AMTEK

250/350/700/750/800

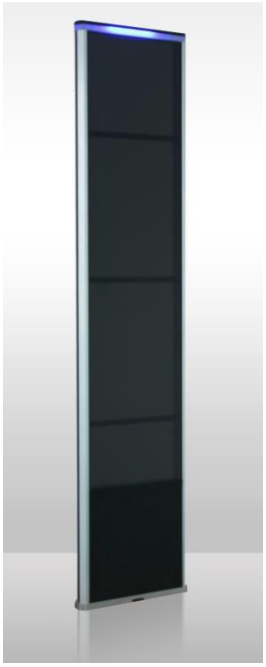
Operation Manual

58kHzAcousto-Magnetic EAS System

valid for

AM Pro-Line electronics (TX/RX)

Hardware Version AMPRO 700V7.3, Firmware Version AT1.2



SAFETY GUIDELINES

- Any manipulation of the system should be done by qualified and trained personnel only.
- Do not open the AMTEK system‟s power supply when connected to power! High voltage!
- Do not touch the antenna wire or matching circuit when connected to power! High voltage!
- Before changing blown fuses or manipulating the antennas, always disconnect from 120V power source first!
- Do not plug in or out the power supply cables to or from the processor board unless the power supply is switched off!
- Do not insert or take-out any jumpers unless the power supply is switched off!
- Route the RX-TX cable and power supply cables through places where they cannot be easily damaged!
- Do not use the system in water condensing conditions!
- Do not use the system in explosive environmental conditions!

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1. INTRODUCTION

1.1. System Description

The AMTEK range of Acoustomagnetic EAS Systems is fully compatible with all 58 kHz tags and Acustomagnetic labels on the market.

The systems are designed to get optimum detection performance and to avoid false alarms at the same time by using digital signal processing and anti-noise algorithm.

The AMTEK systems can be operated in 2 configurations:

1.) Dual system 1 Transmitter and 1 Receiver antenna
2.) Split system 1 Transmitter and 2 Receiver antennas

Working principle: A 58 kHz pulsed magnetic field is generated between the Transmitter (TX) antenna and one or two Receiver (RX) antennas. Any 58 kHz AM label or hard tag brought into the magnetic field will generate a signal which can be detected by the Receiver antennas and subsequently trigger an alarm signal.

F40 tag

Mini Pencil

Super tag II

DR label

Picture 1.1 - AM Hard Tags and Labels

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1.2. Typical System Performance

Depending on the AM tags used and the installation environment, the detection distance can vary. The following table gives an overview of typical detection ranges with the different AMTEK systems and security elements.

Distances(m)	AMTEK 250	AMTEK 350	AMTEK 750
F40 tag	2.5	2.6	2.5
Mini Pencil	2.2	2.3	2.2
Super tag II	1.8	1.9	1.8
DR label	1.2	1.9	1.8

1.3. Additional Features

All Version AMTEK V7.3 systems are equipped with 2 additional alarms that allow an easier handling of certain situations.

The **Jammer alarm** indicated that the system is compromised by a jammer signal.
The alarm light and buzzer sequence for Jammer alarm can be set via InfoNet software.
In this case the detection of the system is disabled to avoid false alarm.

The **Near Tag alarm** is triggered by a continuous detection of a stationary security element in the detection zone. The alarm light and buzzer sequence for Jammer alarm can be set via InfoNet software. By enabling the Near Tag alarm, one can easily detect tags that have accidentally been placed inside the system"s detection area.

Both of the above described alarm features can easily be enabled/disabled by activating the respective checkbox inside the InfoNet software.

Programmable on/off time:

The system can be automatically switched on/off at certain times. The time for ON and OFF can be set via the InfoNet software. The system will consume much less power during OFF time (Energy saving)

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Incoming/outgoing alarm (only with integrated visitor counter):

The system is able to distinguish between incoming and outgoing alarm if equipped with the optional integrated visitor counter. The alarm indication is different for the two types of alarms allowing easy identification of incoming and outgoing alarm.

Firmware update:

If a new firmware becomes available, the processor‟s firmware can be updated via the InfoNet software allowing update of new system features without replacing the electronics.

Selection of light/sound sequence:

The system alarm light and sound can be programmed in different sequences. Different aisle could have different sound sequence enabling the identification of where the alarm came from. It is also possible to have the alarm light on longer than the alarm sound to easily identify the alarm position. For multi aisle installation this feature is especially useful.

Remote Tuning/Service/Monitoring

In order to reduce the need for service calls, especially for remote places, our PRO-LINE systems can be accessed via Internet. The system service provider can log-in from their office into the system via **infoNet Cloud** (provided they are authorized) and diagnose/solve potential problems.

Integrated bidirectional visitor counter

- Possibility to count customers per aisle and to determine the direction of movement (in or out of the shop)
- Showing the importance of the alarm (is a customer moving in or out during the alarm)
- Detecting undefined alarms
- Pinpoint the exact aisle where the alarm occurred
- Generate reports on visitor counts and alarm counts

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2. AMTEK SYSTEM

2.1. Component Overview

The standard system comprises the following components:

a.) Processor Board	AMPRO 700V7.3
b.) Receiver Board	AMRB 700V5 or higher
c.) Power Supply	AMPSS 700V6 or higher
d.) Antenna	AMTEK 250/350 or AMTEK 750/800
e.) Connection Cable TR	AMCTR 710
f.) Computer Cable	LAN Cable AMCOM 710
g.) infoNet Software	infoNet V4or higher

Please note that the Version 7.3 processor board hardware can come with different Firmware Versions. Please check the label on the processor if you are not aware of your board"s firmware version.

2.1.1 Electrical Specifications:

Power supply -Output	40VDC/ 600mA or 18VDC/400mA
-Input	100-240VAC, 50/60Hz
100VAC/0.31A Transmitter Operating Frequency	58 kHz (±200Hz)
Transmit Burst Duration	1.5ms or 1.6ms
Max. Transmit Current	12A peak
Transmitter Coil Resistance	2.7 ohm (±5%)
Burst Repetition Rate	50Hz
Receiver Center Frequency	58 kHz
Receive Coil Resistance	4.0 ohm (±5%)
Alarm Audio level	95dBA
Environmental Ambient Temperature	0°C to 50°C
Relative Humidity	0 to 90% (Non-condensing)

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2.2. Processor Board AMPRO 700V7.3

The picture below shows a top view of the TX board. Table 2.2 lists the board"s relevant connectors and tuning components together with their functions.

