

(AM_TRX_FW_v4.0)

July 2022



AM TRX DIGITAL SECURITY SYSTEM FEATURES

- Remote maintenance and diagnostics
- ShopMonitor connectivity
- Visitor counting
- Alarm validating
- Additional alarm outputs
- Additional binary input
- Jammer detector
- Permanent magnet detection
- Booster Bag detection
- Tag too close indication
- and much more...

REFERENCE MANUAL

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1. OPERATION GUIDELINES



CAUTION! Before operating this device, all operating technicians should study this manual and device technical data to understand and follow the safety instructions. Keep these instructions with the device for further reference. If you have any questions, contact your device representative or distributor.

This is a Class A product. In a domestic environment, this product may cause high-frequency interference. In this case, it may require the user to take appropriate precautions.

2. BASIC INFORMATIONS

- Full-featured, powerful AM (Acousto-Magnetic) system designed with a focus on strong detection of adhesive labels, reliability, and flexibility. This AM TRX el. board is suitable for any environment, with a performance that ranks at the top of the retail security market.
- A fully equipped security solution includes integrated visitor counting, direction alarms, Jammer and MetalMagnet detection. It can also be connected to the ShopMonitor cloud or upgraded with wireless communication for easy data collection and maximum security.
- AM TRX el. board detects all types of tags and "DR" paper labels in range of 58 kHz.
- Device transmits short high-frequency pulses and receives signals from tags/labels which are located in detection field. Detected tags activate sound and light alarm. The system is fully compatible with other AM systems. Synchronization with other AM systems is controlled from the mains frequency.
- The AM TRX el. board excels in large or multiple entrances also.

3. PRE-INSTALL TASKS

3.1 AM pedestal system placement

- If possible, keep the AM pedestal security system at least 1,2m away from any noise sources such as computers monitors, TV's, switching power supplies, and neon lights.
- Try to avoid interference from security shutters like the kind that roll down from the ceiling.
- Minimum 1,2m distance apply even for tagged merchandise with AM hard tags / "DR" sticker labels. Shorter distance can lead to false alarms or decrease in performance.

3.2 Installation equipment of AM pedestal systems in one entrance

- 1x AM pedestal with electronic board and internal or external power supply
- 1x Interconnection powercord (in case of using external power supply)
- 1x Interconnection sync cable (in case of using external power supply)
- tools needed for mounting of pedestals and basic settings (driller, crosshead and slotted screwdrivers, wire strippers, safety pliers, crimping pliers etc.)
- Laptop with Windows® 7 or newer operating system
- HW key (USB Dongle) including USB and interconnection cables
- BT01 Bluetooth module (optional)
- Installed service configurator software

4. SPECIFICATIONS

4.1 Electrical

POWER INPUT	100-240VAC @ 50-60Hz
INPUT POWER	Max. 35W
OPERATING FREQUENCY	57 kHz - 59 kHz (center frequency 58 kHz)
TRANSMITTED PULSE WIDTH	1600 µsec
OPERATING TEMPERATURE	0-50°C
RELATIVE HUMIDITY	0-90% noncondensing
COMMUNICATION PORT	RS232 Serial, ethernet

The protective element of overload is located on the electronic board and also in the PSU.

4.2 Mechanical

ELECTRONIC BOARD

Physical Dimensions 210x120x30mm

Weight 240 g

POWER SUPPLY (EXTERNAL) 18-011 type

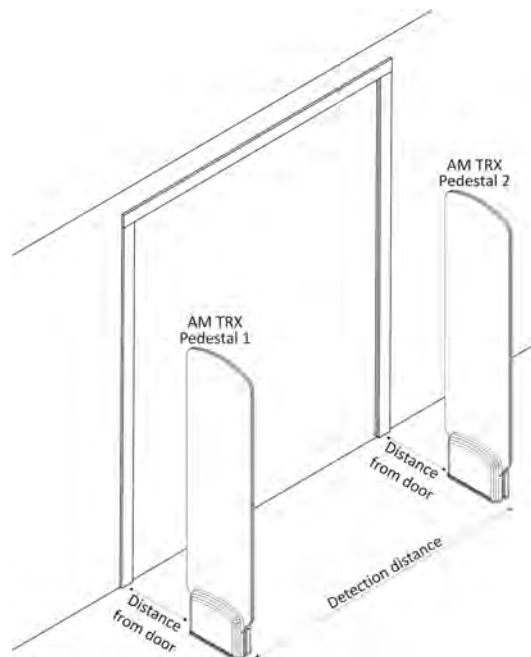
Physical Dimensions 140x170x50mm

Weight 940 g

5. MOUNTING AM PEDESTAL SYSTEM – GENERAL RECOMMENDATION

5.1 Pedestals installation and placement

- Before you drill holes into the floor it is recommended to place pedestal without mounting, connect with power supply and try detection properties. If you discover any problems, try to find the place where the pedestal will work best (try to rotate with pedestal or move pedestal closer/far away from exit/entrance doors). Mind the interference from pedestals in neighboring shops.
- Another important issue is wiring direction of cable from power supply. Ideally there are used to be conduit (goosenecks) under the floor, on which are pedestals placed on and through which the power supply cable is routed. In other cases, power supply cables are routed in the sealing spares of tiles, under the carpet or run in wiring raceway up to the pedestal.
- Ensure power to the system is not connected on the same phase as other devices that may cause electrical interference (fans, printers, computers, monitors, and cash registers). We recommended a separate power supply line that comes directly from the fuse box with less than ½ volt between neutral and ground. The pedestals must be powered from an outlet connected via a circuit breaker of adequate rating, which must be part of the electrical installation of the building in which the device is located.
- Large metal items or metal door frame bring noise into the system and they are acting as large antennas. This brings interference into the pedestal, which causes poor detection and false alarms.
- The system should be installed at least 60 - 70 cm / 2 - 2.3ft from exit door. This will greatly reduce the possibility of resonance caused by moving metal doorframes and other door security systems. If door swings inward, the door arc should not come closer than 30 cm / 1 ft. to the pedestal.



5.2 Sources of interference

This list includes some, but not all, common sources of interference to AM systems. Place the pedestals as far away as possible from these sources. To determine if an electric device is interfering, turn the device off, or move/turn the antenna away from the device while monitoring the signal in the configuration software. Test before mounting.

Lights: lighting is the most common source of interference. Often this is caused by poor quality or old ballasts used by fluorescent, HID, or LED lighting. In some cases it is possible to reduce the unwanted signal by turning the ballast by 90°, which rotates the magnetic field. In other cases it is necessary to replace the ballast.

Power Cables & Adaptors: large bundles of power cables in an adjacent wall or floor, or nearby switching power adaptors may cause interference to AM systems.

LCD Screens: Place pedestals at least 2m away from TVs and computer monitors, depending on the size of the screen.

Tagged Merchandise: may not be placed within the detection field of the system on either side. Distance depends on type of tags.

Resonance: metal frames, reinforced concrete, and other closed wire loops may cause a resonant signal. To test if you have a resonant signal, turn off your Transmitter and check if the unwanted signal disappears.

5.3 Pedestals cables and wiring

- In case of using external power supply use power cord of max. length of 3m, recommended cross-section is min. 2x0.75 mm²
- One unit of external power supply usually enables power supply of more then one system (el. board) – most often it is possible to supply up to 2 systems. More information is available in documentation of respective power supply.
- Use UTP CAT.5 cable of max. length of 30m as sync cable.
- Interconnection cables installed in a wall or on the doorframe must be enclosed in a mechanical enclosure (conduit, raceways).
- In case of using internal power supply, supply the pedestal (115VAC or 230VAC) directly by cord with recommended cross-section of 1,5mm².
- The system operates using resonant frequencies. Mechanical and electrical devices or metal objects too close to the pedestals can occasionally induce a spurious resonance or a noise causing a system malfunction. For this reason, the system should be installed in an area as free as reasonably possible of these items. Find the right place for placement of the pedestal. It is important to situate the pedestal away from influences that can cause unwanted interference (LCD monitors, switching power supplies, electricity power lines etc.).

5.4 Routing the cables

- Once all the equipment and raceways have been mounted, you can route interconnection cables, if any.
- **WARNING - RISK OF ELECTRIC SHOCK!** Always turn off the device before you connect the cables to it.
- Start routing the cables. DO NOT connect the cables right now; only prepare the cables for later connection.
- The power cord connection must be easily accessible on either the power outlet or the PSU side.
- Open all pedestals that you want to connect.
- Lead the cable through the raceways, until you reach el. boards in the pedestal.
- Stretch the cable through the cable passage.
- Now you can crimp/plug in the connector according the type of interconnection cable that you connecting.
- For respective wiring of interconnection cable see pic. 1, 2, 3, 4.

CONNECTION OF INTERCONNECTION CABLE AM TRX EL. BOARD INTO THE POWER SUPPLY

Example: the simplest installation - one pedestal and one power supply only



Picture 1 - Connected external power supply

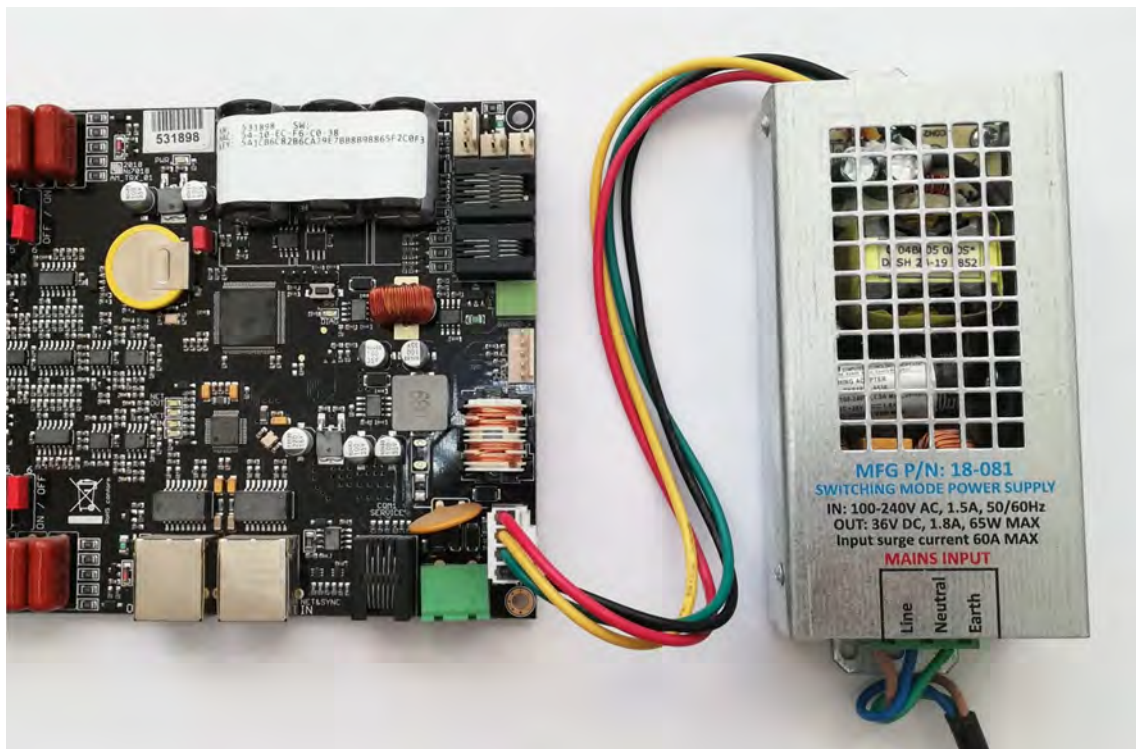
Power supply cord (115 or 230 VAC) is connected to power supply, power output for el.board and synchro output for el. board (from left to right).



Picture 2 - Connected el. board

Synchro cable, cable for connecting PC with HW key (for setup) and power cable are connected to the el. board (from left to right) with external power supply.

For **internal power supply** connect the power cable directly to the power supply. The internal power adapter is connected internally with **DC IN** - Input voltage and synchronization (internal power supply).



Picture 3 - Connected internal power supply with el. board

For **UL Certified power supply** is connection visible on the screen below. Connection scheme is similar with external PSU.



Picture 4 – Connected UL certified power supply

Power supply cord (115 or 230 VAC) is connected to power supply on one side, power output for el.board and synchro output for el. board (from left to right) on the other side of the UL certified PSU.

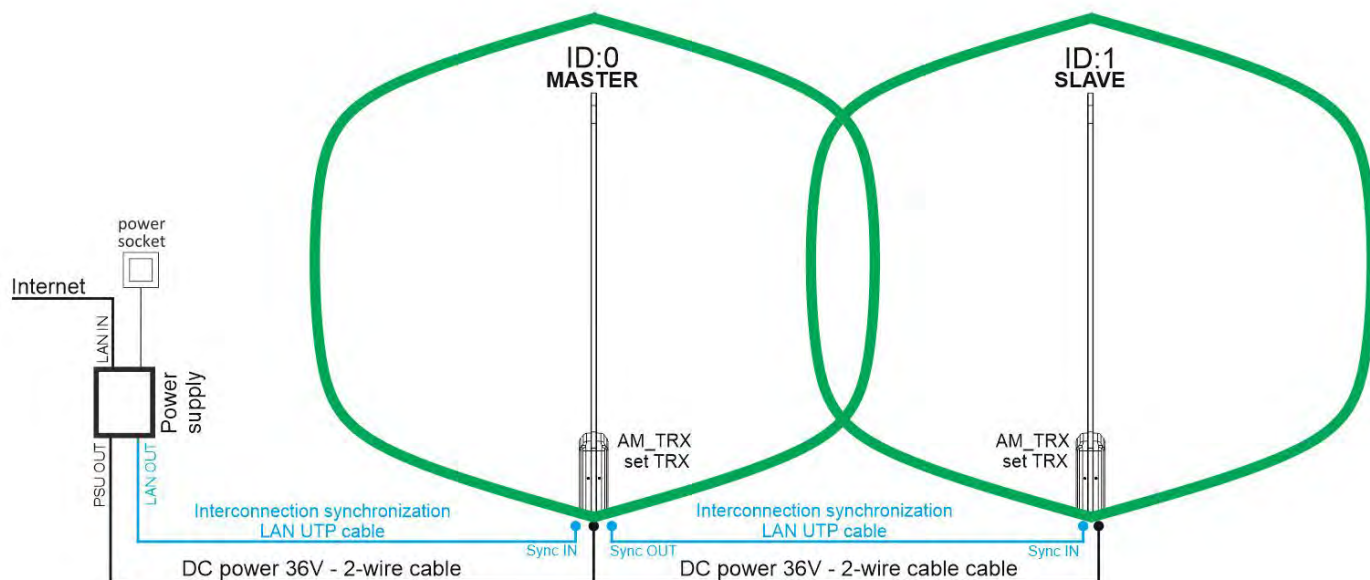


Picture 5 – Connected el. board

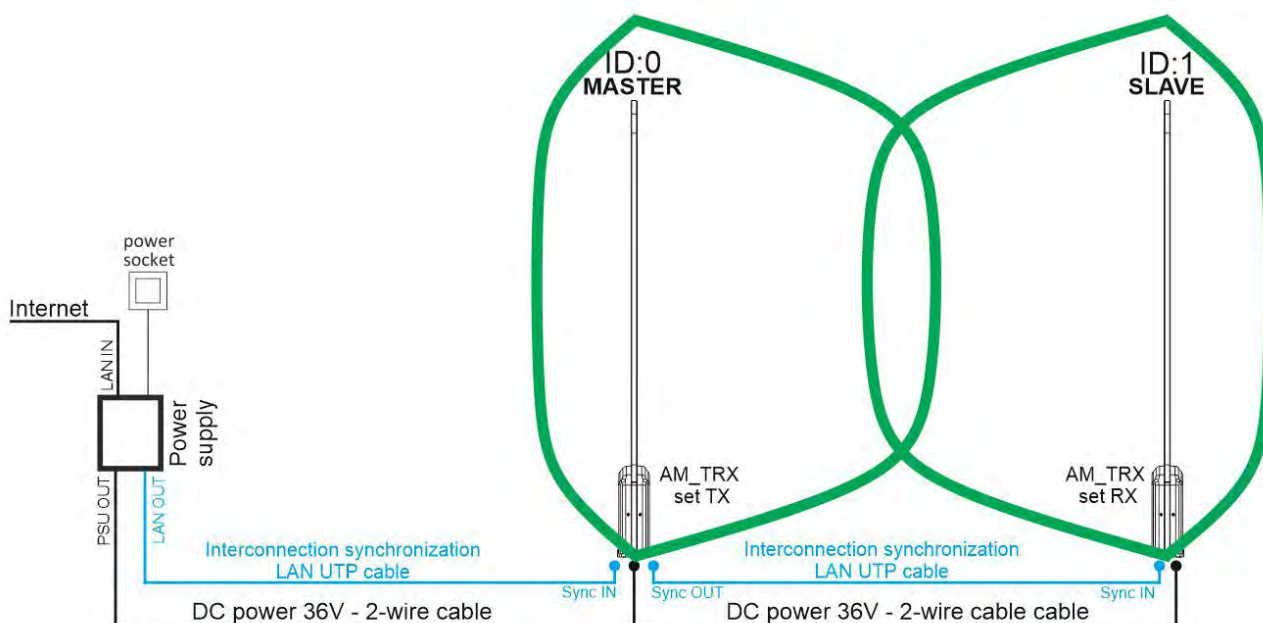
Synchro cable, cable for connecting PC with HW key (for setup) and power cable are connected to the el. board (from left to right) with UL Certified power supply.

