Digital 2020

www.zimo.at

MADE IN AUSTRIA

Decoders →

The System

Highest performance with the latest technology,

recognizable among other things by the small dimensions of the digital central unit MX10, which brings 20 A on the rail (600 watts total output) and manages without a fan. Both the central unit and the controllers are equipped with generously dimensioned processor and memory capacity, necessary for decentralized intelligence.

170 x 200 x 40 mm

MX10 „big" version

140 x 170 x 40 mm

MX10 EConomy

Digital centrals: The „big" MX10 vs. the „EConomy" command station MX10EC

The MX10 has two rail outputs: "rail 1" with 12 A and "rail 2" with 8 A; the MX10EC version is based on the hardware and software of the MX10, but does not have the " rail 2" output. Neverthelessboth versions, so also the MX10EC, are called high performance digital control panels.Most features of MX10 and MX10EC are identical: the finely adjustable voltages, Overcurrent thresholds, tolerance limits, the short-circuit spark suppression, the RailCom precision detector, CAN buses, "MiWi" radio, XPressNet, LAN for communication with Apps, Roco WLANMAUS and interlocking systems.The "full version" MX10 also has a built-in sound generator, more power for auxiliary voltages, more ABA pins, a USB client interface (MX10EC has "only" Ethernet), and a Loconet interface (not yet in use).

ZIMO controllers in the year 2020: from MX32 to MX33

ZIMO digital system controllers are traditionally referred to as "control desks"; their shape allows them to be used either as tabletop units or walk-around manual controllers. The new MX33 brings a formal and ergonomic upgrade, but also potential for future enhancements through software updates.

Right from the start, the MX33 controllers (and the MX33FU radio version) offer a larger screen (2.8 inches instead of 2.4) and the capacitive multi-touch glass, additional buttons (for stop handling and east-west direction), RGB LEDs (all colours can be displayed, integrated in the buttons), etc.

CAD drawing

StEin expansion boards at upper connectors

for 8 additional switches (coils, motor, servos), and 16 inputs

Stationary equipement modul
One "StEin" is more than a pure synergy of elements

The StEin

REPLACES a collection of occupancy detectors, RailCom detectors, accessory decoders, etc.

StEin = TRACK SECTION MODULE
Fully functional track sections with detection of occupancy and train number, RailCom local/global, overcurrent (short circuit) treatment, and ZIMO "HLU" train control.

The combination of continuous and intermittant ATPs allows a special stopping point accuracy, means a cost saving and brings the ZIMO system to the way to ETCS (European Train Control System).
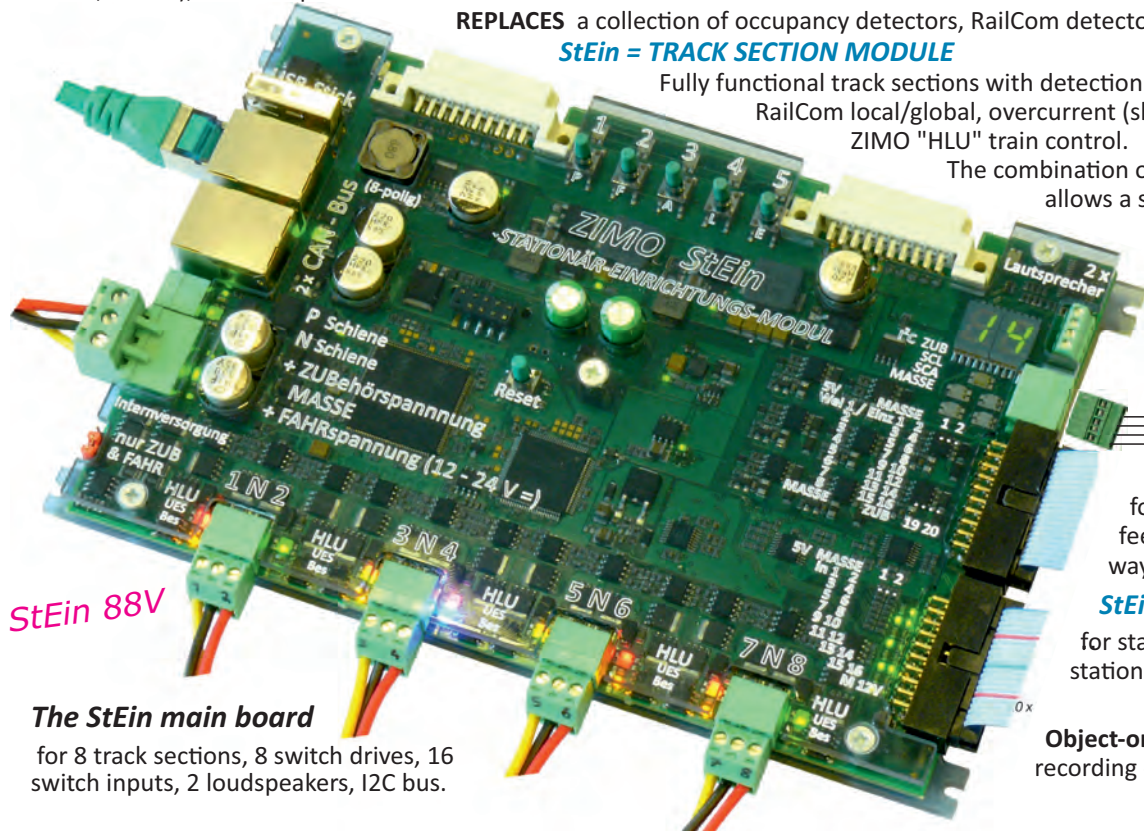
StEin = Signal-MODUL
Signals are not connected directly, but via the outsourced "ICA boards" for mounting in close proximity to the respective signals. Up to 12 boards are powered and controlled from the I²C bus connector of each StEin: each ICA board has 16 outputs for signal LEDs.

...from the I²C connector of the StEin

...to the next signal PCB

StEin = SWITCH-MODULE
for all types of switch drives and feedback signals, two-way, three-way, comprehensive parameterisation.

StEin = SOUND MODULE
for station announcements and all stationary railway noise.

