OPERATING MANUAL

EDITION

2013 03 15
2013 10 15
2013 11 23
2014 02 28
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The ZIMO

COMMAND STATION MX10

Chapter

Display (128 x 64 pixel, RGB- backlit)

	Normal operating screen	*BLUE*	Primary volt and amp values, track 1, track 2, communication's statistics, AOS
↻↺	VOLT & AMP Main settings	*YELLOW*	Output voltage, maximum permissible current for track 1, track 2
↻↺, Bt. **1** (↴)	VOLT & AMP Detail settings	*YELLOW*	Turn-off times, differential (current jump) turn-off, tolerance
2 sec ↧	STOP & OFF	*RED*	Broadcast stop BCS, track 1 power OFF, track 2, overcurrent OVC (Short circuit)
Button **3** (↺)	BaseCab LOCO	*GREEN*	Set vehicle address, use rotary knob for driving, use buttons for functions
Button **2**	**(MENU)**	*GRAY*	Select menu choices by turning and pressing rotary knob
M,↻, ↧	DCC SERV PROG	*YELLOW*	Read and program CV's at the programming track 2 (Schiene 2)
M,↻, ↧	MX10 Config	*GRAY*	Several settings such as language, radio channel, sniffer inputs, booster…
			Various information i.e. software version, statistic, date/time…
➪ *USB-Stick*	UPDATE & SOUND	*GRAY*	Decoder update and sound project uploads via USB stick

KEY TO SYMBOLS: ↻↺ Rotary knob, turn rapidly back and forth ↺ Scroll with rotary knob ↧ Press rotary knob Button **1**(↴) **Button 2** (**M**) Button **3** (↺)

USB (Host) socket

Accepts a USB flash drive.

➪ Insert → UPDATE & SOUND

Select a file for decoder update, sound upload, and for MX10's own update.

Sockets for ZIMO CAN and XNET

CAN bus for 6-pin connection with ZIMO cabs and modules; additionally: sniffer inputs on 8-pin socket.

Note: Stationary StEin modules are connected on the rear side of the MX10.

XNET socket for the connection with ROCO Locmouse and similar; on the 8-pin socket (additionally): second ZIMO CAN bus and second XNET bus (in reserve).

SUSI socket

For quick sound uploads via SUSI interface.

Rotary knob

Normal operating screen *BLUE* – Protected against unintentional actuation: brief push or turn → NO effect

↻↺ (rapid turning left/right) → Enters main setting page for VOLT & AMP *(display YELLOW)*

↧ (press for 2 sec) → Broadcast stop BCS and operating state STOP & OFF *(display RED)*

↧ (press for 1 sec) → Cancels broadcast stop and returns to normal operation (or to previously active state)

↧ (press for 4 sec) → SYSTEM OFF (track 1& 2 OFF, CAB power OFF, display OFF etc.)

↧ (press for 1 sec) → SYSTEM ON

Outside of normal operation (-screen) – ↻↺ Scroll and ↧ Select, ↻↺ Adjust, ↻↺ Drive ↧ Direction…

3 buttons

Normal operating screen *BLUE* –

Button **1** (↴) → AOS operating sequences, settings and control display

Button **2** (**MENU**) → Menu for operating mode selection *GRAY*

Button **3** (↺) → Operating mode LOCO DIRECT *GREEN*

STOP & OFF (after ↧ rotary knob or short circuit) *RED*

Button **1** → BCS, OFF, ON for track 1 Button **2** → …for track 2

BaseCab *GREEN*

Button **1, 2, 3** → (after selecting a group) Function switching

UPDATE & SOUND *BLUE (GREEN)*

Button **1** → Starts decoder update Button **2** → Starts sound upload

Button **3** (↺) → (unless otherwise assigned) returns to normal screen *(BLUE)*

Powered by

external DC power supply

10 - 35 V =

80 - 600 Watt

Only electrically insulated power supplies are allowed!

The MX10 starts automatically after the power supply is connected and turned on.

AOS inputs and LED outputs

8 logic inputs (responds to negative and positive voltage, e.g. rail power) for

- External buttons for panic STOP and track power OFF
- Rail contacts for internal AOS‘ (automated operations)
- Rail contacts for external AOS‘ (automated operations)

6 LED outputs (up to 25 mA) for signals or other lights, controlled by AOS‘

5V and GROUND supply pins.

Sockets for ZIMO CAN and LAN

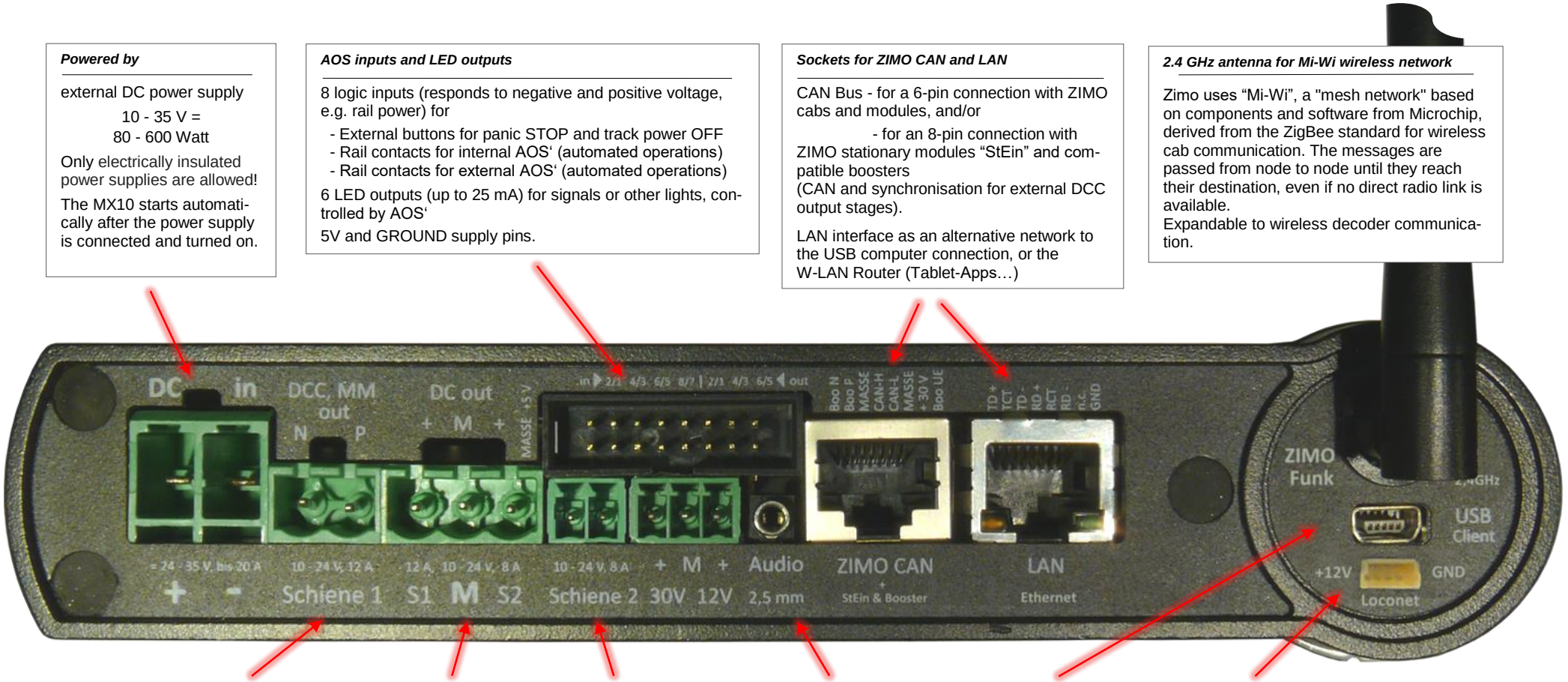
CAN Bus - for a 6-pin connection with ZIMO cabs and modules, and/or

- for an 8-pin connection with ZIMO stationary modules “StEin” and compatible boosters
(CAN and synchronisation for external DCC output stages).

LAN interface as an alternative network to the USB computer connection, or the W-LAN Router (Tablet-Apps…)

2.4 GHz antenna for Mi-Wi wireless network

Zimo uses “Mi-Wi”, a "mesh network" based on components and software from Microchip, derived from the ZigBee standard for wireless cab communication. The messages are passed from node to node until they reach their destination, even if no direct radio link is available.
Expandable to wireless decoder communication.



Outputs: track1 (“Schiene 1”) | DC track voltage (DC out) S1, S2 |track 2 (“Schiene 2“)

2-pin socket for track 1 (“Schiene 1“) – usually for the main track
2-pin socket for track 2 (“Schiene 2“) – for programming or 2nd main track.

“Digital current” (DCC, MM, poss. other future formats such as mfx, sx)

Polarity N, P is of no importance in simple layout applications, but is important on layouts with track sections or block control using components such as MX9 modules, StEin modules or boosters.

The track 1 (Schiene 1), track 2 (Schiene 2) outputs can be set individually (different) in terms of voltage, amp limits etc., depending on configuration and situation with the same or different data signal.

3-pin socket “DC out”: S1 (to track 1), M = “Ground”, S2 (to track 2)
to power stationary modules such as StEin, track section, reverse loop modules etc. (within the MX10 DCC end stage limits).

All necessary plugs are included.

Audio-socket (Line-out)

For amplified sound-playback primarily through internal speakers (from warning sounds to complete sound projects; application is not ready by 2017).

USB (device) socket

USB computer hock-up socket for switch panel applications and configuration software.

The transfer rate corresponds to 1 M baud; the necessary protocol is available at the ZIMO web site.

Loconet socket

Ready for future implementation.

General notes:

- This manual reflects (matches) the product- and software version at delivery. The device may show further features after an update. New versions of this manual are published on the ZIMO website www.zimo.at .
- ZIMO devices should not be operated in extreme surroundings (heat, humidity). The air circulation into and out of the device should not be restricted (i.e. by covering).
- The cable connection should not be squeezed or put under physical tension or twisted. In order to have a faultless power- and data transmission, make sure that all connections have a solid fit.
- The device should not sty under voltage unattended. The power supply unit(s) must be disconnected from the mains using a switchable socket strip or pulling the plug(s).
- Children under the age of 8 years must be under supervision of an adult when operating the device.
- Improper use or opening of the device without consulting ZIMO may lead to danger or loss of warranty.

For further information about ZIMO products, sound projects for locos or software from ZIMO partners, please visit our website at http://www.zimo.at/web2010/index.html

1. First start up of the ZIMO system

- The ZIMO system is usually offered as a starter set. Different types of sets are offered, this manual refers to a set with:
  1 command station MX10
  1 cab MX32 or MX32FU
  1 power supply with 30 V / 240 VA or more
  Different plugs, CAN cable, power cable (adapter may be necessary)
- In a first step, all connections must be established with the material (cables, plugs …) included (picture see page 6):

  - MX32 cab using the CAN bus cable to the command station MX10 (“ZIMO CAN” socket)

ATTENTION: **It is important to use the cable with the identical plugs on both sides!**

  - The track system to the terminal “Schiene 1” (track 1) or “Schiene 2” (track 2) of the MX10. Track 2 may be used as a separate main track but can also be switched into “Service mode” for programming.
  - The power supply cable to the terminal “DC in”. Polarity must be correct, there is no danger in any case.
  - The power supply to the mains (110 – 240 V ~). In case the MX10 does not start (boot), change cables of the plug in the terminal “DCC in” on the MX10 (wrong polarity)

- The command station MX10 starts when power is supplied through “DC in”. The boot sequence shows a red, than blue screen.

- The cab switches itself on subsequently (30 sec.). In case of…

..a new MX32, it shows the ***LOCO IN*** screen. Enter the address of the loco you want to drive:

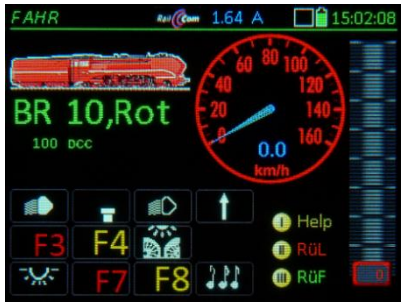
address

F-key

- To drive a new loco, press the A-key to switch to the ***LOCO IN*** screen and add a new address. Activate the new loco by pressing the F-key.

..a used MX32 (with locos in it’s memory), it shows the ***LOCO*** or the ***SWI*** screen. Continue driving the loco or add an new one be pressing the A-key to switch to the ***LOCO IN*** screen.

A-key



After entering the address in the screen, press the F-key to activate the newly entered loco – the screen turns into the ***LOCO*** screen

You can drive the new loco now using the slider, the R- and the function keys.

2. Power supply and technical specifications

The ZIMO command station MX10 (and thus all connected control system components and the entire model railroad layout) is supplied by an external power supply; this provides the so-called "primary" power. A product offered by ZIMO as well as a third-party product can be used as a power supply unit, as long as it complies with the basic conditions:

DC input: **external power supply** with galvanically insulated DC output……	**20 - 35 V**
applicable maximum current……	3 – 30 A
for small layout operations (@ 3A track voltage)……	80 Watt
for full capacity (up to 25 A total track current)……	**600 Watt**

The power supplies available from ZIMO meet these criteria's. Consult the product and price lists for the currently available power supplies or for the ones supplied with the starter sets. The example here shows a ***ZIMO standard power supply*** with ***30V and 8A*** output; this ***240 W – device*** is included in the current starter sets but can also be ordered separately.

The track output voltages of the MX10 is reduced to values between 10 – 24 V by the internal DC converter, depending on the **Volt & Amp settings** (corresponding chapter).

MX10 backside

Due to the internal power consumption of the MX10, the voltage difference between the MX10 input and track output must be 3V or more. The maximum track voltage must be 3 V below the voltage available from the power supply.

The total track current may be higher than the power supply current: the smaller the track voltage compared to the power supply, the higher the current (max. double). In the case of a 240 W power supply unit, total currents of 8A (at 24V) and 15A (at 12V) can be expected.

There are however other power consumers besides the track outputs (i.e. attached cabs etc.), that limit the available power according to configuration settings.

The power supply output is connected with the "DC in" socket (at the rear, left) of the MX10.

Observe polarity (+ / -) !

There will be NO damage to the MX10 if polarity is reversed, but it won't run either.

ATTENTION:
Classic TRANSFORMERS of any kind are ***NOT ALLOWED*** with an MX10 (neither those with rectifiers); ***ZIMO Trafos*** (although they were formerly used with the MX1) or old ***model railroad transformers*** are ***NOT ALLOWED*** either.

Track 1 output (Schiene 1)

			Default
- Track voltage ……	(adjustable in 0.2 V increments)….	10 to 24 V	16 V
- Boot-up current ……	(adjustable in 1 A increments)……	1 to 12 A	5 A
- Track voltage boot-up time ……	(adjustable in 1 sec increments)….	1 to 60 sec	1 sec
- Overcurrent threshold ……	(adjustable in 0.1 A increments)….	1 to 12 A	5 A
- Overcurrent turn-off speed ……	(adjustable in 0.1 sec increments)	0.1 to 5 sec	0.2 s.
- Tolerated transgression of overcurrent threshold...	(adjustable in 0.5 A increments)….	0 to 4 A	0 A
for the time of……	(adjustable in 0.5 sec increments).	1 to 60 sec	0 sec
- Spark suppression (Select from Off /Lev1 /Lev2).....	Level 1……	8 A	OFF
	Level 2……(sensitive)…...	4 A	

Track 2 output (Schiene 2)

			Default
- Track voltage ……	(adjustable in 0.2 V increments)….	10 to 24 V	16 V
- Boot-up current ……	(adjustable in 1 A increments)……	1 to 8 A	3 A
- Track voltage boot-up time ……	(adjustable in 1 sec increments)….	1 to 60 sec	1 sec
- Overcurrent threshold ……	(adjustable in 0.1 A increments)….	1 to 8 A	3 A
- Overcurrent turn-off speed ……	(adjustable in 0.1 sec increments).	0.1 to 5 sec	0.2 s.
- Tolerated transgression of overcurrent threshold...	(adjustable in 0.5 A increments)….	0 to 4 A	0 A
for the time of ……	(adjustable in 0.5 sec increments).	1 to 60 sec	0 sec
- Spark suppression (Select between OFF /Lev1 /Lev2).....	Level 1……	8 A	OFF
	Level 2…..(sensitive).....	4 A	

DC outputs S1 and S2

DC output 30 V	(Power supplied to other devices connected to the CAN bus)…..	4 A
DC output 12 V	(Power for XNET and Loconet devices).....	2 A
LED outputs	(6 pins on 2 x 8-pin plugs) – constant 15 mA current... …….	max. 25 mA
	"out 5" and "out 6" useful for relays ……	100 mA
AOS inputs	(8 pins on 2 x 8-pin plugs) – Switch to ground or switch-threshold	0 to 32 V
Audio output	(2.5 mm phone jack) ……	Line-out
RailCom Detector track1	Measurable minimum amplitude of RailCom signal	4 mA
	Sample rate (3-times oversampling).....	750 kHz
Detector track 2	Measurable minimum amplitude of RailCom signal.	4 mA
	Sample rate (3-times oversampling).....	750 kHz
ZACK Detector track1	Detection threshold ……	500 mA
Detector track 2	Detection threshold ……	500 mA

Cable communication

ZIMO CAN bus 1 ……..	(ZIMO CAN socket, front and back) ……	**125 kBd**
……..	Prepared for ……	512 kBd
ZIMO CAN bus 2 ……..	(with special 8-conducter cable on: XNET socket) …	**125 kBd**
……	Depending on protocol, up to……	512 kBd
XNET ……		62,5 kBd
XN2 ……	(2. XNET or OPEN DCC Bus) not yet in use..... …	512 kBd
Loconet ……	only hardware installed at this time ……..……..	16.6 kBd
USB device (client) interface...	……	1 Mbit/s
USB 2.0 host interface ……	(for USB stick and future applications) ……..……	12 Mbit/s
LAN ……	(ethernet, also for W-LAN routers) ……..……	10 Mbit/s
Radio communication	**Mi-Wi network** (derivative of ZigBee stds., 2.4GHz) approx. …	**20 kbit/s**
Internal memory:	DRAM und SRAM (random access memory)	64 MB
	NAND Flash (pictures, databanks, switch panels, sound files..)	4 GB

3. Typical system configurations

The MX10 is ZIMO's central unit for a digital multi-train system or, in other words the "digital center", or according to the NMRA - terminology, the digital "command station".

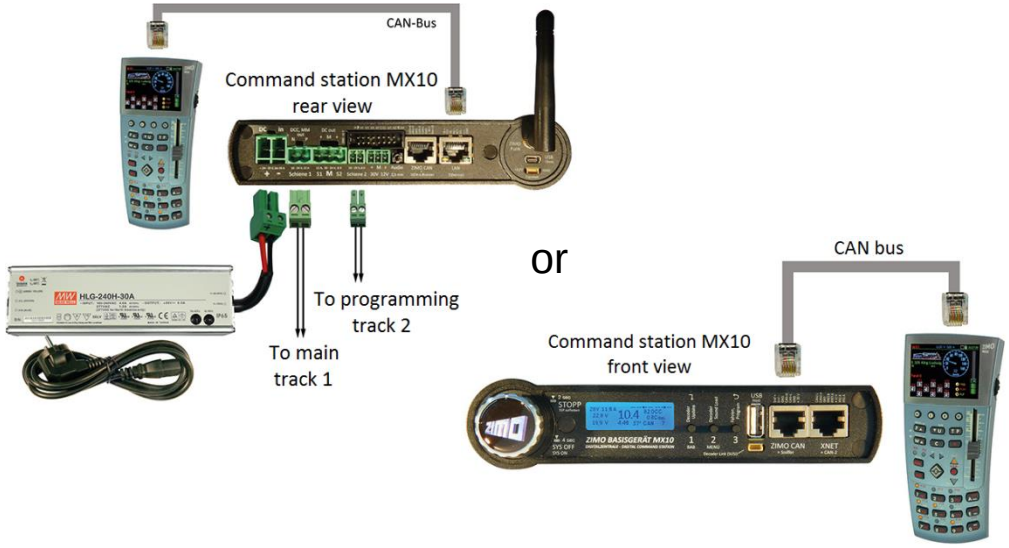
The command station provides a stabilised, short circuit protected voltage to the tracks (from each of the two rail outputs) along with the control information for vehicles and accessories, in either the standard DCC* data format (see below) and/or in the MOTOROLA** data format (to which the factory-installed decoder in Märklin vehicles react).