5.5 Connection schematic and detection field

On the Picture 4 you can find, how looks detection field and also connection diagram of two pedestals in TRX configuration with external power supply unit. Detection distance depends on type of pedestals and also how high is environment noise detected by pedestals (higher noise level decrease detection distance). Detection distance can be found in the Datasheets for every pedestals type.



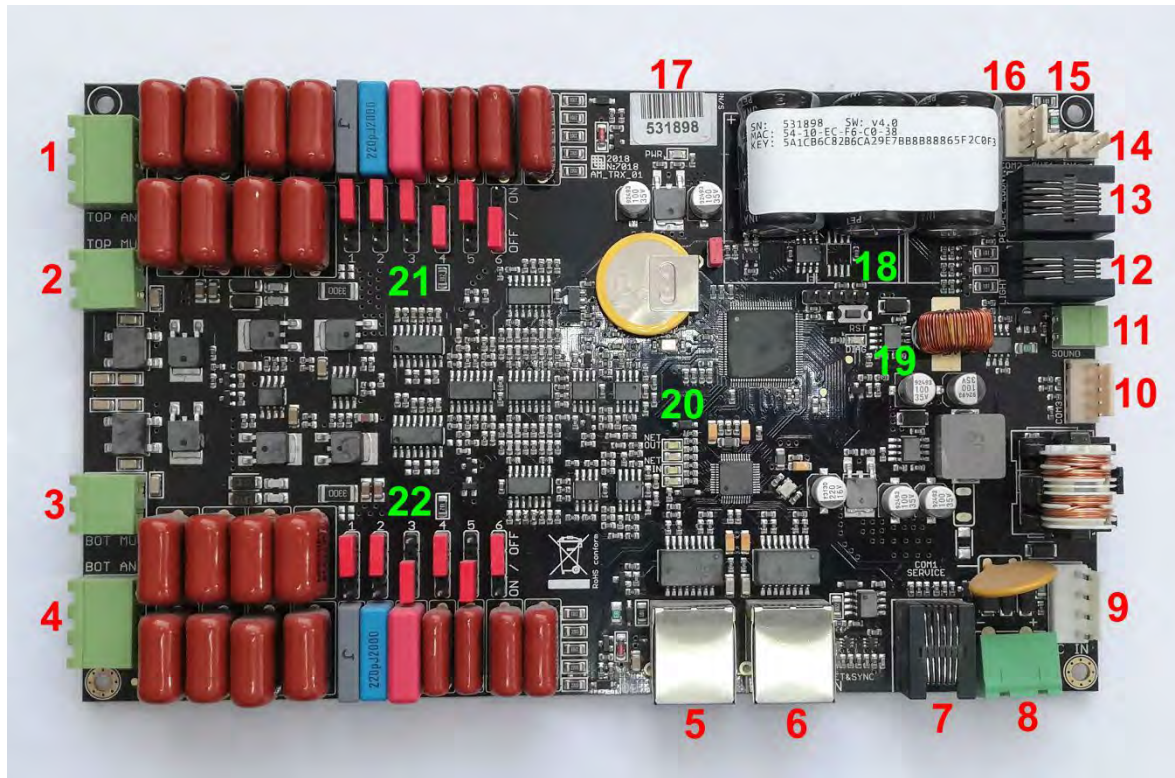
Picture 6 – Routing cables and detection field – 2x TRX pedestals



Picture 7 – Routing cables and detection field – RX and TX pedestals

On the Picture 5 you can see detection field of AM TRX pedestals preset to RX and TX mode (DUAL configuration). This configuration is reducing detection at the sides of the pedestals – reduction of backfield. It is very helpful at the installation, where very close to the pedestals is installed vitrine with detection tags on the merchandise.

6. AM TRX ELECTRONIC BOARD



Picture 8 - Description of AM TRX el. board

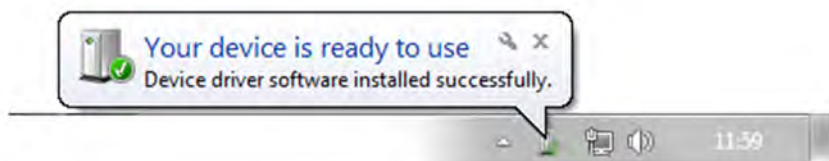
1. TOP ANT- upper antenna loop
2. TOP MUTE - MUTE winding of the upper antenna loop
3. BOT MUTE- MUTE winding of the bottom antenna loop
4. BOT ANT - bottom antenna loop
5. DATA + SYNC OUT - data communication output for additional el. board
6. DATA + SYNC IN - input of data communication and synchronization (from source or from previous power board)
7. COM1 SERVICE - RS232 comport link for configuration of the control unit. Connect your laptop via HW key for maintenance.
8. DC IN - input voltage input (external power supply)
9. DC IN - Input voltage and synchronization (internal power supply)
10. COM3 - communication port output COM3
11. SOUND - output of acoustic signaling (piezo)
12. LIGHT - optical signaling output (RGB light)
13. PEOPLE COUNT - people counter sensors input
14. IN1 - universal binary input
15. OUT1 - universal output (open collector)
16. COM2 - communication port output COM2
17. PWR - LED PWR (presence of supply voltage)
18. RST - reset button
19. DIAG diagnostic LED
20. NET OUT, NET IN - diagnostic LED
21. JUMPERS OF TUNNING CAPACITORS - top loop
22. JUMPERS OF TUNNING CAPACITORS - bottom loop

7. EL. BOARD SETTING CONNECTION

AM TRX el. board is (except tuning capacitors) configured and tuned completely by software. The latest version of software should be installed before connecting to the receiver electronic board. The receiver el. board is connected to the PC/laptop with a USB Hardware Key which is required for security purposes or with eComm via internet connection.

7.1 HW key connection

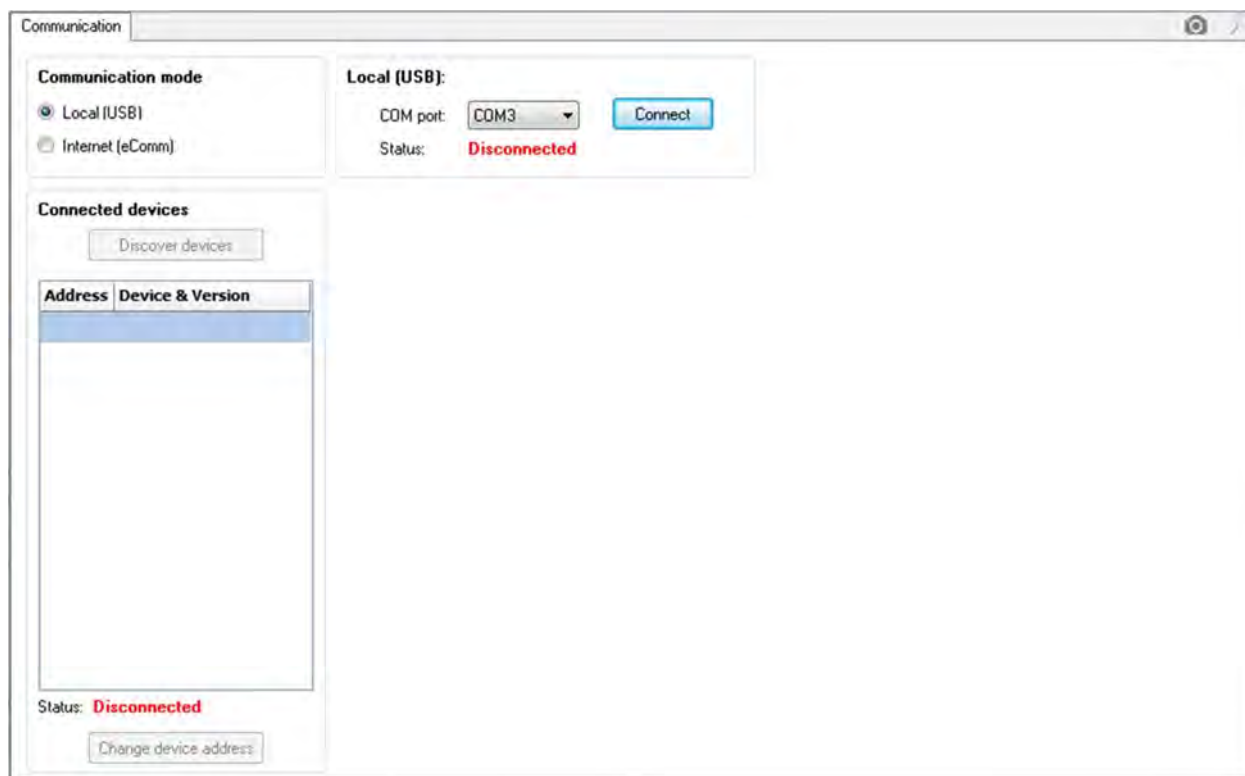
The hardware key is connected to the 6-pin RS232 serial connector on the control unit and then to an available USB port on the PC/laptop. The hardware key is only for use by installers and technicians. Only 1 hardware key is needed for each technician. It is not left at the store with the system.



Picture 9 - HW Key and succesful installation of device

7.2 Connecting to the PC/Laptop

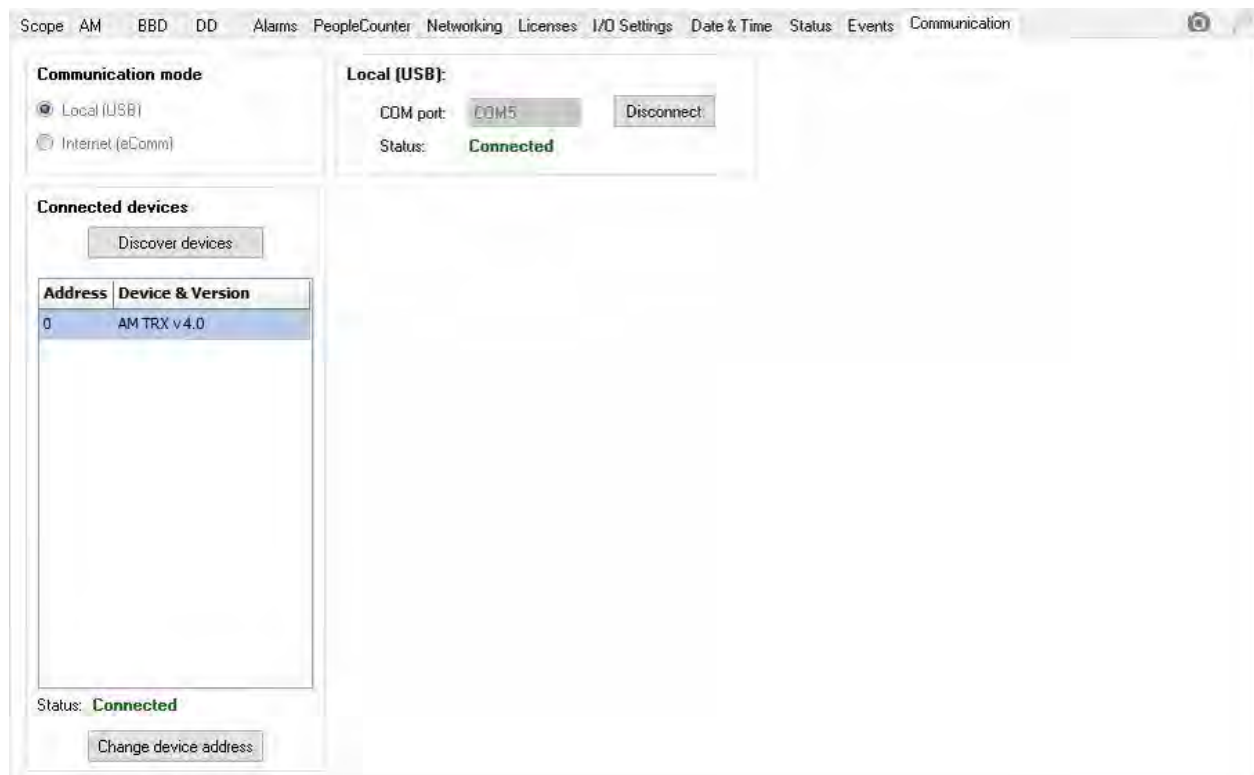
- The hardware key must be connected and the el. board powered ON before the software can be opened and a connection made to the system.
- Before opening the software, wait until the PC indicates that “new hardware is installed and is ready for use.” This will be especially important when using a new hardware key or new software version.
- Open the application, the startup screen looks like this:



Picture 10 - Connecting to the AM TRX el. board

- Connect through the correct “COM port”.

- Once the connection is successful, the application window looks like this Pic. 9



Picture 11 - Successfully connected service application

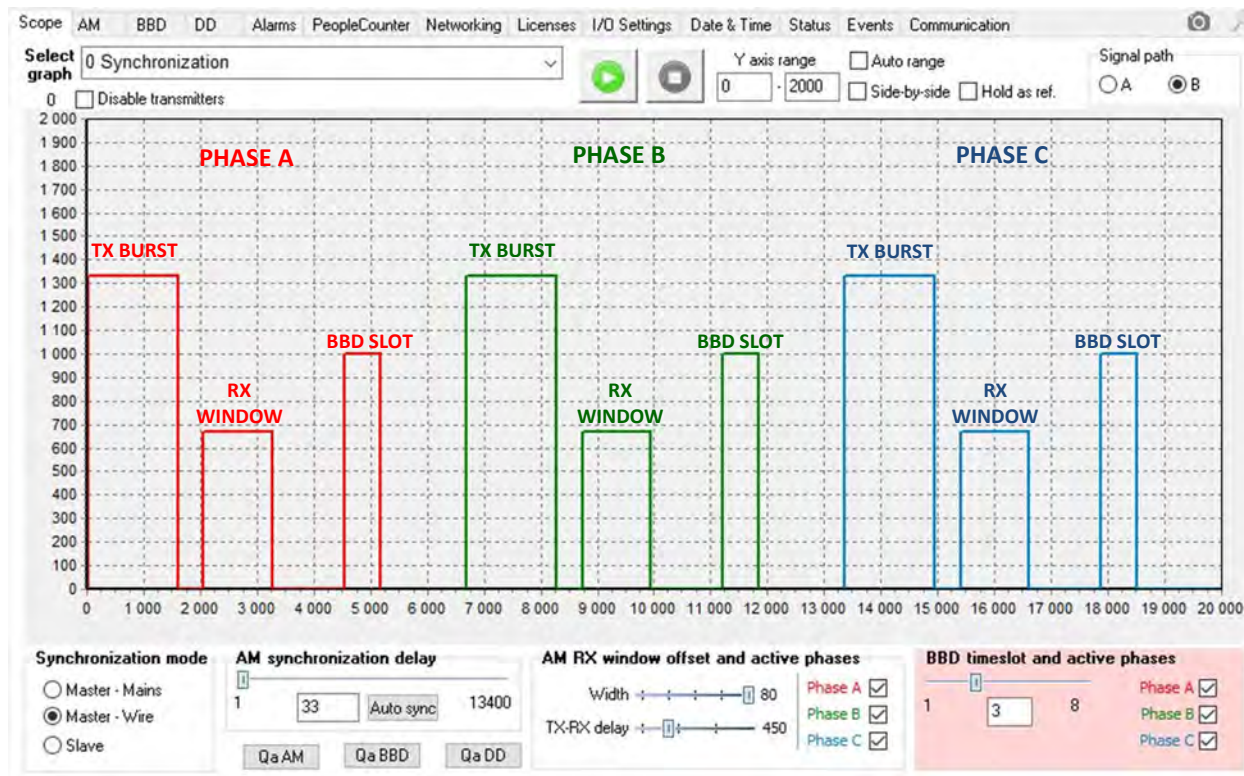
Now you can configure the connected devices as needed. Here, however, it is important to note:

- All configuration changes at the installation site need to be done very carefully. Incorrect settings, especially poor synchronization settings, may adversely affect other AM systems up to 50m.
- If possible, perform sync settings with the transmitter OFF (see Scope > Disable transmitters).
- Check the tuning of antenna loops at the installation site after correct synchronization settings (see "Tuning the loops" chapter).

8. SOFTWARE DESCRIPTION

8.1 Window scope

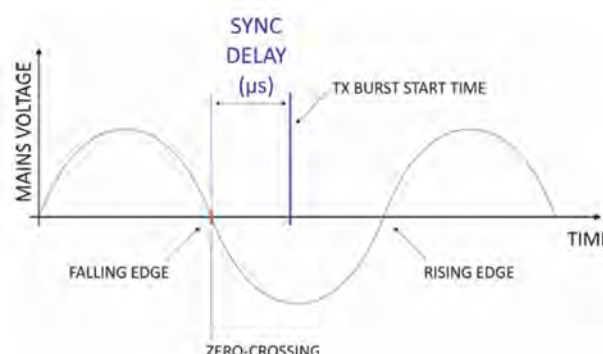
This window is for checking, respectively for timer setting of AM transmitter and booster bag detector - if enabled and for other diagnostic purposes.