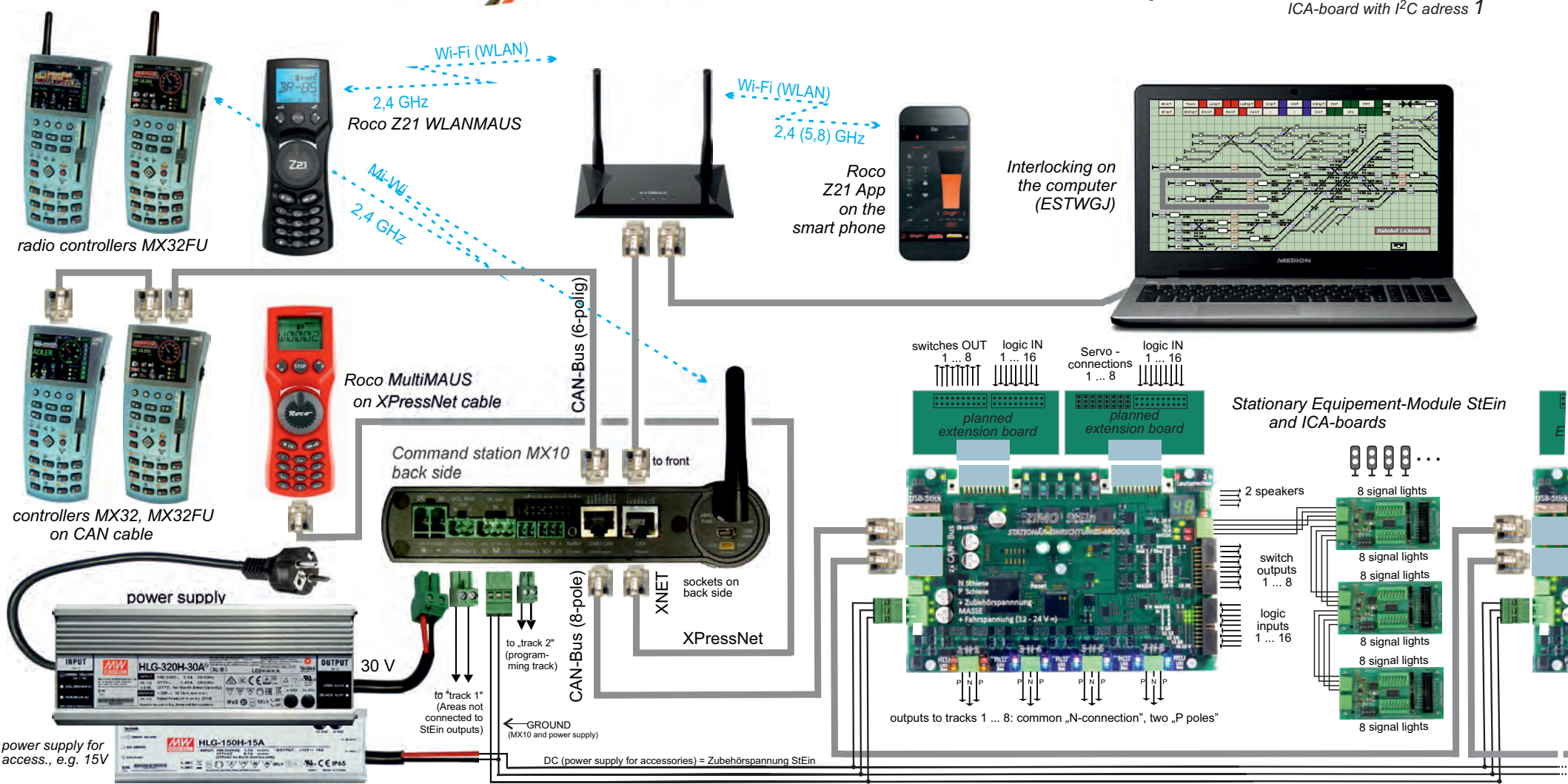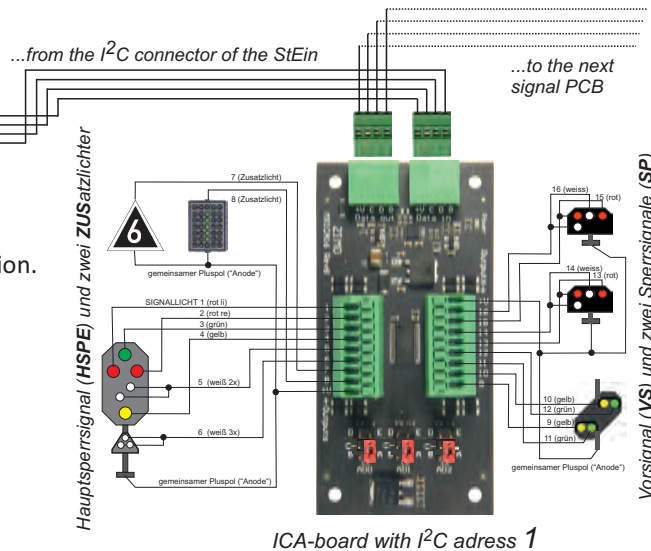**Object-oriented** approach and tabular recording of the configuration.

StEin 88V

The StEin main board
for 8 track sections, 8 switch drives, 16 switch inputs, 2 loudspeakers, I2C bus.

Hauptsignalsignal (HSPE) und zwei ZUSatzlichter

Vorsignal (VS) und zwei Sperrsignale (SP)

ICA-board with I²C adress 1

Wi-Fi (WLAN)

2,4 GHz

Roco Z21 WLANMAUS

Wi-Fi (WLAN)

2,4 (5,8) GHz

Roco Z21 App on the smart phone

Interlocking on the computer (ESTWGJ)

radio controllers MX32FU

MiWi

2,4 GHz

Roco MultiMAUS on XPressNet cable

switches OUT 1 ... 8

logic IN 1 ... 16

Servo - connections 1 ... 8

logic IN 1 ... 16

planned extension board

planned extension board

Stationary Equipement-Module StEin and ICA-boards

controllers MX32, MX32FU on CAN cable

Command station MX10 back side

to front

CAN-Bus (6-polig)

2 speakers

8 signal lights

switch outputs 1 ... 8

8 signal lights

8 signal lights

logic inputs 1 ... 16

8 signal lights

8 signal lights

power supply

30 V

to „track 2" (programming track)

to „track 1" (Areas not connected to StEin outputs)

GROUND (MX10 and power supply)

XNET

sockets on back side

CAN-Bus (8-pole)

XPressNet

power supply for access., e.g. 15V

outputs to tracks 1 ... 8: common "N-connection", two „P poles"

8 signal lights

DC (power supply for accessories) = Zubehörspannung StEin

DC S1 (MX10, running voltage on track/Schiene 1) = Fahrspannung StEin

The Decoders

MS - SOUND-DECODERS

REAL 16 bits audio - 22 or 44 kHz sample rate - 16 channels - 128 Mbit memory

The _REAL 16 bits_ refer to the complete sound project: from the sound files stored in the flash memory, to the I2S-bus (=Inter-IC-Sound) for playback in stereo, to the fully digital Class "D" amplifier.

22 kHz sample rate by default, but also (defined by the sound project) sound channels of _11 kHz_ for simpler sounds (e.g. station announcements) and _44 kHz_ for sounds of maximum hifi quality.

128 Mbit sound memory means 360 sec playback time of high quality (16 bits / 22 kHz); using the memory economically (8 bits / 11kHz) makes up to 1440 sec playback time possible (neglecting the overhead).

16 Sound channels can be played back simultaneously and adjusted individually, and can also be distributed to two speakers in "stereo decoders" (especially, but not limited to, large-scale decoders).

The _timbres_ of driving sounds (e.g.: chuff sounds, diesel engine, whistles, horns, ...) can be adjusted via high and low pass filters via CV configuration.

Note! Even "old" (not converted) 8 bit sound projects do sound better with the MS hardware!
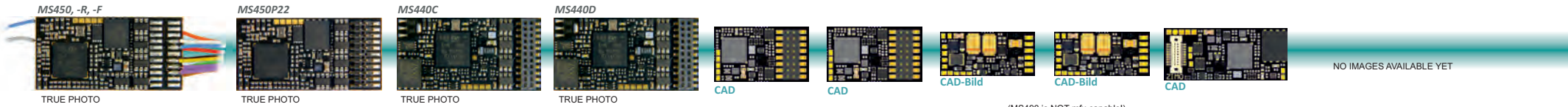
Multiprotocol: DCC, mfx, MM

Introducing the MS generation, ZIMO decoders do not only work with DCC and MM, like all ZIMO decoders, but also with the **mfx track format**, including RDS feedback and automatic **registration** with mfx central stations. They also work in analog operation, AC and DC, of course.
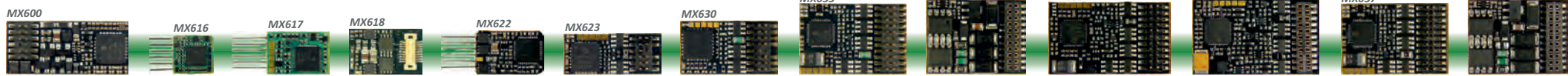
MS decoders as successors of the MX decoders

The new sound decoders contain many components which are important for the performance. Some of the most important are a state-of-the-art 32 bits ARM processor and DSP properties. Many things are new, but the MS decoders still represent a continuous development of the MX decoders: the well-proven power electronics (rectifier, amplifiers) were adopted, as well as the construction types and interfaces.

NOTE: The MX decoders will not be removed from ZIMO's product range, and are still offered - as long as there is demand. Due to the fact that the old decoders are continuously being developed, also during the development of the new decoders, there may be some situations where the MX decoders have an advantage.