*) **DCC** (Digital Command Control): originally standardized by the NMRA (National Model Railroad Association) and since 2010 further specified by the European manufacturers association VHDM ("Rail Community"), is used by digital systems and decoders from "Digital plus" (Lenz), ROCO-digital, LGB multi-train (Massoth), Digitrax, ESU, Uhlenbrock and others.

**) MOTOROLAis not yet implemented.

The MX10 is connected with other ZIMO devices by means of CAN bus connectors and cables: the input devices - known as cabs (MX2, MX31, MX32), the stationary modules ("StEin modules) or the accessory and track section modules (MX7, MX8 and MX9).

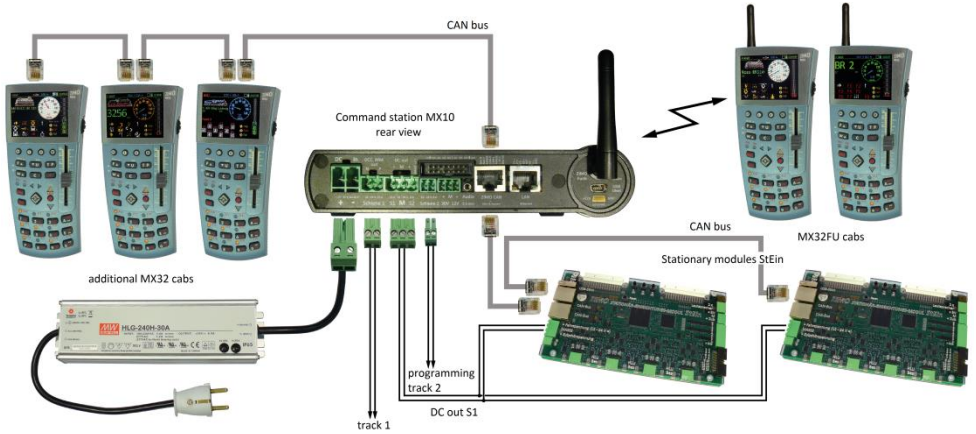
The usual minimum configuration of a ZIMO digital control system with MX10 looks like this:



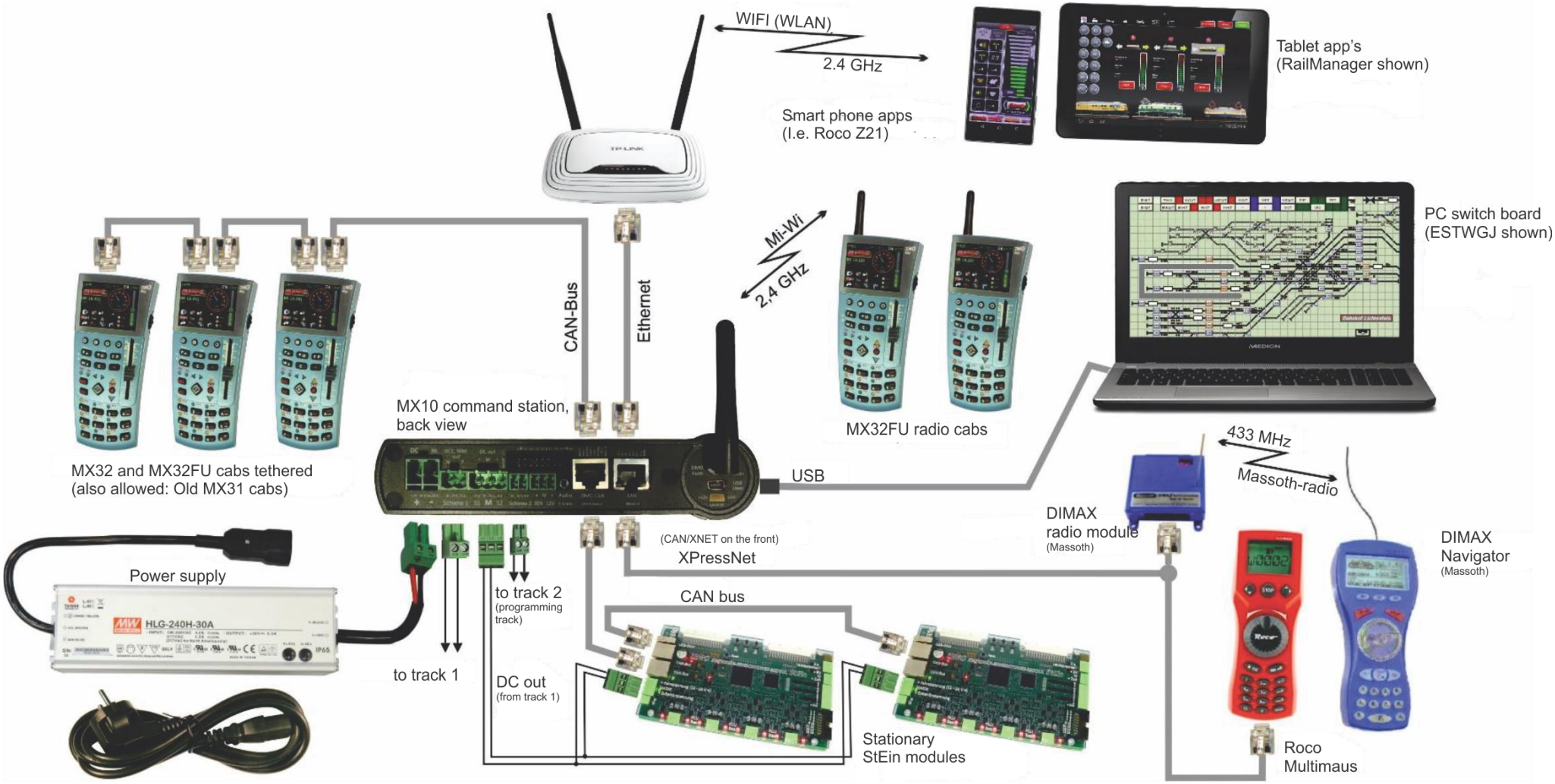
The MX32 and MX32FU (in tethered mode) can be connected to either the rear or front MX10 CAN bus socket. Since these two CAN bus sockets are linked internally and thus interconnect to the ZIMO MX10 CAN 1, cabs can be plugged into the rear and front simultaneously. For example: the rear socket can be used for permanently connected MX32's (or bus wire) while the front socket is used to charge the MX32FU battery when needed.

A more elaborate layout configuration with solely "new" products is shown below:

MX32FU radio cabs can be operated in tethered or **radio mode**. When operated with the current MX10 command station – in contrast to earlier ZIMO systems – NO additional radio module is required, as this is already installed in the command station.



NOTE: Arrangements without cabs are also possible in case of computer control only or operating through virtual input devices (mobile phones, tablets... via USB, LAN).


WIFI (WLAN)
2.4 GHz
Smart phone apps
(I.e. Roco Z21)
Tablet app's
(RailManager shown)
PC switch board
(ESTWGJ shown)
Mi-Wi
2,4 GHz
MX32FU radio cabs
CAN-Bus
Ethernet
MX10 command station,
back view
MX32 and MX32FU cabs tethered
(also allowed: Old MX31 cabs)
USB
433 MHz
Massoth-radio
DIMAX
radio module
(Massoth)
DIMAX
Navigator
(Massoth)
(CAN/XNET on the front)
XPressNet
Power supply
HLG-240H-30A
to track 2
(programming
track)
to track 1
DC out
(from track 1)
CAN bus
Stationary
StEin modules
Roco
Multimaus

Details on connections of "old" and "new" ZIMO cabs as well as control units of other manufacturers

Various input devices can be connected to the ZIMO system with an MX10 command station for operating and configuring vehicles and accessories:

- ZIMO **CAN** bus:

  All generation ZIMO cabs such as the MX2, MX21, MX31, MX32, ZIMO radio modules MXFU (to connect with the "old" radio cabs MX21FU and MX31FU). Only the current generation MX32 cabs can take full advantage of all MX10 functions.

  The Roco central station **Z21** can also be connected to the ZIMO CAN bus to take advantage of the Roco mobile phone and tablet apps.

- **"Mi-Wi",** the MX10's integrated radio module:

  The new generation ZIMO MX32FU radio cabs also contain a radio processor and can communicate with the MX10.

- **XNET**:

  The "red" Roco Lokmaus, Massoth DiMAX Navigator and other compatible devices.
  The use of other products will be tested only as needed.

- **WLAN** (i.e. a router connected to the LAN socket of the MX10):

  Wi-Fi enabled mobile phones and tablet PC's (and of course other mobile Wi-Fi devices).

- Other bus systems such as Loconet and S88:

  the hardware of these interfaces is installed but not functional with the initial MX10 firmware. Any future implementation depends on demand.

- **USB Client** interface:

  Virtual (computer) cabs within switch panels and decoder configuration programs such as STP, ESTWGJ, Train Controller, ADaPT etc.

- **Sniffer** input:

  track outputs of a third-party system can be connected here to reproduce their data at the MX10 outputs.

The ZIMO CAN bus:

The MX10 has two 8-pin connectors for the CAN bus, one on the front and one on the back of the device. The six middle pins of these two connectors form the so-called ZIMO CAN bus and are completely identical. Since these are connected together internally, all devices connected to these CAN sockets with 6-pin CAN bus cables are connected in parallel. It does not matter which of these sockets the cabs, MX8 accessory modules, MX9 track section modules or other devices are connected to.

The distinction between these two sockets simply refers to the two outer pins:
The socket on the back is equipped with additional lines for the control-signal synchronization of StEin modules and the front socket is used, together with an 8-pin CAN cable, as a "Sniffer input".

Each cab (MX32, MX31, MX2, MX21...) also has two identical 6-pin sockets, which allow the power and data lines to be looped from cab to cab. A 6-conductor bus wire can be installed alternatively with 6-pin distributors and sockets, so more cabs can be connected as needed.

The "CAN2" – Bus:

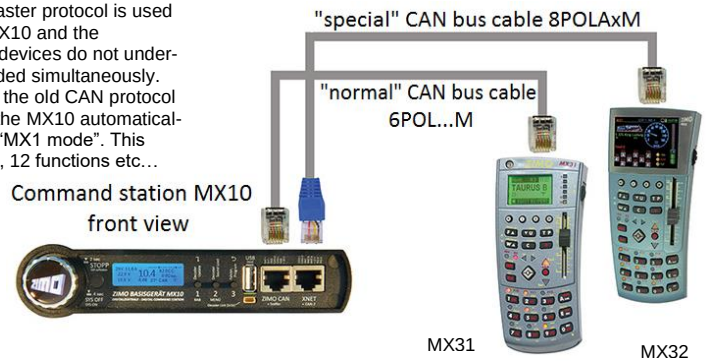
The "**XNET" socket** also contains the connections for "CAN2", a second CAN bus, in addition to the XNET itself. This is needed when the new system devices (MX10-MX32) are used together with the "old" MX31 cabs and/or accessory and track section modules MX8 and MX9.

The following wiring must be observed when "old" cabs such as the MX31, MX21, MX2 or radio modules MXFU are used together with the new MX32 or MX32FU cabs:

- the "old" devices (MX31…) are connected with a "normal" CAN bus cable to either the front or the rear ZIMO CAN bus socket.
- the "new" devices (MX32, MX32FU) must be connected to the front XNET socket (!) with the **special cable "8POLAxM"** (8-pin plug on the MX10 end and 6-pin plug on the cab end). This special cable connects the "CAN2" (=second CAN bus) XNET socket pins with the CAN pins of the cab.

Because a more extensive and faster protocol is used between the command station MX10 and the MX32/MX32FU (which the older devices do not understand), both CAN buses are needed simultaneously. As soon as a device operating in the old CAN protocol is connected to the system bus, the MX10 automatically switches over to the so-called "MX1 mode". This mode is restricted to no RailCom, 12 functions etc…

In order to retain all the new functions of the MX32, it is necessary to connect it to the ZIMO CAN2 (XNET) socket. There are no restrictions in wireless operation.



The same type of wiring is to be used when connecting MX8 and/or MX9 modules. These modules are connected like the older cabs (MX31…) to the "normal" ZIMO CAN bus socket, while the MX32 is connected to the XNET socket as described above.

Radio communication via "Mi-Wi":

The MX10 and the ZIMO radio cabs MX32FU are equipped with a "Mi-Wi" radio module from Microchip (who also provides the "PIC" microcontroller).

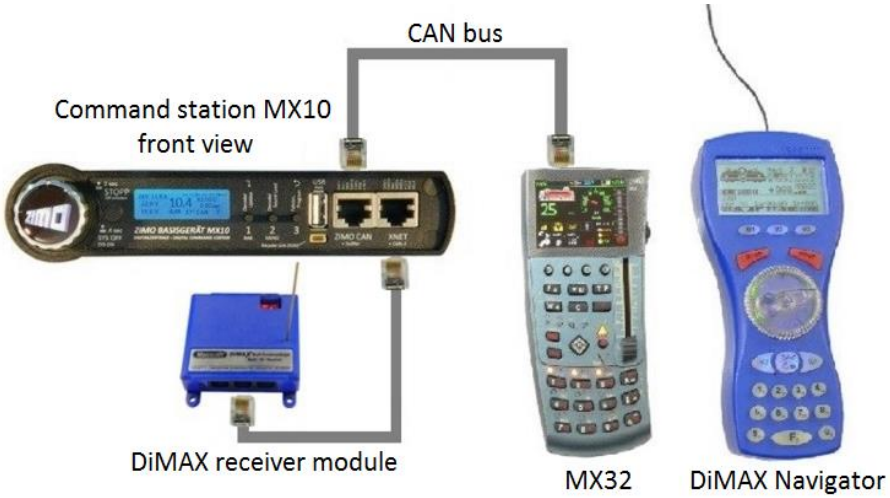
The "Mi-Wi" protocol is based on the "ZigBee" standard in the 2.4 GHz band, but offers higher efficiency and lower resource consumption. Compared to Bluetooth, "Mi-Wi" (as well as ZigBee) provides a greater range of up to several 100 m and unlike W-LAN (Wi-Fi) offers an integrated network capability, as well as a higher data transfer when compared to the 344 MHz technology (of the "old" ZIMO cabs), and is approved worldwide.

Potential disadvantages of the 2.4 GHz technology with respect to the penetration ability inside of buildings compared to 344 MHz can be offset if necessary by the network capability on the one hand, or by using 900 MHz - "Mi-Wi' modules on the other hand (instead of 2.4 GHz).

The Massoth DiMAX Navigator on the MX10:

DiMAX Navigator cabs can only be used in radio mode, with the DiMAX radio module connected to the MX10 XNET socket (i.e.: „Design for X-Press-Net & LocoNet, MS813102").

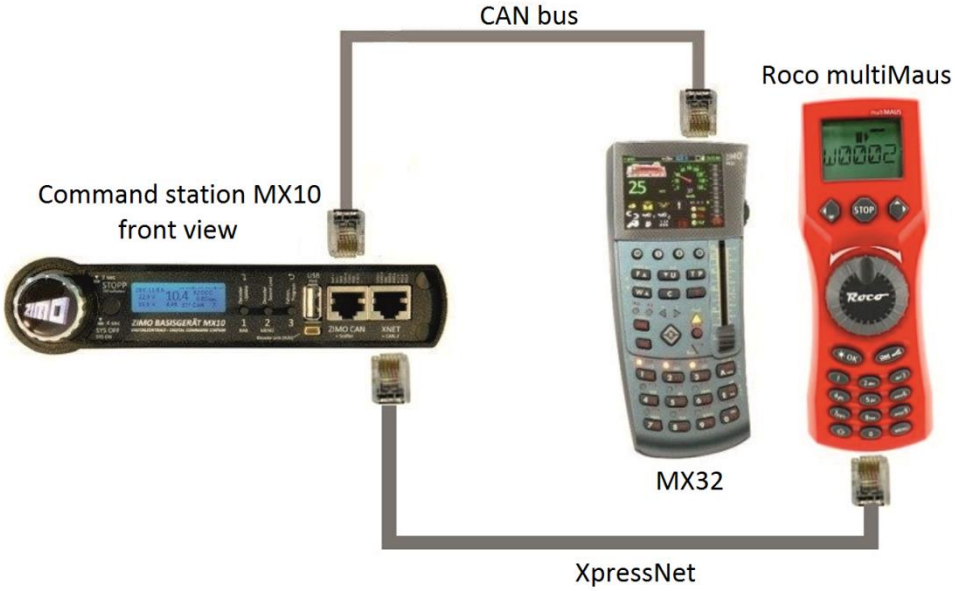
The DiMAX receiver module has three sockets. The center socket with the label "XpressNet" is connected with a 4-pole XpressNet cable or with a 6-pole ZIMO CAN bus cable to the MX10 command station's "XNET" socket. When using a conventional ZIMO CAN bus cable, the outer two cores remain unused.



There is no handover/takeover procedure with Massoth devices as there is with ZIMO. Even so, the ZIMO MX32 indicates in the upper bar that a third-party device affects the active address via Xpress-Net with the message "**XNET-control**". The speed or function changes coming from the DiMAX are also displayed on the MX32. The MX32 can directly control the address currently active on the DiMAX without takeover procedure.

The ROCO multiMAUS on the MX10:

Roco multMAUS throttles are connected to the XNET socket on MX10's front with a "normal" 6-pole CAN bus cable. If MX32(FU) are used at the same time, they can be connected to the ZIMO CAN socket or operated in radio mode. The functionality of the MX32 will not change, unless MX8 and/or MX9 modules are connected to the MX10 as well. In this case, the MX32 operates with the "old" MX1 CAN protocol, which is limited to 12 functions and RailCom is disabled.

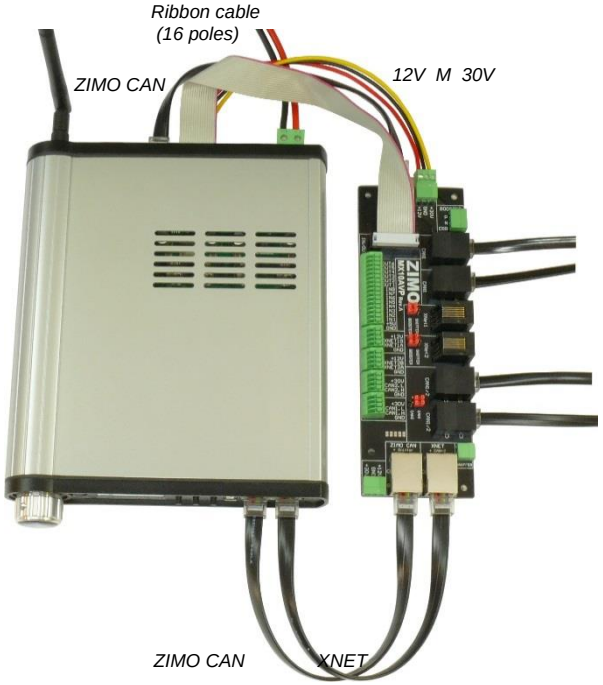


If MX8 and/or MX9 modules are used in this constellation and the MX32's should retain all their functions, an adapter (splitter) for the X-Net socket must be used that makes the CAN2 accessible. Such an adapter can be made by ZIMO upon request: service@zimo.at.