Picture 12 - Scope screen with graphs

The Synchronization page is used for viewing all signals in the environment (interference, other systems, etc.). The colored rectangles represent your system in different phases (red – phase A, green – phase B, blue – phase C). The bigger on the left stands for TX burst and the smaller in the right side stands for RX window. It is only a time representation so the height is not important. Other AM systems will be represented by pulses. By giving your system a time delay of transmission that starts from zero-crossing, it can be synchronized to any other system so that both systems are pulsing at the same time.

System transmitter generates 1,6ms long pulses. Moment of transmission is synchronized by the moment of mains frequency zero-crossing in selected polarity (rising, falling) and the sync delay time. System read process of mains frequency to which is connected (in manual phase A) and processes from other two phases mathematically calculates (phase B and C). In that case can system start transmit even in the moment of zero-crossing phase which is not physically connected to. So, the system can synchronize its transmitting with other system, which is connected to different phase. Repetitive frequency of transmitting pulses is standardly every 13,3ms for 50Hz power supply or every 11,1ms for 60Hz power supply. This situation is constantly repeated.



Select graph:

0 - Synchronization - viewing of the surroundings (other nearby systems, detected noise in the work zone, etc.)

1 - Tag A - detected signals at the time of the "tag window", in the individual power phases - for configuration of the "0" shape loops.

2 - Back A - detected signals at the time of the "background window", in the individual power phases - for the configuration of "0" shape loops.

3 - Tag B - detected signals at the time of the "tag window", in the individual power phases - for configuration of the "8" shape loops.

4 - Back B - detected signals at the time of the "background window", in the individual power phases - for configuration of the "8" shape loops.

5 - Frequency responses A - detailed levels of signals detected at individual transmitting frequencies for configuration of "0" shape loops.

6 - Frequency responses B - detailed levels of signals detected at individual transmitting frequencies for configuring "8" receive loops.

20 - TX power management - detailed information about tuning individual antenna loops.

Disable transmitters – allows you to turn Off the system transmitter to limit interference during setting of the parameters.



Allow continuous scanning.



Stop continuous scanning and clear the screen.



Pause continuous scanning on the last measured sample.

Y axis range - choice of the y-axis scale on a graph, for automatic matching use „Auto range“ option

Side by Side - mode of displaying data in a graph or scale change (depending on selected chart)

Hold as ref - use the currently displayed data as a reference course

Signal Path A, B - choice of the amplification of the displayed signal (Path A - less amplification of the displayed signal, Path B greater amplification of the displayed signal). Recommended - Path B.

Synchronization mode - way of synchronize the transmitter. Following options are available:

Master - Mains - when internal power supply is used. Synchronization of the transmitter is derived from the frequency of the power supply. The device works independently and can control devices of "Slave" type.

Master - Wire - when external power supply is used. The synchronization of the transmitter is derived from the synchronization signal coming to the "Data + Sync In" input. The device works independently and can control devices of "Slave" type.

Slave - the synchronization of the transmitter is derived from synchronization signal coming to the "Data + Sync In" input. The device is controlled from a "master" device

AM Synchronization Delay - setting of the delay from zero supply voltage to the start of the transmission. The value is adjustable from 1 to 13400us. The value can be set manually by the slider or using „Autosync“ function that will search for the transmitters of AM systems in surrounding and will set AM Synchronization Delay to the correct value.

AM RX window and offset and active phases - here it is possible to choose in which supply phases the AM labels detection is performed (Phase A, B and C options). If there is synchronous interference in some of the supply phases, you can omit the receiver detection in a phase-by-phase. Recommended setting – detection at all phases. It is also possible to set tag window width. The default value is 80 (max). In case of interference it is possible to reduce the window width. Finally, it is possible to set up time delay between the end of the transmitting pulse and start of the tag window. The default value is 450us.

BB detector offset and active phases - here it is possible to choose in which supply phases the booster bag detection is performed (options are Phase A, B and C). If there is synchronous interference in some of the supply phases, it is possible to omit the receiver detection in a phase-by-phase. Recommended setting – detection at all phases. Further it is possible to set timing of the transmitting pulse of booster bag transmitter. There are 8 values of time delay available, default value is 6.

QaAM, QaBB, QaDD - start of quick adaptation of AM system receiver (QaAM), booster bag (QaBB) and magnet detector (QaDD)



NOTE: When quick adaptation proceeds, never leave tag/label in detection.

Running “quick adaptation” is represented by:



8.2 Window AM

This window is used for setup and control functions of AM system.



Picture 13 - Main screen of AM detection

AM system mode - choice of basic mode in which the AM detector will work. The following options are available: Receiver (RX) – Default setting, Transmitter (TX) and Transceiver (RX/TX). Below only the most comprehensive window – the Transceiver Window – is described.

Aisle alarm - choice of follow neighboring AM alarm to None, Previous or Next pedestals. When AM alarm is created and choice is to Next/Previous, alarm is send to the next/previous pedestal for alarming together at the same time. Default value is None – created alarm is not send to prev or next pedestal so only this one pedestal, where alarm was created is alarming

Receiver - is use to display detected values and for setting of AM receiver. Columns A and B are use to distinguish signal levels for „O“ shaped (A) and „8“ shaped (B) detection antennas

Input signal level - input signal level

Signal gain - setting up gain of input amplifier, the gain is reduced if there is high level of interference from surroundings. Under standard conditions maximum gain value is recommended.

Last detected tag frequency - displays actual frequency level of detected signal.

Enable alarm - enables or disables alarm signaling

Column graphs display level of signals. **Tag** is a detected signal level (tag window), **Bckg** is background level (background window), **SNR** is ratio of Tag and Bckg signal sizes. **SNRSet** sets value of SNR from which the detected signal is considered as tag located near antenna.

Max. hold reset – resets setup of index in SNR column, that represents highest reachable level of signal from the latest reset. It is useful for SNR Set setup.

Do quick adaptation – makes a quick adaptation of the AM receiver

Transmitter – used to set AM transmitter parameters.

Tx power – Setup of transmitter performance. Recommended setup is 100 %. Bargraphs indicate electricity flow into individual loops of antenna. Values in individual charts may not be equal. Value around zero in some chart (when the transmitter is ON) may indicate broke cable or antenna loop.

TX Mode: A – the antenna transmits in the "0" loop configuration, B – the antenna transmits in the "8" loop configuration, C – combines both previous configurations.

Top coil enabled – enables transmitting by upper loop.

Bottom coil enabled – enables transmitting by bottom loop.

Transmitter disabled – LED indicating that the transmitter is off from the Scope tab.

Alarm evaluation criteria – window used to setup and indicate additional criteria to increase detection reliability and to suppress of interfering signals. In column A and B shines red, if the criteria is chosen but not met. If the criterium is met, the LED shines green. If criterium is not chose, the LED does not shine (grey color). SNR evaluation result LED is signalize meeting all chosen criteria.

Tag phase – sets the highest allowable phase difference of the detected signal. The Any option means that the criterion is disabled, if the criterion is turned on, the lower the number of the criterion, the more stringent the criterion.

Tag Q value – the criterium characterizes how the frequency spectrum of the received signal is examined. Option Off means that the SNR is exceeded at any frequency of the receiving band (the criterion is off), the "Hi" (HiQ) setting means that the alarm will only occur when the signal is detected at the nearest ambient frequencies, or when setting "Low" (LoQ shape) even at distant frequencies – the strictest setting. The default setting is "Any".

Mains phases with tag – the criterium is used to set the number of power mains phases (A, B or C) in which the SNR threshold must be exceeded. Setting the value of "1" means that only one phase has been exceeded (the smallest setting), 3 then the SNR must be exceeded in all three phases (the strictest setting). Mostly is usable in noisy environment to eliminate false alarms.

Multicycle mains phases with tag – the criterium is used to set the number of power mains phases (A, B or C) in current measured phase and previously measured data from the same phase. Setting the value of "0" means that this criterium is disable (Default value) or in how many phases this criterion must be exceeded (1, 2 or 3 phases). Mostly is usable in noisy environment to eliminate false alarms.

Prealarms – the number of consecutive labels detection required to trigger the alarm. The default value is "1". In this case, the alarm is triggered after the first label detection. If necessary, the value can be increased to "2" or "3". In these cases, the label will be tested for a total of 2 or 3 times and the alarm will only be issued after this verification.

Enable alarm validation by People Counter – if this feature is not enabled, each detected alarm is sounded (sound, light). If this feature is enabled, an alarm is announced if the alarm is confirmed by passing around the pedestal at the time set after the tag is detected. The correct setting of the customer's counter is the condition of the correct function. Then three types of alarms are distinguished according to the direction of the passage: outgoing, incoming and false alarm, which is not confirmed by passage. For each type of alarm, different signaling can be set (light, piezo).

Use virtual background – if this feature is not enabled, system works with TAG and BCK data to evaluation of alarms. If this feature is enabled, system works only with TAG data to evaluation of alarms (in the BCK is noise or other AM system).

Alarm counters – AM counter with possibility of zero reset.

Warnings – a place for possible alerts (Tag too close, etc.).

Jammer – indication of an AM system jammer. Bar graphs show the level of detected jamming signal for individual receiver loop configurations ("0" and "8"). LEDs A and B lit red if the jammer was not found, green when the jammer is nearby.

Enable jammer detector – allows the presence of a jammer to be evaluated.

Set – is used to set the threshold from which the jammer is indicated.

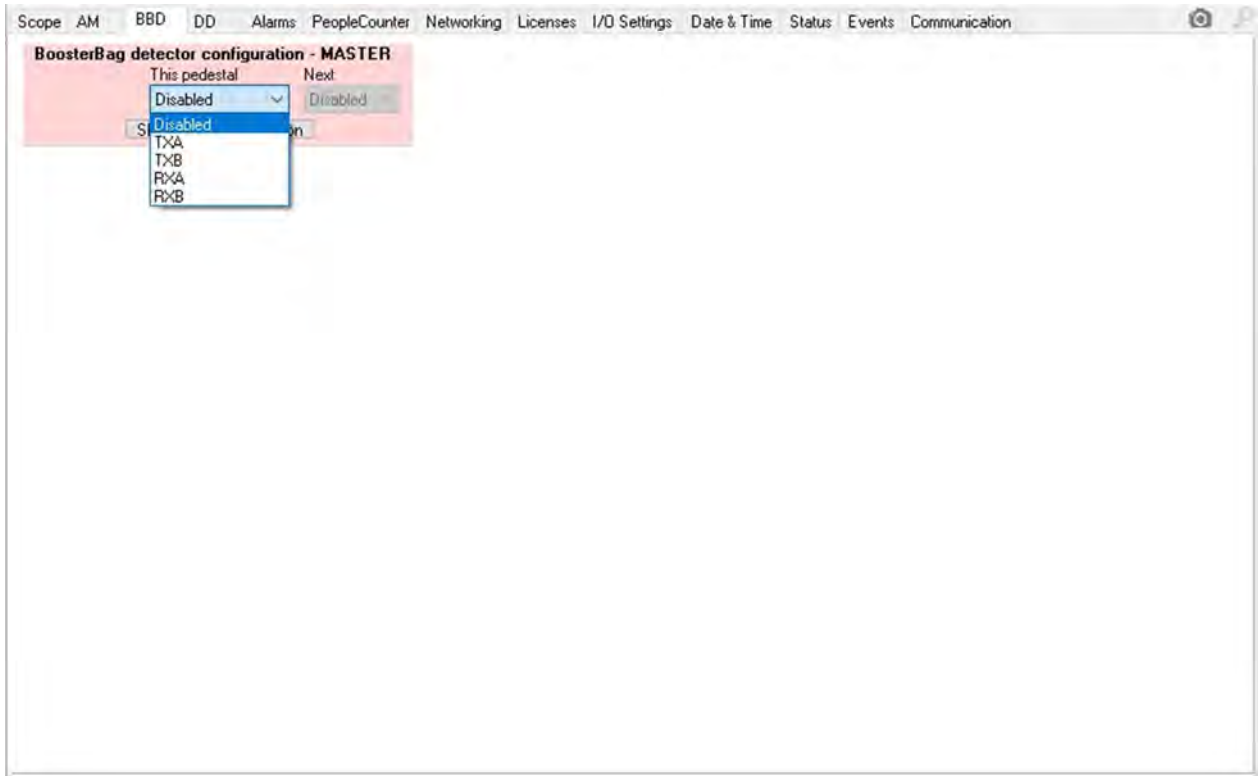
Min. time duration – is used to set how long the interfering signal must be present to call "Jammer Alarm".

Jammers detected – jammer detector counter. Reset value using the "Reset" button.

8.3 Window BB

In this window you can set functions of Booster Bag Detector.

Attention: The booster bag function is only available when minimum of two pedestals (dual system) are installed.



Picture 14 - Main screen of Booster Bag Detector

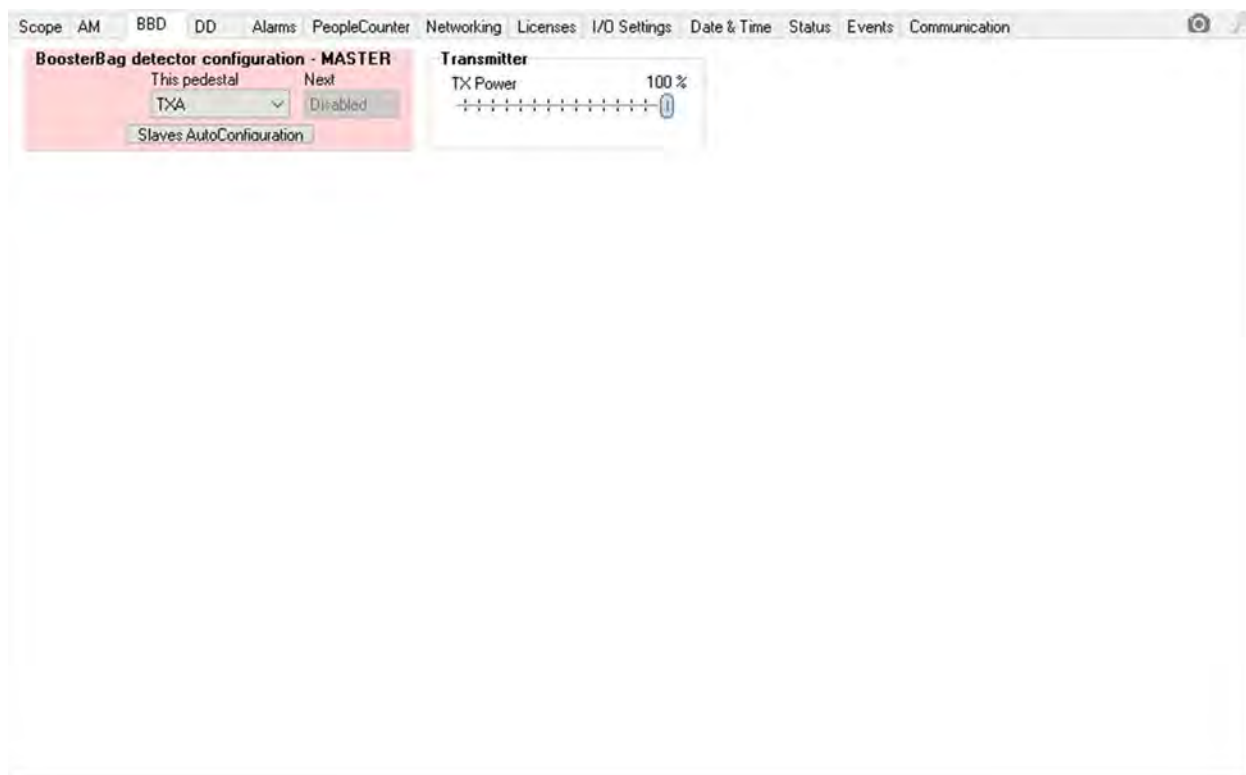
This main window shows the Booster Bag setting in the default setting on the Master antenna.

BoosterBag detector configuration - MASTER: the booster bag detection can be turned On here. Master electronic board can be set for BB detection as TXA (Transmitter A), TXB (Transmitter B), RXA (Receiver A) or RXB (Receiver B).

Slaves AutoConfiguration – after selecting of the transmitter / receiver on the master pedestal, there need to be set correctly Slaves pedestals for proper function of BoosterBag detection. For automatic configuration of slaves pedestals (recommended) there is Slaves AutoConfiguration button. After click on this button, all slaves pedestals in one ID Group, will be automatically set in the following order – TX/RX/TX/RX... or RX/TX/RX/TX... It will be working only if on all slaves pedestals are correctly set GROUP and ID of all pedestals (pedestals are in the same group ID and pedestals ID continue one by one).