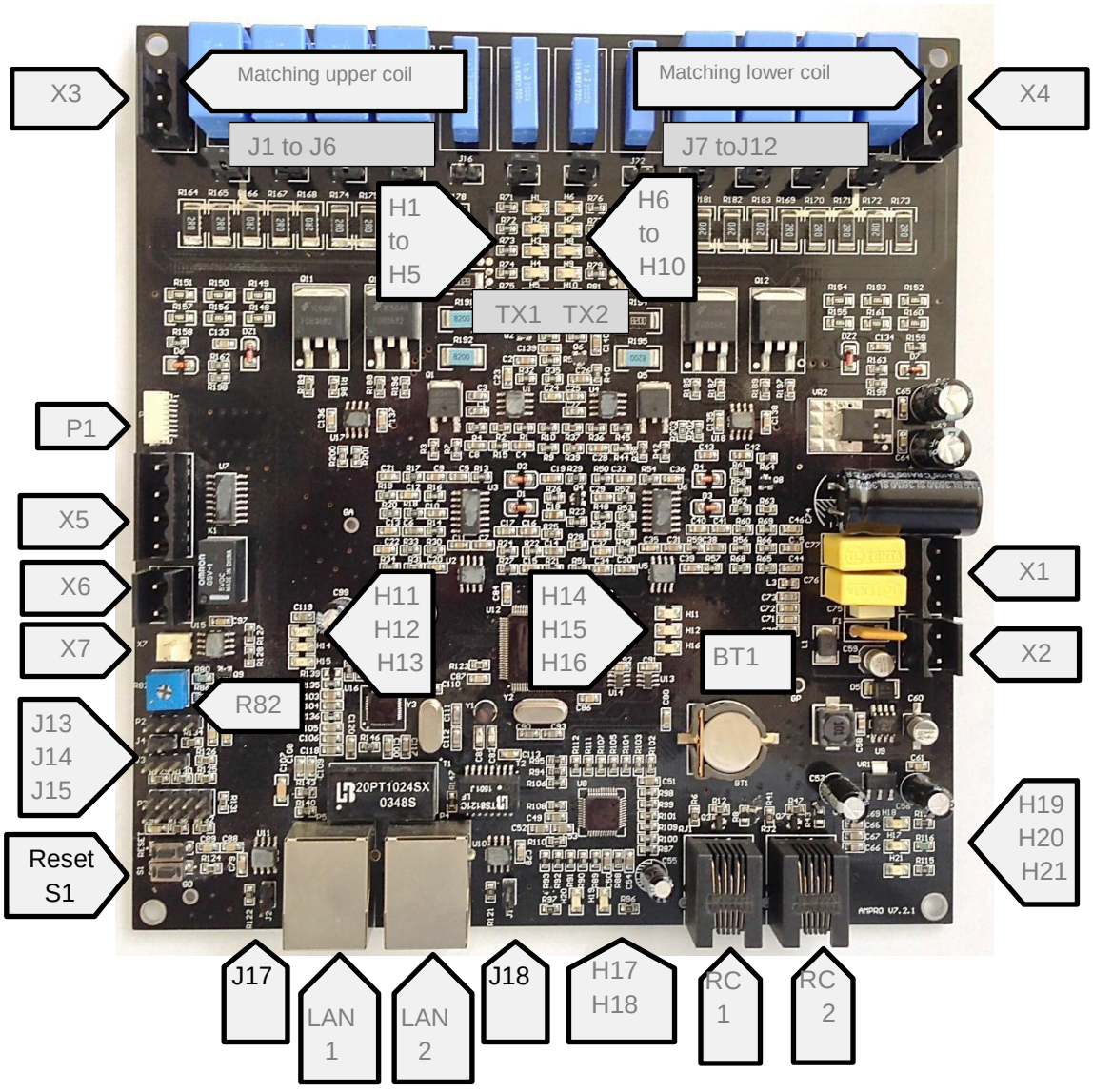

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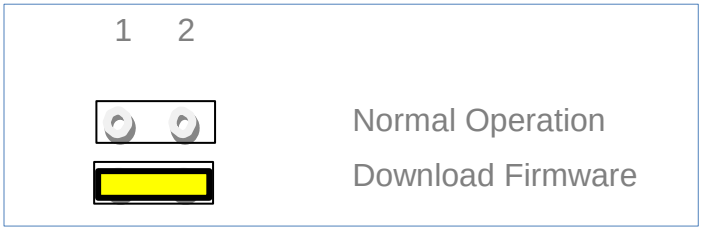
Table 2.2 - TX board's relevant components for connection and tuning

Component	Function	Component	Function
X1 & X2	Powers supply	RC1	Receiver channel 1
X3	Upper TX loop connection	RC2	Receiver channel 2
X4	Lower TX loop connection	TX1	LED bar for upper TX loop
X5	LED Alarm Lights	TX2	LED bar for lower TX loop
X6	Relay output NO contact	LAN1	Switch port 1
X7	Buzzer connector	LAN2	Switch port 2
J13	Factory use	H19	12V power supply
J14	Download Firmware	H20	5V power supply
J15	Master/Slave selection	H21	3.3Vpower supply
J16	Factory use	H14	Indicator for Internet
J17&J18	Sync bus termination	H15	Flashing →Normal Operation
BT1	Real Time Clock battery 3V	H16	Indicator for Master/Slave
R82	Buzzer Volume	H11 – H13	LAN switch indicators
		H17 – H18	LAN Data indicators

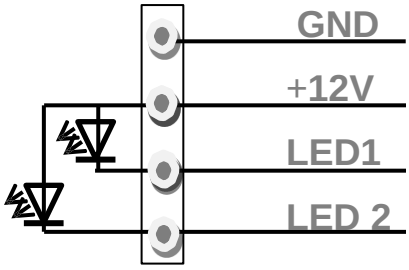
Jumpers 14 (Download Firmware)

The firmware of the AM Processor board V7.3 can be updated via the **infoNet** software.
For more details see Software Manual V4.2



LED Light connector X5

The AM Pro-line V7.3 board allows the connection of a two color LED top-light.



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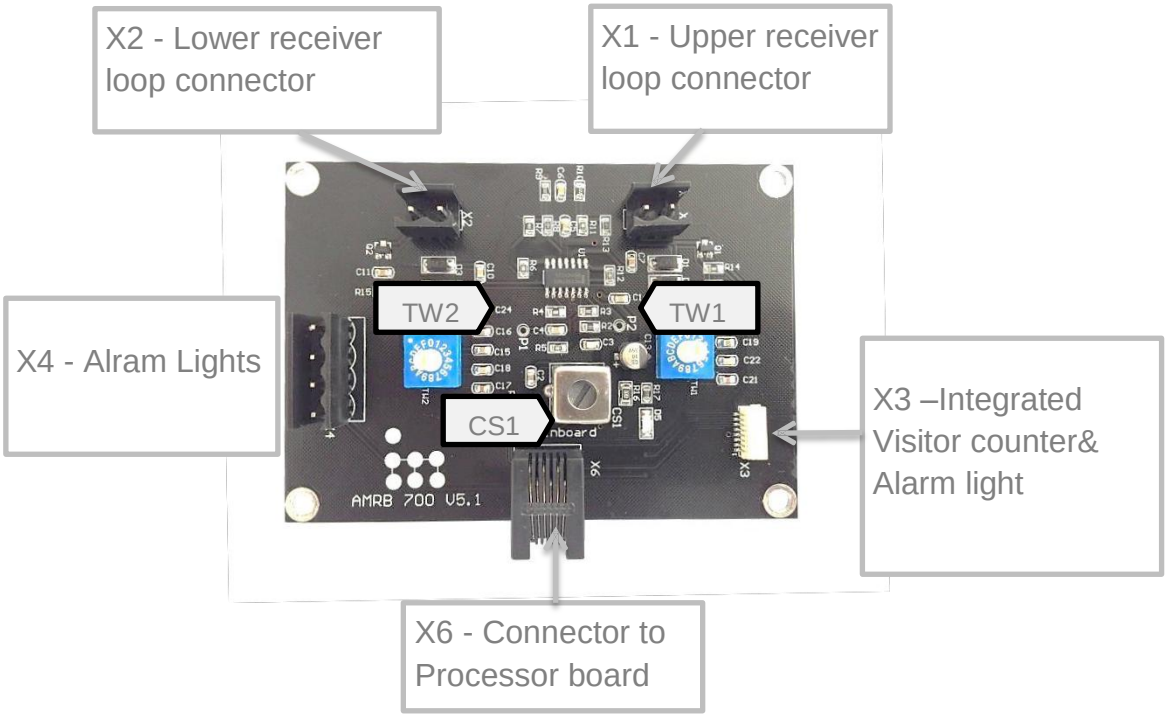
2.3. Receiver Board AMRB 700V5.1

Picture 2.3 below shows the RX board and the relevant components:



Each RX board controls the resonance of two loops in the RX antenna. The matching for the upper and lower receiver loop can be adjusted through the 2 rotary switchesTW1 and TW2. TW1 adjusts the matching for the upper loop and TW2 adjusts the matching of the lower loop.