This also applies to all other X-Net operated throttles that make the CAN2 connector inaccessible.

4. The MX10AVP Connection board

This connection board is available as accessory and not included in the MX10 starter sets.



The “MX10 Connection board” is a distributor board with convenient sockets and terminals. The board itself has no active electronic components.

As the MX10 has many connections in a tight place in front and rear, some connections are pooled: i.a. “CAN-2” and “XNet”. Some connections are pin headers in order to save space.

The “MX10 Connection board” useful in giving you enough connections to plug all possible “old” and “new” ZIMO devices by keeping an overview.

The picture on the right shows the typical wiring possible between the MX10 and the MX10 Connection board. The cables and plugs are supplied with the MX10 Connection board.

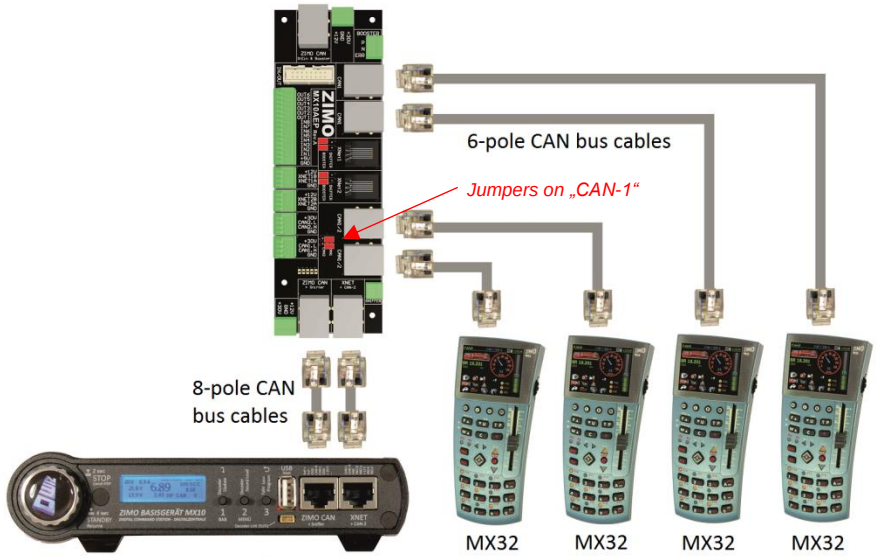
Not all connections may be needed, depending on the use.

First example:

The simplest use for the MX10 Connection board is the one as a distribution board for the ZIMO CAN bus. In total there are 5 CAN bus sockets available: the MX10 holds two (one front, one rear), the MX10AVP Connection board holds four sockets. This is useful to “daisy chain” the devices.

The jumpers situated next to the sockets marked “CAN-1/2” of the MX10AVP Connection board must be plugged into the position “CAN-1”. All four CAN sockets are in parallel.

As long as only devices from the “new” ZIMO generation such as the MX32 are in use, it is irrelevant if the cables between the MX10 and the MX10AVP Connection board show 6- or 8-cores. For the reason of standardization, we recommend to use 8-pole CAN bus cables. We recommend 6-pole cables to connect the cabs, as these cables are more flexible.

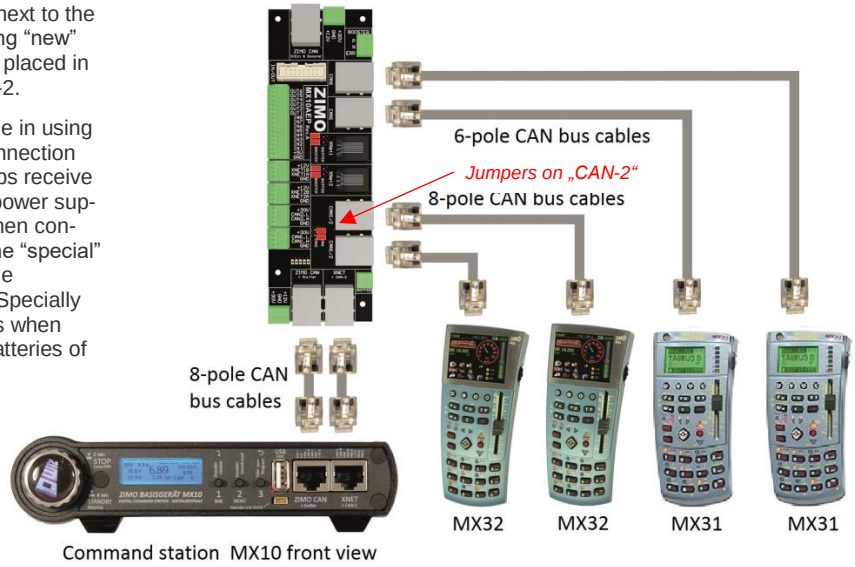


Second example:

In case of using “old” (MX31, MX31FU) and “new” (MX32, MX32FU) cabs simultaneously, both the old and the new CAN bus protocol have to be used at the same time, so that the new cabs can operate with their full functions. The “old” cabs have to be connected to CAN-1, the “new” cabs to CAN-2.

The jumpers next to the sockets hosting “new” cabs must be placed in position CAN-2.

The advantage in using the MX10 Connection board: the cabs receive the full CAN power supply of 30 V when connected with the “special” CAN bus cable (8POLA1M). Specially advantageous when loading the batteries of MX32FU.

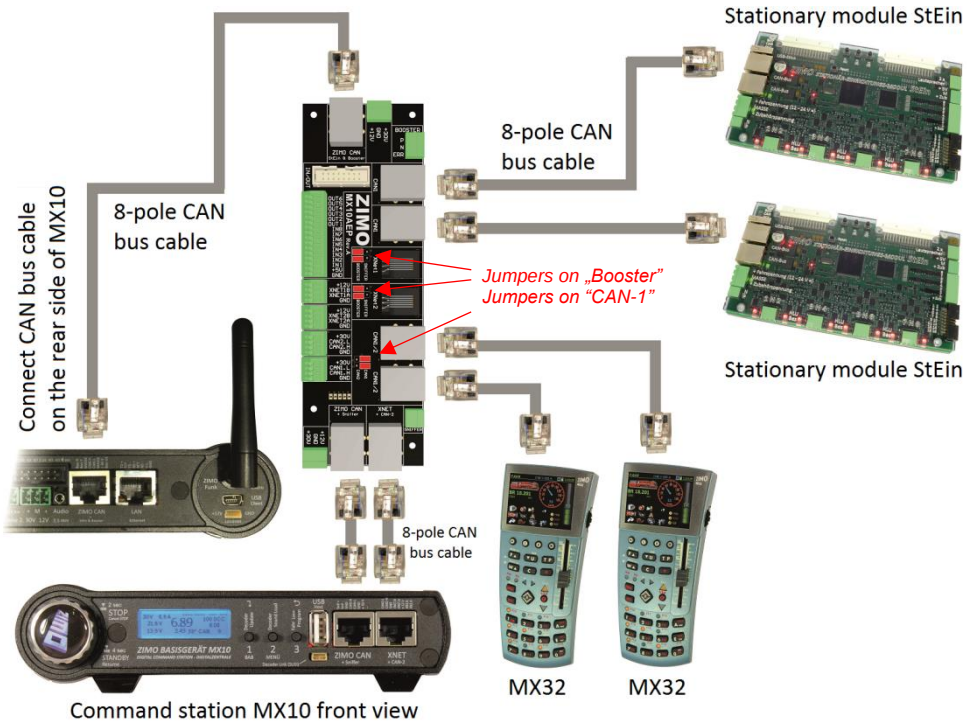


Third example:

In this case, only ZIMO devices from the "new" generation are in use: MX32 cabs and Stationary module "StEin", all using the CAN-1 socket. Stationary modules StEin (as well as MX10 in booster mode) do also use timing information for the DCC track signal on top of the CAN data bus. In such case, it is necessary to connect the devices with 8-pole cables in the following manner:

- from rear the side of the MX10 to the socket on MX10AVP Connection board and
- from the MX10AVP Connection board to the Stationary module StEin.

In order to lead the signal trough the MX10AVP Connection board, the (four possible) jumpers have to be set in position "Booster".



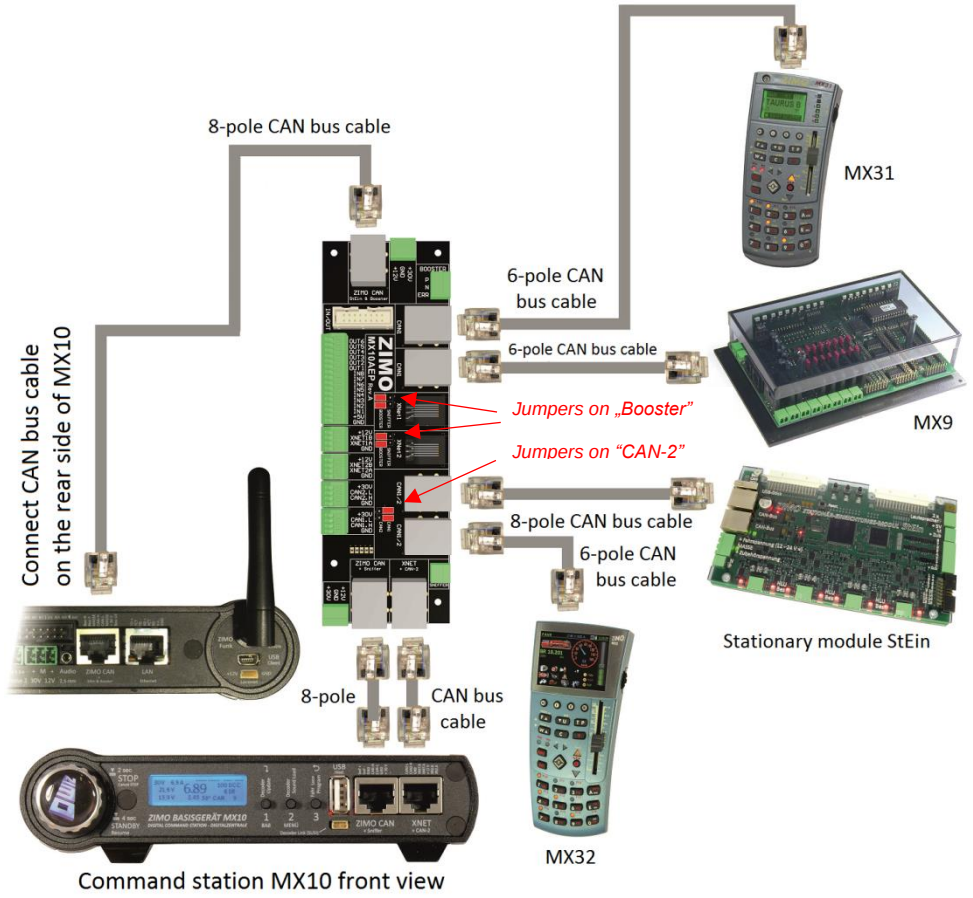
In any case, all devices can forward the CAN bus as all of them have more than one socket. MX32 can also be connected on StEin, as these pass all 8 cores of the CAN bus (although only using six of them).

Fourth example:

In this last example, the "old" and "new" generation of ZIMO cabs and modules are used together. As already described, both CAN buses are needed:

- "old" cabs (till MX31), all accessory- and track section modules (MX8, MX9 with valid addresses 801 – 863 and 901 – 963) are connected to CAN-1 and
- "new" cabs (MX32 …) as well as Stationary modules StEin are connected to CAN-2.

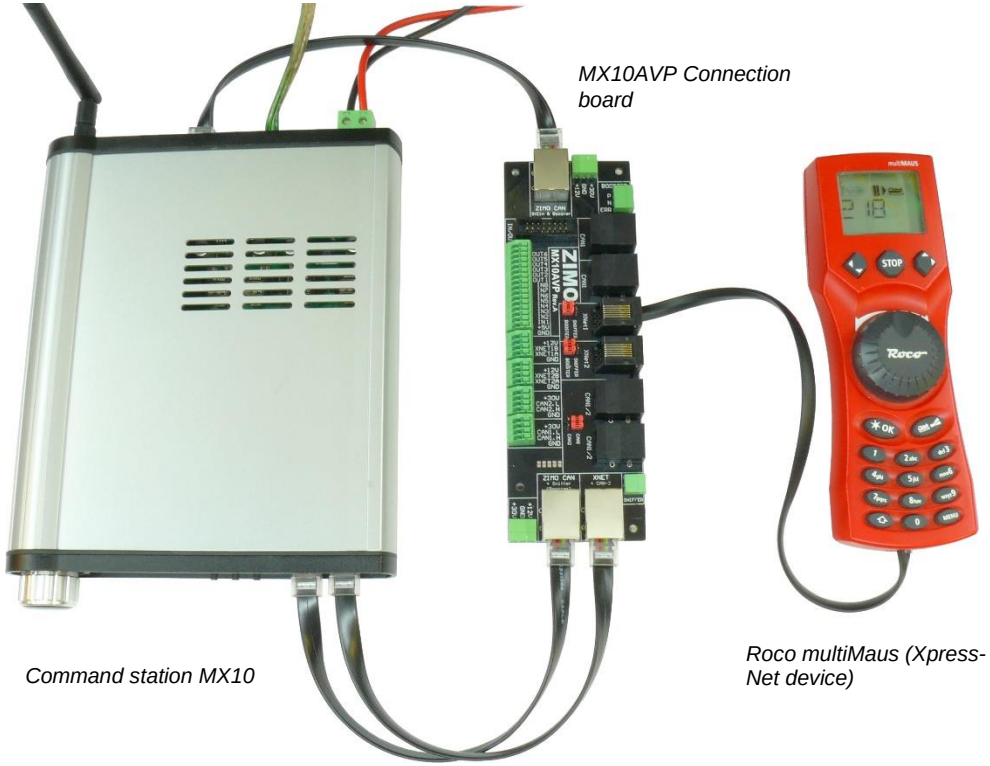
The jumpers next to the sockets hosting MX32 cabs and Stationary modules StEin have to be set in position "CAN-2".



Further applications:

The MX10 AVP Connection board may be used at the same time or instead of the abovementioned CAN bus applications as:

- connection to XpressNet devices such as the Roco Lokmaus or multiMaus as well as the DiMax Navigator (radio version). The MX10 Command station operates two separate XpressNets which are combined on one “XNET” socket in the front of the device. Two separate sockets (“XNET-1” and “XNET-2”) can be found on the MX10AVP Connection board.
- external easy to use circuitry instead of the 2x 8-pin plugs on MX10’s back side. MX10AVP offers eight inputs and eight outputs on terminal strips.



Connection of a Roco multiMaus on one of two XNET sockets of a MX10AVP Connection board.

Blank page, space for still more applications

5. Layout track, programming track, AOS in/out's

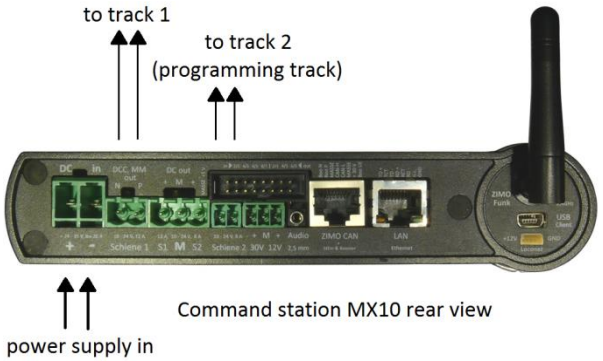
The command station MX10 has two track connections:

- the **output "Schiene 1" (track 1)**, to which normally the **"main track"** is connected, that is the actual layout.
- the **output "Schiene 2" (track 2)**, can be used for a second main track, an accessory power bus (with separately adjustable voltage, current limit, etc.), a ***programming track*** (for programming decoder addresses and CV's in service mode) or an ***update track*** (to update decoder software and sound upload).

  The "track 2" is fully drivable with identical DCC signals applied to as on the main line, except when a programming operation is currently running in service mode,. If "track 2" is used as programming track being part of the main layout track, it must be totally insulated from the main track. Please pay attention that polarity is the same on both tracks (n, p terminals), as the gaps will be bridged by the wheels when driving on/off the programming track.

The track output voltages are are fully-stabilized and separately adjustable over a wide range (each from **10 to 24 V**, see chapter "Application ...").

The current limits (**1 – 12A** on track 1 and **1 – 8A** on track 2) and the shut-off times (**0.1 – 5 sec**., for bridging brief short circuits at crossing frogs etc.) are the most important settings: the so-called "main settings".



A number of **safeguards** are incorporated into the MX10 to prevent damage to the track and vehicles **during short circuits,** despite the large driving currents available. These safeguards are especially important when smaller scales (N, TT) are in use:

- The design of the high-frequency switching regulator with a low output capacitance ensures that no large power surges occur from discharging capacitors during short circuits.
- A special **spark suppression circuit** (adjustable in three steps) recognizes arising electric arcs and cuts them off by internally bridging the output terminals.
- Through a special **"adaptive overcurrent detection"** setting, the power switch-off can be defined to take place when a sudden rise in current is detected, even before the actual overcurrent threshold has been reached.

Voltage and maximum current on the programming track in SERVICE MODE (SERV PROG):

Entering the service mode with the default setting, usually from a cab with the E-Key + MN-Key, sets the program track automatically to

11 V and 0.3 A (maximum current at first) or 0.1 A (maximum current after 100 msec).

This corresponds to the published standards of the Rail Community (Association of DCC product manufacturers).
The idea behind the strict current limitation during programming is to avoid damage to vehicles and electronics even if, i.e. the decoder is wired incorrectly. However, not all vehicles are built to get by with as little power, as there may be energy storage capacitors that need to be charged, or consumers that are not connected to the decoder and therefore cannot be turned off.

To overcome these shortfalls, it is possible to modify these standard-compliant voltage and current settings for the programming track, by changing the settings in

MX10 Main Menu → VOLT & AMP DETAIL → SERV: track voltage, Max current

A WARNING will be shown on the cab display during SERV PROG if the SERV PROG settings differ from the ones above!

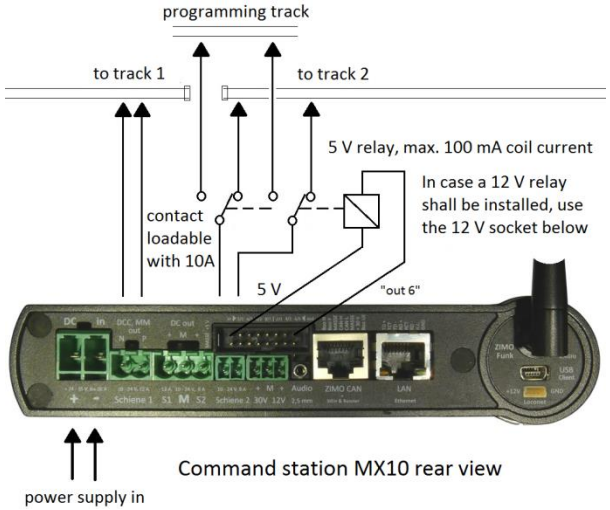
Using an external programming track relays:

If this track output is intended to be used alternatively as section of a layout and as programming track, the corresponding wires can be exchanged manually or more comfortably switched between the two with the help of a relay.

The relay is connected – as shown in the drawing below– to the "5V" pin and "out-6" pin of the16-pin plug. The relay should have two sets of switch-over contacts and be loadable with 5 A (even better 10 A).

The relay is controlled automatically by the MX10 in such a way that the track output 2 is connected with the programming track as long as a cab is set to *SERV PROG,* otherwise it is connected with the layout.

NOTE: This is the standard application of the "out-6" pin. However, this pin can also be reconfigured (see "DCC SERV PROG settings) and thus would no longer be available for controlling a programming relay.