After selecting either Transmitter or Receiver, the following windows will appear:

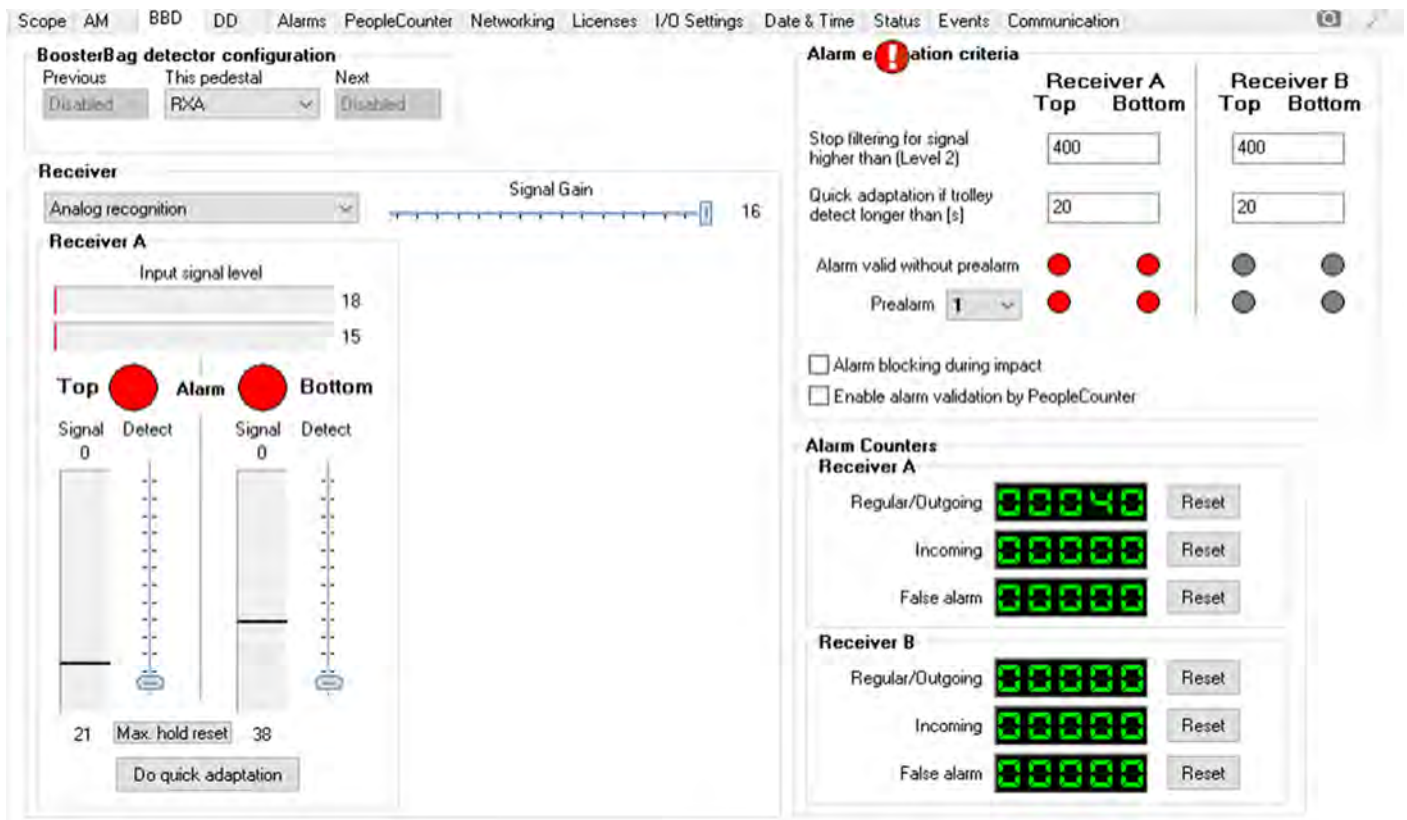
Transmitter



Picture 15 - Main screen of Booster Bag Detector

TX Power – setting the transmitter output value of the booster bag detector.

The Transmitter can be set to Timeslot – a window where the booster bag detector will send pulses. This Timeslot is set in the Scope tab.



Picture 16 - Booster Bag Detector - receiver

Receiver A, B – selecting the correct type of receiver. If the system is only installed as DUAL (ie 2 antennas), Receiver A is set. However, if 3 and more antennas and one receiver are between two transmitters, this must be set as Receiver A+B. However, we strongly recommend that you set both transmitter and receiver automatically. Setting is faster.

Signal Gain – setting the gain of the receiver to the optimum value (see "Input signal level").

Input signal level – indication of the BB detector receiver input signal. The redundancy is indicated by a red color (Signal Gain is reduced), the green color is the optimal setting and the yellow color is a low gain (Signal Gain needs to be increased).

TOP, Bottom Signal – shows the detected metal object. When placing a BB between the antennas, the detection of the detected signal is displayed.

Detect – setting of BB detection for alarm announcement (detection sensitivity).

Quick adaptation – this will trigger a rapid adaptation of BB detection.

Alarm evaluation criteria – detecting and accomplishment the alarm criteria on receiver A or B on both the upper and lower loops and at which stage the signal was detected. For the alarm, detection must be performed in all phases A, B, C for the top or bottom, or both.

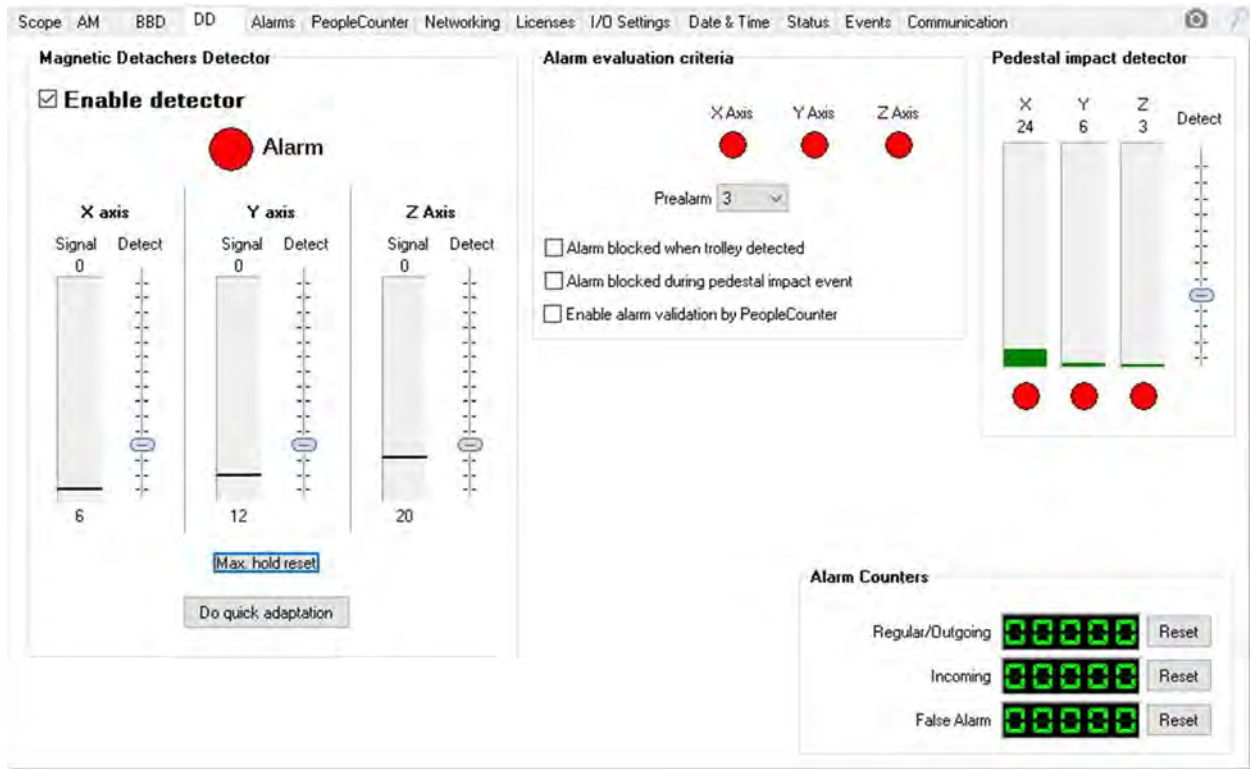
Prealarm – to increase the resistance, it is possible to set how many times the BB alarm has to be met in order to be declared.

Enable alarm validation by People counter – activates the BB detector alarm validation using the people counter. It distinguishes the following validation alarms: Incoming, outgoing and false alarm. The system detects the presence of metal and waits for the set time on customer counters to which the customer is going. This time is set centrally on the tab People counter – validation timeout.

Alarm counter – counting BB alarms (resetable with "Reset"). If alarm validation is not selected by the customer counter, the alarms are counted in the Regular alarm. Otherwise, they count as Outgoing, Incoming, False.

8.4 Window DD

In this window you can set the Magnetic Detacher Detector function.



Picture 17 - Main screen of Magnet Detacher Detector

Enable detector - enabling/disabling of the function.

The detector detects a change of mag. three-axis fields (X, Y and Z), signal detection and alarm setting are shown separately and can be set separately for each axis.

Signal - the value of the detected signal. On the graph, the largest detected signal from the last zero is shown in the black line (Max hold reset)

Detect - setting the value after which an alarm is triggered.

Do quick adaptation - makes a quick adaptation of the detector.

Enable alarm validation by People counter - detector alarms can be validated by people counter and can be differently displayed according to the direction of exit (outgoing, incoming, false) (see Alarms window). If alarm validation is not enabled, each alarm is counted using the "Regular" counter.

Pedestal impact detector - the device can detect bumps and shocks and their strength. If the "Detect" value is exceeded, an alarm is triggered and an event occurs (Event window).

8.5 Window Alarms

Setting of visual and acoustic signaling for all kinds of alarms.



Picture 18 - Main screen of Alarms

The setting of acoustic and visual settings for all alarms is unified. The user selects the group of alarms that needs to be set (AM, BB, DD, System) and then sets the alarm parameters. In the picture you can see setting the alarm for the AM detector. You can set alarm parameters for the following types here: Outgoing / Regular, Incoming, False, Jammer and Tag too close. Setting of other alarms (metal detector, magnet detector, and system status indication "System") is the same.

Test - testing the selected setting.

Sound: Type - following options are available: OFF - Disable buzzer, 1 - One short beep, 2 - One long beep, 3 - S.O.S., 4 - Two long beeps, 5 - Three long beeps, 6 - Four long beeps, 7 - 16 - for future use (One short beep).

Duration – Sound repetition speed (1x - 16x).

Repetit. - Number of repetition (1-255).

Volume – volume setup. OFF - Disable buzzer. Range for 3 types of buzzer volume.

Light: Odd, Even, Deco - Range for 7 different types of colors. When you set Odd color only the alarm will blink with this color. When you set Even color too, the alarm will blink alternately between Odd and Even color. Deco color will stay light after alarm.

Example: red/blue blinking – set "Odd" to red, "Even" to blue and "Deco" to black. Red blinking only – set "Odd" to red, "Even" to black and "Deco" to black

Duration - Blinking repetition speed (1x - 16x).

Repetit count - Number of repetition (1-255).

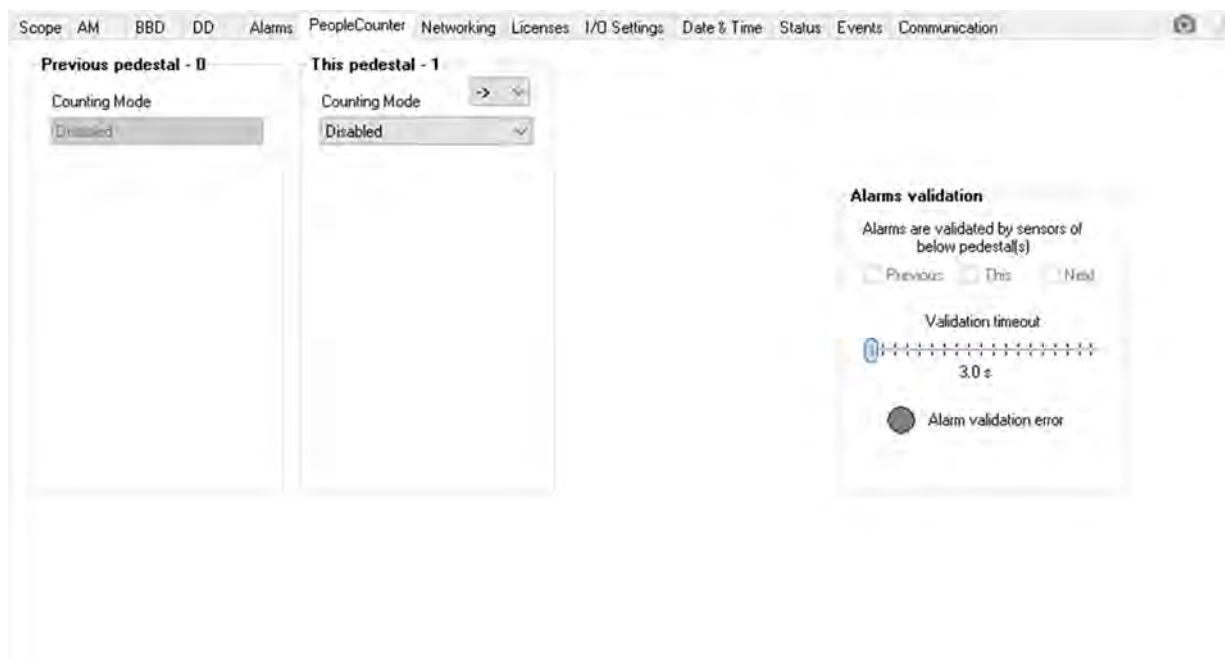
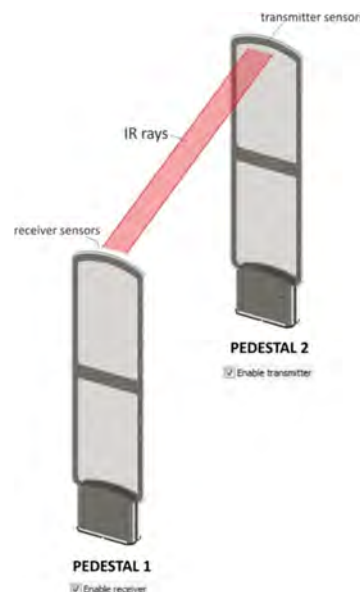
Clone to slaves - the device set as "Master" will enable the alarm setting to be sent to all systems of the same group that are set as "Slave"

8.6 Window PeopleCounter

Setting up of the PeopleCounter: **Caution!** The PeopleCounter (PC) is only available if at least two (dual system) or more antennas are installed. A prerequisite for proper PC operation is that all antennas are installed in the same direction (el. boards are placed from the same side). Of course, Group ID and Pedestal ID must be set correctly in the Networking folder.

The standard installation is when, from the side view of the antennas, the Master antenna is the left most one (Pedestal ID 0) and other Slave pedestals are placed to the right (Pedestal ID 1 – n). This arrangement makes it easier for us to check the correct PC settings.

At first we will set the Master antenna, due to the following one, works as Transmitter or Receiver (it can be found out in the documentation of the particular antenna type how the transmitting or receiving diodes of the PeopleCounter system are oriented due to placement of electronic boards).



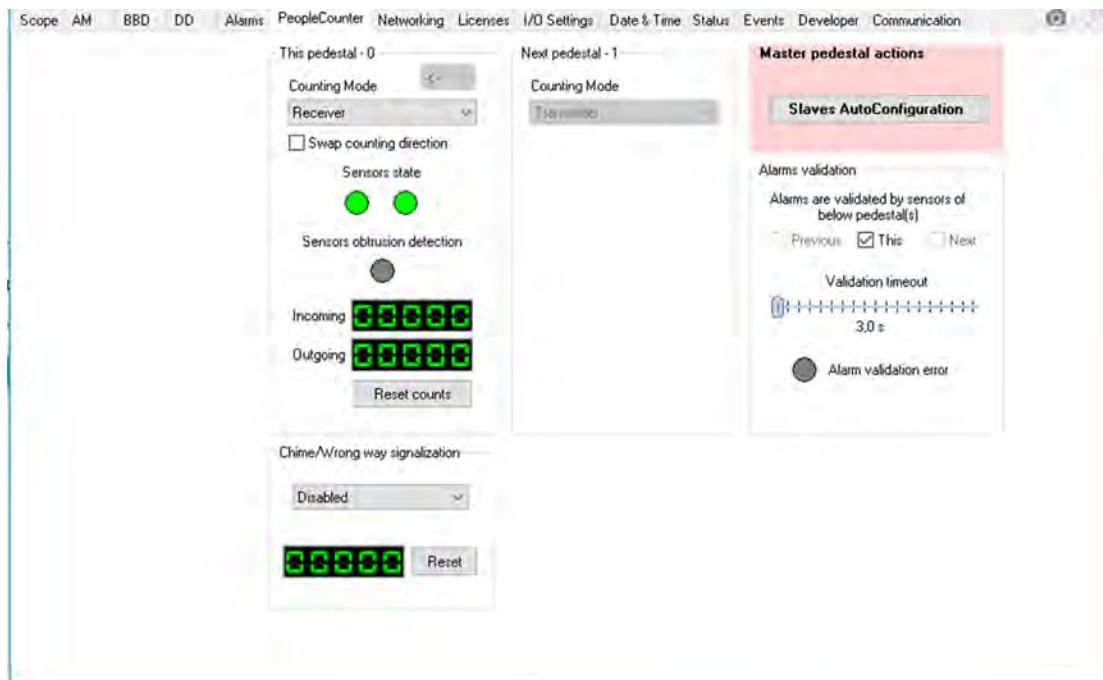
Picture 19 - Main screen of PeopleCounter - PeopleCounter not in use

If, in our example, the master is set so that the following antenna is a receiver, after selecting the Counting mode – Receiver, the screen looks like this:



Picture 20 - PeopleCounter screen - none signal from TX sensor

Red LEDs indicate that the transmitter does not lit to the receiving sensors. The SlavesAutoConfiguration option automatically selects all the following Slave antennas to the correct Counting Mode. If no using the Slaves Autoconfiguration option, it is necessary to set each Slave system manually.