MS Decoders (Sound)	MS450, MS450R, MS450F	MS450P22	MS440C MTC acc. VHDM Std.	MS440D MTC variant ZIMO	MS480, MS480R, MS480F	MS480P16	MS490, MS490R, MS490F	MS490N, L	MS580N18	MS960V, S	MS990 -KV, -KS, -LV, LS
	Standard H0				Miniature (MS490 is NOT mfx capable!)				Next		Large Scale
Dimensions (mm)	30 x 15 x 4	30 x 15 x 4	30 x 15 x 4	30 x 15 x 4	19 x 11 x 3,5	19 x 11 x 3,5	19 x 8,6 x 3,5	19 x 8,6 x 3,5	25 x 10,5 x 4	55 x 25 x 13	50 x 40 x 13
Connections (Wires and/or standardized interfaces)	13 wires NEM-652, NEM-651	PluX-22	21MTC FO3, FO4, FO5, FO6 logiq level (std.)	21MTC FO3, FO4, FO5, FO6 "amplified" outputs	11 wires NEM-652, NEM-651	PluX-16	11 wires NEM-652, NEM-651	NEM-651 directly	Next18	pin connection	pin conn. or screw terminals
Continuous Current motor+sound+FOs (peak)	1.2 A (2.5 A)	1.2 A (2.5 A)	1,2 A	1,2 A	0,8 A	0,8 A	0,7 A	0,7 A	0,8 A	4 A	6 A
Function Outputs incl. 2 x headlights (+ logic-level outputs)	10 4 with wires 6 on s.pads (+ 2 logic level)	10 9 on plug (+ 2¹ on s.pad logic level)	8 4 on plug, 4 on s.pad (+ 6 logic level)	8 all 8 on plug	6 4 with wires, 2 on s.pad (+ 2 logic level)	5 4 on plug, 1 on s.pad (+ 2 logic level)	4 all 4 with wires (+ 2 logic level)	4 2 on plug, 2 on s.pad (+ 2 logic level)	4 all 4 on plug (+ 2 logic level)	8 or 14	8 or 14
Servo - control lines (complete with 5V supply)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	4 servo wires	full feat. 3-pole servo connections (YES)
SUSI - connection alternatively SUSI, I2C, sound loading	yes alternate use on s.pads	yes alternate use on PluX	yes alternate use on MTC	yes alternate use on MTC	yes alternate use on s.pads	yes alternate use on PluX	yes alternate use on s.pads	yes alternate use on s.pads	yes alternate use on NEXT18	yes	yes indiv. 4-pol. SUSI conn.
Switching Inputs for cam sensors, Reed switches, i.a.	1 on s.pads +2 alternate use of logic-level	1 on s.pads +2 alternate use of logic-level	2 on MTC +2 alternate use of logic-level	2 on MTC +2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	3 on pin connector or screw terminals	3 on pin connector or screw terminals
Energy Storage - connect. 15V - capacitors DIRECTLY on the decoder	yes with wires (no limit)	yes on PluX (no limit)	yes on s.pads (no limit)	yes on s.pads (no limit)	yes on s.pads max 1000µF	yes on PluX max 1000µF	yes on s.pads max 1000µF	yes on s.pads max 1000µF	internal buffer 2000µF/5V AND external 5V tantals on s.pads	internal energy storage: 2 Supercaps AND	internal: 3 Supercaps AND external on pins/screw terminals
Speaker Outputs dep.on dec. 8Ω or 4Ω (2 x 8Ω in parallel)	1 3 watts / 4Ω with wires	1 3 watts / 4Ω on PluX	1 3 watts / 4Ω on MTC	1 3 watts / 4Ω on MTC	1 1 watts / 8Ω with wires	1 1 watts / 8Ω on PluX	1 1 watts / 8Ω with wires	1 1 watts / 8Ω with wires	1 1 watts / 8Ω on NEXT18	2 10 watts / 4Ω on pins/terminals	2 10 watts / 4Ω on pins/terminals

MX-Decoders (Non-Sound)	MX600, -R, -P12	MX616, -R, -F, -N	MX617, -R, -F, -N	MX618N18	MX622, -R, -F, -N	MX623, -R, -F, -P16	MX630, -R, -F, -P16	MX633, -R, -F, -P22	MX634C, D	MX635, -R, -F, -P22	MX636C, D	MX637P22	MX638C, D
	flat decoder	Miniature			Standard H0			High end H0		High power H0, 0		Ecomony high end H0	
Energy Storage - connect. 15V - capacitors DIRECTLY to the decoder	-	-	-	-	-	-	-	yes wires or PluX	yes wires	yes wires or PluX	yes wires or PluX		
SUSI - connect. (altern. SUSI, I2C)	-	-	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level	2 alternate use of logic-level
Servo - control wires (complete with 5V supply)	-	-	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (NO, external 5V)	2 alternate use of logic-level (YES, version "V")	2 alternate use of logic-level (YES, version "V")	2 alternate use of logic-level (NO, external 5V)		
Function Outputs incl. 2 x headlights (+ logic-level outputs)	4 all 4 with wires or on plug	6 2 wires or pins 4 on s.pads	6 2 wires or pins 4 on s.pads	4 4 on plug (+ 4 logic-level)	4 2 wires or pins 2 on s.pads 4 on s.pads (+ 2 logic-level)	4 2 wires or PluX 2 pads or PluX (+ 4 logic-level)	6 4 wires or PluX 4 s.pads or PluX (+ 2 logic-level)	10(9) 4 wires or PluX (+ 2 logic-level)	6(8) MTC (+ 2(4) logic-level)	10(9) 4 wires or PluX (+ 2 logic-level)	6(8) (+ 2(4) logic-level)	10(9) PluX (+ 2 logic-level)	6(8) (+ 2(4) logic-level)
Continuous Current motor+sound+FOs (peak)	0.8 A (1.5 A)	0.7 A (1.5 A)	0.8 A (1.5 A)	0.8 A (1.5 A)	0.8 A (1.5 A)	0.8 A (1.5 A)	1.0 A (.,5 A)	1.2 A (2.5 A)	1.2 A (2.5 A)	1.2 A (2.5 A)	1.2 A (2.5 A)	1.2 A (2.5 A)	1.2 A (2.5 A)
Connections wires and/or standardized interfaces	9 wires or PluX-12	7 wires or NEM-651	7 wires or NEM-651	Next18	7 wires	7 wires	9 wires or PluX-16	11 wires or PluX-22	21MTC	12 wires or PluX-22	21MTC	PluX-22	21MTC
Dimensions (mm)	25 x 11 x 2	8 x 8 x 2	13 x 9 x 2.5	15 x 9.5 x 2.8	14 x 9 x 2.5	20 x 8.5 x 2.5	20 x 11 x 3.5	22 x 15 x 3.5	20.5x15.5x3.5	26 x 15 x 3.5	26 x 15 x 3.5	22 x 15 x 3.5	20.5x15.5x3.5

Every ZIMO decoder is technologically advanced, being ahead of their time. Making a unique difference through advanced features which are realized thought the use of innovative software and hardware that in many cases integrates the use of RailCom. All of this is designed and made inhouse, at ZIMO in Austria, using high quality components, while providing an extra

MXULF _Updating and Sound loading device for decoders_

Updating and loading sound onto ZIMO decoders can be done via flash drive or computer.
Alternatively, the SUSI interface can be used to load sound within a few minutes, to test the driving operation and for many other feartures.

HLU _unmatched for 20 years_

Almost from the beginning (1980), the "signal controlled speed influence" (HLU's predecessor) is integrated in all ZIMO decoders and digital systems.
DCC is known to be a communication format from the digital command station to the vehicles; a single command is distributed on the whole layout, to which (only) one decoder reacts due to the loco address sent with the command**.**
HLU information is always bound to one specified track section, does NOT contain addresses and is valid for all trains on the track section. Usually those are commands to stop the trains or limit the speed; practically without delay (100 times/sec).

H	**Halt**	7
5 UH	Zwischenstufe	
L i m i t s U	Ultralangsam	S
LU	Zwischenstufe	t u
L	**Langsam**	f e
FL	Zwischenstufe	n
F	**Volle Fahrt**	
(A	Spannung AUS)	

Die HLU - Geschwindigkeitslimits (einschließlich „Halt" und „Fahrt")

PoM _all over the place_

Standardized PoM allowing the reading and programing of CV's on the main track; Zimo has also implemented the VHDM standard allowing addresses of decoders to be changed on the main track.