The MX10 as a decoder update module *(software planned for 2017)**:***

One of the basic tasks of a modern digital command station is to support the uploading of new software versions and sound projects to the decoder. Separate update devices or sound programmers are no longer needed - at least for decoders of the system manufacturer, in this case ZIMO (but are of course still available in the form of the MXULFA, if no MX10 is at hand).

Uploading new software and sound projects to the decoder can be carried out directly from the plugged-in USB stick or a computer via the USB interface. But the MX10 can also keep a large number of decoder update collection files and sound projects in its own flash memory and use them when needed.

Booster-Solutions:

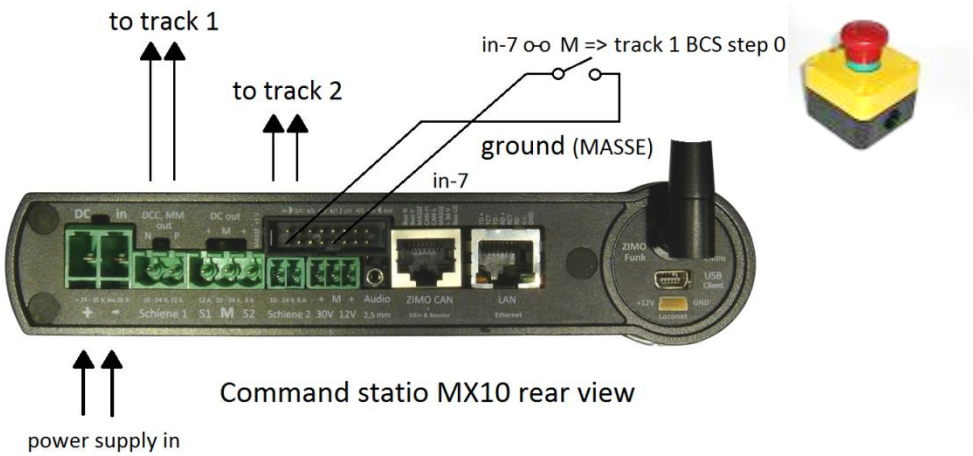
Thanks to the high track current of the MX10 (up to 12A + 8A), there is seldom a need for additional boosters except maybe in very large layouts or large scales. In such situations, preference should be given to an additional MX10, which is synchronized with the "Master MX10" (software planned for 2017).

The use of third-party boosters is possible but less effective because communication with such devices is only possible using the outdated NMRA "Control Bus".

Connecting external emergency stop buttons:

The AOS inputs (1…8) on the 16-pin socket can be used for different tasks, especially for the “AOS” (Automated Operating Sequences).

The AOS inputs “in-5” to “in-8” are intended for emergency stop buttons (as long as their assignment is not changed): There are a total of 8 options available; the most often opted feature is probably to trigger a BCS (Broadcast stop) on "track 1"; such an emergency stop button must be connected to "in-7" and pulled low to be activated (system ground = ground pin available on 16-pin plug).



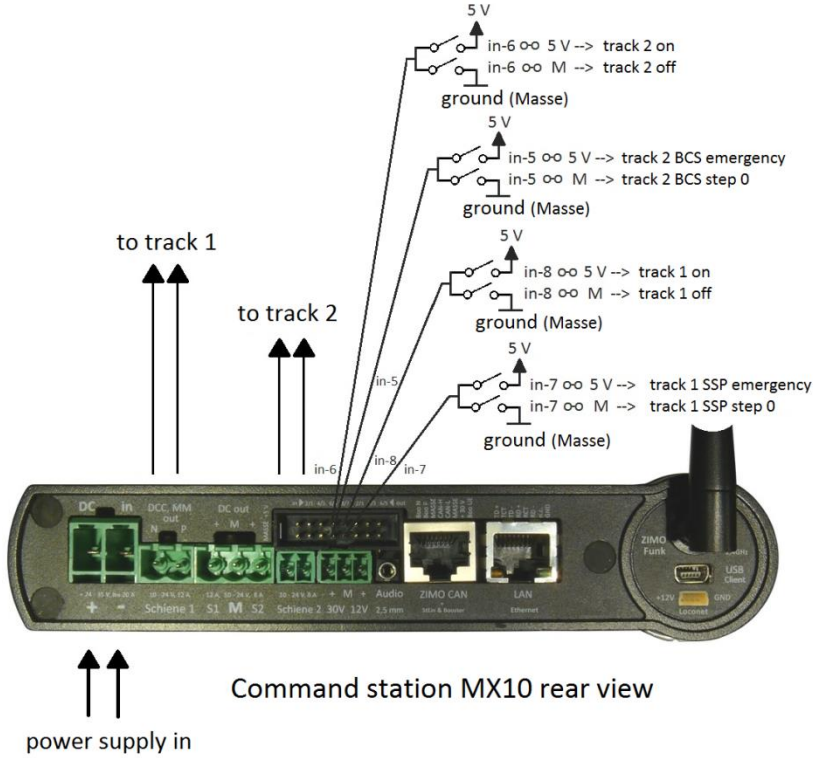
If a broadcast stop is issued, the corresponding information is displayed on the command station and all connected (tethered or radio) cabs. The broadcast stops can be cancelled (with “ON”) from the same screen.

MX10 display

MX32 display

The illustration below shows all possible emergency stop button connections, with which a BCS (Broadcast stop) as emergency *) or as breaking to speed step 0 *) can be triggered as well as track power OFF for either “track 1” or “track 2”.

*) BCS (broadcast stop) “as emergency” means immediate stopping without braking distance (depending on motor and gearbox design with very little or no run-out, which could lead to derailments), and “breaking to speed step 0” means stopping according to the set deceleration rate in CV #4.



NOTE: in early software versions where this ABA input feature is not yet available, the line "Boo UE" at the ZIMO CAN socket can be used for the external emergency stop button.

6. DCC format, feedback, database

DCC and MOTOROLA are part of the standard MX10 configuration from the outset. Hardware and software however are open to accept other protocols, in particular mfx (with RDS feedback) and Selectrix, as planned for the future. Also conceivable would be an extension in the direction of new and more efficient methods of data communication by rail.

RailCom® and ZIMO Loco number identification:

Within the ZIMO system (of the MX10 / MX32 / StEin generation) “bidirectional communication” according to “RailCom®” is an integral part of all relevant components.

The MX10 is equipped with two **“Precision-Global-RailCom®-Detectors;** a separate detector for each track output.

"Global" is a notion from the RailCom® standard (as from NMRA) and indicates the reception of RailCom® messages that are independent of the current vehicle position (= the track section), such as feedback of speed, power consumption, alarms, turnout positions, read-out CV values, etc. *).

"Precision" means that the reception and evaluation of RailCom® messages is not carried out according to the standardized threshold values of simple detectors, but that the RailCom® signal is first digitized and subsequently analyzed to decipher even heavily weakened and garbled messages. This makes the detectors resistant to influences that can occur in the practical application of a large layout, for example the removal of large parts of RailCom® feedback current caused by illuminated coaches..

*) "Local detectors", however, deal with the identification of vehicles in individual track sections; this task is performed by the "StEin" modules (= stationary modules) within the ZIMO system. However, these modules don’t just operate as simple local detectors, but also read global messages (and forward them to the MX10 command station), because the quality of reception in large layouts can often be better in individual track-sections than at the command station’s location.

The ZIMO MX10 command station also reads the "loco number pulses" of ZIMO decoders, which are used in addition to RailCom® as an acknowledgment for the reception of DCC packages. This works also with decoders from before 2005, when RailCom® was not yet existing and the ZIMO loco number identification was the only available decoder feedback system.

ATTENTION: NO RailCom® messages will be received (neither on track-1 nor track-2) during programming in SERV PROG mode (with track-2 as the programming track).

RailCom® is a registered trademark from Lenz Elektronik GmbH

The organisation of data transmission via the layout tracks:

In addition to supplying the layout with power, a digital command station must above all accept the vehicle and accessory information from input devices (cabs, computer…) and send that information along to the decoders in an efficient and reliable manner with minimum time-delay.

In the course of this we always have to take the interference-prone data channel into account, as it exists in the world of model railroads due to contact interruptions between rails and vehicles.

Therefore, a sophisticated priority scheme is used that determines how the available transmission time is allocated among the different data packets. Distinction is made between the following priority levels; higher priority (0, 1, 2...) means more frequent transmission:

0. Protocol requirements (request-for-service slots, time sync for decoders and more).
1. Changes in file content from cab, computer etc. (i.e. new speed settings, functions…)
2. Data for active addresses in the foreground of a cab,
3. Data for addresses of “secondary objects” tied to foreground addresses, i.e. consists,
4. Data for addresses of computer cabs (STP, ESTWGJ, TrainController, etc.),
5. Data for addresses in the LoR (Loco Recall) of cabs or favorites list in a computer,
6. Data for addresses in the system’s databank (that don’t fall into one of the higher priorities),
7. Scan cycle to find unregistered addresses.

7. Firmware update of the MX10 via USB stick

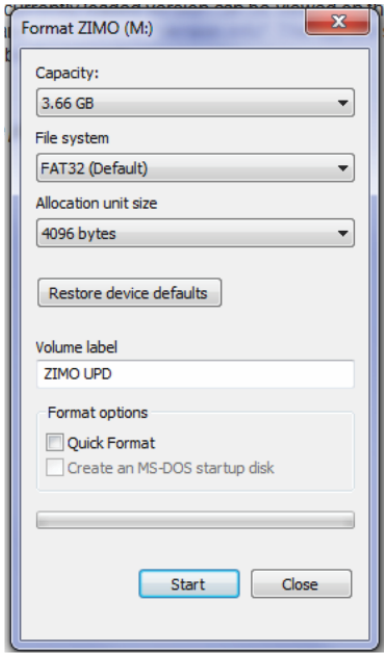
The current software version:

Is available as a free download from the ZIMO website:
www.zimo.at → "Update & Sound" → "Update System (MX10, MX32 ...)"

A so-called container software file is used for updating the MX10 and MX32 (FU) since the introduction of software version 01.17. This container file contains all necessary files for a software update of both devices (MX10 and MX32). So you need to download, unzip and store only one single file to the USB flash drive.

The currently loaded version can be viewed on the MX10 menu (**M button 2**) under the heading "MX10 Config" and from there to "Version Info". The current software version of the radio processor and XILINX can also be found here.

The proper USB flash drive:



As shown on the left, the flash drive must be formatted to FAT32 for the MX10 software update. The cluster size (allocation unit size) must be set to 4096 Bytes (= 4 kB).

Most flash drives bought today are already in this format.

If an older or a differently formatted stick is used, the stick must first be reformatted, whereby the box "Quick Format" remains unchecked.

With the proper flash drive at hand, you may transfer the MX10 software. It is important that the data file(s) for the MX10 are copied to the root memory of the usb. stick, as the MX10 is not capable of reading folders. The update .zip file (available free from zimo.at) must therefore be unzipped before it is loaded into the USB flash drive.

The flash drive must not be dedicated to ZIMO updates only as other "unknown" files do not interfere with the update process.

These properties also apply to the MX32 (FU) update!

ATTENTION: *Windows 7 or newer cannot format USB flash drives that are larger than 32GB to FAT32!*

The update procedure:

The MX10 firmware update is done during normal operation with the help of a USB flash drive. If a USB flash drive with useful MX10 data files is inserted, **ALL MX10 outputs will be disabled**. All devices, modules and decoders powered by the MX10 are therefore immediately turned off. In order to prevent damage to vehicles by abrupt stops, it is recommended to bring all vehicles to a standstill and prepare the entire layout for the power shut-down the MX10 will initiate, before you connect the USB flash drive.

With the normal ***BLUE*** operating screen,
plug the flash drive containing the appropriate software into the USB socket of the MX10. ⇨ *(USB stick)*

The available data on the usb. stick is automatically read by the MX10 and displayed in a ***TURQUOIS*** update list:

Currently available update options on the flash drive are shown in "bold" type. Lines not in bold represent update files that could also be used by the MX10 but are NOT PRESENT ON THIS USB flash drive.

The "MX10 Update (all)" contains:

- MX10 main processor update
- Radio processor update
- XILINX update
- Languages (DE, E)
- CV list
- Decoder descriptions
- MX10 sounds (e.i. error sound)

↻ Scroll with the rotary knob (if several files are shown): Set cursor (▸) to "MX10 Update (all)"

↧ Press the rotary knob → The display color changes to ***RED,*** and the version number and creation date of the MX10 update is shown.

▸ Update

↧ Press the rotary knob (again) → to start software update. After completion (about 10 seconds), the display prompts for the next step.

NOTE: Turning the knob instead of pressing it or pressing another button cancels the updated procedure immediately and returns to the normal operating mode. In such a case, remove and reconnect the USB flash drive.

After each update, the MX10 has to be unplugged and rebooted after a waiting period of at least 1 minute to reliably restart the processor and all components affected by the update with the new software.

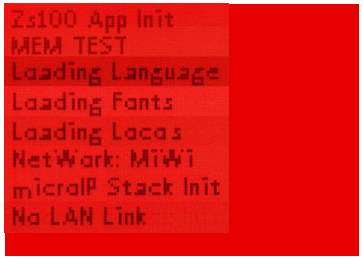
If no usable file is found on the usb. stick due i.e. to damaged data, or an empty stick, the note (also in ***TURQUOIS***):

"NO ZIMO FILES FOUND"

is displayed instead of the list. In this case, the flash drive must be removed and checked for an existing (or correct) update file. After removing the USB flash drive, the MX10 shows the normal ***BLUE*** screen again (without rebooting).

8. Operation and controls

After connecting and switching on the power supply, the MX10 starts automatically and completes the start-up sequence that takes a few seconds.



The ***RED*** start-up (boot) screen shows various information of the boot sequence, among other things: start-up current and start-up time. Both are adjustable as may be needed when energy storages are in use in the locos.

In case LAN is connected to the MX10 and a valid IP-address is set, “LAN link active” is shown during the boot period. If the USB-port is connected, the screen shows “V Com link active”. In case both connections were made, the **USB port will turn itself off.**

At the end of the boot sequence, the normal operating screen appears in ***BLUE.*** The display shows the actual voltage and current values of the two track outputs as well as some communications data (DCC, CAN...). The prominent number shown in the middle of the display is the current power consumption of "track-1" (Schiene-1).

8.1. The Normal MX10 Operating Screen

***AOS In/Outputs**, displays the status of all 14 rear connections.*

***Voltage and current** from the power supply unit at the input **"DC in"**, which supplies the MX10 as well as the entire the layout (“primary power”).*

***Voltage and current** at output **“track-1“**(Schiene-1 includes DC output S1).*

***Voltage and current** at output **“track-2“**(Schiene-2 includes DC output S2).*

***DCC signal statistics** (number of sent command packets per sec);*
xx DCC *= DCC packets only*
xx MM *= MM packets only*

***RailCom statistics** (number of received messages as answers to DCC commands).*

***CAN bus statistics** (number of CAN packets);*
CAN xxx E *= number of CAN packets per sec*
CAN xxx E yy% *= as above with percentage error*

***Temperature measured** on the circuit board.*

*) The current "DC-in" input (from the power supply unit) value shown is not a measured value, but rather calculated from the output currents (track outputs 1, 2 as well as the 12 V and 30 V outputs and the internal consumption of the unit), while taking into account the efficiency of the voltage converters.
The primary purpose is to estimate whether the power supply has sufficient power reserves.

**) Sporadic flicker of the letter "E" indicates single errors on the CAN bus, such as those that may occur when connecting / disconnecting a device. These typically cause no problems. If there are more than 10 errors per second the screen is switched to "E" with a percentage value of erroneously arriving packets (compared to the total number of packets that stands behind "C"); an error rate of several % may be an indication of a bad CAN bus transmission situation (i.e. caused by long, poorly terminated cables).

LEAVING this “normal screen” is only possible for the following events:

⇆ ***(USB stick)*** Plug in USB Stick (containing files for the MX10 update and / or decoder update files and sound files in the root directory) → ***TURQUOIS*** display: with USB stick options.
(See chapter 7, 8.8 & 8.9)

↻↺ Turn knob quickly back and forth → Display ***YELLOW:*** VOLT & AMP setting **(chap. 8.2)**.

↧ Press/hold the knob for 2 sec. → Display ***RED:*** broadcast stop (BCS) and power OFF **(chap. 8.3)**.

Press button **3** (↩) → Display ***GREEN:*** “BaseCab“, driving and programming **(chap. 8.4., …, 8.7)**

Press button **2** (**Menu**) → Display ***GRAY:*** **MX10 MENU (chap. 8.8).**

Press button **1** (↴) → Display ***GRAY:*** AOS (Automated Operating Sequences)

Overcurrent on the track → Display ***RED***: OVC on track-1 or -2 (one track remains operational). **(8.3)**

Under-voltage from the power supply → Display ***RED***: Power supply inadequate.

For an overview on:
MENU see chapter 8.8

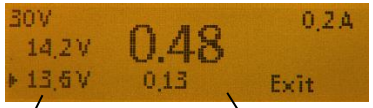
8.2. Voltage & Current Settings – VOLT & AMPERE MAIN

Starting point: the normal ***BLUE*** operating screen, quickly turn the rotary knob left/right to enter the ***YELLOW*** voltage and current adjustment screen.

↻↺

VOLT & AMPERE MAIN (Main settings)

NOTE: the possible adjustments on the "main settings" page correspond to the "Voltage" and "SHORT threshold" in the "detail settings" (see description below). This screen can also be opened via the menu line "VOLT & AMPERE MAIN" (see chapter 8.8).



Track voltage for track 1 top row; track 2 bottom row

Current: OVC threshold

APPLICATION:

↻ Use the rotary knob to scroll: move the cursor (▸) to the value to be changed.

↧ Press the rotary knob → Selected (▸) number is framed, ready for changes.

↻ Turn the rotary knob to change the value of the selected number,
in case of a voltage value: immediate effect on the relevant track output
in case of a current limit: shows threshold value, measured value reappears later.

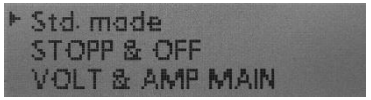
↧ Press the rotary knob → to save the new value, continue scrolling with the rotary knob.

RETURN to normal operation or the menu:

Press button **3** (↩) → Return to the normal ***BLUE*** operating screen
↻ Move cursor (▸) to "EXIT" and press the rotary knob
Timeout after 3 seconds of inactivity → Back to the normal screen

or

Press button **2** (***MENU***) → to open menu screen ***GRAY***



CONTINUE to the Detail Settings:

Press button **1** (↴) → Continue to the Voltage & Ampere – detail screen ***YELLOW***

– VOLT & AMPERE DETAIL

VOLT & AMPERE DETAIL (Detail settings)

*This **YELLOW** screen is also accessible via the menu line*
VOLT & AMPERE DETAIL (chap. 8.8)

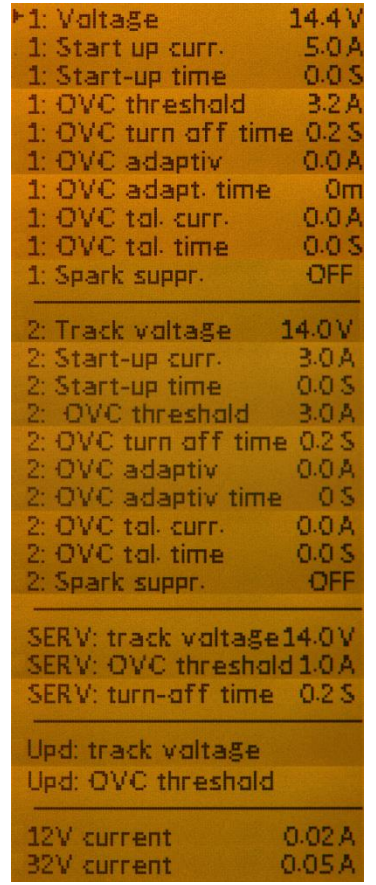
The "Detail settings" offer a variety of parameters that go beyond the "Main settings" for optimum adaptation to individual needs.