Picture 21 - PeopleCounter screen - visible signals from TX sensor

If everything is well installed, the LED is green, the status of next antenna can be seen in the Next pedestal window – in this case that the Transmitter is set. Passing through the antenna will shade the sensors, the Sensor stat will blink red and the counter will increment, depending of the direction of passage.

8.7 Window Networking

Set of communications parameters between system and remote controls and between the systems themselves.

The screenshot shows the 'Networking' tab in a software configuration window. It is divided into several sections:

- Networking status:** Displays current network parameters. Network SWITCH ports are P1 DOWN, P2 UP. Pedestal BUS status is OK. MAC address is 80:1F:12:47:D2:C0. IP address is 192.168.1.197. Netmask is 255.255.254.0. Gateway is 192.168.0.1. Primary DNS is 192.168.0.1. Secondary DNS is 0.0.0.0. RemoteAccess Server IP is 193.165.214.84. RemoteAccess Conn. is Connected. RemoteConn. Ping is 6 s. Cloud/Mon. Server IP is 0.0.0.0. Cloud conn. state is Done, idle. MQTT Server IP is 0.0.0.0. MQTT conn. state is Not connected. MQTT last action state is 0. MQTT status ping is 0 s.
- WebInterface Access control:** Includes fields for User password (12345678) and Admin password (*). There is a checkbox for 'User can reset counters and mute alarms'.
- Pedestal BUS settings:** Includes Group ID (15) and Pedestal ID (0). A button 'Start automatic configuration' is present.
- IP settings:** Includes a text field for 'NETBIOS/Device discovery name' (AM_TRX_47D2C0). A checkbox 'Obtain configuration from DHCP server' is checked. IP address is 192.168.0.22. Netmask is 255.255.255.0. Gateway is 192.168.0.1. Primary DNS is 192.168.0.1. Secondary DNS is 192.168.0.1.
- Cloud connection:** Includes a checkbox 'Enable remote access' which is checked. Remote access server (Name/IP) is monitor.shopmonitor.net. Port is 9761. A checkbox 'Enable Cloud synchronization' is unchecked. Synchronization interval is 15 sec. A checkbox 'Enable Date&Time synchronization' is checked. Monitoring/Cloud server (Name/IP) is www.shopmonitor.net. Port is 80.
- Actions:** Includes a button 'Apply configuration changes'.
- MQTT IOT:** Includes a checkbox 'Enable MQTT client' which is unchecked. MQTT server (Name/IP) is mqtt.shopmonitor.net. Port is 1883. Username is user. Password is (masked). Base topic path (without slash at end) is monitoring/eas. A checkbox 'Allow remote configuration' is checked.
- Web API access:** Includes a checkbox 'Enable Web API access' which is unchecked. API key is 00000000.

Picture 22 - Networking

Very important is to set correctly IP address of system. IP address can obtain from DHCP server or manual mode.

If you do not have connected system to the local network and to the internet, you need to set-up network setting manually. Setting of IP address (Manually or from DHCP) is important, if you need to clone setting from master to all slaves, set AM system as Master/Slaves, share alarms on all pedestals or you can use Pager transmitter and share alarms from all pedestals to the pagers, etc. At the picture on the right side, you can see manually setting of network (in the yellow, you need to confirm it by ENTER) and at the end of setting in Network bookmark, you need to click on the "Apply configuration changes".

When you set-up IP address by manually (example 10.100.10.1), last digits in the group of IP address (1) corresponds to the MASTER. All other pedestals – SLAVES will continue in this IP address (10.100.10.2, 10.100.10.3, etc.) for better identify of pedestal numbers. For all SLAVES you need to change only IP address. Gateway, Primary DNS and Secondary DNS will be same for all pedestals.

This close-up shows the manual configuration section where several fields are highlighted in yellow to indicate they need to be confirmed by pressing the ENTER key:

- Obtain configuration from DHCP server:** Unchecked.
- IP address:** 10.100.10.1
- Netmask:** 255.255.255.0
- Gateway:** 10.100.10.1
- Primary DNS:** 10.100.10.1
- Secondary DNS:** 10.100.10.1
- Cloud connection:** Unchecked.
- Enable remote access:** Unchecked.
- Remote access server (Name/IP):** monitor.shopmonitor.net
- Port:** 9761
- Enable Cloud synchronization:** Unchecked.
- Synchronization interval:** 1 min

Networking status - status of all parameters in network

Pedestal bus settings - basic set up for communication of individual el. boards between each other. El. boards, connected in a group, exchange amount of necessary data during operation. The following is considered to be one group of el. boards: master el. board and all slave el. boards connected to the master one by the synchronization cable.

Group ID - all el. boards in a group must have the same group number set up.

Pedestal ID - each el. board in a same group must have different Pedestal ID number. The Pedestal ID setting applies to this: Master always has the Pedestal ID set to 0. The first connected slave has Pedestal ID set to 1, second slave to 2, etc.

API access – right now not in use. Prepare for future

IP setting - setting necessary for correct communication. Setting can be obtained automatically using „Obtain configuration from DHCP server“ option, otherwise it needs to be set manually.

Cloud connection - enabling remote access to the device. If it is enabled, the „Remote access server name / ID“ must be filled in correctly.

Enable cloud synchronization - system can send to server data of events/alarms in time period.

Enable date/time synchronization - Automatic time/date synchronization available only with ShopMonitor Lite.

Access control – user and admin passwords for control from web browser

Apply configuration changes – confirm and save changes. If any parameter was changed, you need to apply changes.

MQTT IOT – enabling MQTT client on the board. Be careful to fill correct MQTT Server name, login informations etc.

Web API access – Enabling Web API access. When Enable – correct API key is needed.

8.8 WINDOW LICENCES

Considering there are many available features, the el. boards AM TRX is controlled by a system of licence keys. The licence key indicates which features are enabled and for how long time.

The screenshot displays the 'License' configuration window. It is divided into three main sections: 'Licensed functions', 'License keys', and 'License request ID'. The 'Licensed functions' section lists four enabled features: 'People Counter', 'Booster Bag detector', 'Magnetic Detacher detector', and 'MQTT/Web API access'. The 'License keys' section contains three entries, each with a 'Key' label, a text box showing a 32-character hexadecimal string, and an 'Expired' date of '1.1.2000'. The 'License request ID' section shows a single text box with a 32-character hexadecimal string. At the bottom, there is a button labeled 'Accept license changes'.

Picture 23 - Licenses

Following features are available in system: basic function of AM labels detection is always available. Additional features are Booster bag detector, Magnetic detacher detector and Network API access. The additional functions can be enabled permanently or temporarily.

Licensed functions - list of currently enabled features. Allowed functions are marked in green.

Licence keys - One el. board may have multiple licence keys allocated. Here is a list of licence keys that indicate the enabled features and validity dates.

Licence request ID - the numeric code to be sent to the vendor when requesting a change of licence (change or the scope of allower functions, change or validity). This code is unique and is not transferable from board to the board.

Example of request for the licence change: AM TRX el. board with basic licence (AM detector enabled only, disabled booster bag detector, Magnet detector and network API access) need to be expanded with the Booster Bag detector feature. The user will send the number from the „Licence request ID“ field together with the extension request to the vendor. The vendor will then generate a license key and send it to the user. The user enters the license key to a free field (Key 1, 2, 3 or 4) and clicks on the „Accept licence changes“ button.

8.9 WINDOW I/O SETTINGS

In this window it is possible to set function of communication channels and universal input and output (actually visible Port COM2 – Paging TX mode).

The screenshot shows the 'I/O Settings' window with the following sections:

- Port COM2 configuration:** Paging TX mode (selected), Device address: 252, Set button.
- Port COM3 configuration:** Not used, Device address: 253, Set button.
- Input IN1 configuration - MASTER:** Not used, Negative/Positive radio buttons (Positive is selected).
- Output OUT1 configuration:** Not used, Negative/Positive radio buttons (Positive is selected).
- Paging messages:** A table with columns for Enabled events, Address, Message text, and Test buttons.
- SmartPager transmitter settings:** Transmitter settings (Transmitting power: 0 dBm, Max RSSI level: -75 dBm, Delay at high RSSI: 5000 ms) and Hardware inputs (Input type: NO, Delay: 5000 ms).
- Paging receiver internal time:** Automatic time synchronization checkbox, CapCode & Address: 1234565, Synchronization period: 60 min, Set time now button.

Enabled events	Address	Message text (char % will be replaced by aisle or pedestal number)	Test
☐ AM outgoing/regular alarm	1234565	Security tag detected on pedestal %!	Test
☐ AM incoming alarm	1234565	Security tag detected on pedestal % when customer came!	Test
☐ AM false alarm	1234565	Security tag detected on pedestal % without customer presence!	Test
☐ AM Jammer detected	1234565	Security system Jammer detected on pedestal %!	Test
☐ AM Tag too close	1234565	Please check for security tags close to pedestal %	Test
☐ BB outgoing/regular alarm	1234565	Booster bag detected in aisle %!	Test
☐ BB incoming alarm	1234565	Booster bag detected in aisle % when customer came!	Test
☐ BB false alarm	1234565	Booster bag detected in aisle % without customer presence!	Test
☐ DD outgoing/regular alarm	1234565	Tag detacher detected on pedestal %!	Test
☐ DD incoming alarm	1234565	Tag detacher detected on pedestal % when customer came!	Test
☐ DD false alarm	1234565	Tag detacher detected on pedestal % without customer presence!	Test
☐ External alarm	1234565	External alarm/RFID alarm triggered on pedestal %!	Test
☐ Chime/wrong way	1234565	Chime/Wrong way going customer in aisle %	Test
☐ HW error	1234565	HW error occurred on pedestal %	Test
☐ PeopleCount sensors obstruction	1234565	People counting sensors obstruction detected in aisle %	Test

Picture 24 - I/O Settings

Port Com2 configuration - port for communication with pager.

Port Com3 configuration – port for communication with external magnet sensors.

Input IN1 configuration - the binary contact type input can be used for External Alarm Input or for manual switching to standby mode (System Enable Key). Read more about standby mode in DATE/TIME chapter.

Output OUT1 Configuration - open collector output. The output can be used as another external alarm indication or for identification of operating time of opening hours.

After successful preset of “port Com configuration” or “Input/Output configuration” will be possible this port extra configure.

If you select Pager transmitter at the “Port COM2 configuration”, there is extra configuration. You can configure messages of pager and address of this messages as visible on the Picture 22.

Paging messages – there you can select, what messages can be sent to the pager receiver. Also must correspond correct address of pager transmitter and pager receiver. Message text is received on the pager – can be modified to your text.

SmartPager transmitter settings – there is setting of pager transmitter

- Transmitter – set level of transmitting power when you need cover bigger area, RSSI level when noisy area.
- Hardware inputs – set input type (NO or NC) and delay
- Paging receiver internal time – synchronization of internal date/time of pager receiver. Manual or automatic synchronization (period of automatic synchronization) can be selected

8.10 WINDOW RTC

RTC is a clock in the board (integrated circuit) that keeps track of the current time. These settings are mainly for people counters data, events and correct Opening hours control.

The screenshot shows the 'RTC' settings window. It includes tabs for Scope, AM, BBD, DD, Alarms, PeopleCounter, Networking, Licenses, I/O Settings, Date & Time, Status, Events, and Communication. The 'Date & Time' tab is active. It displays the RTC time as 11/5/2019 8:19:47 AM Tuesday and the PC time as 11/5/2019 8:19:43 AM Tuesday. A 'Synchronize with PC' button is present. Below, there's a slider for 'RTC calibration offset(second per day)' ranging from +10s to -10s, currently set at 0. A 'Use DST (Daylight Saving Time)' toggle is set to 'Off'. On the right, the 'Electricity saving based on store opening hours' feature is turned 'On'. A section titled 'Store opening hours:' lists days from Monday to Sunday, each with radio buttons for 'Closed', 'Open', and 'Open from' (with time fields) to 'to' (with time field). For all days shown, 'Open' is selected, and the time range is 00:00 to 23:59.

Picture 25 - RTC

Time zone - select the time zone of the installation site.

Synchronize with PC - You can synchronize the time with PC by clicking on button.

Use DST - Enables the automatic change of summer/winter time.

Electricity saving based on store openings hours - Sets the opening hours of every day, which allows you programmable "Green mode" where the system can be set to turn on only during business hours to help conserve energy.

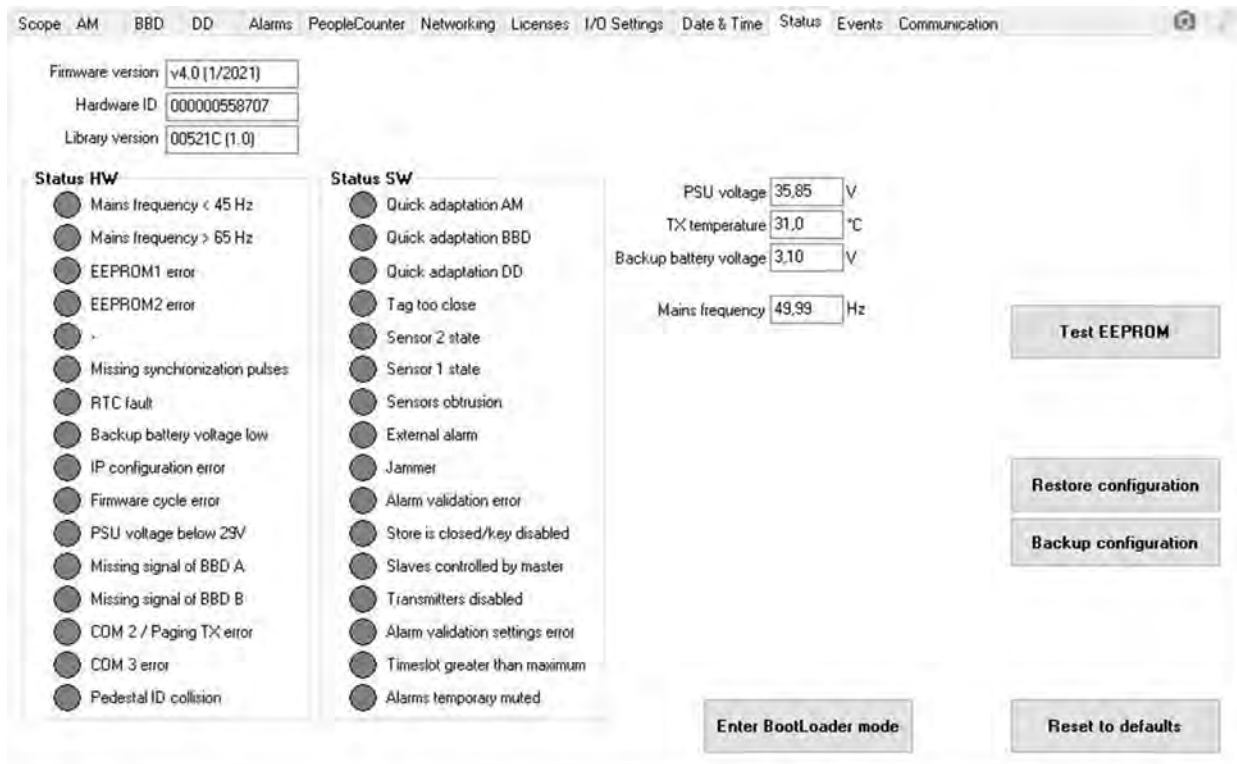
Setting of opening hours - *Example:* Picture below shows setting of two days. Saturday, when it is closed all day, the transmitters will be disabled. In Friday is open for 13 hours (from 7AM till 8PM). Besides this time (from 8:01PM to 6:59AM) will be the transmitter disabled.

This screenshot shows a close-up of the 'Store opening hours' section for Friday and Saturday. For Friday, the 'Open from' time is set to 07:00 and the 'to' time is 20:00. For Saturday, the 'Closed' radio button is selected, indicating the system is closed all day.

Picture 26 - Opening hours in Friday, closed in Saturday

8.11 WINDOW STATUS

This window displays system status information. Data is important for identifying and troubleshooting during putting into operation or during repairs.



Picture 27 - Status

Firmware version, Hardware ID and Library Version - serves to accurate identification of the system.

Status HW - indication of problems that may have a serious impact on the overall functionality of the system. If there is some problem, the red signal lights up.

Mains frequency < 45 Hz – Power mains frequency is lower than 45Hz.

Main frequency > 65 Hz – Power mains frequency is higher than 65Hz.

EEPROM1 error - data in EEPROM1 are incorrect (faulty EEPROM or communication with it)

EEPROM2 error - data in EEPROM2 are incorrect (faulty EEPROM or communication with it)

Missing synchronization pulses – synchronization pulses from power mains or master are not received. System is stopped.

RTC fault – error in communication with RTC or incorrect data from RTC (faulty RTC or communication with it, system does not have correct system time, saved time data are incorrect)

Backup battery voltage low – low power supply of backup battery (less then 2.5V) – in case the system is disconnected from the power supply, risk of loss of system time.

IP configuration error – check IP configuration, there can be a problem with IP address. Not configured or same IP in the network

Firmware cycle error – internal software error

PSU voltage below 29V – the power supply voltage is below the threshold required for proper system operation (low power supply voltage or power failure)

Missing signal of BBD A – the metal detector has no signal from the corresponding transmitter upper loop.

Missing signal of BBD B – the metal detector has no signal from the corresponding transmitter lower loop.