EAST-WEST
Since 2018 always in the right directon

RailCom application

Since the time the model railway also works digitally, the driving direction is not track-bound, but dependent on the vehicle (forward means chimney or driver's cab 1 ahead). This is often, but not always, an advantage. Therefore, the ZIMO system with its decoders has the possibility to set the train's direction in a layout-dependent direction: "East" and "West". The driving direction might as well be interpreted as "right" or "left", technically it depends on the polarity of the DCC track signal.
One of the characteristic features is that East-West does not work against, but together with the driving directions forward-backwards.
This means:
• driving off in the "right" direction without knowing in which direction the train is placed on the tracks
• to send "both directions" via RailCom to the controller, so the driver always has all the information
• without losing the known handling (change of directions).

Track-on search _RailCom application_ and Rolling stock search _(project)_

The "track-on search" is used to determine the unknown address of one or a few vehicles. The vehicle currently being searched for is temporarily disconnected from the power supply (or placed on the layout again); after the procedure is started, the address and (if available) the name of the vehicle found appears. This is done within seconds .

The Rolling stock search has been included in the RCN-217 standard of the "RailCommunity" manufacturers' association.
The "stock search" covers all decoders found on the track. This is done by a request "to all" to report via RailCom. In this way the system database can be (semi-)automatically supplemented and cleaned up.

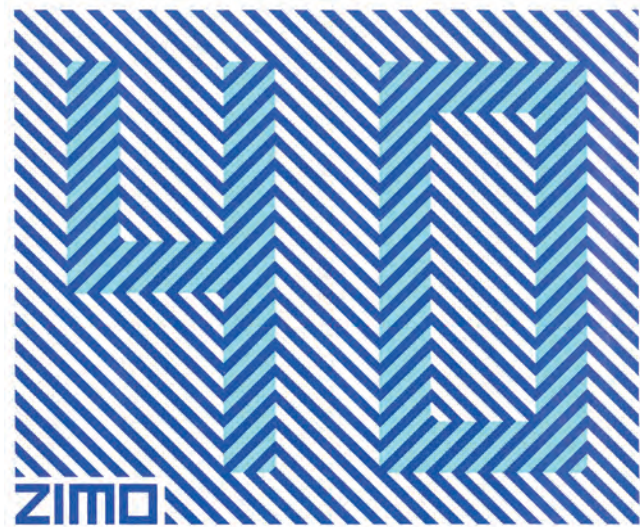## ZIMO Systems and decoders 1980 to 2020

Below: The first command station (digital central), the second (!) controllers, the first "vehicle receivers" (later: decoder).

In several generations (4-7 depending on the article group)the ever growing ZIMO development department has created the most comprehensive product range on the market for model railway electronics from 1980 to 2020.
The in-house electronics production, on which ZIMO relies as one of few suppliers, allows the flexible processing of all orders from the model railway industry and from retailers.
in 2020 (already for the fourth time in history) a large part of the machinery of the SMD production line (assembly machine, solder paste printer, AOI system, etc.) has been renewed. ZIMO is now more efficient in several aspects: higher quantities, more indivi-dualization, even lower error rate, progressive miniaturization.

Photo: New 3D AOI at training.

40 years
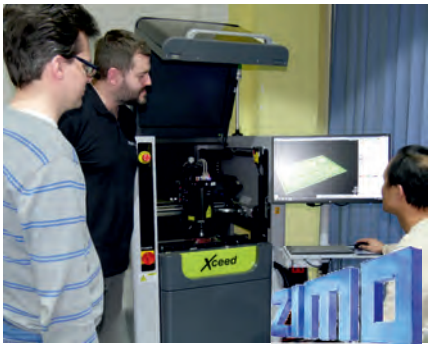
MS decoders: small and large ones.

Following the MS sound decoders for HO standard interfaces PluX22 and 21MTC, i.e. **MS450P22** and **MS440C** and **-D**, more MS types are released. Those, too, are the successors of the MX types equipped with the same interfaces.
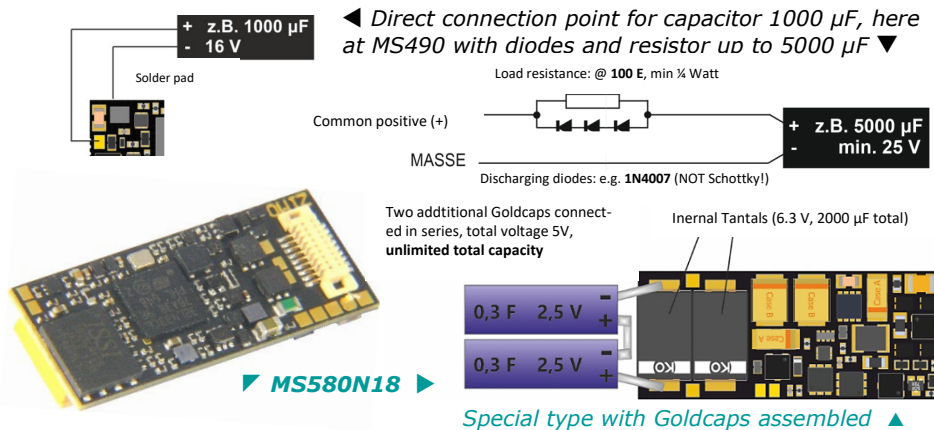
Next18 interface: MX658 -> **MS580** (complete)
PluX16-interface or with wires: MX648 -> **MS480** (in development)
NEM-651 mounted directly or with wires *): MX649 -> **MS490** (almost complete)

  *) "with wires" = as desired with free ends or NEM-652, NEM-651 on wires.

The key innovations of the MS technique compared to MX lies (as is well known) in the sound reproduction (*16 bit* resolution, *128 Mbit* memory, etc.) and in the **mfx ability** (except MS490). New types also provide an opportunity for additional improvements; in this case the focus lies on **stay-alive capacitors**.

The larger decoders (typically HO) already have the connection for stay-alive capacitors by ZIMO since MX decoders; for miniature sound decoders there are new possibilities for MS types:

MS480 and **MS490** at least provide the possibility to connect capacitors with 1000 µF (16 V) directly (i.e. without additional components), even more with diodes and resistors. The greatest possible extent is provided by **MS580N18**: two small Goldcaps, connected directly in series, provide a **stay alive capacity** of **1-2 sec** (5V).

◀ *Direct connection point for capacitor 1000 µF, here at MS490 with diodes and resistor up to 5000 µF* ▼

+ z.B. 1000 µF
- 16 V

Solder pad

Load resistance: @ **100 E**, min ¼ Watt

Common positive (+)

MASSE

+ z.B. 5000 µF
- min. 25 V

Discharging diodes: e.g. **1N4007** (NOT Schottky!)

Two addtitional Goldcaps connected in series, total voltage 5V, **unlimited total capacity**

Inernal Tantals (6.3 V, 2000 µF total)

0,3 F 2,5 V
0,3 F 2,5 V

▼ **MS580N18** ▶

Special type with Goldcaps assembled ▲

The flagship under the MS decoders for scales G and 1 is the **large-scale sound decoder MS990**. Due to better spatial conditions than smaller scales, practically everything can be equipped, as far as it is technically possible. This is also done with this product, although it may take some time until the final release.

This is why there is only a CAD drawing of the PCB at the moment.

Fan 2.1   low voltage outputs 10V, 5V   var. low voltage output
Second speaker   FO7 … FO12   FO13

◀ **MS990LV** *(with pin connector)*
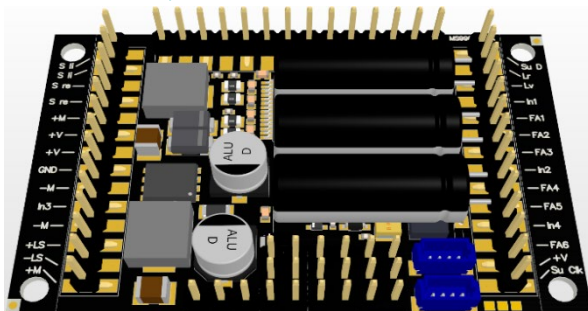
The connection terminals (pins or screw terminals) are equal to the predecessor *MX699*, in the front (servos) and in the back there are differences.