Each parameter is shown separately and adjusted individually for track-1 and track-2 outputs, and is identified in the display as **1:** and **2:**

Lines **SERV:** are available for address and CV programming in service mode (i.e. track-2 as programming track) as well as the lines **UPD:** for update and sound upload processes.

NOTE: during programming operations at "track 2" (Schiene-2) in Service Mode, the values in lines "2" change to the values defined for "SERV"; the same applies to decoder update operations. This may result in a track voltage increase or decrease.

The default values can remain unchanged in many applications, especially when the potential power capacity (output current) of the device is not fully exploited.



APPLICATION:

↻ Use the rotary knob to scroll: move the cursor (▸) to the value to be changed.
Only two or three lines are visible simultaneously, scroll up/down for more content.
The entire parameter list appears twice (for track 1 and track 2)

↧ Press the rotary knob → Selected (▸) number is framed, ready for changes.

↻ Use the rotary rotary knob to change the value of the framed number.
Press button **3** (↩) (instead of rotary knob) → reverses erroneous setting.

↧ Press the rotary knob to save the new value.

RETURN to normal operation:

Press button **3** (↩) → Returns to the normal ***BLUE*** operating screen

The meaning of the parameters in the "VOLT & AMPERE Detail Settings",
*for **1**: (track-1) and **2**: (track-2)*

Track voltage Range 10 V - 24 V Default 16 V

The target output voltage for track-1 or track-2. This voltage is maintained within 1 V; if this is not possible, the track power is turned off "UNV" (UNnder Voltage, usually due to a weak power supply).

Start-up current Range 0.5 A - 16 A Default is set equal to OVC threshold

When powering up the track (system start up or after a short circuit), the "start up current" applied during the "start up time" (see below) is higher than the one defined at the "overcurrent threshold", which allows the back-up capacitors in the locomotives on the layout to be charged. The inrush current required for this is in the range of 100 – 300 mA for vehicles fitted with capacitors according to standards, for non-compliant vehicles the current may often be much higher.

Start-up time Range 0 sec - 60 sec Default 0 sec

The "start up current" (see above) is applied to the track output for the time specified here when powering up the track. This limitation can force a reduction of the track output voltage (which rises slowlier); the shutdown due to low voltage is disabled for this reason.

OVC threshold Range 1 A - 12 A Default 5 A (Track-1), 3 A (Track-2)

OVC = Overcurrent. The current at the track outputs shall be limited to the "OVC threshold" defined here (provided the adaptive threshold current does not result in an even lower limit, see "OVC adaptive"); the output shall be switched off after the "OVC turn off time" is reached (see below). The only exception is the "Tolerance current" (see parameter below), which may be higher during the "Tolerance time".

OVC Turn-off time Range 0.1 sec - 5 sec Default 0.2 sec

When the current threshold is exceeded (either relatively acc. to "OVC adaptive" or absolutely specified in the "OVC threshold"), the track output is first limited to the constant current threshold, leading to a forced reduction of the track voltage. After the "OVC turn-off time" defined here has elapsed – and the overcurrent condition persists – the track output is turned off. The turn-off time permits i.a., that momentary shorts due to wrongly polarized frogs are being ignored.

OVC Adaptive Range 0.1 A - 6 A Default 2 A

Whereas the uppermost current on the outputs is defined by the "OVC threshold", the "OVC adaptive" defines how big sudden increases in the current consumption may be. Huge increases shall lead to a shutdown, independent from the absolute limit.

OVC Adapt. time Range 1 sec – 10 sec (at least 5 x the turn-off time) Default 2 sec

The extent of the "OVC Adapt." current step is the difference between the higher curr. and the average current in the time before. The average value is created during the "OVC Adaptive time". This setting should not be changed.

OVC Tolerance current Range 0 A - 6 A Default 0 A

The "OVC threshold" (max.allowable track power, see above) may be exceeded by the defined "OVC tolerance current" for the specified "OVC tolerance time" (below). The shutdown occurs thereafter by applying the turn-off time (as described above).

OVC Tolerance time Range 0 sec - 60 sec Default 0 sec

See description above (OVC Tolerance current).

Spark suppression Range OFF - LEV 1 – LEV2 Default LEV 2

Special electronic circuitry in the track output end stages ensure that no big sparks can occur in a short circuit situation (i.e. between wheel and rail when driving over frogs or during derailments), despite the high output currents.

The meaning of the parameters in the "VOLT & AMPERE Detail Settings",
*for **PROG:** (track-2 as programming track)*

SERV: Track power Range 10 V - 24 V Default 12 V

Target output voltage for track-2 during a programming procedure in Service Mode (SERV PROG); In driving mode, the operating voltage setting for track-2 ("2:") is valid.

SERV: OVC Threshold Range 400 mA, 1 A - 8 A Default 400 mA

OVC = Overcurrent. The current at the track output (track-2 in Service Mode) shall be limited to the "OVC threshold" defined here.

The "400 mA" setting essentially corresponds to the relevant standard of the "Rail Community" (VHDM) RCN-216: The power consumption is limited to this relatively low value, and a subsequent check is made after 150 msec to see whether the current has fallen to 100 mA. The programming procedure will continue only if this condition is met, otherwise the track power is turned off. This is a security measure for traditional programming tracks, to prevent overheating and subsequent damage caused by wrong decoder connections.

When set to 1A…: no specific time-dependent limits apply; the current is limited to 300 mA to dampen the acknowledgment pulse (so that the engine does not "jump") while waiting for a decoder acknowledgment.

SERV: OVC Turn-off time Range 0.1 sec - 5 sec Default 0.1 sec

See track-1 and track-2 description for details. This value is very short by default because there are normally no turnouts (with possible shorts caused by a frog) in a programming track.

Upd: Track voltage Range 10 V - 24 V Default 12 V

Target voltage at output track-2 during an update or sound upload procedure; in driving mode the operating voltage setting for track-2 ("2:") is valid.

Upd: OVC Threshold Range 1 A - 8 A Default 3 A

OVC = Overcurrent. The current at the track output shall be limited to the "OVC threshold" defined here.

Upd: OVC Turn-off time Range 0.1 sec - 5 sec Default 0.1 sec

See track-1 and track-2 description for operational details. This value is very short by default because there are normally no turnouts (with possible shorts caused by a frog) in a programming track.

NOTE: concerning acknowledgment detection in SERV PROG:
The MX10 automatically checks whether the **quiescent current** of the vehicle on the programming track after a program or read-out command drops
- within a specific time (1 sec)
- below a specific value (100 mA below the value set in "SERV: OVC Threshold", i.e. 300 mA, if OVC Threshold is set by default to 400 mA),
- no great fluctuations are present (less than 10 % of the quiescent current, provided the quiescent current itself is higher than 10 mA).

If this quiescent current condition is not met, a corresponding error message is displayed in the MX32 cab display such as "Vehicle idle current to high (xxx mA)".

8.3. Broadcast stop (BCS, BCSe), Track power off (OFF), Overcurrent (OVC), Low voltage (UNV) – STOP & OFF

Starting point: the normal ***BLUE*** operating screen

↧ Press/hold the rotary knob for 2 sec. or double-click (within 1 second) → *Display changes to **RED**, STOP & OFF - screen:*
Broadcast stop (BCS) on track-1,
Normal operation is maintained on track-2.

NOTE: ↧ Press/hold rotary knob for 8 sec. → **SYS OFF = STANDBY**. All outputs (tracks, DCC, CAN bus) are switched off. Thus the cabs are also switched off.
ATTENTION: **the command station stays under voltage, the controller is active. Make sure the device stays under supervision.**

Status of track-1: BCS – Broadcast stop
Pressing button **1** (↴) *changes track output 1 to OFF.*

Status of track-2 (below): Normal driving is maintained, button **2** (***MENU***) *can be used to switch between states.*

This screen is also accessible via the MENU line STOP & OFF (chap. 8.8); However when scrolling through the menu, the status of each track output is ON. To stop the traffic on track 1 press button **1** (↴) and for track 2 press button **2** (***MENU***).

Broadcast stop (BCS) and track power off (OFF) can also be switched on or off from the cabs, where the relevant information will also be shown.

Button 1 → Track-1
or
Button 2 → Track-2

The status of track-1 or track-2 can be switched cyclically with buttons 1 or 2, independent of each other:

BCS (Broadcast stop) → **OFF** (Power off) → **ON** (Normal operation) → **BCS** → **OFF** → etc.

e.g.: →

→

→ As soon as both track outputs are powered up again → automatic switch (after 2 sec) to normal operation, with the normal ***BLUE*** operating screen

Press button **3** (↩) → to enter the "not quite normal" *) normal operating screen in ***RED***

*) "not quite normal" means that the BCS and OFF states are **NOT** cancelled and will also appear in the blue display; therefore engines on track-1 will **NOT** run.

The purpose for this "not quite normal" screen is to still have access to OS, MENU and LOCO with buttons 1, 2 or 3 (as with the "real" normal screen). This allows for full operation even though one of the two track outputs, for example, is stopped or turned off.

Do the following to switch from the "not quite normal display" back to the "STOP & OFF" screen:
(to be able to switch the track-1 and 2 states again with button 1 and 2)

Press button **2** (***MENU***) → Displays the MX10 MENU ***GRAY***
(with cursor at STOP & OFF)

and again:
Press button **2** (***MENU***) → normal operating screen in ***BLUE***

or

↧ Press/hold the rotary knob (4 sec.) → *STOP & OFF - Screen* ***RED***

The status of track-1 or track-2 can be switched cyclically and independently of each other again .

When switching from the "not quite normal screen" to the STOP & OFF screen by pressing/holding the rotary knob, note the following:

Track 1 state: **ON** → **BCSe**
BCSe / OFF → No change

Track 2 state: No change

This means: if the power on track 1 is switched on, entering the stop screen again will set track-1 to broadcast stop (BCSe) again.

Cancelling the rotary knob initiated broadcast stop; Return to the normal screen:

↧ Briefly press the rotary knob → Track-1 BCSe = **ON,** display returns to the normal ***BLUE*** operating screen

ATTENTION: This applies only if either the ↧ knob was pressed / held in the normal screen to initiate a broadcast stop (track-1 = BCSe and track-2 = ON) or if the same state in the STOP & OFF screen is restored manually (by repeatedly pressing the buttons **1** (↴) and **2** (***MENU***)).

Overcurrent (short) on track-1 or track-2
or low voltage on track-1 or track-2 → Display color changes to ***RED***, STOP & OFF - Screen

Starting point: the normal ***BLUE*** operating screen
The over-current or under-voltage display appears in each screen of the MX10 (e.g. LOCO, SERV PROG...)

OVC = Overcurrent
= Current level reached OVC threshold; Track power is turned off on the track where the short has been detected on.

UNV = Under-voltage
= Power supply cannot deliver the required voltage for the target track voltage. The input must be at least 3V higher than the target track voltage!

These screens are otherwise designed exactly the same (apart from the text “OVC” or “UNV”) as after initiating a broadcast stop (“BCS” or “OFF”) on the MX10 or from a cab. Therefore, cancelling the broadcast stop or turning power to the track back on is also identical:

Button 1 → Track-1
or
Button 2 → Track-2

The status of track-1 or track -2 can be switched cyclically with button 1 or 2, independent of each other:

OVC (Overcurrent) -> **ON** (Normal operation) → **BCS** (Broadcast stop) → **OFF** (Power off) → **ON…**

e.g.: Power ON with button **1** (↴):

→ automatic switch (after 2 sec) to normal ***BLUE*** operating screen.

…normal operation is restored when both track outputs are powered up again.

If normal operation is not possible after both track outputs are turned ON, the defect that caused the OVC or UNV situation still exists. A repeated shut-down however only occurs after the defined shut-down time has elapsed (VOLT & AMP detail settings).

*The following describes the reaction of the device to **defects** and possible remedies.*

The messages **“OVF”** and **“TVF”** only appear in case of an MX10 hardware defect with respect to the power supply circuits or perhaps an unexpected behavior of the power supply.

*It is recommended to contact the **ZIMO Service** (service@zimo.at) and/or to send the unit back for **repair**.*

“False” overcurrent on track-1 / track-2 → Display changes to ***RED***, STOP&OFF – Display

OVF = “False” overcurrent
= Current reached “false” OVC threshold

This display (***"OVF"***) means that the track output was turned off due to an "overcurrent" (actually "OVC") even though the conditions set in the "VOLT & AMP" settings are not met, and the power supply voltage did not drop too low (that would be ***"UNV"***). When this error occurs, the cause is probably a defect in the current limitation circuit.

Voltage error on track-1 / track-2 → Display changes to ***RED***, STOP&OFF – Display

TVF = Track Voltage False (usually too high)
= continuous voltage measurements at the track output found the track voltage to be too high.

This display (***"TVF"***) means that the voltage sent to the track was wrong, usually higher than defined under “VOLT & AMP” settings, and as a result turned the output off. This may be caused by an actual defect in the command station or an external interference voltage. The failure is potentially dangerous for the rolling stock, in particular with relatively small track voltages (and therefore the difference to the occurred voltage surge could be significant).

These screens (***“OVF”***, ***“TVF”***) are otherwise designed exactly the same (apart from the text) as the ***“BCS”***, ***“OFF”***, ***“OVC”*** *and* ***“UNV”.*** Therefore, the procedure to turn the power back on is also identical:

Button 1 → Track-1
Or
Button 2 → Track-2

→ The status of track-1 or track -2 can be switched cyclically with button 1 or 2, independent of each other:

OVC (Overcurrent) -> **ON** (Normal operation) → **BCS** (Broadcast stop) → **OFF** (Power off) → → **ON** → **BCS** → **OFF** → etc.

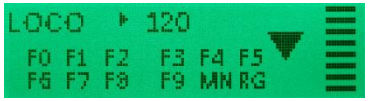
8.4. BaseCab LOCO (Driving without a Cab)

FUNCTION IS NOT YET IMPLEMENTED – THE FOLLOWING CHAPTER IS A PREVIEW.

Starting point: the normal ***BLUE*** operating screen

Press button **3** (↩) → Display color changes to ***GREEN***, "BaseCab" LOCO - Display

*This screen is also accessible via the MENU line "*BaseCab LOCO*" (see chapter 8.8) or from the "ObjectDB Vehicles" by pushing the rotary knob at the appropriate line (see chapter 8.16), in this case with vehicle address.*



↻ Scroll with the rotary knob: Until the cursor (▸) points to the value to be changed.

When the cursor points (▸) to the vehicle address:

- ↧ Push the rotary knob → Vehicle address is now framed and ready to be changed,
- ↻ Turn the rotary knob to the selected vehicle address ("accelerated rotation effect"),
- ↧ Push the rotary knob → Selected address is fixed (Rotary knob is released for other tasks).

When the cursor points (▸) to the speed indicator:

- ↧ Push the rotary knob → a framed "slider knob" with current speed step is displayed,
- ↻ Control speed with the rotary knob (i.e. in this case: DCC-Speed step 0 … 126),
- ↧ Push the rotary knob → to change direction,
- ↧ Press/hold the rotary knob → freezes the current speed (and releases the rotary knob).
  (ATTENTION: Press/hold means holding the knob for about 2 sec, holding it for 4 seconds initiates BCS – Broadcast stop).

With the cursor pointing (▸) to functions group (0,1,2 / 3,4,5 / …):
The complete "function field" scrolls when needed to get access to F19, F20… etc.

(Without pressing the rotary knob) operate the corresponding functions with buttons 1,2,3.

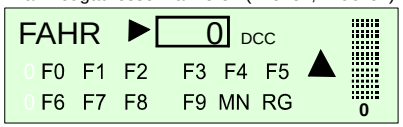
↧ Press the rotary knob → fixes the current three functions and releases the rotary knob so it can be used again for speed control; the three buttons remain associated with the functions. Fixation is indicated with the cursor changing from ▶ to ■.

(↧ Press/hold the rotary knob (1 sec.) → Freezes speed and releases the rotary knob),

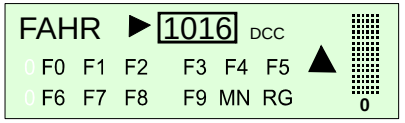
↻ Use the rotary knob to point the cursor to another function's group → first "fixation" is cancelled.
Moving the cursor to other lines such as the address or speed indicator has the same effect.

NOTE: The requested address uses or generates a normal memory block (same as vehicles controlled by cabs) with priorities to "Change", "Active" or "No longer in cab".
If the vehicle address already exists in the ObjectDB, the current driving data is copied from there and displayed.
When the "BaseCab" screen is called up again, the last address used with the "BaseCab" is automatically displayed again; Powering up the device is NOT relevant in this respect.

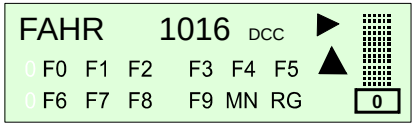
Fahrzeugadresse markieren (Drehen, Drücken)



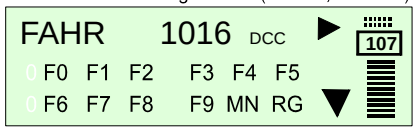
Fahrzeugadresse einstellen (Drehen))



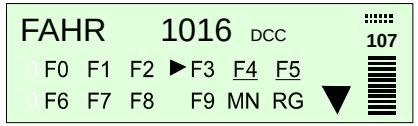
Fahrzeugadresse fixieren (Drücken),
Fahrbalken markieren (Drehen, Drücken)



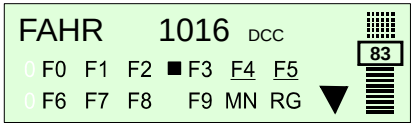
Fahrstufen + Richtung steuern (Drehen, Drücken)



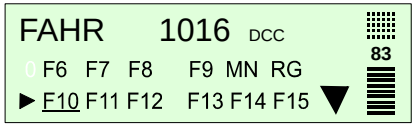
Eine Funktionsgruppe markieren und schalten



Funktionsgruppe fixieren, Fahrstufen steuern



Andere Funktionsgruppe markieren



EXIT the "BaseCab":

Press/hold button **1** (⤵) (1 sec) → switches to CV-Programming, "BaseCab OP PROG" - screen.

Press/hold button **2** (***MENU***) (1 sec) → to menu (restricted to VOLT & AMP, BaseCab…, DCC...)

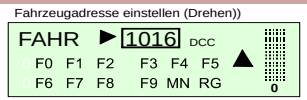
Press/hold button **3** (↩) (1 sec) → returns to normal screen (if that was active before entering "BaseCab")
or MENU (if actived before entering "BaseCab")
or ObjectDB (if actived before entering "BaseCab")

NOTE: A brief push is also sufficient if no function group is marked or fixed!

8.5. BaseCab OP PROG (CV-Programming without cab)

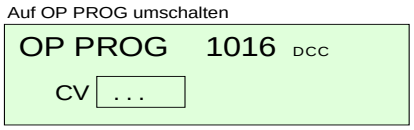
FUNCTION IS NOT YET IMPLEMENTED – THE FOLLOWING CHAPTER IS A PREVIEW.

Starting point: the "BaseCab LOCO"- screen ***GREEN*** (chap. 8.4)

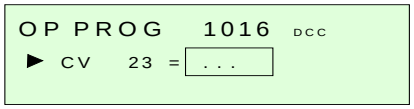


Press/hold button **1** (↴) for 1 sec. → Display remains ***GREEN***, "BaseCab" OP PROG - Screen

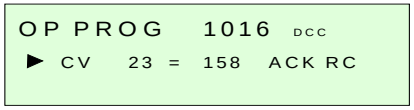
This screen is also accessible via the MENU line BaseCab OP PROG (chap. 8.8).