COM2/Paging TX error – COM2 port failure

COM3 error – COM3 port failure

Pedestal ID collision – at the installation site multiple el. boards have the same ID – communication is impossible

Status SW – an indication of important system operation states. In the case of detection, the red signal lights up.

Quick adaptation AM – quick adaptation of AM labels detection is in progress. Quick adaptation takes several seconds and is triggered by a large change of the detection conditions (e.g. transmitter switch on/off, changed synchronization settings, etc.). Detection of the system is suppressed during the quick adaptation.

Quick adaptation BBD – quick adaptation of booster bag detector is in progress. Quick adaptation takes several seconds and is triggered by a large change of the detection conditions (e.g. transmitter switch on/off. Change synchronization settings, etc.). Detection of the system is suppressed during the quick adaptation.

Quick adaptation DD – quick adaptation of magnetic detector is in progress. Quick adaptation takes several seconds and is triggered by a large change of the detection conditions (large changes of the magnetic field around the system etc.). Detection of the system is suppressed during the quick adaptation.

Tag too close – the system detects the AM tag in the detection field for a long time (forgotten label). During the Tag too close indication, AM detection may be reduced.

Sensor 1 State – people counter No. 1 sensor status (free / shaded)

Sensor 2 State – people counter No. 2 sensor status (free / shaded)

Sensors obstruction – people counter sensors permanently shaded – counting and alarms validation is not working

External alarm – on external port IN1 is detected external alarm

Jammer – detection of interference around the system (possible presence of an AM jammer nearby)

Alarm validation error – improper configuration of people counter and validation request. Example: alarms validation for booster bag detector is requested but people counter is not allowed (window Peoplecounter – Counting mode is disabled).

Store is closed/Key disabled – the system is in the "out of opening hours" state - RTC window or is disabled by external input (IO Settings - Input1 window). Detection is suppressed.

Slaves controlled by Master – Slaves for proper function need to be controlled by Master

Transmitters disabled – the AM transmitter is off, detection is not possible

Alarm validation setting error – improper setting of Alarm validation causes malfunction of AM evaluation

Timeslot greater than maximum – timeslot of BBD is overlap. Mainly for change between 50/60Hz.

Alarms temporary muted – indication of muted alarms for pre-defined time (default value is 60 minutes)

PSU voltage 36V - current value of the supply voltage.

TX temperature - current temperature of transmitter.

Backup battery voltage - the supply voltage of the backup battery RTC, the value should be higher than 2.5 V

Mains frequency – current network frequency value. The value should be in the range 49-51Hz for a 50Hz network or 59-61Hz for a 60Hz network.

Restore configuration – allows you to restore the previously saved system configuration.

Backup configuration – allows you to save the current system configuration to the file.

Enter BootLoader mode - el. board AM TRX will switch to the firmware upgrade mode.

Reset to defaults – factory values setting

8.12 WINDOW EVENTS

If your system have any occasionally trouble or false alarms, check how many times or in what time this trouble was created. You can download Events from the memory and check these data. You can remotely sent this data to your server or you can monthly export this data to CSV or JSON. There is also possibility to download only new events in memory if you download some data before.

Selection of events can be done with **all available** or **custom selection** by type of events and from Date range.

Maximum events in the memory is 1600, after that the older events will be rewrite by new events (FIFO).

Events in memory: 456

Download events

☒ All available
☐ Only new
☐ Only 25 last

DateTime /	Type	Data1	Data2
2019-12-18 06:30:20	DD alarm		
2019-12-18 06:30:00	Tag too close	3s	
2019-12-18 06:29:56	Tag too close	0s	
2019-12-18 06:29:52	Power ON		
2019-12-17 15:22:24	Power OFF		
2019-12-17 15:22:24	HW error - Mains frequency < 45 Hz		
2019-12-17 15:22:24	HW error - Missing synchro pulses		
2019-12-17 14:45:34	DD alarm		
2019-12-17 14:45:00	Tag too close	145s	
2019-12-17 14:40:00	Tag too close	300s	
2019-12-17 14:35:00	Tag too close	244s	
2019-12-17 14:34:22	HW error - Missing synchro pulses		
2019-12-17 14:34:08	Tag too close	0s	
2019-12-17 14:33:32	Tag too close	0s	
2019-12-17 14:30:00	Tag too close	271s	
2019-12-17 14:29:10	Tag too close	0s	
2019-12-17 14:25:00	Tag too close	300s	
2019-12-17 14:20:00	Tag too close	300s	
2019-12-17 14:16:58	DD alarm		
2019-12-17 14:16:46	DD alarm		
2019-12-17 14:16:44	DD alarm		

Select device: 000000558707

Events and date range selection:

☒ All available ☐ Custom section

Events:

- ☒ Tag alarms - Regular/Outgoing
- ☒ Tag alarms - Incoming
- ☒ Tag alarms - False alarm
- ☒ Tag too close
- ☒ Jammer alarms
- ☒ BBD alarms - Regular/Outgoing
- ☒ BBD alarms - Incoming
- ☒ BBD alarms - False alarm
- ☒ DD alarms - Regular/Outgoing
- ☒ DD alarms - Incoming
- ☒ DD alarms - False alarm
- ☒ PeopleCounter data
- ☒ Sensor blocking
- ☒ Wrong way
- ☒ External alarms

Check all Uncheck all

Date range: 1. 1.2000 - 18.12.2019

Show required data

Export to CSV Export to JSON

Picture 28 - Events

If your device is connected to the internet and data from device are send to the server (alarms, people counter, etc), after device successfully send data to server, counter of Events in memory will show zero events. It means that data was successfully sent to the server.

9. BASIC SETTINGS

As described above, el. board AM TRX has a wide range of settings. However, for the basic function only a few steps are required, as described below.

9.1 TUNING THE LOOPS

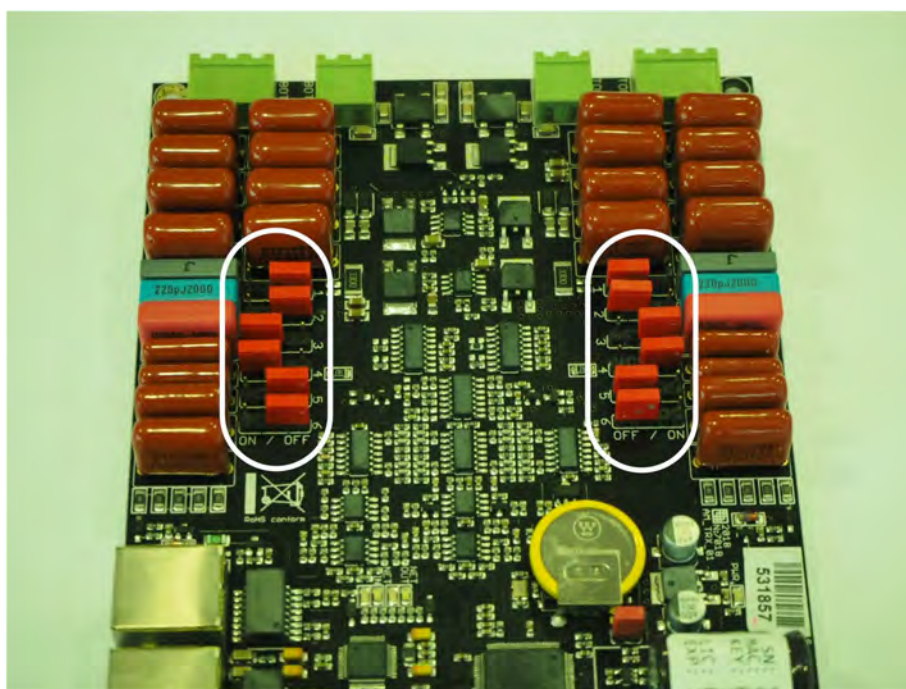
For proper AM function, always check the tuning of antenna loops after installation. For reliable detection, the resonant frequency of the antenna loops must be tuned to the frequency of the labels used, ie to the 58kHz band. Correctly tuned pedestal increases the system's detection range, because of higher output power and better receiver signal/noise ratio.

Tuning is performed manually with the aid of AM TRX application software.

With the use of jumpers on the board you connect capacitors of various sizes to the pedestal loops for tuning into respective operating resonance frequency.

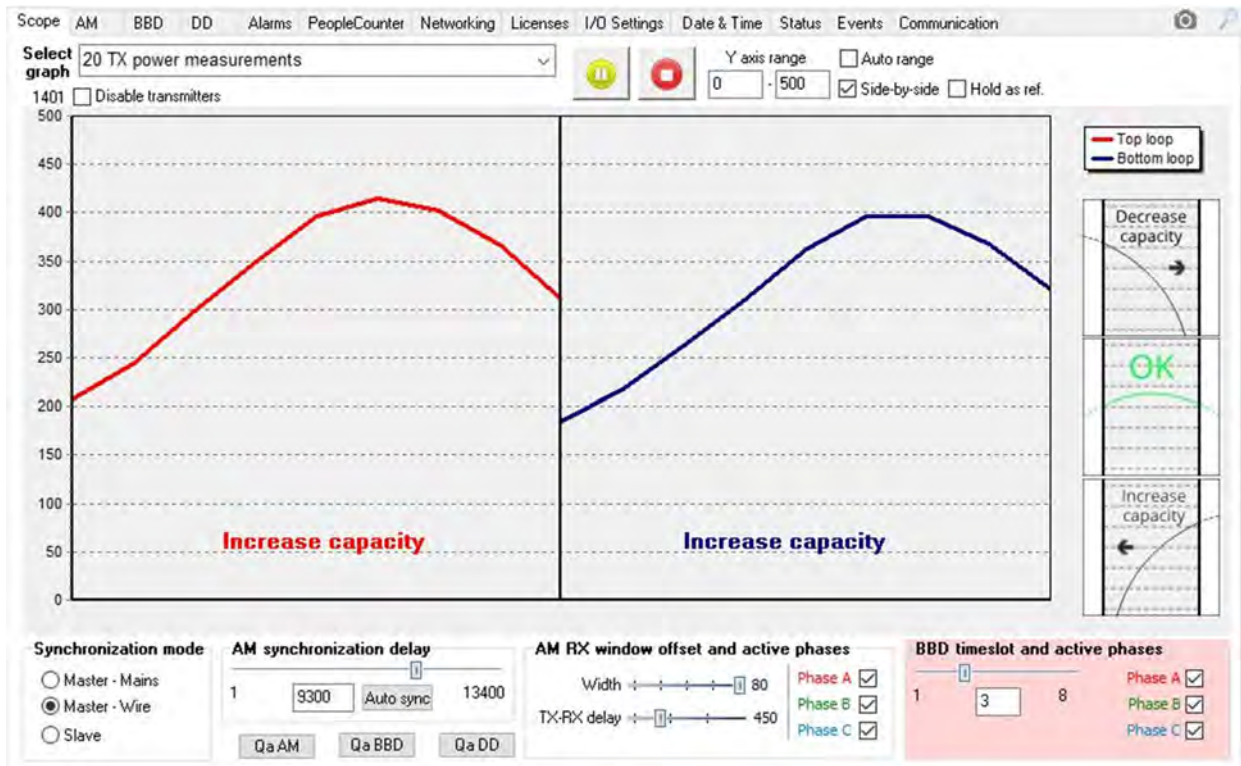


CAUTION! Improper settings of capacitors can in extreme cases disable the detection of labels/tags completely.

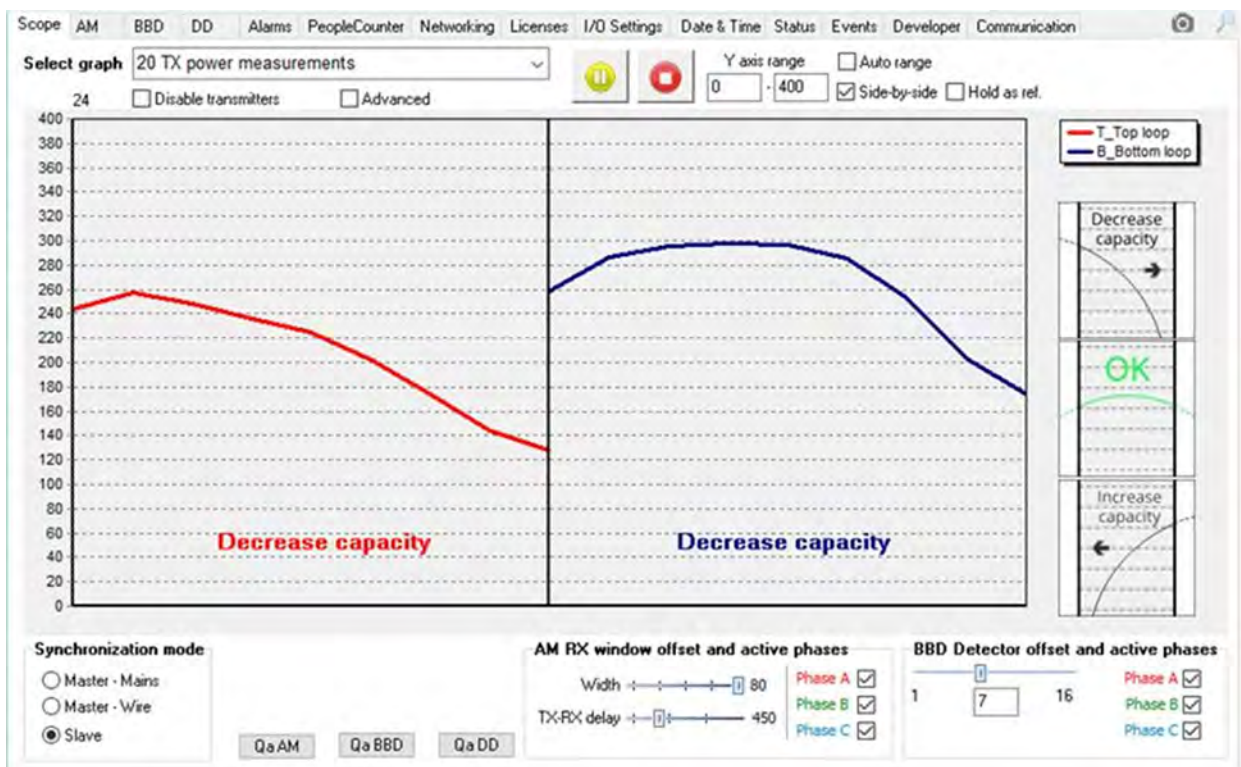


Picture 29 - Antenna loops tuning capacitors

1. Run the application and connect (window Communication)
2. Choose window "Scope".
3. From "Select graph" options choose "20 TX measurements" – see pic. 28
4. Use the help picture (in the bottom right window) to set the jumper of the el. board - add or reduce capacity.
5. Whenever adding/removing tuning jumpers, it is necessary to either turn OFF the TX in the software (Disable Transmitters check box) otherwise you are at high risk of electric shock! **ALWAYS USE ISOLATED SAFETY PLIERS.**
6. Jumpers are marked with numbers 1 to 6, depending on the size of the connected capacitor. Jumpers with lower number will cause less change of tuning than jumpers with higher numbers.
7. Try different combinations of jumpers until you reach the correct tuning.



Picture 30 - TX Power measurements



Picture 31 - TX Power Measurement - interferred with another AM system

If the curve is not smooth, it is necessary to turn off the surrounding AM TX, if possible.

9.2 VALUES OF TUNING CAPACITORS

There you can find values of tuning capacitors. If system need to decrease or increase capacity, you can find actual value and with different combination of connected capacitors, you can decrease or increase capacity.