Please refer to the next page for details to MS990!
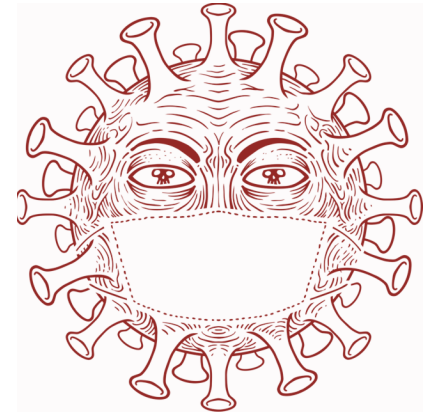
Free picture by Gordon Johnson on Pixabay

Currently the Corona virus affects everything, even model railways.

Fairs and exhibitions were and are going to be cancelled (Mannheim, Dortmund, Wels, St. Louis, ...). This does not only mean loss in promotion and business, but especially missing personal contact between "railroaders" of all kinds.

It SHOULD start again on August 13th: the new date for the Intermodellbau in Dortmund. Although this is not very probable, keeping in mind that the (at a later date) Oktoberfest in Munich has been cancelled already....

Nevertheless, the model railway industry keeps working; we register almost no decrease in orders for decoders by manufacturers.

At ZIMO we had to establish some safety measures: Distance, working from home in some areas, ...

The production is working as usual, especially now the MS decoders broaden our range of product types.

Material supply is a little unsteady, some components are more expensive, but because of the ZIMO-internal flexibility, the assembly and following processes are still producing at full capacities.

It looks like ZIMO will overcome this crisis without short-time work or even dismissals. To achieve this, we need

Y O U

that is, model railroaders, who buy our products directly or "packed" in fully equipped model vehicles.

The most important features and specialties of the
*MS large-scale decoder **MS990**,*
especially regarding differences to the MX types
(additional to 16 bit and 128Mbit sound inherent to all MS decoders)

6 A motor/total current | **15** function outputs | **3** stay-alive capacitors Supercap 3F3 similar to MX699, optimization regarding energy storage.

2 fixed and **1** variable low voltage connections,
similar to MX699, the voltage 5, 10, 8 V are available (for servos or sound amplifiers) as well as type dependent: one low voltage output for other functions.

2 independent outputs for 10 Watt speaker ("stereo"),
on the one hand, to provide more volume and, on the other hand, distribute sound according to their origin like in the prototype.

2 independent smoke generators with their own fan each can be activated if required by the model; the voltage supply is accordingly powerful.

6 servo connections, eligible 6 x 3 pole or on one single line; for all cases 4 servos are not enough, e.g. two couplers or more than two pantographs.

2 independent SUSI interfaces
one of them on a typical SUSI interface as well as on pins/screw terminals, the other only on the second SUSI interface; as always, "SUSI" does not only mean a train bus connection corresponding to the SUSI-protocol standardized by Railcommunity, but also for I^{2}C usages for faster sound loading.

1 gyroscopic sensor
for future use (as soon as activated by the software) to influence driving and sound through inclines and declines or other measurable movements.

This sound decoder will bridge the HO-world with the "real" large-scales (G, 1), regarding dimensions as well as characteristics.

The MS590 will be **narrower** than the current "small large-scale decoder" MX696 (only 23 instead of 29 mm), reproduce two-channel sound (2 x 3 Watt), provide many function and servo outputs, as well as a connection for smoke generators and an individual output for a fan.

Stay alive is - as in all MS decoders - of utmost importance: three Supercaps 1F (like the "big" MS990, only less capacity) supply motor, sound and function voltage.

Note: ZIMO is thinking about developing a smoke generator, like the TR92-101 without internal electronics to eliminate those unnecessary costs.

MS decoders - current software development status:

Currently (when receiving this newsletter) the **software version** for MS decoders is "around" **4.15**. This is an intermediate step to version 5.00 (almost there...); in 5.00 there should not be essential backlogs to the features of the MX decoders, but more advantages of the MS technique. Currently, DCC features prevail; after the release of SW version 5.00, the work on mfx will be intensified (regarding the automatic configuration of the GUI when registering).

The current instruction manual (download at: www.zimo.at) already contains the features of the upcoming SW-version 5.00, always with the note "SW version 5.00 and higher".

This is a summary of missing features at delivery of **MS decoders since 20th April** (or the SW versions to download); with notes to the planned sequence of additions per SW update:

- **Loading sound** via **tracks** (up until now not possible at all) is still very slow (depending on the sound project between 1 and 2 hours). This is mainly due to the MXULF software which also is developed constantly.
Note: fast sound loading (a few minutes) is still possible via SUSI and especially suitable for decoders with the following interfaces: PluX, MTC, Next. This is because the MXTAP is equipped with the corresponding sockets.

- The **DC analog operation** is not yet possible, only AC analog is working.
The time of implementation depends on the need of insustrial clients, because it is not very important for private clients.

- The **Script language** in sound projects (very often used by sound providers Däppen, Henning, Chetter) can only be interpreted in part by MS decoders; therefore, interruptions of background noises or wrong dependencies of driving situations can occur.
The script ability is the most pressing MS project.

- Some **effects** are not yet implemented; this concerns mostly "American light effects" (Ditch, Mars, ...).

- Some **special features**, like motor brake, adaptive acceleration, idle, solo drive, motor control in consist, etc. are not yet implemented, whereby it is unclear, if all of the features will be needed in MS decoders.

- "Distance controlled stopping" (also known as "**constant braking distance**") is not yet implemented.
Feature can be improved (to MX); therefore a little later, but better, in the realisation for MS.

- **SUSI** interface (only shares pins with sound loading) as well as **servo** control and **inputs** (for cam sensors or reed contacts) are not implemented.
Urgency depends on need for clients.

- The **CV #300 procedure** (select and configure sound) is not implemented yet; the development is connected to the development of the new controller MX33.

- Sound projects for **diesel mechanical locos** cannot be used yet.

- Some **less important configurations** and other routine sounds for steam, diesel, electric locos are not yet useable.

SOUND – News for MX and MS
A contribution by Alexander Mayer (ZIMO Sound design)

Only a few years ago, the entries in the ZIMO sound database could be counted on one hand, this has changed drastically. We can provide our clients with the biggest range of different sound projects of the whole world. Thereby, we value highest quality. This is only possible with our partners the "sound providers".

We proudly present new partners:
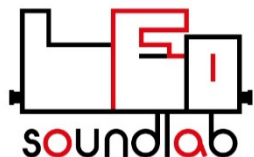
 ### Leo Soundlab, Austria

Christian Leopoldseder is sound engineer and worked at AKG for many years, until he became a freelancer. LeoSoundLab creates sound projects of highest quality and also offers installation of decoders and speakers into locos.

A quote from the company's website:
"It all started with the hobby model railroading and the dissatisfaction with sounds available on the market, as well as the limited range of sounds for Austrian vehicles. The first steps towards the production of the first sound project lead to the ÖBB 399.01 (today Mh.1). To get the best audio quality, I used the large diaphragm condenser microphone C414, the best equipment of the Austrian company AKG. The sound was recorded with a Zoom 4Hn. With this equipment, the first recording was impeccable.

The steadily big demand for sounds of Austrian vehicles and many compliments for this and other sound projects encouraged me to further recordings. The recording of the Rh.298 / U and the offer to install it professionally into the (at that time) current Liliput model on the market marked a breakthrough and so I founded my company."

 ### éTT, France

Frédéric Holbrook comes from a family of railroaders. His father was head of a consulting and certification company for railbound matters near Paris. Following the foundation of his own small company in 2019, which specializes on repair and digitalization of model vehicles and partnering with Maketis, éTT will provide French sound projects on the ZIMO sound database. The recordings are from last summer. Due to his close relationship to French Heritage railways further projects are also possible in future.

ZIMO Team

A lot of time has passed since the last print version of the catalog in 2019, and because of the missing exhibitions due to Corona, the next edition will be released in autumn 2020 the earliest. Therefore, the employees are presented in a newsletter; there have been many changes this year.... to provide more information for our readers, the heads are enriched with information about the actual task within the team.