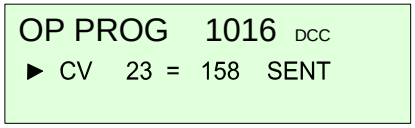
↻ use the rotary knob to input the desired CV number
↧ press the rotary knob to fix the selected CV number and move to the next field (e.g. CV value)



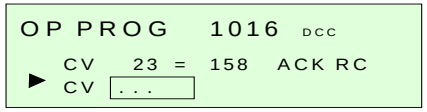
↻ use the rotary knob to input the desired CV value
↧ press the rotary knob to program the decoder with the selected CV value; opens next line
If programming is successful (and acknowledged via RailCom), "ACK RC" is displayed



The display shows "SENT" if no acknowledgement is received from the decoder



↧ press the rotary knob → opens the next line



Read CV's:

Same as above (for CV programming), but:
Instead of entering a CV value: ↧ press the rotary knob: reading is confirmed with "READ"

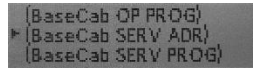
NOTE: It is NOT possible to scroll back to already completed reading- and programming lines!

EXIT the "BaseCab": Press/hold button **3** (↩) for 2 sec. → return to LOCO or MENU

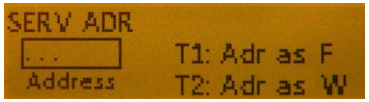
8.6. BaseCab SERV ADR (Decoder address programming)

FUNCTION IS NOT YET IMPLEMENTED – THE FOLLOWING CHAPTER IS A PREVIEW.

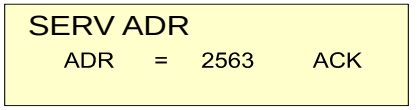
Via the MENU (see chapter 8.8)
(the MENU is also accessible from the "BaseCab LOCO" mode by pressing/holding button **2** (***MENU***) for 1 second)



↻ select "BaseCab SERV ADDR" from the MENU and
↧ press the rotary knob → Display turns ***YELLOW***, "BaseCab SERV ADDR " - screen



↻ use the rotary knob to input the desired address
↧ press the rotary knob to program the decoder with the selected address



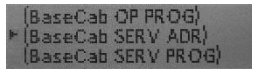
Read address:

Same as above, but instead of entering a value: ↧ press the rotary button, confirmed with "READ"

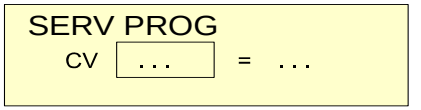
8.7. BaseCab SERV PROG (CV-Programming)

FUNCTION IS NOT YET IMPLEMENTED – THE FOLLOWING CHAPTER IS A PREVIEW

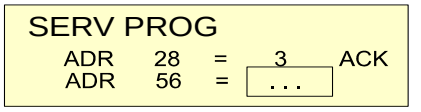
Via the MENU (see chapter 8.8)
(the MENU is also accessible from the "BaseCab LOCO" mode by pressing/holding button **2** (***MENU***) for 1 second)



↻ select "BaseCab SERV PROG" from the MENU and
↧ press the rotary knob → Display turns ***YELLOW***, "BaseCab SERV PROG" - screen



↻ use the rotary knob to input the desired CV number or CV value
↧ press the rotary knob to program the decoder with the selected value



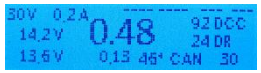
Read CV's:

Same as above (for CV programming), but:
Instead of entering a CV value: ↧ press the rotary knob. A read-out is confirmed with "READ"

NOTE: It is NOT possible to scroll back to already completed reading- and programming lines!

EXIT the "BaseCab": Press/hold button **3** (↩) for 2 sec. → return to MENU

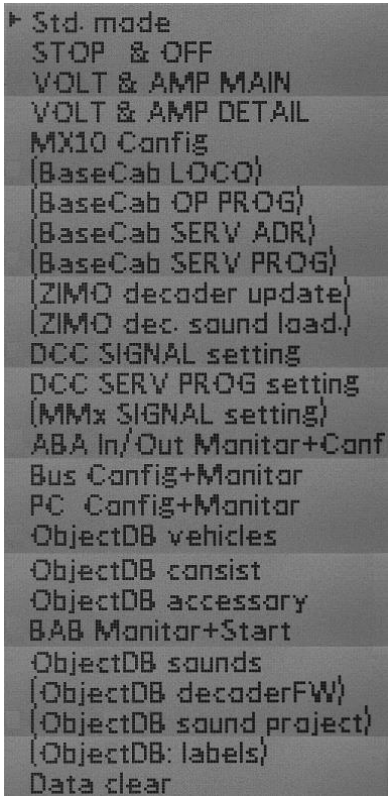
8.8. The MX10 MENU (Main Menu)



Starting point: the normal ***BLUE*** operating screen
or: VOLT & AMPERE ***YELLOW***

Press button **2** (***MENU***) → displays the MX10 MENU ***GRAY***

NOTE: Some of the menu items are not yet functional with the current software version; for more information go to www.zimo.at , follow “Update & Sound” and “Update - System (MX10, MX32…)”. The menu items shown in parentheses are not yet implemented.



↻ Scroll with the rotary knob: set the cursor (▸) to the desired application (Only two or three lines are visible simultaneously; scroll up/down for more content)

↧ Press the rotary knob → to open the selected application, which also changes the display background

Press button **3** (↩) → to return to the normal ***BLUE*** operating screen (if still in the menu; to return from an application requires button 3 to be pressed more than once)

Gray lists:
Are intended for reading and scrolling with the rotary knob.

Yellow lists:
After scrolling to a menu point and pressing the rotary knob, the list will turn yellow and marks an input or selection field. The value can be changed now with the rotary knob.

Menu item **STOP & OFF - Screen** → ***RED***

After entering the Stop & Off screen through the menu, the broadcast stop is not triggered automatically. To initiate a broadcast stop (BCS) on the track outputs 1 and/or 2 or turn the track power off (OFF), the buttons **1** (↴) for track-1 and **2** (***MENU***) for track-2 have to be pressed. All possible states of the respective track output can be set in succession with the buttons **1** (↴) and **2** (***MENU***): ON - BCS - OFF - - BCS - OFF - ON ... etc.

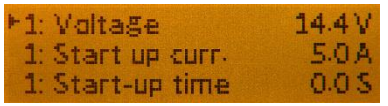
NOTE: The same picture that is used with the menu item BCS & OFF is also displayed when “BCS” or “OFF” are selected from an MX32 cab or “STOP” by pressing/holding the rotary knob on the MX10. In both cases the screen opens up with an already initiated STOP or OFF state. The buttons **1** (↴) and **2** (***MENU***) serve to reset the track outputs (with the same sequence as shown above).
See chapter 8.8

Menu item **VOLT & AMPERE MAIN** → ***YELLOW***

Adjustments to track voltage and current limits for track-1 and track-2; changing the voltage value has an immediate effect on the relevant track.

See chapter 8.2

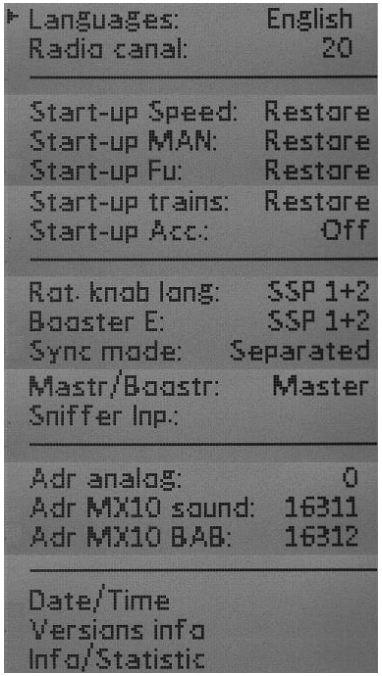
Menu item **VOLT & AMPERE DETAIL** → ***YELLOW***



Adjustments to track voltage, current limits, short circuit turn off times, temporary acceptance of higher currents etc. for track-1 (**1:**) and track-2 (**2:**), and also for track-2 as programming track (**SERV:**) as well as firmware update and sound upload track (**UPD:**).

See chapter 8.2

Menu item **MX10 Config** → *GRAY*



↻ Scroll with the rotary knob: set cursor (▶) to the target position

↧ Press the rotary knob → the value to be edited is framed or a submenu opens up

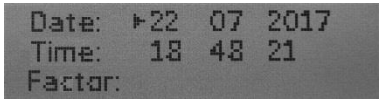
↻ Set the value or make a selection with the rotary knob

↧ Press the rotary knob again → to save the value. The rotary knob is now available again for scrolling.

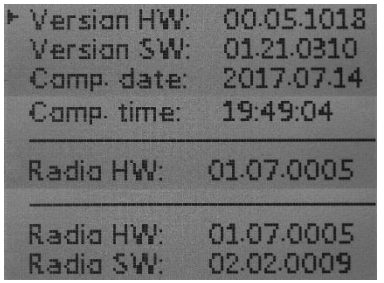
Press button **3** (↩) → to return to the MX10 menu

- **Language:** once the language is set it is applied immediately. Any text that doesn't exist in the selected language is retained in German.
- **Radio Channel:** the channel can also be checked in the MX32 CAB CONF screen. The channel can be changed in the MX10 menu to prevent wireless conflicts with other systems.
- **Restore:** defines whether all trains (loco decoders) and / or switches (accessory decoders) should be restored to the same state they were in before the system was turned off. The following options are available: "Full restore" (default setting), restore only the functions, restore the trains to the previous speed settings only, only restore the accessory positions (i.e. turnout, signals…) or that the system deletes all decoder data at restart. The MAN bit is also activated / deactivated here.
- **Booster Err:** defines the operating state after an overcurrent message from the connected booster or by pressing the emergency stop button connected to the "Boo UE" input of the booster socket (MX10 rear ZIMO CAN). Select from: BCS S1, S2 BCS; BCS S1 + S2; OFF S1; OFF S2; OFF S1 + S2 or ignore.
- **R-Knob Hold:** special settings when pressing the rotary knob for 4 seconds. The options are: ignore, system standby (default) or track power OFF.
- **Sync Mode:** determines whether the track output 1 and output 2 should operate independently of each other (which is the default mode and allows for different settings to track voltage, broadcast stop etc. on each track output) or operate both outputs as one common track with identical track voltage and control so that the outputs can be connected in parallel with up to 20A of power.
- **Master/Booster:** defines this command station as **Master** or **Booster** unit – M, B1, B2, B3, B
- **Sniffer Input:** is prepared but not yet functional.
- **Addr Analog:** is a virtual address (that can be activated by a cab) for an analog vehicle (without decoder), which is controlled through the NMRA "stretched 0-bit method".
- **Addr MX10 Sound:** is a virtual address for the integrated sound generator (including speaker and audio-out connector), which can be activated with the cab. The stored sound samples can then be played using the cab's function keys.
- **Addr MX10 AOS:** automated operating sequences can be accessed after activating this address on a cab (currently not in use).

- **Date/Time**: In this "MX10 Config" submenu the date and time can be set as well as the fast clock factor → us the rotary knob as described above. The data set in the MX10 will be taken over by all connected MX32 cabs with the next system restart.



- **Version Info:** This screen displays information about the currently installed MX10 software and its creation date. The current radio processor software is also shown.



NOTE: The MX10 radio processor software should match the one in the MX32 ("Cab Conf" – "HW/SW Version Info"). Otherwise the radio communication will be either problematic or non-existent.

- **Info/Statistic**: The data shown here are for information only and cannot be changed.

"Lifetime" is the total time the system has been running since it was new and "Runtime" is the time since the last power up.

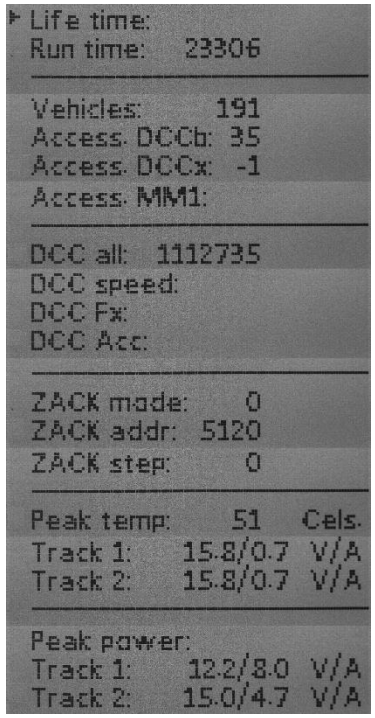
"Vehicles/Accessory" shows the number of vehicles and accessory articles stored in the MX10 in the DCCb, DCCx and MM1 format.

"DDC tot.": Is the total number of sent DCC packets within the "Runtime". This number is split into "DCC speed" (speed commands), "DCC Fx" (function commands) and "DCC Acc" (accessory commands).

"ZACK Mode": can be turned ON or OFF in the "DCC SIGNAL" settings and is shown here in the SCAN mode while the address of a new vehicle on the track is currently scanned. The ZACK address will be shown once the scan is finished. "ZACK Step" shows how many calculations were required to identify the vehicle address.

"Peak Temp" is the highest MX10 temperature in degrees Celsius measured at the volt and amp readings shown below.

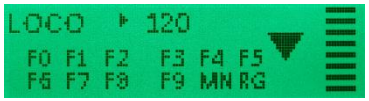
"Peak Power" is the highest measured volt and amp reading of each track output.



Menu item **BaseCab LOCO** → **BaseCab LOCO - screen** *GREEN*

This function is shown in the MX10 menu in brackets and is therefore not yet fully implemented. The “BaseCab LOCO” screen can be seen but is **not** usable.

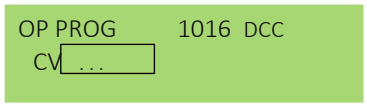
See chapter 8.4



Menu item **BaseCab OP PROG** → **BaseCab OP PROG- screen** *GREEN*

This function is shown in the MX10 menu in brackets and is therefore not yet fully implemented. The “BaseCab LOCO” screen **cannot** be called up.

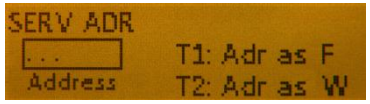
See chapter 8.5



Menu item **BaseCab SERV ADDR** → **BaseCab SERV ADDR– screen** *YELLOW*

This function is shown in the MX10 menu in brackets and is therefore not yet fully implemented. The “BaseCab SERV ADDR” screen can be seen but is **not** usable.

See chapter 8.6



Menu item **BaseCab SERV PROG** → **BaseCab SERV PROG– screen** *YELLOW*

This function is shown in the MX10 menu in brackets and is therefore not yet fully implemented. The “BaseCab SERV PROG” screen **cannot** be called up.

See chapter 8.7

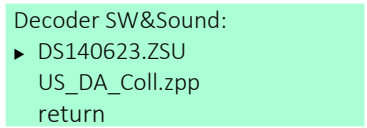
Within the "BaseCab" applications of the MX10, the display and the controls (rotary knob, three buttons) are used like a cab for driving (i.e. speed control and function switching), address and CV programming in service mode or operations mode (POM); directly from the MX10 without using a cab.

See chapter 8.4, 8.5, 8.6, 8.7

Menu item **ZIMO Decoder SW-Update** → **listed from the file memory** *TURQUOISE*

This feature is **not** yet implemented.

Currently the screen looks like this and shows one decoder firmware and one “ready-to-use” sound file.



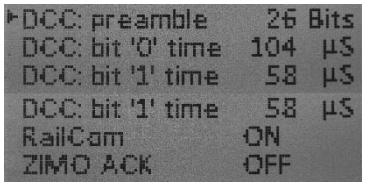
After selecting an update or sound file, the
Update or Sound Upload screen changes to → *YELLOW* (after completion: *GREEN*)

Opening the decoder software update screen from the menu means that a decoder software update collection file or sound project file is to be used, which was previously saved to the MX10 memory; the available files are listed for selection. In contrast, the situation in which the update procedure is started by plugging a USB flash drive in to the MX10 and use a file directly from this stick!

See chapter 7 This chapter deals with decoder-SW-updates and sound uploads from the MX10 memory as well as from the USB-Stick.

Menu item **DCC Signal Selection** → **Selection screen** *GRAY*

DCC Preamble: adjustable number of preamble bits; default setting of the MX10 is 26 and this number shall not be lower when an MX9 is connected. The NMRA standard is 14 bits. ZIMO decoders can operate with only 10 preamble bits, but the slightest loss of data may lead to problems with such a low setting. A reduction of the preamble bit number allows faster data transmission, but is recommended only for experienced users!



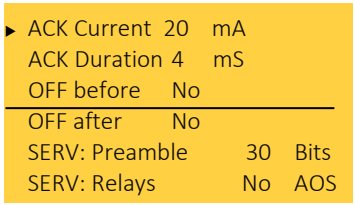
DCC Bit ‚0‘ / ‚1‘ Time: the DCC bit 0 and bit 1 timing can be adjusted here. Changing this setting is only recommended for experienced users and is not needed under normal circumstances since the default setting is according to standard.

DCC RailCom: Auto: this is the MX10 default setting and automatically turns off RailCom if a MX9 is present, otherwise RaiCom is always active.
ON: RailCom is always ON, regardless of the kind of components connected to the CAN bus.
OFF: RailCom is switched off. This setting must be used with some reverse loop modules, especially those that use current pulse relays, because each RailCom gap would cause them to switch, this may lead to damages.

ZIMO ACK: „ZIMO ACKnowledgement“ is the automatic loco number recognition of the MX10. It is turned OFF by default. One can choose between "Report" and "Search", if a message is needed by a computer program or the address of a new vehicle on the track is to be detected.

Menu item **DCC SERV PROG Adjustments** → **Adjustment-Screen** *YELLOW*

ACK Current: the current is limited to 60 mA according to the NMRA standard. A current of 20 mA is usually enough for ZIMO decoders. The acknowledgement current should be set lower for smaller more sensitive motors (e.g. N-scale engines) or when function outputs only (without a motor) are used (e.g. coaches). Larger values are needed for stronger motors as often used in large-scale engines.



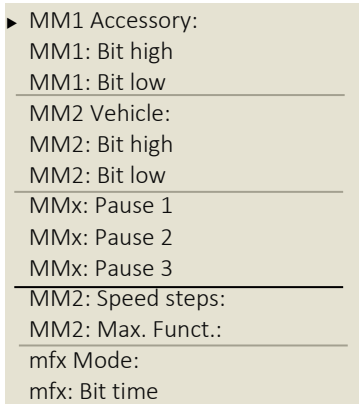
OFF before / OFF after: This is normally set to "NO". This function is only rarely needed with third-party decoder that will only accept a reset command at power-on. In these cases the track power is turned off for 500 mS before or after every read or write command.

SERV: Number of preamble bits and the option whether the AOS inputs should be turned on for the relay-function or not.

Menu item **MMx SIGNAL Adjustments** → **Adjustment-Screen** *GRAY*

Timing and other parameters for the MM (Motorola) format, where MM1 is for accessories, MM2 for vehicles and MMx for both; mfx adjustments are also possible here.

This function is shown in the MX10 menu in brackets and is therefore not yet fully implemented. The "MMx SIGNAL Adjustment" screen can be seen but is **not** usable.



Menu item **AOS In/Out Monitor+Conf** → **Monitor Screen** *GRAY*

Live AOS input readings of values, threshold settings, assignment for BCS and OFF functions as well as operating modes for „AOS outputs".

If the AOS input level fluctuates between 120 and 140, it means that this input is "open" or not connected; ≥ 0 means connected to ground and ≤ 256 connected to posistive (see below for threshold settings). Should there be a reading that does not fit into this scheme, such as "180" even though there is nothing connected to this AOS input, the input in question is probably faulty.
Inp. 6, Inp. 7 and Inp. 8 are set by default for the emergency stop functions BCS, OFF and ON but can be changed here for other functions.