Values of tuning capacitors at the AM TRX board

Value (nF)	1 (100p)	2 (220p)	3 (470p)	4 (1n)	5 (2n2)	6 (5n)
30n	OFF	OFF	OFF	OFF	OFF	OFF
30n1	ON	OFF	OFF	OFF	OFF	OFF
30n2	OFF	ON	OFF	OFF	OFF	OFF
30n3	ON	ON	OFF	OFF	OFF	OFF
30n5	OFF	OFF	ON	OFF	OFF	OFF
30n6	ON	OFF	ON	OFF	OFF	OFF
30n7	OFF	ON	ON	OFF	OFF	OFF
30n8	ON	ON	ON	OFF	OFF	OFF
31n	OFF	OFF	OFF	ON	OFF	OFF
31n1	ON	OFF	OFF	ON	OFF	OFF
31n2	OFF	ON	OFF	ON	OFF	OFF
31n3	ON	ON	OFF	ON	OFF	OFF
31n5	OFF	OFF	ON	ON	OFF	OFF
31n6	ON	OFF	ON	ON	OFF	OFF
31n7	OFF	ON	ON	ON	OFF	OFF
31n8	ON	ON	ON	ON	OFF	OFF
32n2	OFF	OFF	OFF	OFF	ON	OFF
32n3	ON	OFF	OFF	OFF	ON	OFF
32n4	OFF	ON	OFF	OFF	ON	OFF
32n5	ON	ON	OFF	OFF	ON	OFF
32n7	OFF	OFF	ON	OFF	ON	OFF
32n8	ON	OFF	ON	OFF	ON	OFF
32n9	OFF	ON	ON	OFF	ON	OFF
33n	ON	ON	ON	OFF	ON	OFF
33n2	OFF	OFF	OFF	ON	ON	OFF
33n3	ON	OFF	OFF	ON	ON	OFF
33n4	OFF	ON	OFF	ON	ON	OFF
33n5	ON	ON	OFF	ON	ON	OFF
33n7	OFF	OFF	ON	ON	ON	OFF
33n8	ON	OFF	ON	ON	ON	OFF
33n9	OFF	ON	ON	ON	ON	OFF
34n	ON	ON	ON	ON	ON	OFF

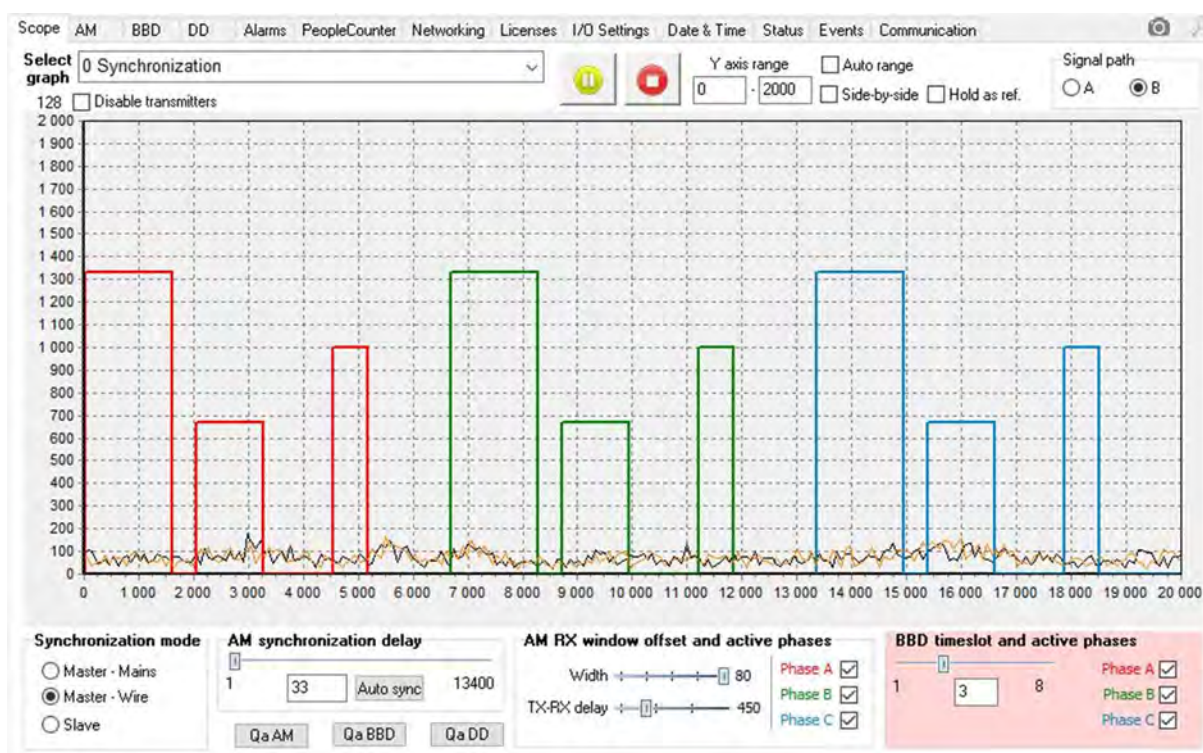
Value (nF)	1 (100p)	2 (220p)	3 (470p)	4 (1n)	5 (2n2)	6 (5n)
35n	OFF	OFF	OFF	OFF	OFF	ON
35n1	ON	OFF	OFF	OFF	OFF	ON
35n2	OFF	ON	OFF	OFF	OFF	ON
35n3	ON	ON	OFF	OFF	OFF	ON
35n5	OFF	OFF	ON	OFF	OFF	ON
35n6	ON	OFF	ON	OFF	OFF	ON
35n7	OFF	ON	ON	OFF	OFF	ON
35n8	ON	ON	ON	OFF	OFF	ON
36n	OFF	OFF	OFF	ON	OFF	ON
36n1	ON	OFF	OFF	ON	OFF	ON
36n2	OFF	ON	OFF	ON	OFF	ON
36n3	ON	ON	OFF	ON	OFF	ON
36n5	OFF	OFF	ON	ON	OFF	ON
36n6	ON	OFF	ON	ON	OFF	ON
36n7	OFF	ON	ON	ON	OFF	ON
36n8	ON	ON	ON	ON	OFF	ON
37n2	OFF	OFF	OFF	OFF	ON	ON
37n3	ON	OFF	OFF	OFF	ON	ON
37n4	OFF	ON	OFF	OFF	ON	ON
37n5	ON	ON	OFF	OFF	ON	ON
37n7	OFF	OFF	ON	OFF	ON	ON
37n8	ON	OFF	ON	OFF	ON	ON
37n9	OFF	ON	ON	OFF	ON	ON
38n	ON	ON	ON	OFF	ON	ON
38n2	OFF	OFF	OFF	ON	ON	ON
38n3	ON	OFF	OFF	ON	ON	ON
38n4	OFF	ON	OFF	ON	ON	ON
38n5	ON	ON	OFF	ON	ON	ON
38n7	OFF	OFF	ON	ON	ON	ON
38n8	ON	OFF	ON	ON	ON	ON
38n9	OFF	ON	ON	ON	ON	ON
39n	ON	ON	ON	ON	ON	ON

9.3 SYNCHRONIZATION

For the flawless function of AM systems, the transmitters of these systems must be synchronized with another AM systems, it means that the transmitters of all systems must transmit at the same time. Not meeting this condition will cause that at the time when one system transmits, the second system attempts to receive. This leads to reduced detection or false alarms.

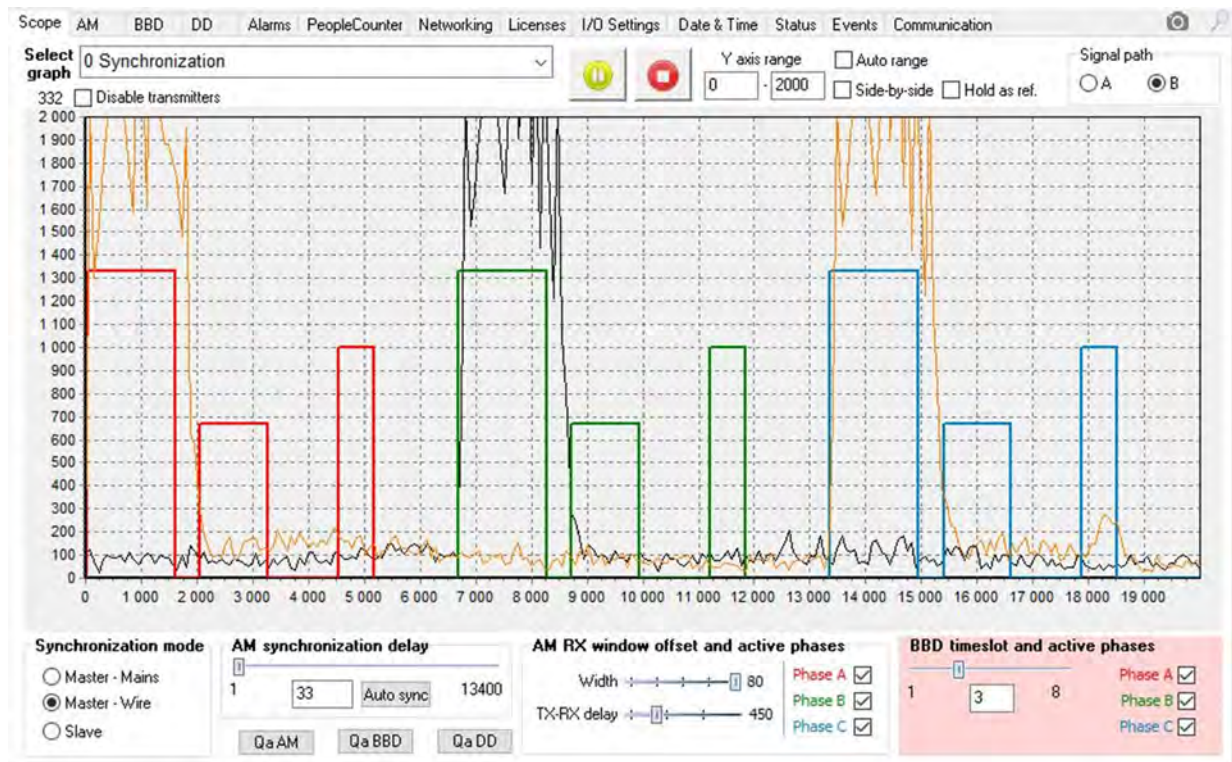
Synchronization of AM systems transmitting is performed using the 50 or 60 Hz power supply network to which these systems are connected. The system monitors the supply voltage by zero and from that moment waits for the set time and then starts transmitting. Correct setting of this delay is absolutely essential for faultless operation. You can set this delay by using the options "AM synchronization Delay", "Autosync" and "Disable transmitters". If a booster bag detector is used, then the settings of this transmitter will be added ("BB detector offset and active phases").

Sync setting is made in the window Scope, graph "0" Synchronization. The following options were set for the picture below: Disable transmitters YES – disabled own transmitters AM and BBD, Signal path B (narrow band signal filtering), Y range 2000 (for more detailed view). The ideal environment where no interference and no AM system are detected:



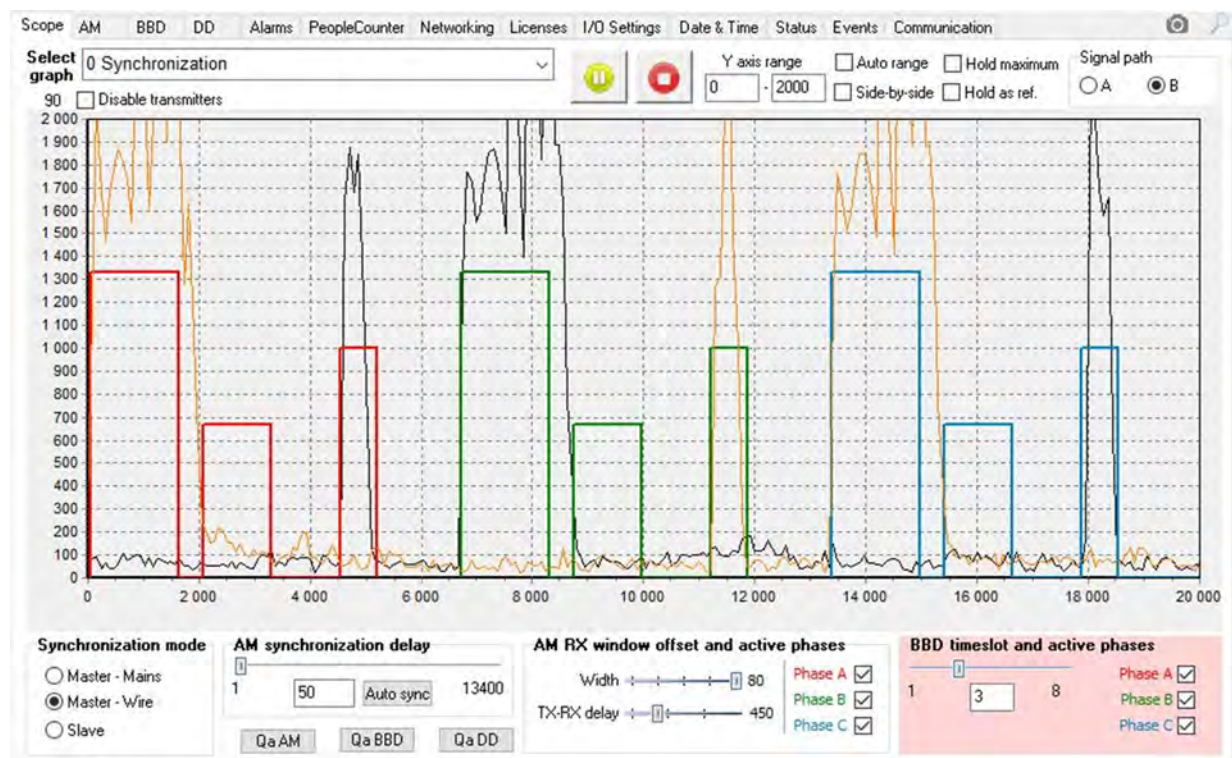
Picture 32 - Clear environment without other AM system

If the transmitting system is around, the signal waveform looks like this (Disable transmitters YES, Signal path B, Y range 2000):



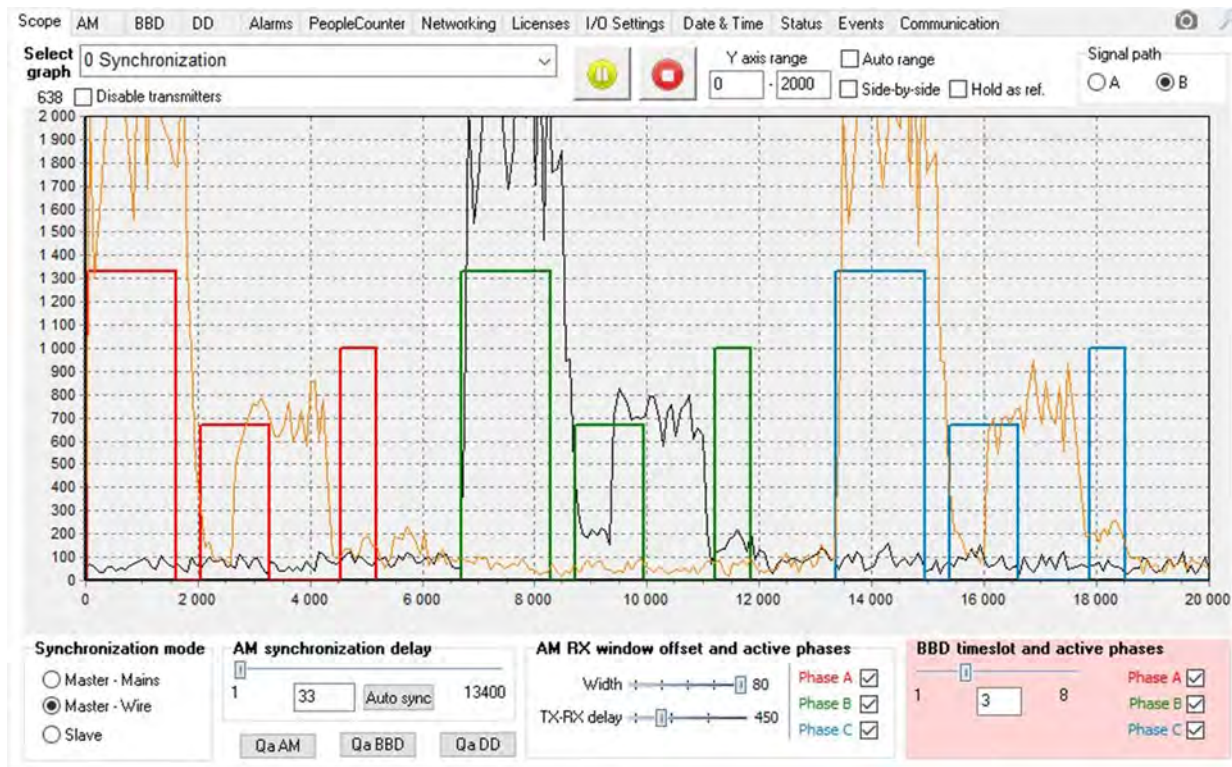
Picture 33 - Clear environment with close one system

If there is a system in the surroundings that also transmits with booster bag detector transmitter, the waveform looks like this (Disable transmitters YES, Signal path B, Y range 2000):



Picture 34 - Clear environment with close one AM system with Booster Bag

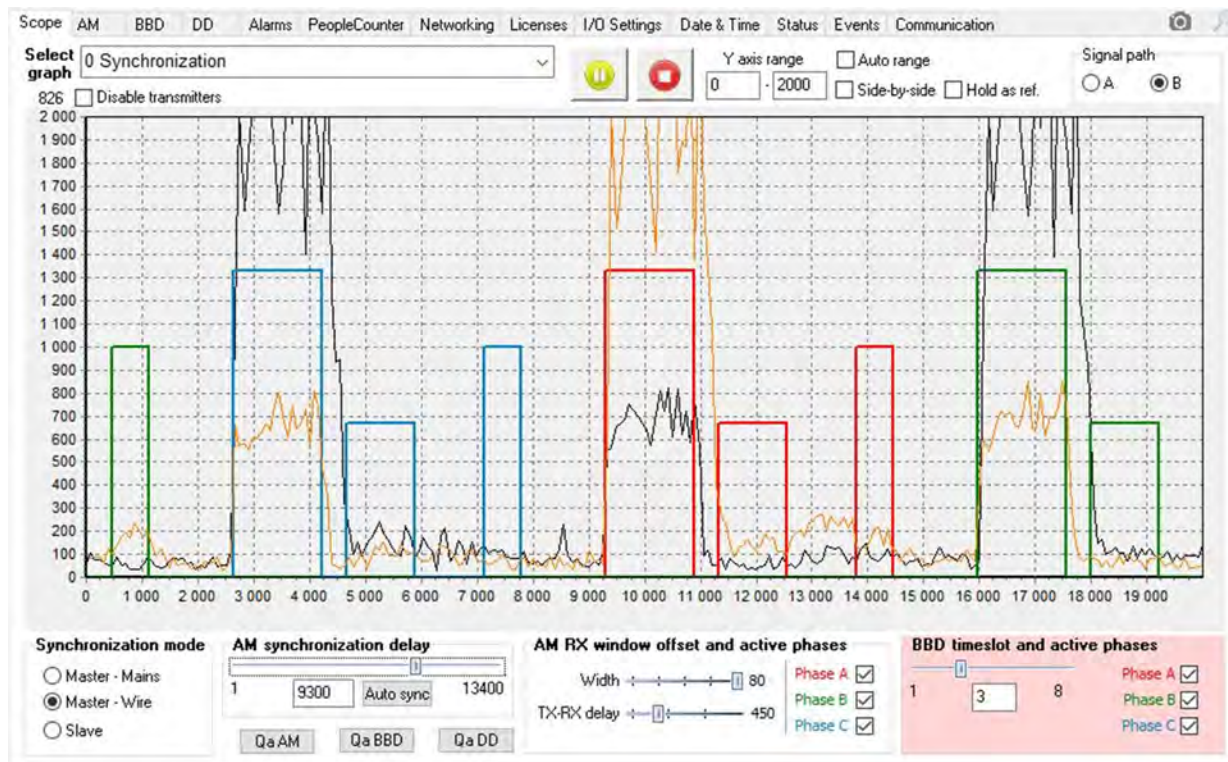
If we turn-On the transmitter and there is another AM system in the neighborhood that is not synchronized with ours, the waveform looks like this (Disable transmitters NO – transmitters allowed, Signal path B, Y range 2000):



Picture 35 - Not synchronized AM system

Higher signals (1) correspond to our transmitter, lower signals (2) correspond to the external transmitter. It can be seen that a foreign transmitter interferes with our receiving window (3). The task is to set the delay(AM synchronization delay) so that the signals of all transmitters are covered. We do this either by manually setting the delay or by clicking on "Auto Sync", where the system searches the nearby transmitter and sets the corresponding delay automatically.