This information makes no claim to be complete regarding the whole "ZIMO world", on the one hand due to spatial reasons, on the other hand there are external part-ners additional to the people employed by ZIMO GmbH, who perform important tasks (interlocking software, ZCS, ... up to assisting on workshops and fairs, etc.).

Peter W. Ziegler — Geschäftsführer

Development - Testing

Stephan Lampert	Schaltungsdesign, Leiterplattenlayout
Markus Veigl	Schaltungsdesign, Leiterplattenlayout
Vincent Hamp	Softwaredesign MS-Decoder
Stephan Zimmerer	Softwaredesign MS-Decoder, ZSP
Roman Hlozka	HW- und SW-Test Demo-Anlagen
Peter Ostatnik	Softwaredesign StEin, ICA
Michael Schwarzer	Softwaredesign MX10, MX32
Endre Sinka	Softwaredesign StEin, MXULF
Michael Rubitschka	Softwaredesign MX32, MX33
Oswald Holub	Leitung Entwicklung

Production - Purchaising

Tan Hung Huynh — Leitung Produktion, Einkauf

Attila Balog	SMD-Bestückung, optische Kontrolle
Maria Liszka	Handlötarbeiten, SW-, Sound-Laden
Selda Telci	Handlöt- und Serien-testarbeiten
Nada Radulovic	Handlöt- und Serien-testarbeiten
Ferenc Györe	Produktions-reparaturen, Test
Selim Adamkaya	SMD-Bestückung, optische Kontrolle
Renata Gyenge	Handlötarbeiten, SW-, Sound-Laden
Mohammad Alrifai	SMD-Bestückung, optische Kontrolle
Ruslan Agiev	Produktions-reparaturen, Test

Sounddesign - Documentation - Administration - Sales - Repair - Testware - Customer Service

Oi Van Beranek-Che — Leitung Verkauf, Vertrieb, Verwaltung

Alexander Mayer	Sounddesign, Ver-trieb Frankreich u.a.
Sven Fuchs	Sounddesign, Anlagen, Ausstellungen
Oliver Heissenberger	Webdesign, Grafik, Video
Irina Lochmann	Buchhaltung, Assistenz
Harald Schandara	Fakturierung, Buchhaltung
Rene Farahmandi	Auftragsbearbeitung, Behördenmeldungen
Alexandra Bopp	Auftragsbearbeitung, Auslieferung
Manojela Stanojevic	Verpackung, Auslieferung,
Thomas Mader	Verpackung, Lautsprecherbau
Manfred Brückner	Reparaturen, Produkt-fotos, Testmittelbau
Alyssa Reed	Testen, IT-Administration
Stephan Hubinger	Kundendienst Telefon und Mail
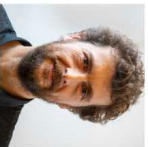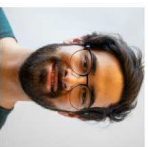
MX → MS – *the replacement*

With **software version 4.50**, two major milestones in the development of MS decoders have been reached:

the **mfx**-*mode*, and the alignment of a large part of the **DCC** performance feature spectrum (compared to the MX decoders).

Not all features known from the world of MX decoders are yet available for the MS decoders, but there are no more limitations for most applications and sound projects. Of course further software updates will be made available in the coming weeks and months, up to software version 5.00, where "nothing" should be missing by then.

For the current status: see operating instructions!

For those users for whom optimal sound is essential, an MS decoder can be recommended as the better choice.

There are already **a number of 16-bit sound projects**; and their number is growing rapidly. If there is no 16-bit project available for a certain model yet, this is no big limitation: MS decoders also accept 8-bit sound projects (from the MX world). A 16-bit project can then be loaded later, when available. Such a change is free of charge even for projects requiring a load code (i.e. surcharge). If the sound provider is identical, which is usually the case, the same load code applies.

List of already (mid-October 2020) available and free 16-bit sound projects (extract from the ZIMO Sound Database):

Standard	Dampf	DRB / DB / DR	BR 56.20-29 (Pr. G 8.2)	Preloaded / Free - Petr Smutek (Jacek-modely)/ZIMO	2018-09-06	
Standard	Dampf	DRB / DB / DR	BR 58 (Pr. G 12)	Coded / Coded - Alexander Mayer/Matthias Henning	2017-10-08	
Standard	Dampf	DRB / DB / DR	BR 64	Coded / Free / Coded / Coded - Alexander Mayer/ZIMO /Alexander Mayer/Matthias Henning	2020-03-06	16Bit
Standard	Dampf	DRB / DB / DR	BR 78 (Pr. T 18)	Free / Coded - ZIMO/Georg Breuer	2020-03-01	16Bit
Standard	Dampf	DRB / DB / DR	BR 80	Coded / Free - Alexander Mayer/Oliver Zoffi	2020-03-06	16Bit
Standard	Dampf	DRB / DB / DR	BR 86	Coded / Free - Leo Sound Lab/ZIMO	2020-04-30	16Bit NEW
Standard	Dampf	DRB / DB / DR	BR 89.70 (Pr. T 3)	Coded - Matthias Henning	2014-07-11	
Standard	Dampf	DRB / DB / DR	BR 91.3 (Pr. T9.3)	Coded - Alexander Mayer	2020-09-29	16Bit NEW
Standard	Dampf	DRB / DB / DR	BR 94.5-17 (Pr. T 16.1)	Coded / Coded / Free - Alexander Mayer/Matthias Henning/Oliver Zoffi	2020-07-17	16Bit NEW
Standard	Dampf	DRB / DR	BR 23	Coded / Free - Alexander Mayer/ZIMO	2019-10-04	
Standard	Dampf	DRB / DR	BR 43	Free - ZIMO	2013-09-30	

The MS decoders are offered with loaded *sound collection* as standard, as was the case with MX decoders, but now of course in *16-bit version.*

At ZIMO, a "Sound Collection" is a special sound project that contains samples of 4 common types of locomotives (3 x steam, 1 x diesel). These can be selected via CV #265 (or mfx parameters) and can also be changed as often as desired. Of course, there is less storage capacity available for the individual vehicle in such a collection; therefore, an individual project is always the better choice, and for this reason there is an…

… offer (limited until the end of 2020) to
load any sound project of your choice (as long as it is marked
"Free - ZIMO" in the Sound Database) into the decoder *free of charge*
instead of the "Sound-Collection". This means that the otherwise charged
handling costs of 9.00 EUR are dropped.
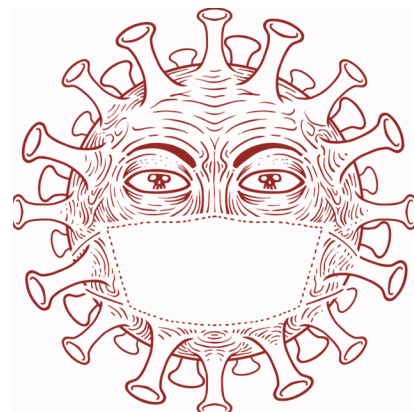
Kostenloses Bild von Gordon Johnson auf Pixabay

Unfortunately another newsletter with this "logo"... We hope that in the next or at least the following newsletter the virus can be overwritten with an ✗.

In meanwhile we are expanding our
▪ **Video workshop offer**
Although it was set up on the occasion of the pandemic, it will continue to exist "afterwards".

An extensive programme is planned for the coming months:

Firstly, there are several aspects of the new MS decoders, i.e. the special topics for which separate workshops are planned:

▪ **mfx** operation with **Märklin CS**
▪ ‚**Swiss mapping**‘ of the MS era
▪ MS decoders for **large scale**
▪ **Configuration** and **GUI** via **ZCS**

As the title suggests, the latter (not necessarily the last one in terms of timing) concerns both decoders and the system (where the GUI is used).

For the system itself, workshops are also planned; these will cover the following topics::

▪ The ‚**StEin**‘ and it‘s **configuration**
▪ Interlocking technology with **ESTWGJ**
▪ Interlocking technology with **STP**
▪ **MX32 → MX33** the 2nd replacement

Workshops on system and interlocking technology place special demands on presentation technology and demonstration equipment.