> All our antennas are pre-tuned in the factory and RX antenna matching WILL NOT HAVE TO BE ADJUSTED in almost any case. When installing the system near metallic frames or metallic doors, resonance value may be affected.

In this case, the RX matching can be modified for the upper and lower loop using the rotary switches TW1 and TW2.

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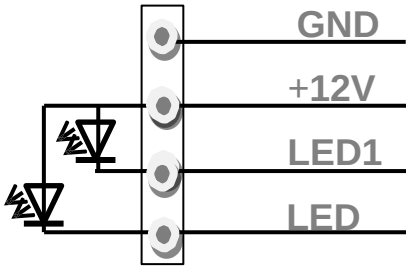
LED Light connector X4

The AM Pro-line V5 Receiver board allows the connection of a two color LED top-light.



2.4. RX-TX-Connection Cable AMCTR 710

The AMCTR 700 connection cable is supplied together with the RX antenna. It connects the receiver board with the processor board of the TX pedestal. Connect one end of the cable to the RX board (X6) and the other end to the TX board (RC1 orRC2).

To avoid noise capturing, the connection between the RX and TX antenna should be as short as possible.

Picture 2.4 - AMCTR 710 Connection Cable

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2.5. Dual Power Supply AMPSS 700V6

The Dual power supply AMPSS700V6 is used for all our AM systems using V4 or V6 processor boards. It provides the power and the Synchronization signal to the system electronics for maximum 2 TX antennas.

Technical specifications for AMPSS 700	
Dimensions (L x W x H)	210 x 150 x 70 mm
Weight	3.0 kg
Input voltage / frequency / current	100-240VAC,50 / 60Hz
Mains inlet type	AC IEA with ON/OFF switch
Output voltage	40VDC and 18VDC
Output cable	5x1mm^2, 8m length. This cable can be extended to 15m using a 3x1mm^2 cable or thicker.
Temperature range	0 – 50C
Primary fuse (FP)	220VAC – 1A slow , 100VAC – 2A slow
Secondary fuses: (Inside the housing)	F1 (40V, 3A), F2 (18V, 3A) F3 (18V, 2A), F4 (40V, 2A) F5 (18V, 2A), F6 (40V, 2A)

AMPSS 700 V6 power supply

X1	Power Processor board 1
L1	40VDC (LED red/blue)
L2	18VDC (LED red/blue)
X2	Power Processor board 2
L3	40VDC (LED red/blue)
L4	18VDC (LED red/blue)

If any LED lights “red” means the respective voltage is missing

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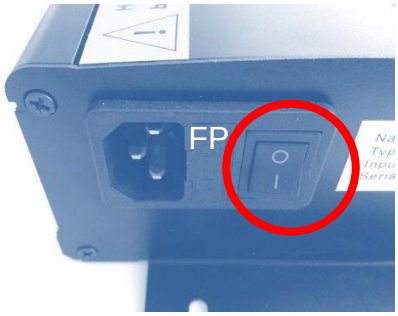

To operate the power supply, connect the power supply via the main power cable to a main power outlet and switch on the main switch SM.

Make sure the “Earth” of the power plug is connected to the power socket.

The AMPSS700V6 has 2 system power outlets (X1 and X2)

The output cable of the power supply is connected to the processor board through 1 x 3 pin and 1 x 2 pin connectors.

If the connector needs to be removed for some reason, the color code of the cables must be observed. To avoid damages to the power supply and to the system electronics replace the fuse with the same kind of fuse if necessary.

If any fuse needs to be changed always unplug the power supply from the AC source first.

Always connect the power supply to the system first before switching on the power supply.

Always switch off the power supply first before disconnecting the power supply to the system.

Local laws and regulations must be respected when installing and servicing this device

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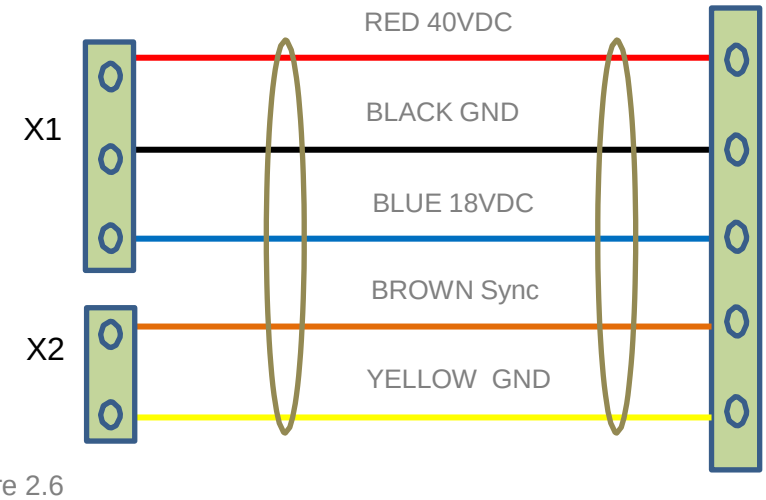
2.5.1 Power supply cable/connector

V7.3 Processor board Power supply V6 (X1 or X2)



Picture 2.6

Please note that the power supply cable between the power supply and the processor board should not exceed 15 meter.

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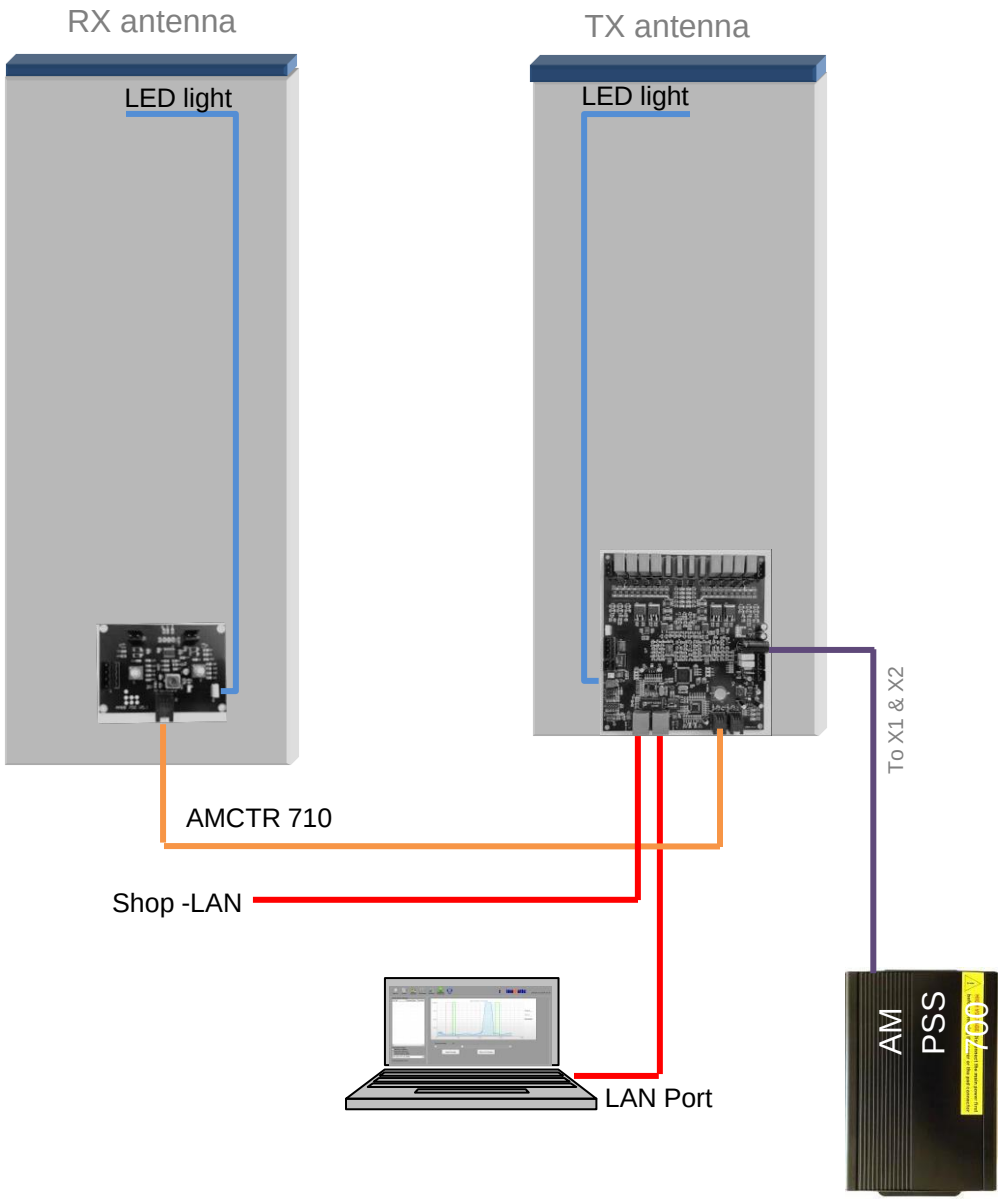
2.6. System Configurations