Once the AM synchronization delay is correctly set, both systems are transmitting at the same time and the waveform looks like this (Disable transmitters NO, Signal path B, Y range 2000):



Picture 36 - Correctly synchronized AM system

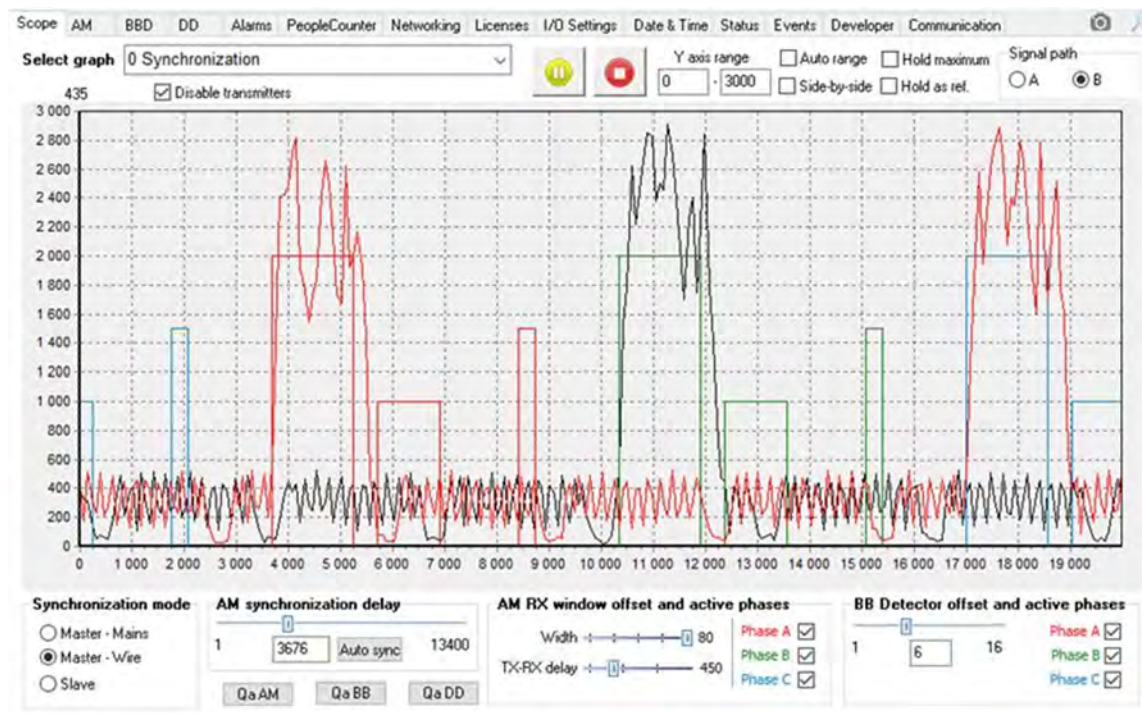
If there is a system in the surroundings that also uses a booster bag detector transmitter apart from the AM transmitter, the waveform looks like this (Disable transmitters YES, Signal Path B, Y range 3000):



Picture 37 - Correctly synchronized system with booster bag

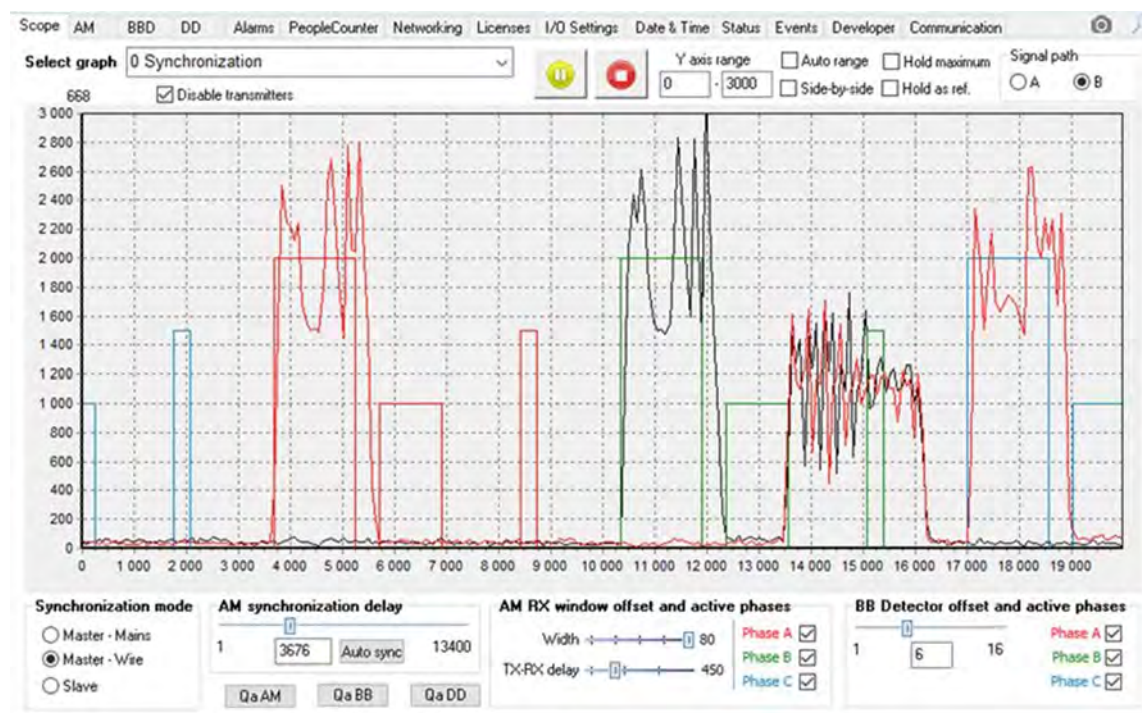
If our system uses a boosterbag detector, we need to set our transmitter timing to transmit at a different time than a foreign transmitter (using BB detector offset).

If there is interference near the working frequency of the AM system, the detection distance may be reduced and the received signal may look like this (Disable transmitters YES, Signal Path B, Y range 3000):



Picture 38 - Synchronization - Not synchronized high noise level

If there is a synchronous interference in the network (eg due to some types of switched sources etc.), the received signal may look like this (Disable transmitters YES, Signal Path B, Y range 3000):

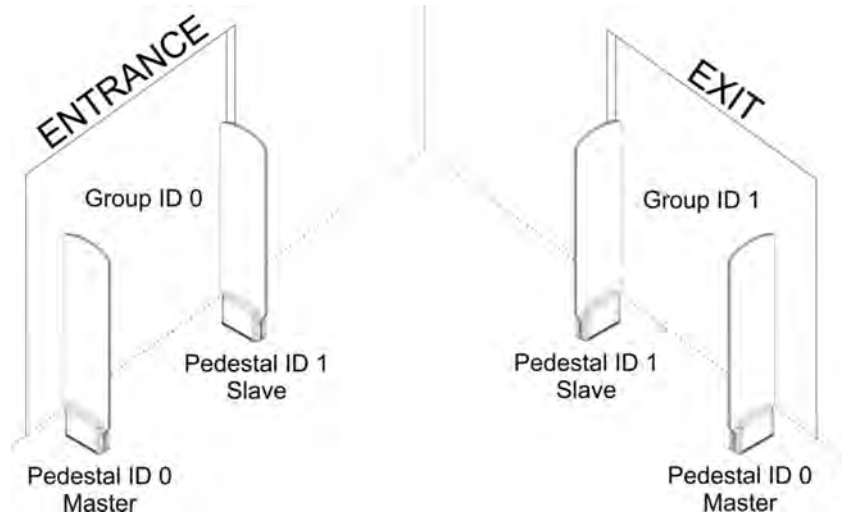


Picture 39 - Synchronization - Synchronized high noise level

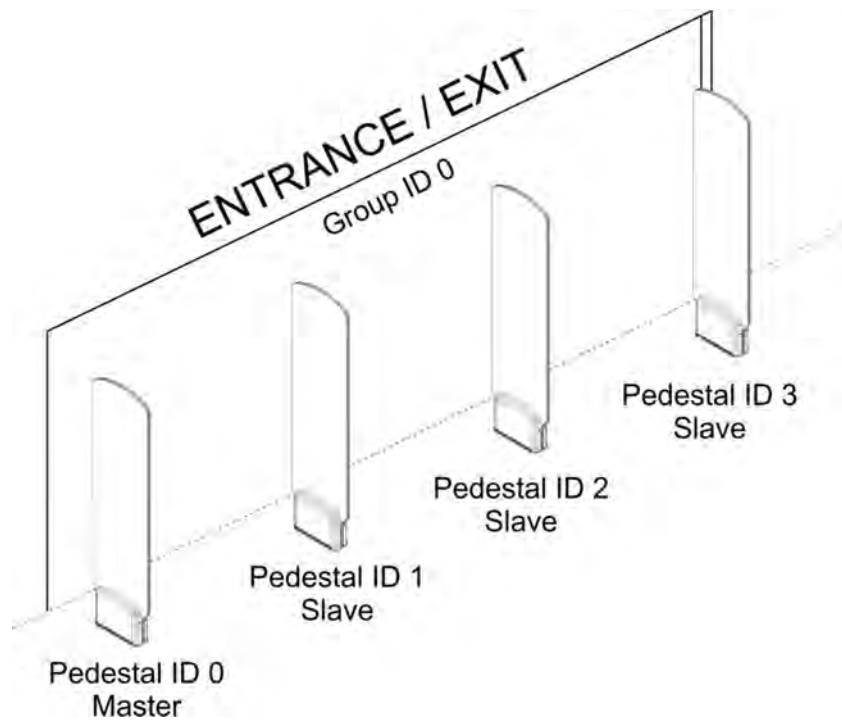
The interference (1) is synchronous with the network frequency and extends into the AM phase B receiving window (2) and into the stage B boosterbag of the detector window (3). This type of interference can not be easily filtered out, but it is possible to set the system so that it does not evaluate during synchronous interference. Synchronization delay can not be changed because we would loose synchronization with surrounding systems (6). In this case, the problem can be solved by turning off the AM system evaluation for phase B (4) and disabling the booster detector evaluation for phase B (5).

10.1 INSTALLATION TIPS

Installation of pedestal can vary from each other customer store. There you can find different installation and how to set every pedestals Group / Pedestal ID.



Picture 40 – Pedestals with separate Entrance / Exit



Picture 41 – Pedestals in one Entrance / Exit

10.2 TROUBLESHOOTING

Below are some frequent issues that may arise when installing a 58kHz system. Since every environment is different, these are common scenarios and a few basic steps for solving the issue with the AM TRX system.

I HAVE POOR DETECTION BUT LOW SIGNAL LEVELS AND NO FALSE ALARMS - Increase sensitivity by increasing the Signal Gain and decreasing the SNR setting on the Receiver. Disable all other evaluation criteria. See the Receiver (RX) Settings section; Increase TX Power, or check that the transmitter loops are tuned correctly. See the Transmitter (TX) Settings section.

I HAVE HIGH SIGNAL LEVELS IN THE ENVIRONMENT BUT NO FALSE ALARMS - Turn off all lights if possible. This is the most common source of electrical noise. If the lights are the source of interference, turn your pedestal 90°. If signal levels drop, you may be able to turn the light ballasts 90°. If noise level remains the same, you may need to replace the light ballasts; Look for other sources of electrical noise such as power cables, motors, LCD screens, power adaptors, card readers, printers, photo booths, etc. These need to be moved away from the system; Check and decrease your RX Window Width on the Scope page.

I HAVE CONSTANT FALSE ALARMS - Make sure you are synchronized to other AM systems in the shopping center – see the Synchronization section - Look for tagged merchandise. Large tags may be triggering the system from quite far away, depending on the sensitivity of the system; Check for resonance by turning off your Transmitters. If the false alarms stop, then something is in a resonant state with your transmitter. This may be a door frame, metal barrier, reinforced concrete, or other loop of metal that is inducing energy from the electric field. Try to decrease your TX Power. In some cases you may need to move the pedestals or break the metal loop that is causing the resonance; Increase your TX-RX Delay in case, when you have ringdown effects from resonance or other AM systems; If you have installed deactivators, make sure they are also synchronized.

THERE ARE MULTIPLE 58kHz SYSTEMS NEARBY WHICH ARE NOT SYNCHRONIZED - Sometimes you may encounter other systems which are not properly synchronized or are installing between two other systems which are far apart. In this case you should synchronize to the largest signal, and then reduce your RX Window Width. Try to fit your RX Window in between the pulses of the other AM systems.

I HAVE OCCASIONAL FALSE ALARMS - Check your evaluation criteria to see which ones are “sensitive” – meaning they are turning green more frequently than the others. Reduce the sensitivity on those; Decrease your RX Window Width to reduce the chances of pulses of electrical interference creating false alarms; Increase your TX-RX delay in case you have some ringdown effects from other systems or deactivators; Make sure your deactivators are synchronized; Are they occurring during certain periods? Sometimes printers, card readers, or other devices can cause false alarms while they are operating.

THE SYSTEM IS ALARMING DURING CLOSING HOURS - This is often due to roller shutters (resonance) or changes in transmitted signals of other systems (self-adjustment). It is not recommended to reduce system sensitivity to try to solve the problem. The best solution is just to turn off the system at night (set Opening Hours to turn off transmitters) or install a timer switch on the power supply to turn it off completely. To avoid false alarms from roller shutters, set the system to switch off a few minutes before closing.

THE SYSTEM IS NOT WORKING AT ALL - Check the System Status page to make sure all settings are okay; Make sure transmitters are not switched off on the Scope page; If using alarm validation with the infrared sensors, make sure they are counting properly when you walk through. And make sure you are walking completely through the system when testing; Test with a new tag or label; Check that the Alarm settings are not disabled, or that the sound or light cables are not disconnected on the TRX board.

I HAVE HIGH SIGNAL LEVELS IN THE ENVIRONMENT AND MANY FALSE ALARMS - Repeat all of the above steps.

11. DECLARATION

11.1 EQUIPMENT MODIFICATION CAUTION

Equipment changes or modifications not expressly approved by manufacturer, the party responsible for FCC &/or CE compliance, could void the user's authority to operate the equipment and could create a hazardous condition.

11.2 LIMITATION OF LIABILITY

Circumstances may arise where because of a default on manufacturer part or other liability is, you are entitled to recover damages from manufacturer. In each such instance, regardless of the basis on which you are entitled to claim damages from manufacturer, manufacturer is liable for no more than damages for bodily injury (including death) and damage to real property and tangible personal property; or any other actual and direct damages resulted from omission or failure of performing legal duties under this Warranty Statement, up to the listed contract price of each product.

Manufacturer will only be responsible for or indemnify your loss, damages or claims based in contract, tort or infringement under this Warranty Statement.

This limit also applies to manufacturer's suppliers and its reseller. It is the maximum for which manufacturer, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS MANUFACTURER LIABLE FOR ANY OF THE FOLLOWING: (1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES; (2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR (3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS), EVEN IF MANUFACTURER, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY.

12. REGULATORY INFORMATION

12.1 FCC AND IC COMPLIANCE STATEMENT

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

12.2 FCC INFORMATION TO THE USER

NOTE: This equipment has been tested and found to comply with the limits for class B digital devices, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generate, uses and can radiate radio frequent energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does not cause harmful interference to radio or television reception, which can be determine by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver.



Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. To ensure compliance with FCC regulations, use only the shielded interface cables provided with the product, or additional specified components or accessories that can be used with the installation of the product.

13. NOTES

[illegible]