Preparations are therefore being made at ZIMO in this direction: the renovation of the (almost historical) "turntable layout", the expansion of the "H0 demo layout", and the construction of a room for holding workshops with permanently installed cameras.

Notes on MXULF for MS

As of **SW version 0.83.15**, the decoder update and sound loading device MXULF is able to perform the following tasks for MS decoders:

➢ Software update from USB stick (SW collection file) via tracks.
➢ Sound project loading from USB stick via track.
➢   … also via SUSI.
➢ Sound project loading directly from Computer (ZSP) via SUSI.

So this version still lacks SW update and sound project loading directly from the computer (ZSP) via track.

Caution when using the MXTAP test and connection board with MS440 decoders:

MXTAP is a development of the MX era; although it can also be used for MS decoders, some particularities have to be considered:

- The index pin of the MTC plug on the MXTAP is cut off, but the "stub" can pierce the solder lacquer on the MS440, contact a conductor track (on MX decoders MX644 none at this point) and destroy a diode (do not press it firmly for safety)

- The function outputs starting from FO3 now occupy different pins due to adaptation to the valid NMRA standard; therefore display LEDs or designations do not match.

- The pin assignment of the MS large scale decoder is similar, but not completely identical to MX.

Thus, an **MSTAPK** is offered though, but it only contains the connectors for the "small" MS decoders, not for large scale decoders; for latter an **MSTAPG** is in preparation.
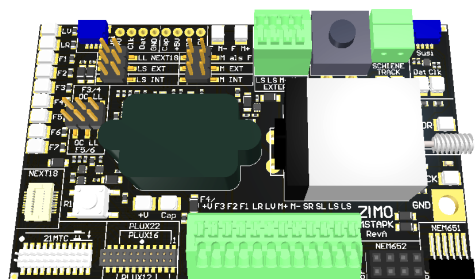
MX → MS – the replacement.

Apart from the 16-bit sound there are other advantages of the MS technology, for example the greatly extended possibilities for connecting "stay-alives" (i.e. energy storage to bridge dead spots in tracks) to a certain extent by integrated capacitors (see decoder MS580) or by providing for the connection of external electrolytic capacitors and gold caps.

See also: Operating instructions or Newsletter April 2020

Above all, however, the **new processor and memory technology** of the MS decoders offers an incomparably larger space compared to MX for future extensions to be supplemented by software updates; published benchmark tests of the processor type built into MS decoders confirm at least 10 times the computing power compared to the processors built into MX sound decoders.

The **operating technology of the prototype**, which is in a state of upheaval, will increasingly affect model railways, and this requires, among other things, ever higher performance of the vehicle electronics, for which the term "decoder" might not be entirely appropriate in the future. The MS decoders are well prepared for these requirements.

Of course ZIMO tries to let the MX decoders grow into new times as far as possible, but there are limitations.

Meanwhile also the large-scale decoder MS990 (hardware) has been completed (software in progress). ▶
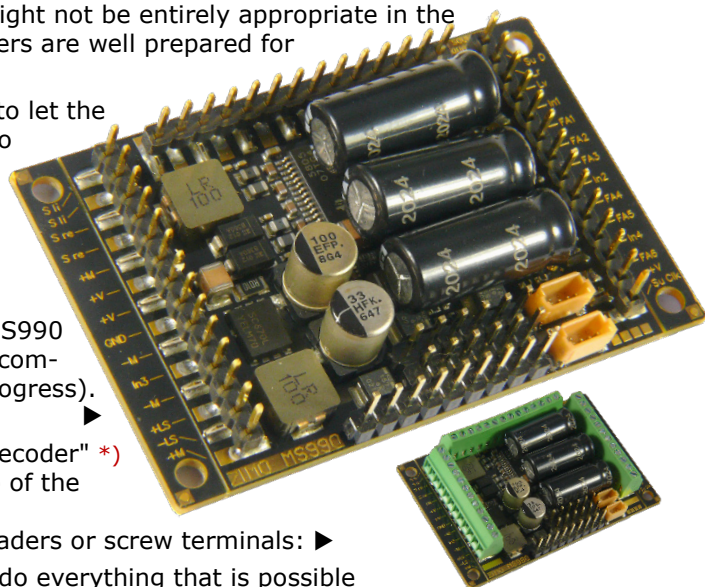
The "big large scale decoder" *) MS990 is the Flagship of the ZIMO decoder range; optionally with pin headers or screw terminals: ▶

It contains and "can" do everything that is possible today at reasonable cost. In many respects this is more than previous ZIMO large scale decoders have offered as well as other "big ones".
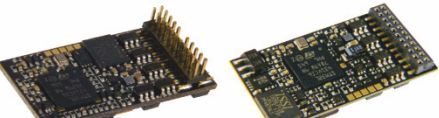
To sum up in a few key words:

6 A Motor/total current with synchronous rectifier to avoid waste heat | **15** Function outputs | **3** „Stay-alive" supercaps | **2** fixed and **1** variable low voltage | **2** independent loudspeaker outputs („Stereo") | **2 x 10 W** Sound power | **2** independent connections for smoke generators without own electronics, each with its own fans | **6** three-pole servo connections | **1** gyroscopic sensor | **2** independent SUSI interfaces with auxiliary operating modes.

*) besides the "big" one there is also a "small large scale decoder", the MS950, especially for gauge 0 (or as a "replacement" when space is limited in G-gauge).

BTW: ZIMO does NOT use the term "large scale sound decoder" here, because sound today is or should be a matter of course - at least for the big ones. A splitting of the functionality into "driving decoder" and "sound module" is superfluous with today's technology - that's why there are no separate (SUSI) sound modules from ZIMO.

For detailed data, please refer to the manual and the April Newsletter.

Overview table of the other (i.e. small and gauge-0) MS-Sound decoders with the most important **technical data:**

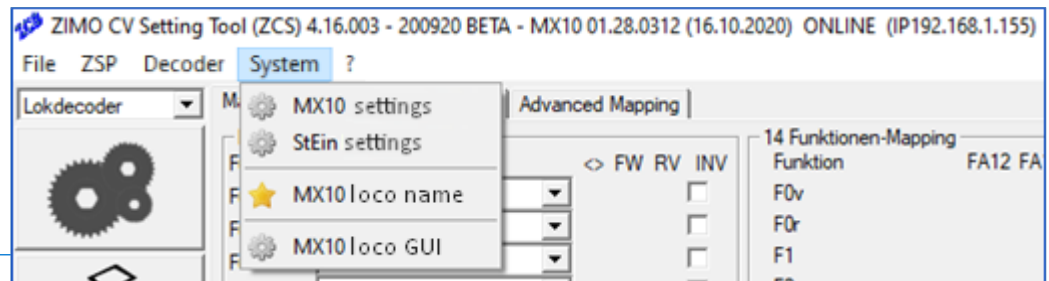		Standard H0			Miniature			Next		Large Scale	
MS450, MS450R, MS450F	**MS450P22**	**MS440C/D** MTC acc.to VHDM std. MTC variant ZIMO	**MS480,** MS480R, MS480F	**MS480P16**	**MS490,** MS490R, MS490F	**MS490N, L**	**MS580N18** MS580N18G	**MS590N18**	**MS950**	**MS990L, K**
30 x 15 x 4	30 x 15 x 4	30 x 15 x 4	19 x 11 x 3.1	19 x 11 x 3.1	19 x 8.6 x 2.9	19 x 8.6 x 2.9	25 x 10.5 x 4	15 x 9.5 x 3.5	50 x 23 x 13	50 x 40 x 13
13 wires	*PluX*-22	21**MTC**, FA3-FA6 logic-level (std.)/ „amplified" outputs	*11* wires	*PluX*-16	*11* wires	*NEM*-**651**	*Next*18	*Next*18	*pin connection*	*/or screw terminals*
NEM-652, NEM-651			NEM-652, NEM-651		NEM-652, NEM-651	direkt				
	←3 W sound→		←1 W sound→					←1 W sound→	2 x 3 W sound	2 x 10 W sound
1.2 A (peak: 2.5 A)	**1.2** A (2.5 A)	**1.2** A (2.5 A)	**0.8** A (1.5 A)	**0.8** A (1.5 A)	**0.7** A (1.5 A)	**0.7** A (1.5 A)	**0.8** A (1.5 A)	**0.7** A (1.5 A)	**4** A (10 A)	**6** A (10 A)
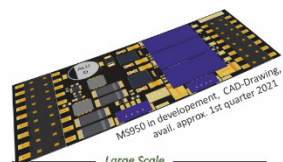
GUI design for MX32 (MX33) controllers on computer with ZCS

ZCS - **ZIMO CV Setting** – the tool for decoder configuration by **Matthias Manhart** – increasingly takes over **system configuration** tasks**.**

With the new version 4.16.000 of ZCS on the one hand

- o settings of the MX10 parameters (menu item "MX10 settings", voltages, currents, ... and what else is shown and adjusted on the MX10 display) can be made, and on the other hand - this is new!
- o **the GUI elements (GUI = Graphical User Interface)** of the vehicles are determined or modified, i.e. name, image, speedometer design and parameters as well as function symbols. The GUI is used to display the vehicles on the screen of the MX32/MX33 controllers.