One processor board (TX) can drive one or two RX antenna(s), thus resulting in two configuration modes: “Dual and Split system. The following gives a schematic overview about the necessary components and connections for both configurations.

2.6.1. Dual System



Hardware synchronization might only be necessary, if 2 or more TX antennas are used.

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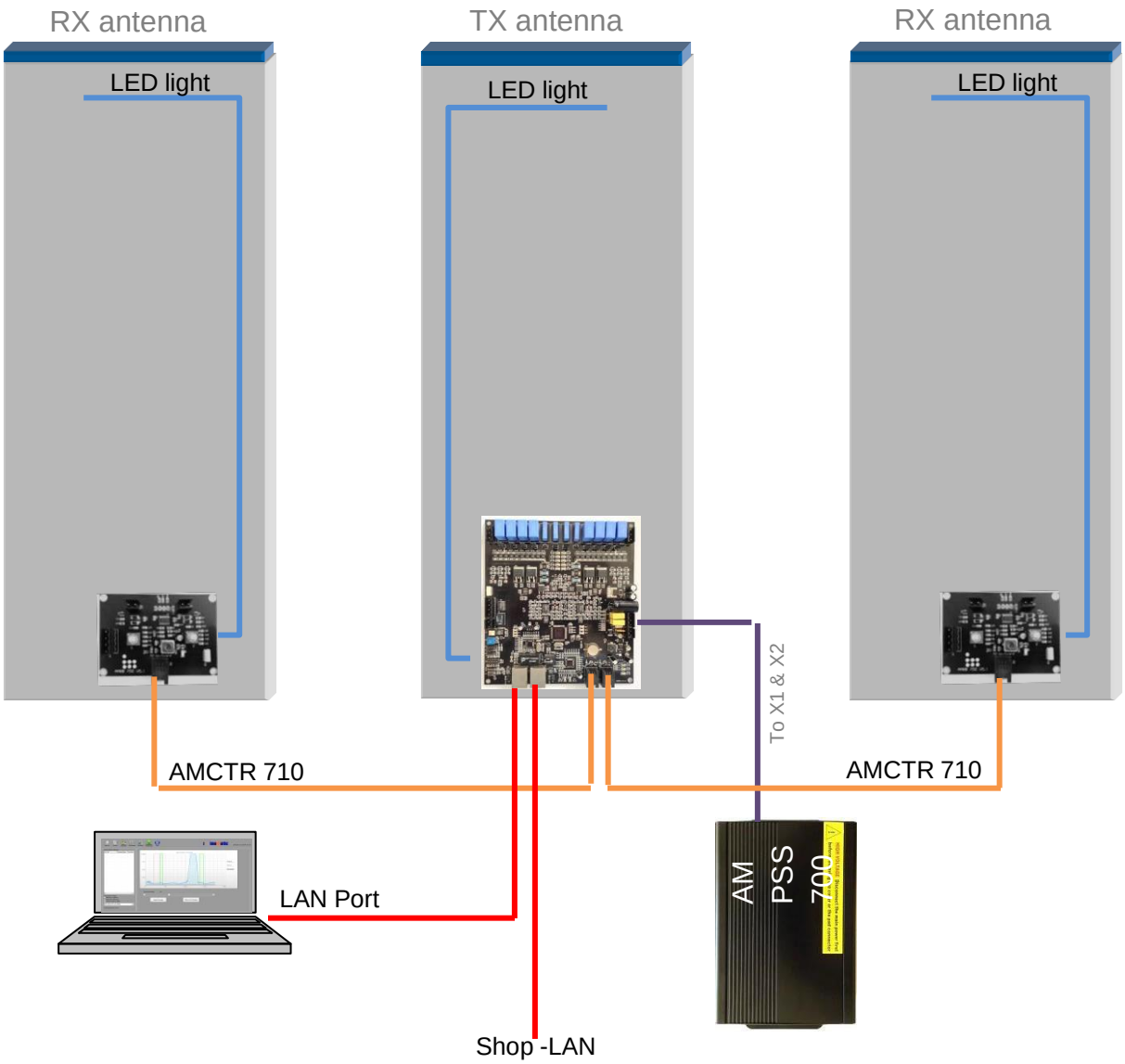
2.6.2. Split System



To reduce any noise influence, make sure:

1.) To place the power supply as close as possible to the TX antenna.

2.) To have the connection between the RX and the TX antenna (AMCTR 710 Connection Cable) as short as possible.

Hardware synchronization might only be necessary, if 2 or more TX antennas are used.

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3. SYSTEM INSTALLATION

This chapter covers the various issues related to Acoustic Magnetic systems and Electronic Article Surveillance systems in general, like:

- Noise sources
- Installation guidelines

3.1. Noise sources

Below there are various noise sources listed that might affect the performance of any EAS system. It is strongly recommended to either eliminate these noise sources (as far as possible) or maintain the largest possible distance to these noise sources.
The following devices can create or absorb AM noise signals which can reduce the performance of an EAS system:

- AM systems installed in other shops (even if they are installed up to 100m or more away from your store).
- Any electronic device that operates around 58 kHz or produces harmonic frequencies around 58 kHz.
- An active laptop. The back light in the screen can create a lot of noise which is detected by the EAS system and can reduce the performance dramatically. Make sure to keep laptop computers at least 3 meters away from the antennas.
- (Moving) Objects containing metal, like sliding and revolving doors, elevators, escalators, roller shutters, frames, etc.
- Electronic devices, like computers, laptop screens, LCD screens, cash registers, engines, transformers, etc.
- Vertically positioned power cables, both low voltage and high voltage.
- Lights (flashing, fluorescent, halogen, gas-de-charge, etc.)
- Metal scan systems installed in close vicinity.

3.2. System Part List

a.)	2x Pedestal AMTEK	(1 TX and 1 RX)
b.)	1x Power supply	AMPSS 700V6
c.)	1x Connection cable TR	AMCTR 710
d.)	1x Computer Cable	LAN Cable AMCOM 710
e.)	1x Computer software	infoNet V4 or higher

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3.3. Installation Requirements

- Make sure all parts have arrived. Make sure there are no damaged parts. If there is any damaged part, notify the transport company.

- Installation shall be performed by a qualified installer with all necessary national/local electrical/fire codes training.

- If possible, connect a set of antennas (1 TX and 1 RX) and put them in the required position in the entrance/exit **without** drilling holes in the floor and bolting the antennas down. Switch on the system and test the performance. In this way the noise level and system sensitivity can be determined and if necessary (in case of high noise or poor sensitivity) the system can be moved to find a better position

- The pedestals shall be placed at a distance equal to or smaller than the maximum value depending on the kind of tag.

- Avoid placing TX/RX pedestals near metallic structures (doors, frames, etc...) or neon/discharge lamps.

