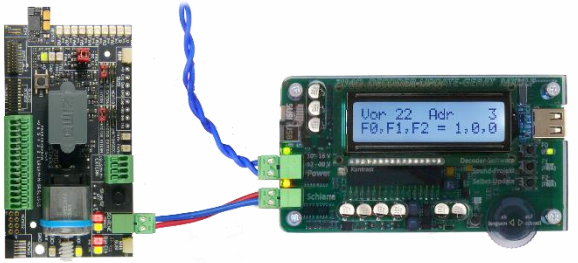
***MSTAPG** with attached MS950 large railway sound decoder, MXULF connected via rail: **sound loading** has just been started on the MXULF , the sound project comes **from the USB stick**.*



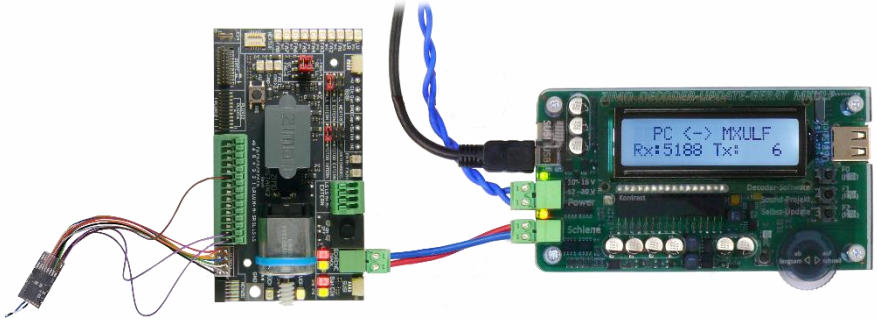
***MSTAPK2** with decoder MS581 (Next18), connected to MXULF:*
SUSI cable** between MXULF and MSTAPK2 to perform fast sound loading via SUSI. MXULF is controlled by the computer in this case (usually software ZSP - ZIMO Sound Programmer; USB cable to the computer; information about communication between PC and MXULF on the display). **ATTENTION:** The rail connection to the test board must always be disconnected. **Never leave SUSI + track plugged in at the same time, this can damage the decoder!



***MSTAPK2** with MS590 decoder (Next18), connected to MXULF:*
***Test operation** is currently running via the controls and display of the MXULF , i.e. motor control, function outputs, sound of the decoder are being tested.*

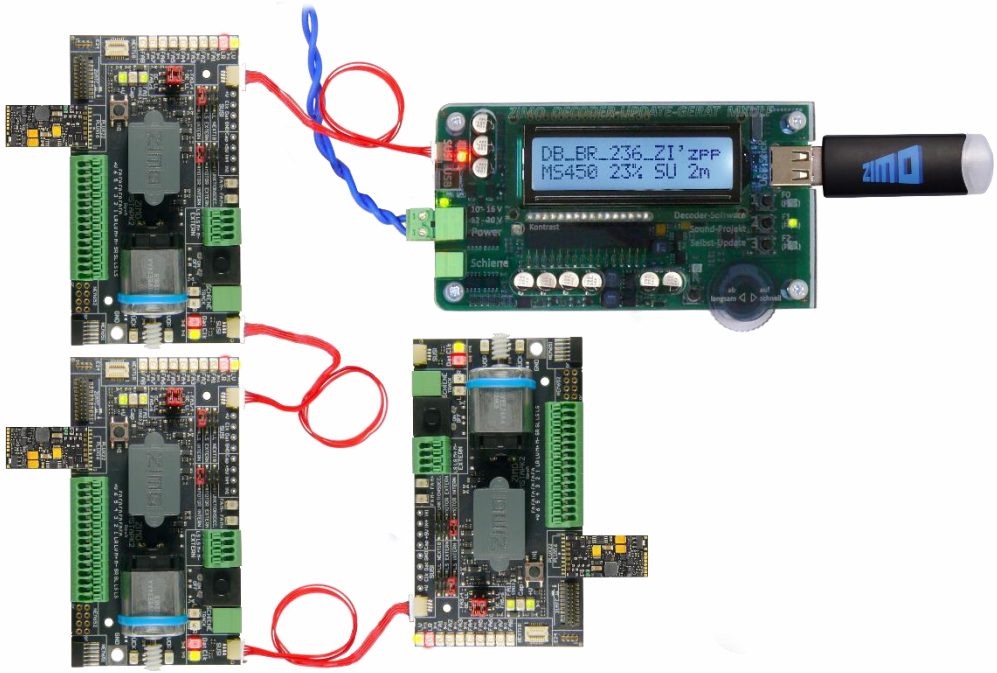


***MSTAPK2** with MS480R decoder (8-pin NEM652 interface, loudspeaker not on interface, therefore wires on terminals), connected to MXULF:*
*In this case, the **test operation** is controlled by the computer (display control panel in ZSP or ZCS), therefore only information about communication between PC and MXULF is visible on the display.*



Note: MS large scale decoders can also sound load via SUSI, either via MSTAPG or directly connected to the decoder. It is also possible to load another large scale decoder of the same type, connected directly to the second SUSI connection of the MSTAPG. Here in the application example: MS990 on its own SUSI connection directly on the MXULF:

Simultaneous sound loading of several MS450 decoders via "SUSI": each decoder must be connected to its own decoder test and connection board MSTAPK2. The **connection boards** can be connected in **parallel**.