On the menu bar (top) of the ZCS, select "System", and then "MX10 loco GUI":

there you can define name, loco image, speedo design and data, as well as function symbols, which are to form the GUI on the control panel for the set address.

The new SMD production line at ZIMO

ZIMO manufactures all products in-house; this is the only way to offer the wide range of products, especially in the decoder sector. In 2020 (for the fourth time in the company's history) new production machines were purchased to meet the increasing demands for quantity, miniaturisation and quality.
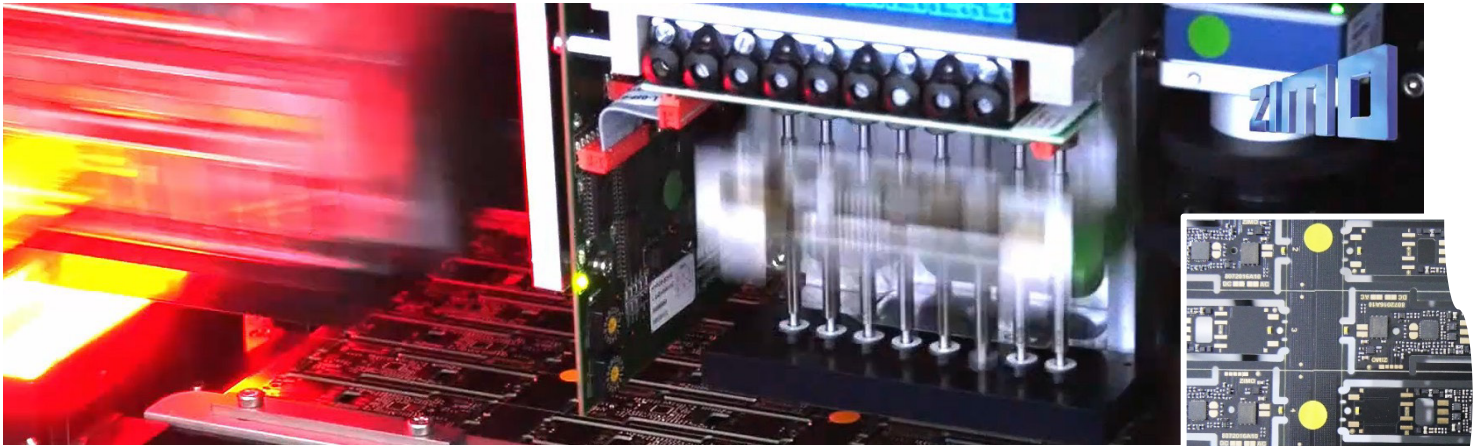

SMD Placement machine: *View of one of the 8-fold placement heads, which take up to 40,000 chips (~ 200 sound decoders) per hour from the racks and place them precisely (0.02 mm) on the board. On the left side of the picture (shining red, in fast motion) the laser unit for the optical control of the components can be seen. 'Individual sound decoders' are currently being manufactured (in the picture); these are "tailor-made" for vehicle manufacturers if there is no space for standard decoders.*
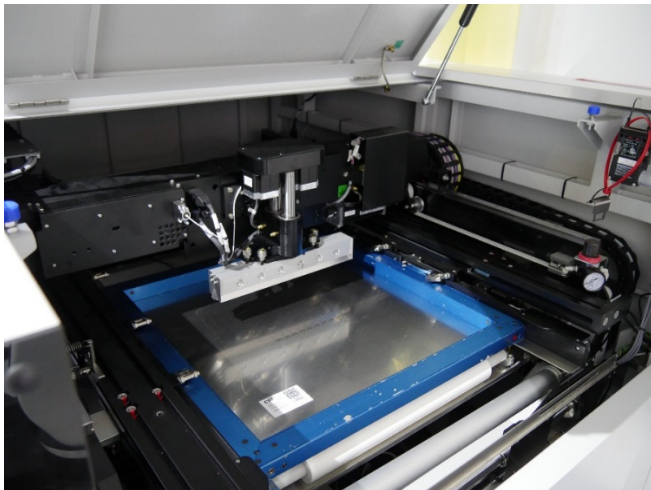
*Before the placement can be done (top),
the soldering paste is applied: in the stencil printing machine a squeegee is guided over an individually manufactured stencil and presses the paste through its high-precision openings onto the soldering points of the circuit board below. Integrated cameras control the perfect result of this process.*
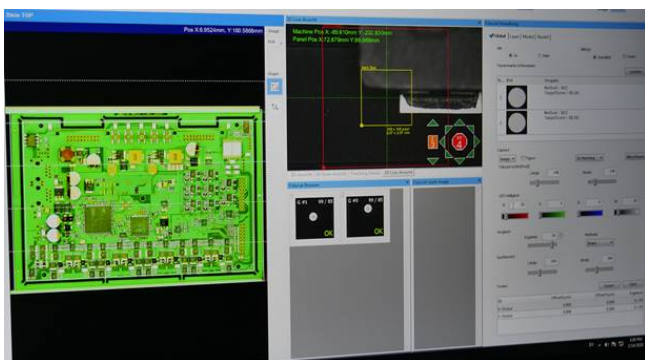
The entire production process is aimed at achieving the highest possible quality by means of checks at each stage. Particularly important is the optical final inspection in the 3D AOI system (Automated Optical Inspection). A large laser head, supplemented by cameras, scans the entire board, creates a height profile and, in addition to the presence and position of the assembled electronic components, checks above all the correct formation of the individual solder joints, because so-called "cold" solder joints are among the greatest failure risks of electronics during their life cycle. The current BGA components (Ball Grid Arrays), which are essential for the continued miniaturisation, can also be effectively checked for reliable contacting by exact measurement of the assembly planarity.
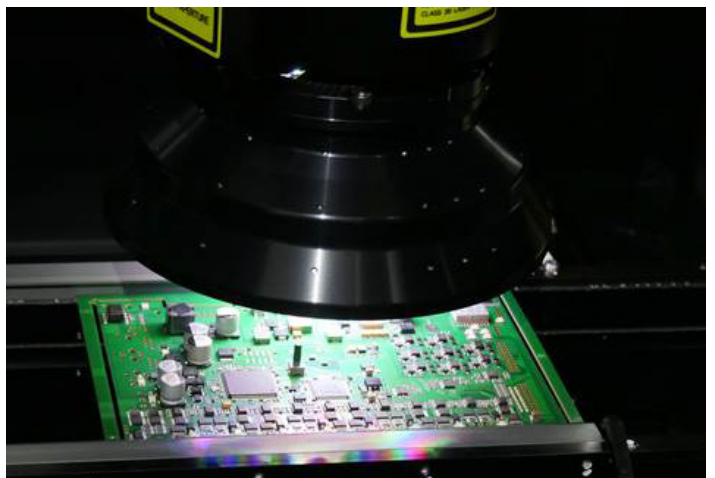
New software version for StEin: 7.1.80

Bug fixing of the current measurement on the track outputs. This was incorrectly calibrated by 25%, resulting in premature response of overcurrent and short-circuit thresholds (e.g. at 2 A, although 2.5 A according to configuration); noticeable only at higher loads (near the maximum of 8 A of e.g. gauge 1 locomotives in consist).