- Metal framed doors may never swing between the EAS antennas, as this will distort the energy field of the system in such a way that it might result in high noise, poor detection and potential false alarms

- Always install the TRX antenna on that side where the highest noise is or where the highest noise can be expected.

- Not connected RX antennas nearby a running system are to be avoided. They act as a big hard tag.

- No power line (including power supply or TX antenna power line) shall be located in the same pipe/tube with the TX-RX interconnection cable.

- Avoid unnecessary long cables. Run the power supply cables in a direct line to the EAS antennas. Never run power supply cables vertically up the wall within one meter distance of the antennas (never around the entrance/exit doorframe).

- The AC source should be a clean AC source. If possible do not share the AC source with computers, neon lights/discharge lamps, or equipment with switching power supplies, make sure the “Earth” of the power supply plug is connected to the power supply socket.

- Blown fuses shall be replaced with fuses of the same kind.
  ALWAYS UNPLUG power supply **BEFORE CHANGING** blown fuses!

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3.4. Installation Procedure

- **Remove base covers from pedestals.**

  Electronics will now be visible. Confirm all connections are firmly in place.

- **Place TX pedestal in the place to be installed.**

  Consider the position of AC 120V/60Hz power source. Ensure that 120V 60Hz AC source can be connected with the Power Supply and that the Power Supply output cable can be connected with the TX pedestal.

  Avoid placing TX/RX pedestals very near metallic structures (doors, frames, etc...) or neon/discharge lamps and LED, LCD monitors.

- **Place RX pedestal at the place to be installed.**

  It is strongly recommended to tune the system to its final working conditions BEFORE drilling any hole! Depending on tag type, RX pedestal can be placed at different distances from TX pedestal (See “System Performance” on page 6).

- **Connect RX pedestal to TX pedestal using the connection cable AMCTR 710**

- **Confirm all connections to the loops, receiver board, and processor board are firmly in place.**

- **Before turning the system on, remove all 58 kHz tags near to it.**

- **Connect Power Supply to the TX processor board with the 2-pin and 3-pin connectors**

- **Connect Power Supply to AC 120V/60Hz source, switch on the power supply.**

- **Connect the computer via the LAN cable and start InfoNet software (for tuning please refer to the InfoNet manual)**

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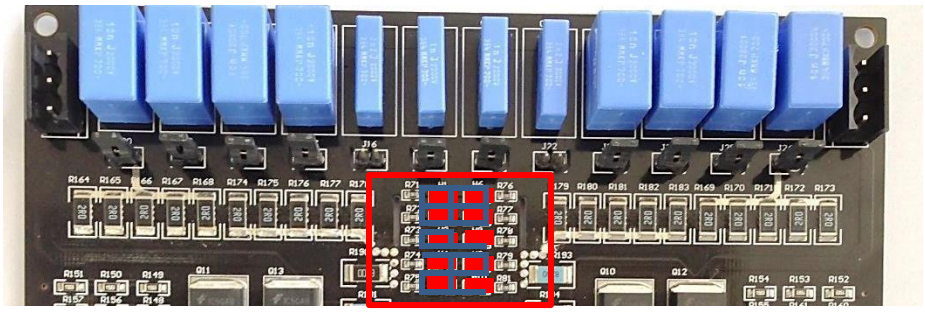
4. TUNING OF THE MATCHING CIRCUITS

4.1. TX Antenna Matching

All our antennas are pre-tuned in the factory and the TX Antenna matching WILL NOT HAVE TO BE ADJUSTED manually in almost any case. When installing the system near metallic frames or metallic doors (which is not recommended), the resonance value may be affected and manual matching is required.

The LED bars TX1 and TX2 should light up completely when the system is powered on.



If the LEDs do not light up at all, then check:

Whether “TX block” is activated by the respective checkbox inside the infoNet Software (see infoNet Manual for further details).

→ De-Activate the TX block if not done yet.

The LEDs should light up now.

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If the **LED bars do not light up completely** on one or both sides, then:

It is necessary to adjust the matching of the antenna loops. The AMTEK700V6 processor board is designed to be used for all AMTEK systems. Since every AMTEK system shows slightly different antenna characteristics, the board allows the selection of different capacitors for each antenna loop by inserting the respective jumpers. The matching capacitors are located at the upper part of the board.

The matching Level is shown by the LED bars TX1 and TX2:

If the antenna is mismatched, not all of the 5 LEDs of LED bars TX1 and TX2 will light up. **In that case, the TX resonance of the upper and lower loop can be modified by changing the matching capacitance through the 6 jumpers in the relevant matching circuits** (refer to default setting below).

Switch off the power first before you change any jumpers!
Wait a while for the capacitors to discharge! High voltage!

Function	Relevant jumpers	Associated LED bar
Matching of the upper loop	J1 to J6	TX1
Matching of the lower loop	J7 to J12	TX2

Table 4.1 – Jumpers for matching of TX antenna

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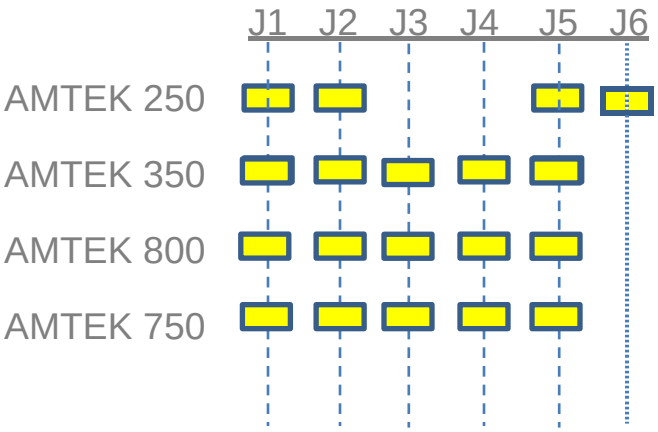
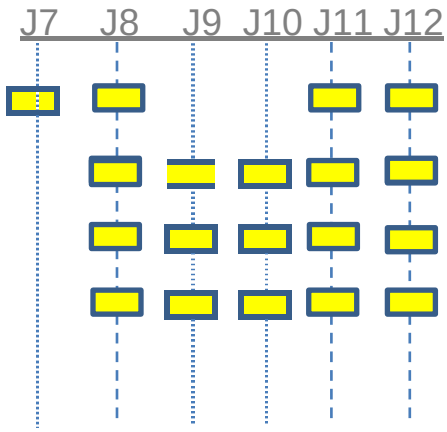
4.2. Matching capacitors default setting:

Upper antenna loop



Lower antenna loop



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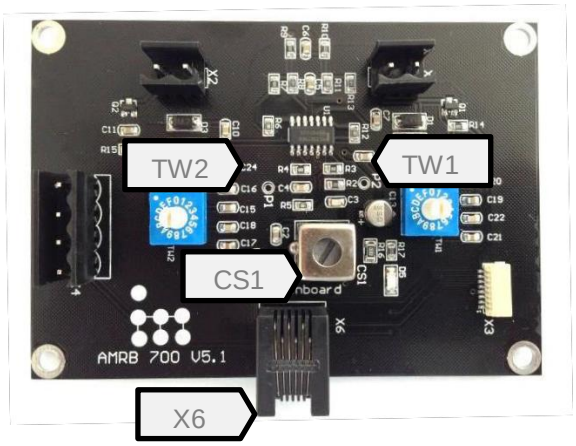
4.3. RX Matching Circuit

All our antennas are pre-tuned in the factory and RX antenna matching WILL NOT HAVE TO BE ADJUSTED in almost any case. When installing the system near metallic frames or metallic doors, resonance value may be affected.

The amplitude of the received RX signals is highly correlated to the matching of the RX board. Hence, when tuning the RX board‟s matching circuit, the signals displayed in the infoNet Software are important for the optimal tuning.