See chapter 5, "Layout track, Programming track, AOS in/out's".

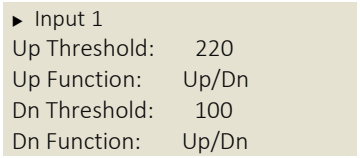
Use the rotary knob to scroll to the trageted menu line, the cursor (▸) indicates the current position.

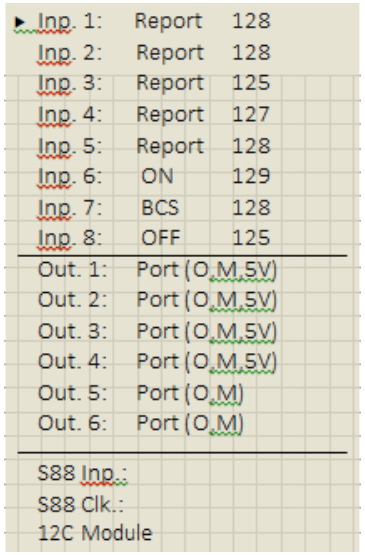
↧ Press the rotary knob → a submenu opens

Submenu Inp. 1-8:

Adjustable are the Up and Down thresholds (a.k.a high and low thresholds) and their functions: Ignore; Up/Dn; ON S1; BCS S1; OFF S1.

The "Up function" always refers to track 1 and the "Dn function" to track 2. The two functions are always balanced, which means, if the "Up function" is set for BCS S1 the "Dn function" is automatically set for BCS S2.



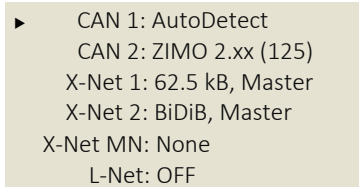


Menu item **Bus Config+Monitor** → **Monitor Screen** *GRAY*

CAN1 applies the (old) ZIMO CAN bus protocol on the left front CAN socket and the rear CAN socket.

CAN2 applies the (new) ZIMO CAN bus protocol on the front right CAN socket. The usable and proper settings are already preset.

X-Net applies the X-Net bus protocol on the front right CAN socket. The usable and proper settings are already preset.

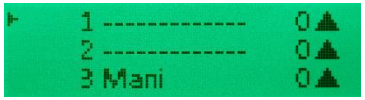


Menu item **PC Config+Monitor** → **Monitor Screen** *GRAY*

LAN IP address an Mask settings.

See chapter 10 "The interlocking panel programm ESTWGJ".

Menu item **ObjectDB Vehicles** → **Object list by address** ***GREEN***



NOTE: there is no need to observe the object database for driving operations. An almost unlimited number of addresses can be managed by a ZIMO system simultaneously; theoretically the refresh cycle accepts up to 8000 vehicle addresses (for comparison: the competition falls in the range of 64 or 128). With (rudimentary) utilization of these skills the desire may arise to investigate why, e.g. the response times have become too long, or why the refresh packages come too infrequently, or which entries of the database should be erased - or deletions should actually be performed..

The central object database in the command station stores automatically generated copies of all entries that are in the local object databases of input devices (cabs), even if they have been deleted from the cabs in the meantime. The central database serves as a base for organizing and sending out the data packets on the track as well as for the transfer of the GUI data between the cabs.

In the menu item "ObjectDB vehicles", the contents of the central database (such as the registered vehicle addresses with all the current movement data and statistical communication values) can be seen and controled. In addition, certain measures may be taken, in particular the deletion of individual addresses (in order to relieve the transmission cycle) or stopping of trains.

Upon entering this menu item, the list of vehicle addresses along with any existing names, current speed step and direction is presented ("Standard display").

↻ Rotary knob → Scrolls through the address list, "▸" cursor points to the current position
button **1** (↴) → Switches the information to be shown for the respective address

Standard Display 0: Address Name MAN-Bit Speed step Direction arrows *)
button **1** (↴)→ Display 1: Address "in" Consist name (or number) Activity code **)
button **1** (↴)→ Display 2: Address Device-Info: the device on which this address is active (incl. LoR)
button **1** (↴)→ Display 3: Address P F M "Fu" ■ ■ ˣ ˣ ■ ***)
button **1** (↴)→ Display 4: Address DCC packets / sec RailCom replies / sec Track format ****)
button **1** (↴)→ Display 5: Address Feedback (via RailCom) Speed (km/h) *****)
button **1** (↴)→ Display 6: Address Manufacturer Decoder-Type (if ZIMO) ID ******)
button **1** (↴)→ Display 7: Debug display *******)

button **1** (↴)→ press/hold: returns to standard display

button **2** (***MENU***) → Submenu, i.a. deletion from the database (exit the submenu with button **3** (↩))
↧ Press the rotary knob → to "BaseCab" screen (if exited with button **3** (↩) by mistake)

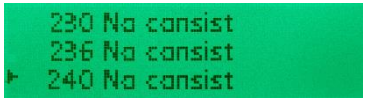
*) **Standard Display 0: Name & Loco data**

Displays the names (if present) and the current loco data (like MAN-Bit, speed, direction) for the relevant vehicle address.

*) **Display 1: Consist name activity code**

These two entries don't have anything in common with each other and or only listed together to save space.

The consist Info shows to which consist (name or number) or train the vehicle address belongs to.



Activity codes in Display 1:

VG Object (Vehicle address) is active in a cab's **foreground**
HG Object (Vehicle address) is in the **recall memory** of one or more cabs
CS This object (Address) received commands from a **computer** within the last 5 seconds
HG CS both...

) **Display 2: System info

***) **Display 3: DCC packets monitor function**

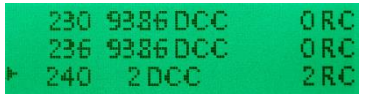
The types of packets that were sent to this address twice per sec. are shown here. How often a particular packet type indicator flares up (e.g. "F" or the third "■") represents the intensity of the data transmission. If for example the speed slider is moved on the cab, the "F" indicator flashes rapidly, that is the DCC speed package for this address will be sent out at least 2 times / second.

Of particular interest for analysis and diagnosis are of course those addresses that are not being operated or in the foreground of a cab, and are shown less often in the "refresh" cycle. Proper changes in the cab settings under "FUMZ" to turn off unnecessary packet transmissions can possibly be deduced from this.

The packet types and their indicators:
P = Programming commands (OP PROG);
F = Driving commands (speed and direction);
M = the MAN-bit;
"Fu" ■ ■ … = the 5 packets for the functions:
F0 .. F4 **|** F5 .. F8 **|** F9 .. F12 **|** F13 .. F20 **|** F21 .. F28.

****) **Display 4: Statistics DCC & RailCom:**

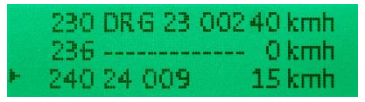
The number of sent DCC packets and received Railcom responses for the target address are shown here:
In the line with the cursor "▸": number / sec
The other lines show the accumulated number of packets / responses since the last power-up.



NOTE: The values only show how many packets / answers are counted in total for a specific address and do not distinguish between the types of packets (speed step, function commands, etc.); the latter is shown in the preceding display type (packet monitor).

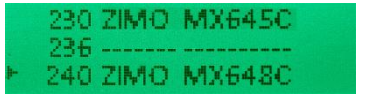
*****) **Display 5: RailCom-Messages**

The content of the RailCom messages is displayed here, particularly the speed feedback (km/h) but also other information (compare with Statistics DCC & RailCom in the preceding display).



******) **Display 6: Decoder Information:**

The most important decoder data of the currently operated vehicle address, such as manufacturer (according to "NMRA-ID" in CV #8), decoder type (in case of a ZIMO Decoder or other recognized manufacturer), ID (if available).



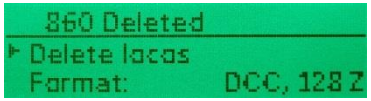
*******) **Display 7: Debug display**

Deleting vehicle addresses from the database (ObjectDB Vehicles):

One of the most important functions of the menu item “ObjectDB Vehicles” is the manual deletion of addresses (as well as the deletion of complete blocks of addresses) from the MX10 database, and thus from the complete system. This is fairly easy to do after entering the menu point “ObejctDB Vehicles” described above, with:

↻ Use the rotary knob to scroll to the first address line to be deleted
button **2** (***MENU***) entry to the submenus
↻ Scroll to the line “Delete Vehicle”
↧ Press the rotary knob to delete the entry
button **3** (↩) returns to the address list (with the cursor below the deleted line)
in order to delete the next address (which is often the case):
button **2** (***MENU***) enters the submenu again; advances automatically to the line “Delete Vehicle”
↧ Press the rotary knob to delete the entry
button **3** (↩) returns to the address list, and so forth
(recurring sequence: button **2** (***MENU***) – Rotary knob – button **3** (↩) – button **2** (***MENU***)– Rotary knob…)

→ button **2** (***MENU***); scroll ↻



Restoring a deleted address (u**ndelete)**: just deleted addresses are still available, but are classified as "DEL" or "deleted"; they can be restored to the MX10 object database with button **2** (***MENU***) while still in the submenu using the command line “Undelete” (which is shown instead of "Delete").

ATTENTION: deleting an address from the object database of the MX10 (i.e. from the systems central database) does **NOT delete** these addresses from any **local** databases in cabs (input devices). If a vehicle with this address is activated again from a local (cab) database (or enters the recall memory of a cab), the address in question and all the data from the cab automatically return to the central object database of the MX10! In order to completely remove an address from the system, it must be deleted from all devices (in the MX32 cab with E-6 to the ObjectDB, scroll to address and delete with the C key).

NOTE: in addition to the “Manual address deletion” described here, an automated deletion is also available for deleting addresses that have not been used for a long time and thus prevent an overloaded memory (which can hold up to 1000 vehicles including GUI data etc.). The criteria for this can be modified in the menu item "ObjectDB Auto-Clear" (depending on MX10 software versions). A list of all active objects (= vehicle addresses and names), with (selction with button **1** (↧))optional real-time indication of speed and direction, MAN-state, send-out statistics (DCC packets structured according to type of command), ... detailed info-screen for single address with delete option from the database, Railcom analysis...

Object lines: Address Name MAN-Bit Speed step (1024 steps) Direction arrows
button **1** (↧): Address “in“ Consist name (or -number) Activity code *)
button **1** (↧): Address PRG F0 F5 F9 F13 F21 MN FS (Monitor functions)
button **1** (↧): Address DCC packet / sec RailCom replies / sec Track format
button **1** (↧): Address RailCom speed feedback (km/h) etc.
button **1** (↧): Address Manufacturer Decoder-Type (if ZIMO) ID

press/hold button **1** (↧): back to default display

press/hold button **2** (***MENU***): Detail view, i.e. delete files from database

Press rotary knob → Display changes to the ***GREEN*** **“**BaseCab“ screen

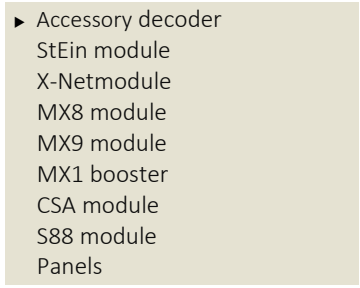
*) Activity codes:
VG Object (vehicle address) is **active** on one of the cabs
HG Object (vehicle address) is in the loco **recall memory** of at least one cab
CS This object or (!) address received a **computer** command within the last 5 seconds
HG CS both...

NOTE: Not all lines are present or laid out as described depending on the software version!

Menu item **ObjectDB Traction** → **Object-List** ***GREEN***

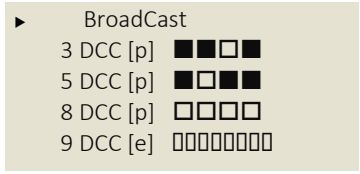
Menu item **ObjectDB Accessory** → **Object-List** ***GRAY***

Press the rotary knob →



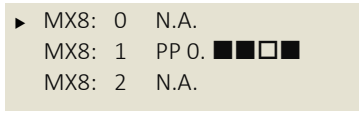
For now, only accessory decoders, MX8 and MX9 as well as MX1 booster are available!

.. Accessory decoder display

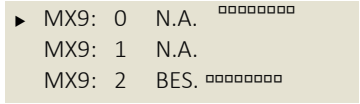


The black boxes correspond by default to the RED LED’s of the MX32 (i.e. turnouts), the white boxed to the GREEN LED’s.

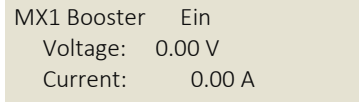
… MX8 display



… MX9 display



… MX1 booster display



Menu items **BAB Monitir + Start** → **Object-List** *GRAY*

Menu items **ObjectDB Sounds**
ObjectDB Software-Decoder-Container Files
ObjectDB Sound-Projects → **Object-List** *YELLOW*

▸ no sound files available,

List of sound samples stored in the MX10 (for playback via the “virtual MX10 sound address”) plus decoder software update files and decoder sound project files (usable through the menu items “ZIMO decoder SW update” and “ZIMO decoder sound upload”).

Menu items **Data Save, Data Clear** → **Save & Restore & Clear** *GRAY*

Save and restore important data to and from the USB flash drive: ObjectDB’s,
Menu settings...

Factory Reset | Delete texts | Delete Fonts | Delete Icons | Delete Sound |
Delete VehicleDB | Delete Vehicle Pictures | Delete Decoder Software |
Delete Decoder Sound-Projects

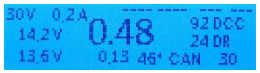
Blank page, space for still more settings

8.9. Plug in USB flash drive containing files for decoder software updates and/or decoder sound uploads to copy them to the memory or for direct execution

FUNCTION IS NOT YET IMPLEMENTED – THE FOLLOWING CHAPTER IS A PREVIEW.

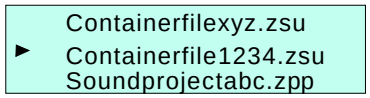
The USB flash drive can be plugged in at any time, regardless of the current screen. In many cases though, the

starting point will be the normal ***BLUE*** operating screen



➪ Plug in the USB flash drive (containing decoder SW update and/or sound upload files in its root directory)

→ Display changes to ***TURQUOISE*** and shows the files located on the stick (first the MX10 update file if present, followed by the decoder files).



↻ Scroll to the desired file using the rotary knob.

↧ Press the rotary knob

If a decoder SW collection file (.zsu) is selected → the file will be copied to the **file memory**.
If a sound project (.zpp) is selected → the file will be copied to the **file memory**.

The files copied to the MX10 memory can later be used for decoder SW updates or sound uploads (see chapter 8.10)

OR (instead of pressing the rotary knob)

Press button **1** (↴) or button **2** (***MENU***) → Starts the d**ecoder update or sound upload** immediately, (see chapter 8.10)

If the file selection above (by turning the rotary knob) has been omitted, and the stick contains several .zsu files (SW updates) or .zpp files (sound projects):

- the most recently added file to the USB stick is used.
- the same file is used again with each repeated application of every newly connected decoder.

FOR DETAILS ABOUT THE DECODER UPDATE SEQUENCE (OR SOUND UPLOAD), SEE DESCRIPTOIN ON THE RIGHT

.

8.10. Decoder update and sound upload directly from the USB flash drive or the MX10 data memory

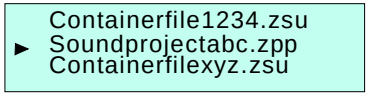
FUNCTION IS NOT YET IMPLEMENTED – THE FOLLOWING CHAPTER IS A PREVIEW.

Starting point: the normal ***BLUE*** operating screen

EITHER (from the USB stick)

➪ Plug in the USB flash drive with decoder update collection file and/or sound project file (see chapter 8.9)

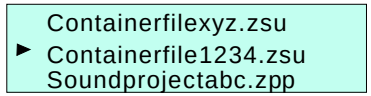
→ Display changes to ***TURQUOISE*** and shows the files located on the stick (first the MX10 up date file if present, followed by the decoder files).



OR (from the MX10 memory)

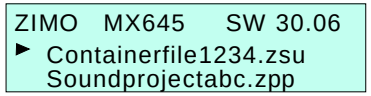
Starting point: the normal ***BLUE*** operating screen

no USB flash drive is plugged in,
instead the decoder update or sound upload files are taken from the **MX10 memory** (chapter 8.9 describes how the files are added to this memory).



DECODER UPDATE PROCEDURE:

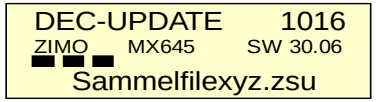
Once the decoder (or locomotive with decoder) is connected to the update track ("track 2"), which can be done before or after the selection of a particular file, the decoder data is displayed (decoder type, currently loaded software version)



↻ Scroll with the rotary knob (if several files are shown): set cursor (►) to the desired file
↧ Press the rotary knob → Information about the selected file (version) and the decoder is shown.

↧ Press the rotary knob (again) → Starts software update

The update is finished after about 10 seconds,
and indicates 100% on the progress bar → ***GREEN***



9. “Roco Z21” App and other app’s on the MX10

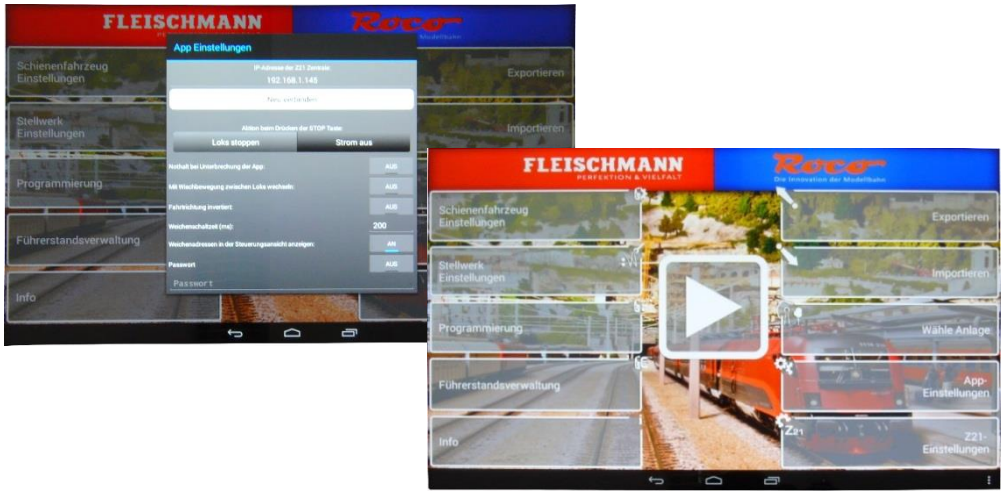
The Roco app “Roco Z21” for smartphones or tablets can be used together with the MX10 command station. The app is downloaded and installed for this purpose from the Roco website (see the Roco manual).

The MX10 command station must be connected via the LAN socket with a customary router. The smartphone or tablet has to be registered in the usual manner: choose the network, input of password).

The app will be started after the download. Input the ID of the command station in the screen “App settings”. The ZIMO **MX10 command station IP address** is preset on:

192 168 1 145 …

as long as not yet changed in the MX10 menu / PC Config+Monitor.



The device will acknowledge the established connection after clicking on the “connect” button so that you are ready to start running the locos (after defining the vehicles, see Roco manual).

In case no connection between the smartphone or tablet (WLAN symbol stays red) and the MX10 command station could be established (e.g. the MX10 IP address does not match to the router or is already in use), the IP address of the MX10 must be changed. The following addresses may be tried on an experimental basis: 192.168.0.145, 192.168.2.145 or 192.168.20.145 (in connection with Apple devices). The last octet “145” may also be varied. See the adjustment process in the instruction described further on.