13. Decoder-connection board MXTAPS / V

MXTAPS and MXTAPV are the "old" test and connection boards (from the "MX time"), Previous chapter for the more modern (functionally similar) MSTAPK2 and MSTAPG.

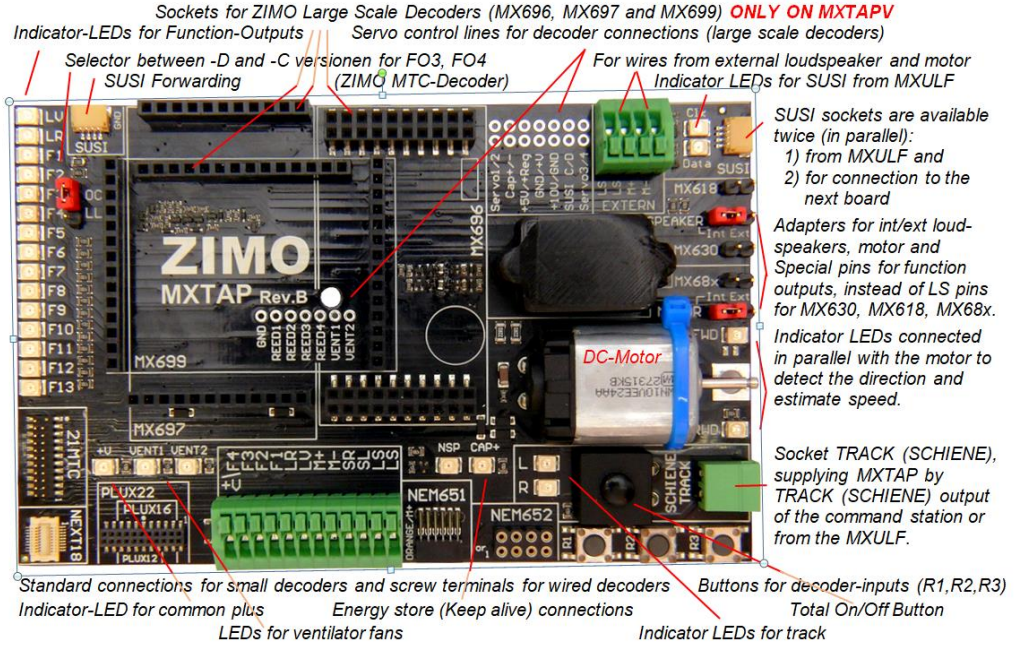
ZIMO decoder-test-and-connection boards are best used with ***MXULF***, as well as ZIMO command stations (especially *MX10)*, but also with older ZIMO digital command stations and devices of other manufacturers.

The basic features of these PCBs are the following:

- Plugs for all interfaces used in ZIMO decoders, i.e. PluX12, -16, -22, Next-18, 21MTC, NEM651, NEM652 (all standardized by VHDM or NMRA), as well as interfaces for large-scale decoders MX696, MX697, MX699 (proprietary of ZIMO).

  Two versions - ***MXTAPS*** only for small scales, ***MXTAPV*** with all interfaces (including large-scale)
- Connection to *MXULF*, ZIMO central command station or other digital command stations via double clamp "SCHIENE" and, if necessary (if available on counter device) via SUSI cable.
- To test the decoders, the following is provided: DC motor, speaker (1 Watt), various LEDs for function outputs and fan outputs (large-scale decoders), servo connections (large-scale decoders), plugs for various ZIMO decoder types and wires to external consumers.

NOTE: With the MXTAPS or MXTAPV, also decoders of other manufacturers can be used. To update software or sound, naturally, a suitable programming device of the corresponding manufacturer has to be used. When testing, ZIMO and other products can be mixed on both sides. SUSI sound load is only possible with ZIMO decoders.



Connections between the MXTAPV and the MXULF: a 2-pole cable to connect the “Schiene”-plug (track; connectors are supplied with the device) and a 4-pole SUSI cable (supplies; SUSIKAB).

The ***MXTAPS*** (or ***MXTAPV***) is connected to the output “Schiene” of the *MXULF* via the double clamp “SCHIENE”, and to a track output of a ZIMO central command station or another digital command station. No additional supply is necessary.