RX Matching:



Set S3 and S4 to the default values according to your system:

Default setting of S3 and S4 for different AMTEK systems

AMTEK…	TW2	TW1
250, 200	4	4
350	1	1
800, 750	0	0

Depending on the tolerance of the system components and environment, the default value might not be suited for optimum performance.
If you have to tune the inductor CS1 please do it carefully with a non-metal screw driver, otherwise you might damage the ferrite core.
For detailed description of the RX tuning refer to the infoNet Manual.

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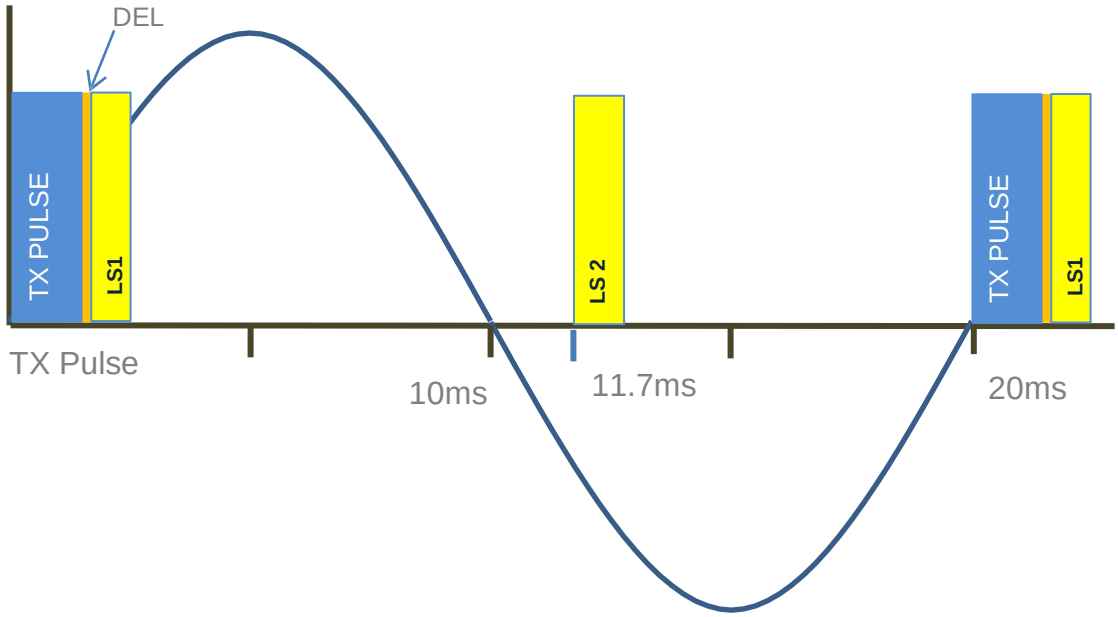
5. SYNCHRONIZATION

5.1. AM operating principle

The AMTEK AM systems operate on the pulse-listening principle. Using the zero crossing of the 50Hz mains frequency as a trigger, a short TX pulse of 58 kHz signal is transmitted and a receiver window is „opened" after the TX pulse has stopped.
If a tag was present within detection range during the TX pulse, the resonance of this tag will be detected in the Signal (Receiver) window and an alarm will be triggered.
A noise reference window is opened to detect the environmental noise. This signal is compared with the signal received in the Signal window and allows the software to properly distinguish a tag signal from a noise signal.

The figure below shows the AM operating principle (at 50Hz, with a default delay of 10µs) during one 50Hz cycle



TX Pulse	1.6ms or 1.5ms (setting via InfoNet)
LS1	Signal window 500µs
LS2	Reference window 1000µs
DEL	Detect delay 100µs

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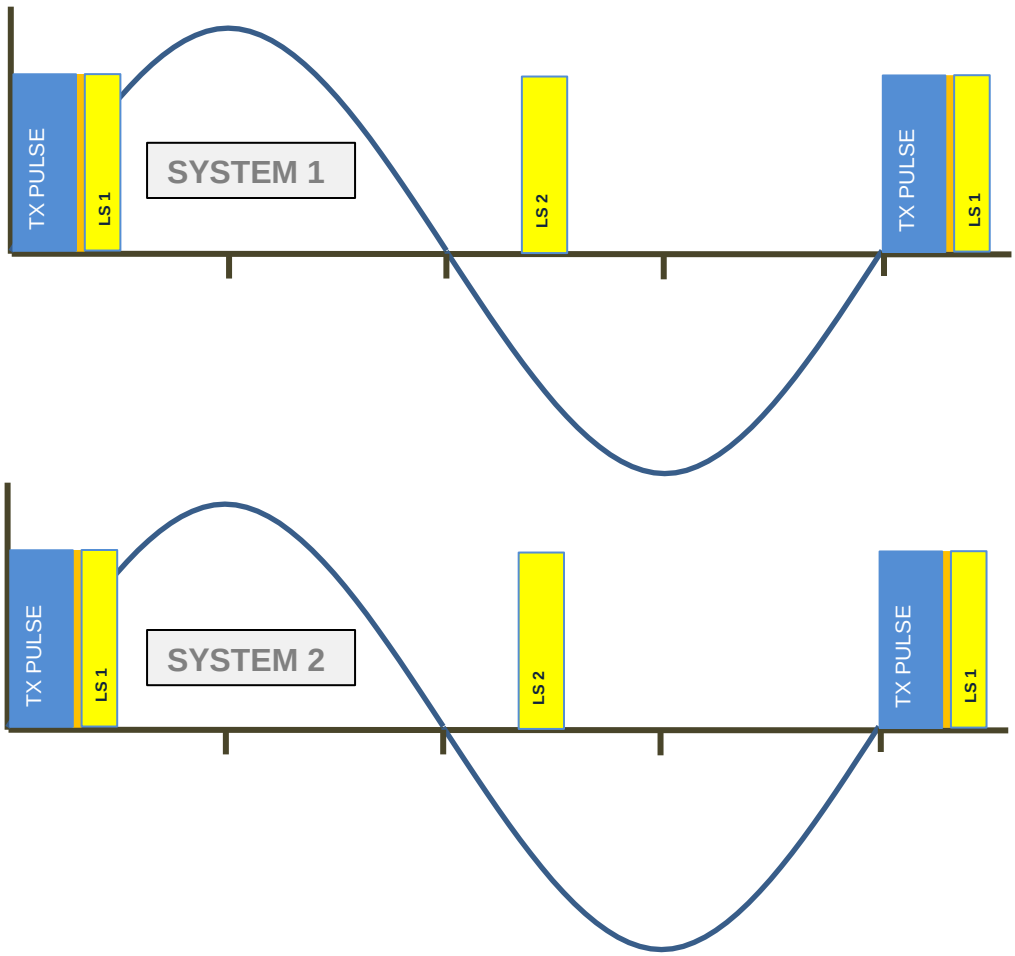
5.2. Synchronization principle

When multiple AM systems are installed in each other‟s vicinity, it‟s very important to properly synchronize the TX pulses and receiver windows for all systems involved. If systems are not properly synchronized they will create false alarms and poor detection. Keep in mind that AM signals, when compared to other EAS technologies, can “travel” quite far (up to 100m or more) because of their longer wavelength.

Two AM systems that are properly synchronized



If two or more AMTEK systems are connected to the same main power phase they would not need to be synchronized by either hardware or software.