The router must be connected to a PC to find out the IP address (see chapter 10 “The interlocking programm “ESTWGJ” on the MX10”) and carry out the matching, if the abovementioned adjustments still do not establish a connection.

After the connection between the MX10 and the Roco app was established (see green WLAN symbol on the app), you may choose the “Locomotives” in order to define your vehicles (e.g. address etc…). After the input of new locos to the app, you may choose “Control Panel” to drive the locomotives.

For further information please see the Roco operating manual.

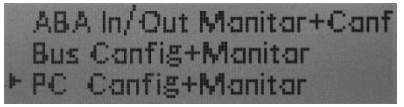
To change the IP address on the MX10 command station:

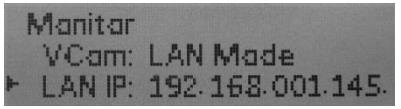
Open “PC Config+Monitor in the MX10 menu and:

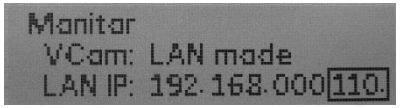
↻ Scroll with the rotary knob:): set cursor (▸) to the line “LAN IP”

↧ Press the rotary knob → the value to be edited is framed and may be changed using the rotary knob. Pressing button **1** (↴) leads to the next octet right.

↧ Press the rotary knob again → the changed values are saved, the rotary knob serves to mark the cursor position.







Restart the Roco app and connect with the newly changed MX10 IP address.

ATTENTION: the receiving port in the app must show the address of the MX10 sending port and vice versa. The application and the used ports must be unlocked when using a PC software.

10. The interlocking programm "ESTWGJ" on the MX10

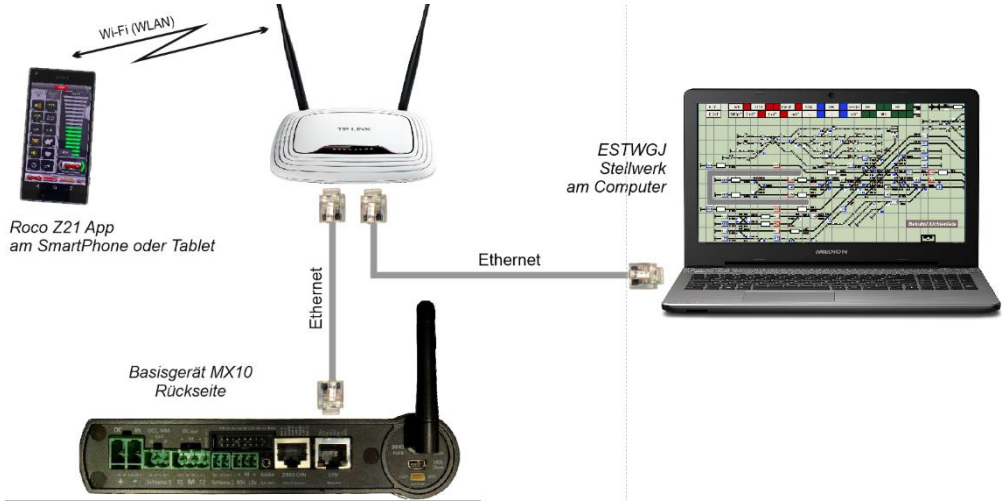
ESTWGJ (Interlocking software developed by Heinz_Willi Grandjean, www.ESTWGJ.com) offers a mostly prototypical realization of a relay interlocking (probably starting 2018 also an electronic interlocking) panel for model railroad use. Core task are the operating-, monitoring- and release / cancellation operations for train- and shunting routes following the safety systems of the prototype.

ESTWGJ runs on Windows XP, 7, 8 and 10 (always being adapted). The newest Windows version should be used as the functionality can be better monitored.

Connecting the MX10 command station to the PC can be done via USB or LAN (or WLAN) interface. The connection via LAN is effective and easy to establish.

Connection via LAN with an Ethernet cable:
Connect the ethernet cable from the LAN socket on the back of the MX10 command station directly

- to the computer or
- to a WLAN router e.g. ued for the Roco app. The router must then be connected with another ethernet cable to the computer.



Necessary procedures on the computer:

The usual Windows setting of "automatically obtain the IP address" are not suitable for the communication with the MX10 command station. It is necessary to set a fixed / static IP address according to the procedure indicated below.

The following is one of diverse possibilities to access the window "Properties of internet protocol, Version 4 (TCP/IPv4) to change the IP address features:

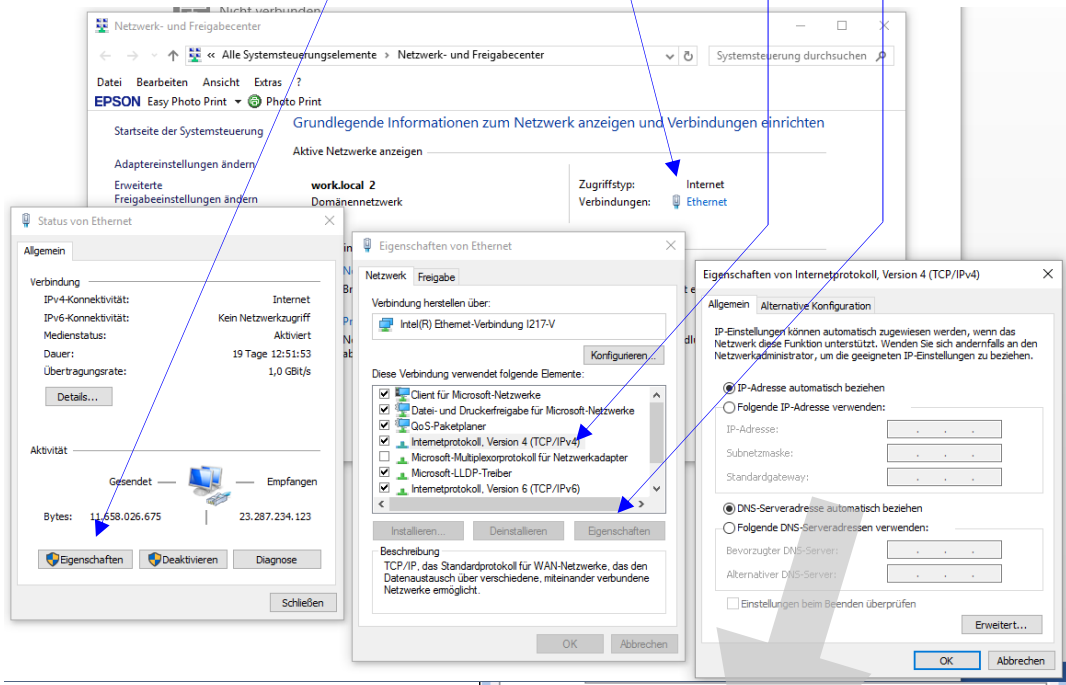
Open the following (by clicking on the Windows button, on "Windows settings" and further to "Network and Internet") and change to the:

Window "Network and release center", click on "Ethernet", leads to

Window "Ethernet status", click on "Properties", leads to

Window "Ethernet properties": click on "Internet protocol, version 4 (TCP/IPv4)" and "Properties", leads to

Window "Properties of internet protocol, versin 4 (TCP/IPv4): changes have to be made there:



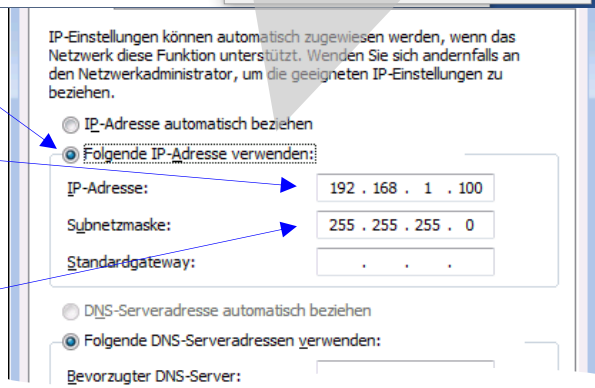
Click on "Use the following IP address" and write e.g.:

192.168.1.100 *)

*) in case "100" is already in use with another LAN device, use another value.

The field "Subnet mask" is filled in automatically (if not: 255.255.255.0).

Click "OK", "OK", … to exit.

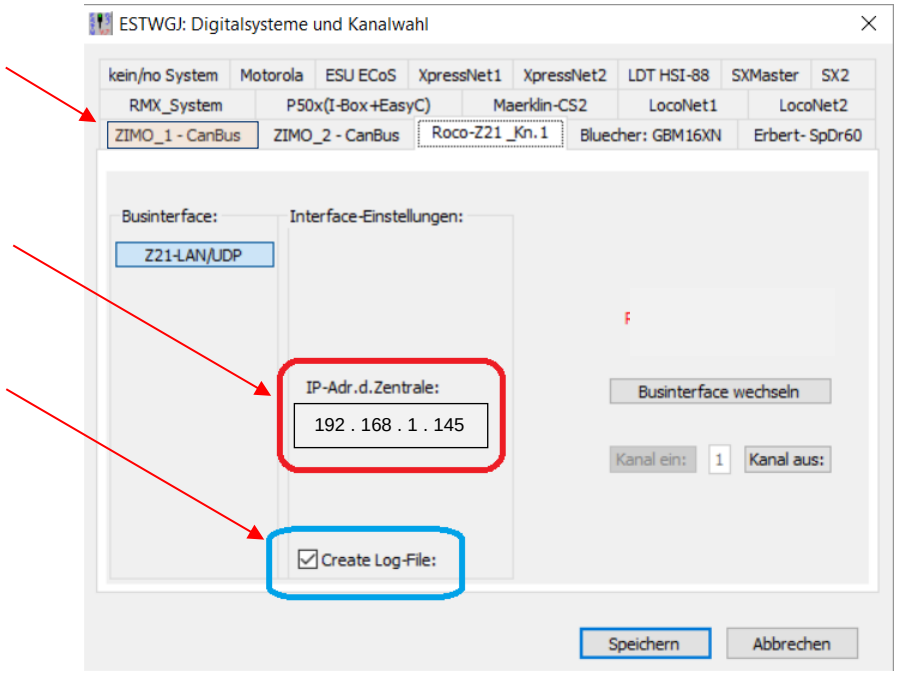


Necessary procedures in the ESTWGJ program:

Please fill the IP address of the MX10 command station in to the field bordered in red: 192.168.1.145*)

*) being the default IP address of the MX10. In case this address was changed, please use the new address.

When setting a ✓ in the field “Create Log-File” (bordered in blue), a log file is created by the ESTWGJ. This log file shows on a monitor all commands on the LAN. This has no effect on the ongoing operation, but might be of interest when e.g. troubleshooting.



The connection to the interlocking panel is ready to work after saving these settings in the ESTWGJ.

Note: the MX10 command station cannot be connected via LAN a**nd** USB at the same time. As soon as the MX10 recognizes a valid LAN connection,the USB port will be deactivated.

Blank page, space for still more features

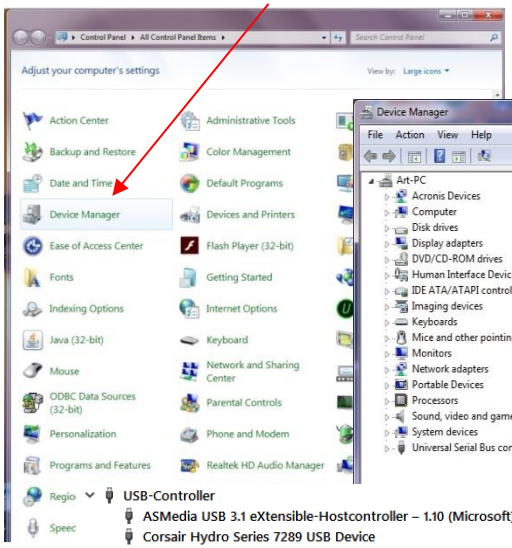
11. USB connection to the computer

This description is kept very general and does not concern a particular program / software.

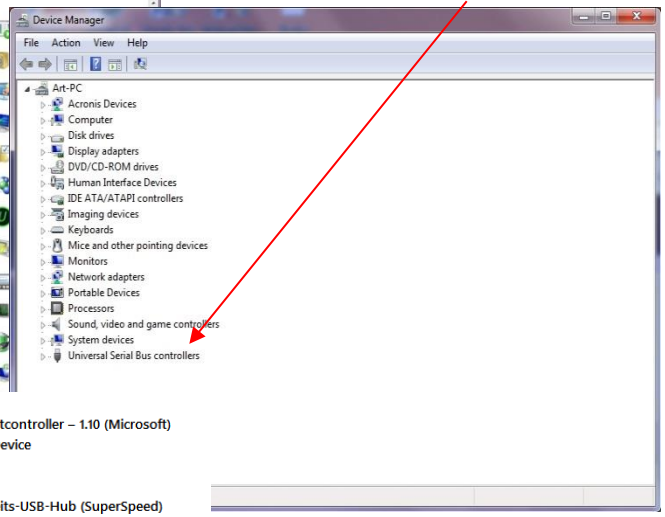
In order to establish communication between the MX10 and a PC, both devices must be connected using a **USB cable (type "A to mini-B").** The USB "client socket" on the MX10 is located on the rear side below the antenna. The necessary **driver** is normally installed automatically and shows up as a new COM PORT in the device manager under "Connections (COM & LPT)", which needs to be changed as described below to COM PORT 10.

If the COM interface is not installed automatically, it must be installed manually as follows:

Connect the MX10 to the USB and switch it on.
Choose "Control Panel" on the computer and click on "System" (in Classic View). Click on the tab "Hardware", then on "Device Manager":

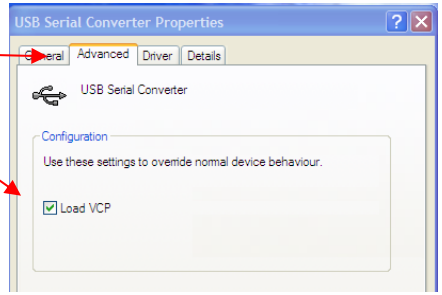


Open the "USB Controller" in the Device Manager



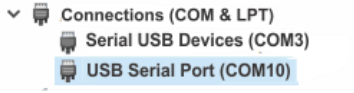
Open the "USB Serial Converter"

Click on the tab "Advanced" and check the box "load VPC".

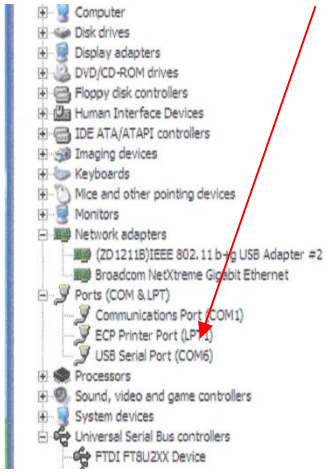


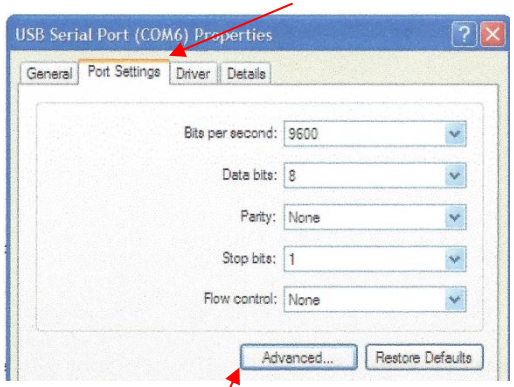
In case the tab "Advanced" is not there, click on "Driver" and "Update Driver".

In case the the Device Manager shows an "unknown device", the driver needs to be updated as well.
If the above steps were successful, the following entry is shown in the device manager under "Connections (COM & LPT):

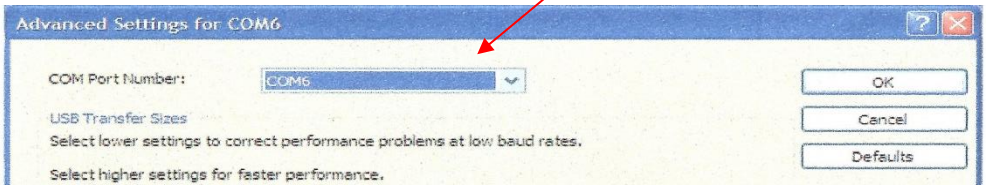


Whereby COM10 is probably not assigned yet - this COM port has to be selected first:
Right-hand click on "USB Serial Port (COM..), then click on the tab "Port Settings".





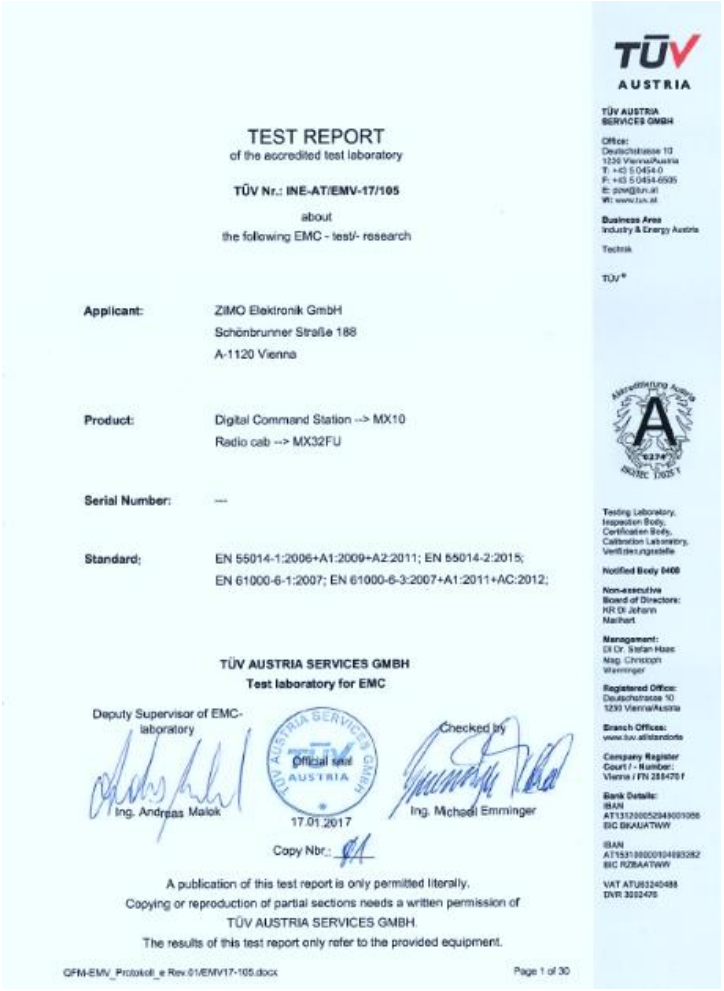
Click on "Advanced" and select "COM10"



Click on "OK" twice to return, this finishes the MX10 driver installation.

Annex: EMC test report / TÜV Austria

Concerning command station MX10 and cab MX32.



TEST REPORT
of the accredited test laboratory

TÜV Nr.: INE-AT/EMV-17/105

about
the following EMC - test/- research

Applicant: ZIMO Elektronik GmbH
Schönbrunner Straße 188
A-1120 Vienna

Product: Digital Command Station --> MX10
Radio cab --> MX32FU

Serial Number: ---

Standard: EN 55014-1:2006+A1:2009+A2:2011; EN 55014-2:2015;
EN 61000-6-1:2007; EN 61000-6-3:2007+A1:2011+AC:2012;

TÜV AUSTRIA SERVICES GMBH
Test laboratory for EMC

Deputy Supervisor of EMC-laboratory
Ing. Andreas Malok

Official seal
17.01.2017

Checked by
Ing. Michael Emminger

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QFM-EMV_Protokoll_e Rev.01/EMV17-105.docx Page 1 of 30

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