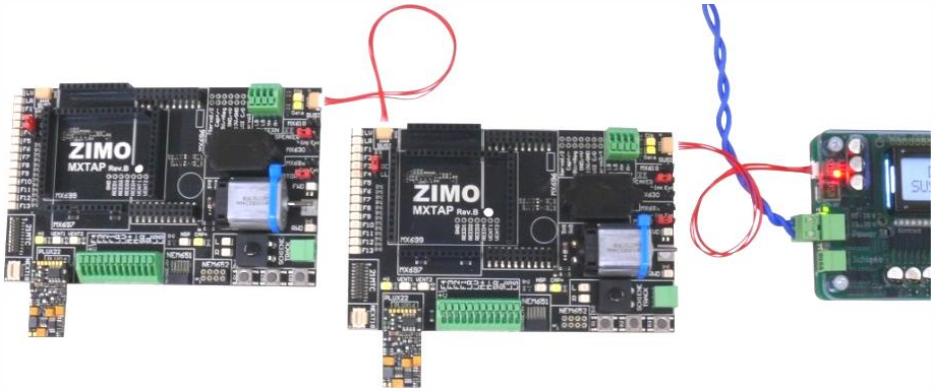
If needed, the SUSI plugs from *MXULF* and *MXTAP* are connected: via “SUSI”, sound loading is essentially faster than via “tracks”. For decoders with the interfaces “PluX”, “MTC”, “Next” as well as large-scale decoders, SUSI is automatically available at the “SUSI” interface of the ***MXTAP*** and can easily be transferred to the ***MXULF***.

ATTENTION: only ONE connection can be used. Therefore, you can NOT connect more than one decoder to the number of interfaces of the ***MXTAPS*** or ***MXTAPV***.

MX644 can **NOT** be loaded simultaneously!

NOTE: The supply via SUSI cable is sufficient for SUSI sound loading!
DO NOT connect "rail" at the same time!

Simultaneous sound loading of more than one MX645P22 via “SUSI”: each decoder has to be connected to an individual decoder-test-and-connection board MXTAP. Several **connection boards** can be connected **in parallel**.



14. Further menu items of the MXULF

Without CV144, 29 - Sound load or SW update using USB stick via track, no CVs are read. The sound projects and decoder software update files saved on the stick are displayed in a list. Use the scroll wheel and then the R button to start the desired process.

MS SW PowCycle - if errors occur when updating the decoder software of MS/MN decoders, this menu item can help. Press the "R" button for approx. 3 seconds, enter the MXULF menu, scroll to the "MS SW PowCycle" entry. If there are several update files on the USB stick, select the appropriate file for the connected decoder using the scroll wheel. The power cycle update is started by pressing the "R" button and is completed when "...100%" appears on the MXULF display.

Multitap update - for updating the decoder SW of several identical MS or MN decoders on one Multitap.

Procedure: Plug the USB stick with the update file into the MXULF, connect the Multitap to the track, press and hold the R button to open the menu and use the scroll wheel to select the "Multitap Update" menu item, confirm with the R button. MXULF runs through all possible decoder types and then starts the update, completed at 100%, disconnect track.

Use the SUSI Soundload menu item (as described above) to **load sounds via Multitap**. (Connect the Multitap to the MXULF via SUSI cable - no track connection).

Serv Prog CV8=8 – resets all self-programmed CVs of a sound project / CV set to the default settings..

Reset – restarting the MXULF

Important information for decoders with SW older than 4.79

See ZIMO website under Updates -Decoder.
Affected are the decoder-types /-families MS440C, MS450, MS480, MS490, MS580, MS590, MS990
TIP:
Which SW version a decoder currently contains can be read out with CV #7 and CV #65 (Subversion)
Which bootloader your decoder currently contains can be read out with CV #248 and CV #249 (Subversion) can be read out. Example: 4.79 (main version 4 . Subversion 79)

Annex: Declaration of Conformity and Warranty

Declaration of Conformity:

ZIMO Elektronik GmbH hereby declares that the product MX10 bears the EC mark and is built in accordance with the provisions of Directives 88 / 378 / EWG ; 89 / 336 / EWG ; 73 / 23 / EWG.

24 months warranty:

Our products are technically sophisticated and are manufactured and tested with utmost care, therefore, ZIMO Elektronik GmbH guarantees its products for 24 months from the date of purchase (with proof of purchase from a ZIMO contractor).

The warranty covers the repair or replacement of defective parts. ZIMO Elektronik GmbH reserves the right to proceed at its own discretion only if the damage is proven to be the result of a design, manufacturing, material or transport fault. A repair does not extend the warranty. Warranty claims can be made with a ZIMO contract partner or ZIMO Elektronik GmbH. Proof of purchase is required.

The warranty does not apply:

- with normal wear and tear
- if devices are not used for the purpose intended by ZIMO Elektronik GmbH and in accordance with its operating instructions
- in case of modifications or alterations not performed by ZIMO Elektronik GmbH.

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