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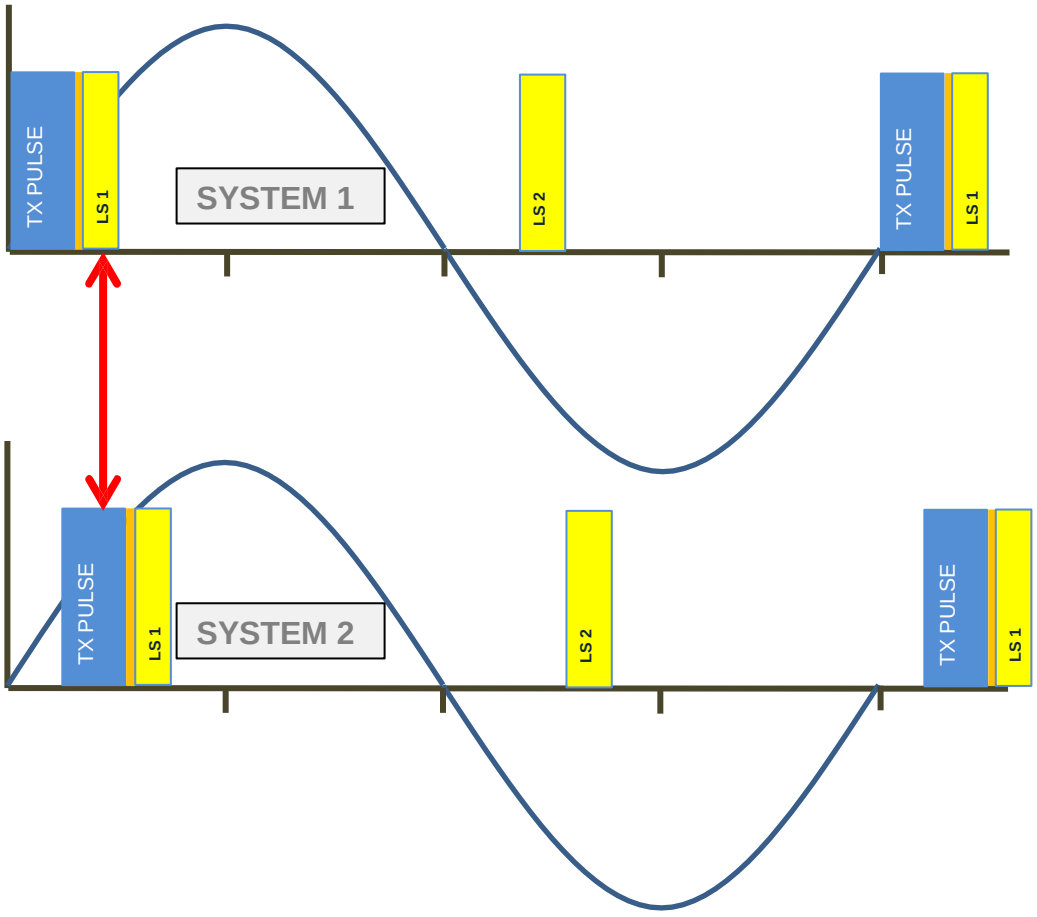
Two AM systems that are NOT synchronized

The TX pulse of system 2 starts later than the TX pulse of system 1, resulting in the fact that system 1 is receiving the TX pulse of system 2 in its receiver window. This might create false alarms and poor detection on system 1, whereas system 2 will function properly as the TX pulse of system 1 is not affecting the receiver window of system 2. This problem can be solved by making sure that both systems transmit and receive at the same moment, which can be realized by changing the "**Syncron**" value time for one of the two systems using InfoNet software.



Please note that any TX pulse should also not fall into to the Reference window LS 2 as it would push up the noise level of the system dramatically. The system may not alarm but the performance will be affected.

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5.3. Hardware Synchronization

Synchronization can be done via software or hardware. The necessary settings for hardware synchronization are described below. A description of the software-based synchronization is included in the **infoNet** Manual.

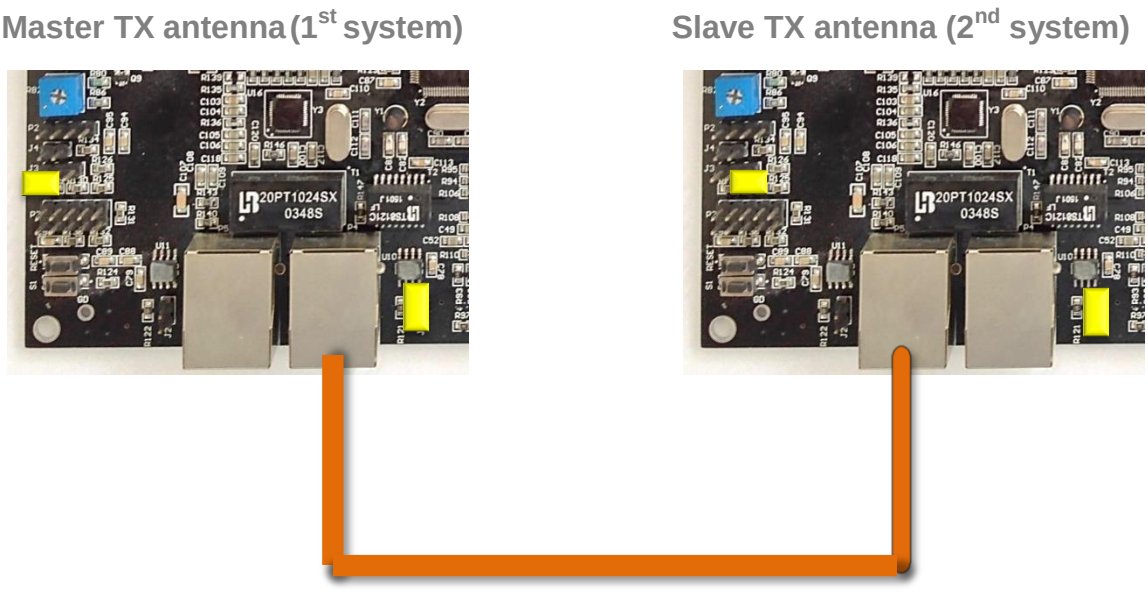
Hardware synchronization allows a number of X AMTEK systems to be synchronized with another AM system nearby by synchronizing only the AMTEK “Master antenna”. The “Slave antennas” will automatically follow the “Master” synchronization.

The LAN ports (LAN1 and LAN2) can be used for connection to the shop LAN and at the same time for hardware synchronization.

1.) One TX processor board has to be set as Master and the other(s) as Slave.

2.) The hardware synchronization ports (LAN 1 or LAN 2) must be connected with a shielded LAN cable.

The picture below illustrates the connection and the necessary settings for Master or Slave operation.



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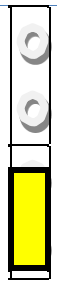
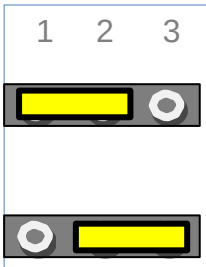


J17 & 18
Sync Bus Termination
All other slaves

Both end of the sync cable (bus)

One “Master” can drive several “Slaves”. In order to proper terminate the Master/Slave Sync bus-cable, the Jumper J17 or 18 has to be inserted at the beginning of the sync bus-cable (usually Master antenna) and the end of the bus-cable (last Slave board).



To set to Master mode (the default mode), put the jumper J15 in position 2 and 3. For the antenna to operate in Slave mode put the jumper in position 1 and 2.

When using hardware synchronization, you must set the synchron value to 0 for all “Slave TX” boards by means of the infoNet software (see infoNet Manual). Shifting the Synchron value for the master TX will automatically shift the Synchron value of all connected slave antennas.

Please do not turn on the power before the configuration is ready. First switch on the power supply for the “Slave” antenna and then the power supply to the “Master” antenna.

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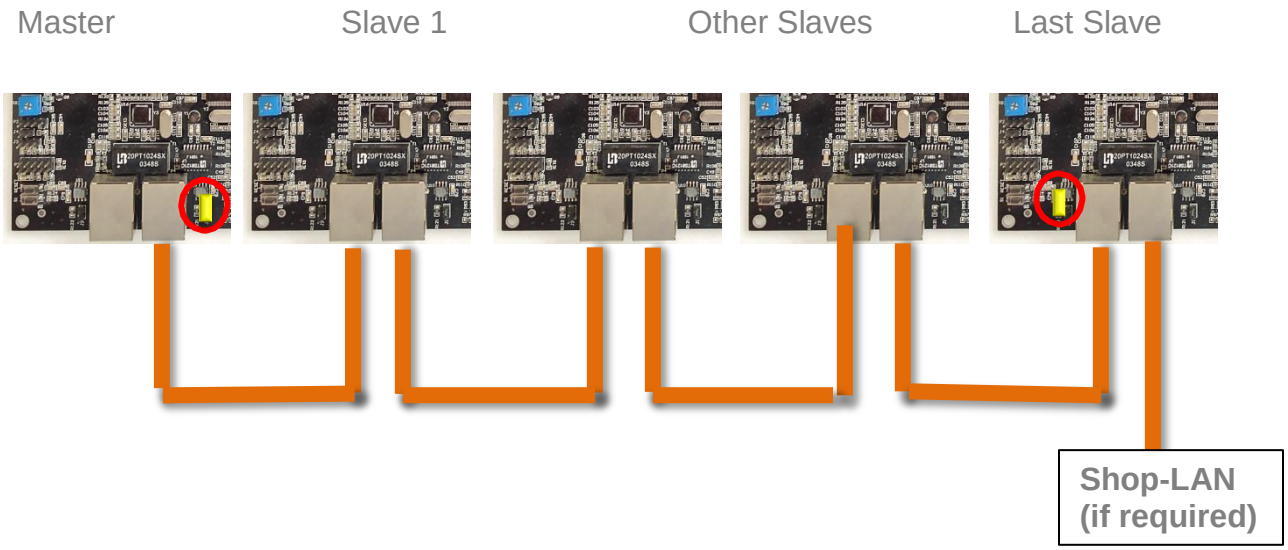
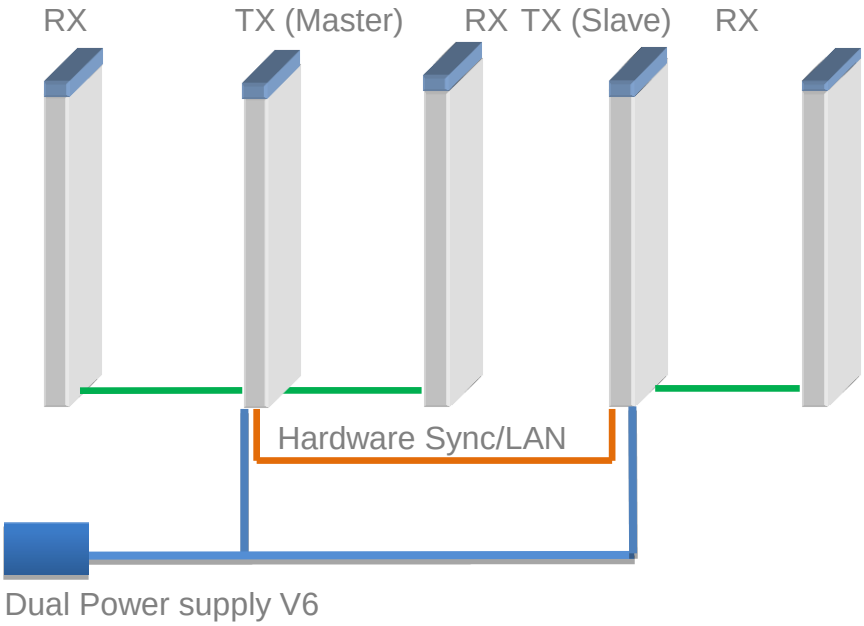
One master can drive several slaves. The way of connection is illustrated below.
Please note the sync cable (bus) has to be terminated to avoid interference.
As such the first board of the sync bus, usually the Master board and the last Slave on the bus have to be terminated by inserting Jumper J17 or Jumper 18.



Installation of 5 Antennas



The new Dual power supply AMPSS 700V6 allows the connection of two TX antennas.

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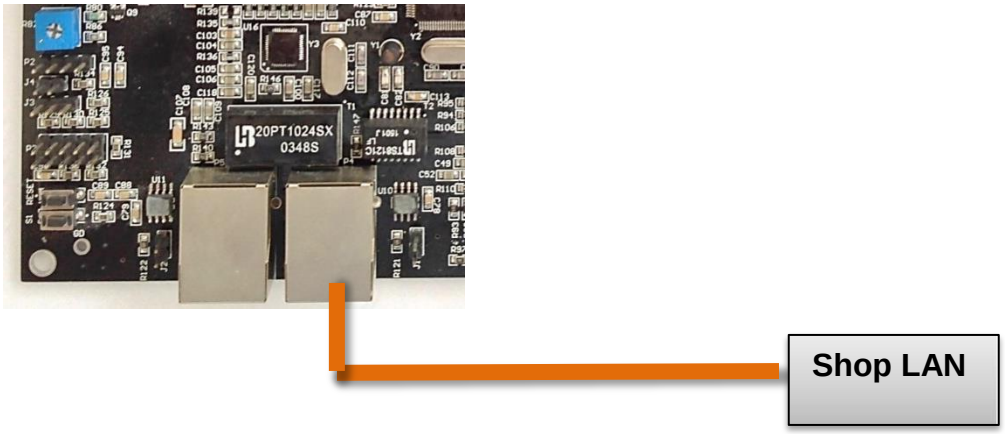
6. LAN CONNECTION

The Pro-Line processor board V7.3 can be connected directly to the shop LAN via a standard LAN cable. Usually no setting of the shop router is required.
If the board is connected to the LAN, the following features will be available via **infoNet Cloud**

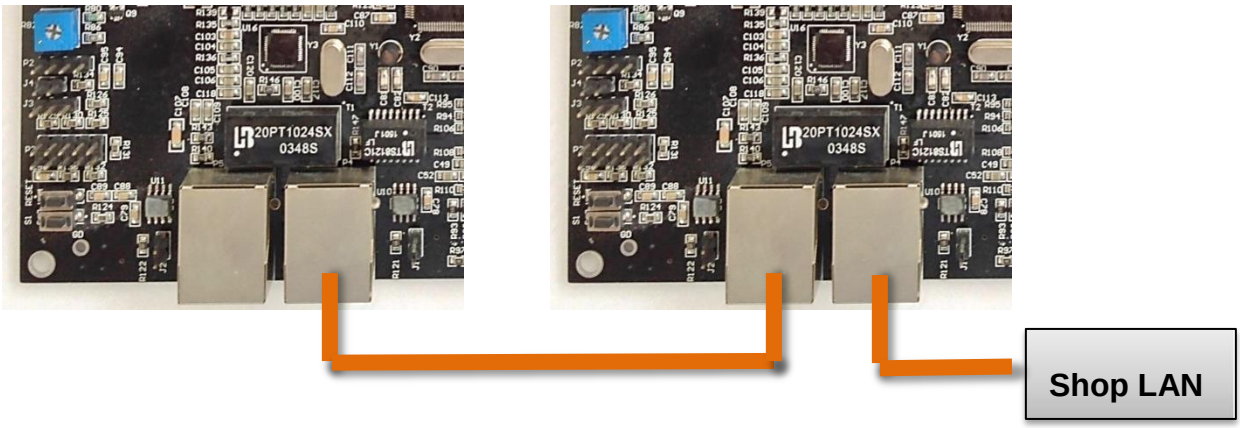
a.) Remote service
b.) Remote monitoring
c.) Visitor counter analysis (if equipped with integrated visitor counter module)

For more set-up information please refer to the **infoNet** V4 software manual

Connection of 1 System (1 Processor board)



Connection of 2 or more Systems



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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, 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 generates, uses 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 cause harmful interference to radio or television reception, which can be determined 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 is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

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