Technical Manual of
Century AM System Standard Series
(CAB58 Mainboard)

Firmware: V2018-10-16, Software: V4.0, Manual: V1.01

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1. GENERAL INFORMATION



PRECAUTION

The electronics inside antennas are extremely sensitive to electrostatic discharges. Always discharge yourself by touching a ground point before touching any of the electronics to avoid damaging the circuits.



PRECAUTION

Some parts of AM electronics are with high voltage. When power is on, do not touch solder points, PCB radiators or other metal parts.



PRECAUTION

All AM-EAS devices should be powered from the mains supplied by power plants. The power generated by self-owned generator may result in bad synchronization among systems. Also, the outlet must be connected with high quality grounding.



PRECAUTION

The line supplying electricity to the systems shall not be shared with other electronic or electric loads, e.g. electronic transformers, neon/spot lights, electrical engines, computers, LCD screens and cash registers, etc.

2. OVERVIEW OF SYSTEMS

2.1 Main Features of Century Standard Series AM-EAS Systems

(1) Complying with worldwide practical requirement on frequency and operating principle in EAS industry.

- No special interfere to the other AM systems to obtain unfair advantages.
- Work with all tags with 58 KHz central frequency.

(2) Complying with corresponding CE directives.

- Safe in application.
- Legal to promote in EU countries.

(3) Integrate all electronics inside the antennas.

- No external/separate controller required
- One antenna can work independently.
- Real plug-n-play.

(4) Air synchronization

- No need for synchronization among nearby antennas by cables.
- Simple installation. Saving installation cost tremendously.

(5) Energy efficient

- Low power consumption

(6) Multi-window verification

- Enhanced noise immunity

(7) Tag-Too-Close alert

- Identifying reason of false alarm caused by nearby tag simply. Saving service cost.

(8) Relay outputs for CCTV application (normally open)

(9) Alarm messages can be pushed to management platform

(10) Background light (permanent)

- Attractive and strong alert to potential thefts.

(11) Adjustable alarm sound speed and duration.

(12) One master antenna can work with two slave antennas

(13) Remote tuning/service

- Responding to clients' service request quickly.
- Enhancing clients' satisfaction.
- Saving service cost tremendously.

(14) System status monitoring (online & offline)

- Guaranteeing continuous operation of the system.

(15) Alarm counting.

- Following handling results.
- Finding possible defects of the system.

(16) Oscilloscope in tuning software

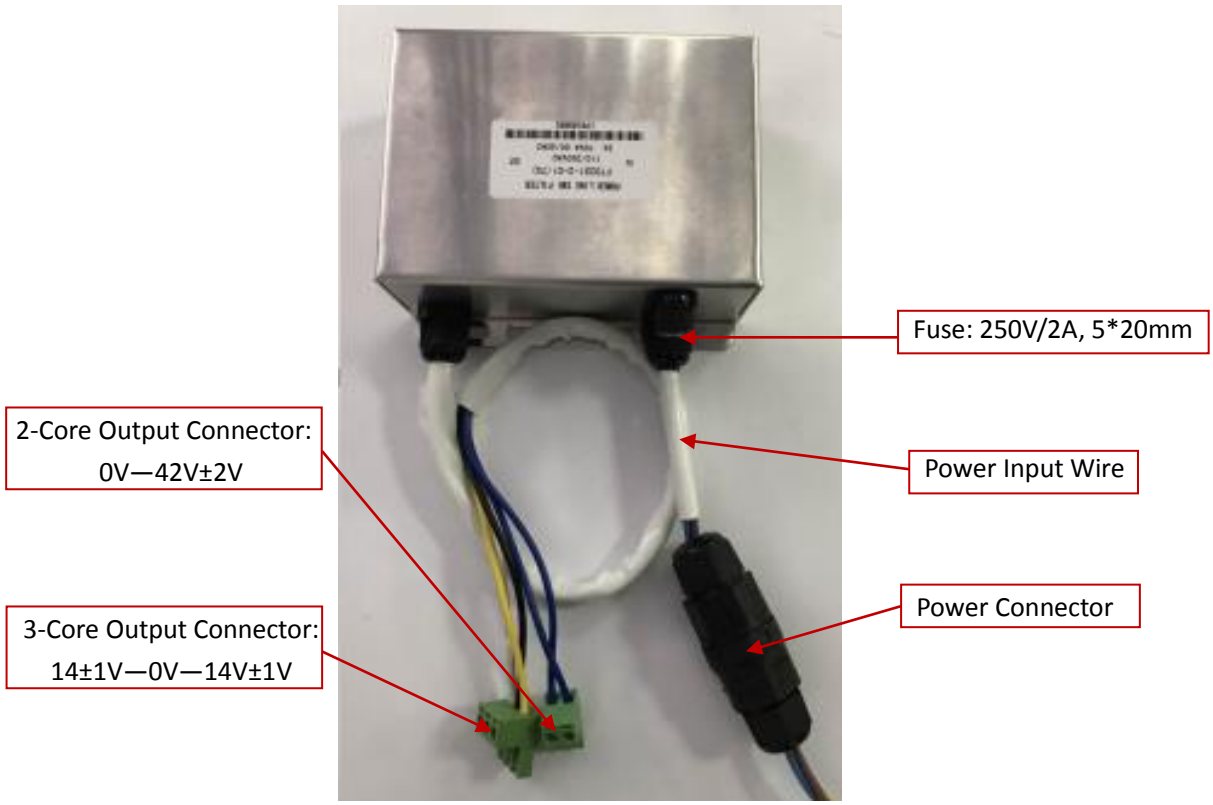
- No need to bring physical oscilloscope for installation and service.
- Intuitively help technicians to set parameters properly.
- Help technicians to identify source of interference.

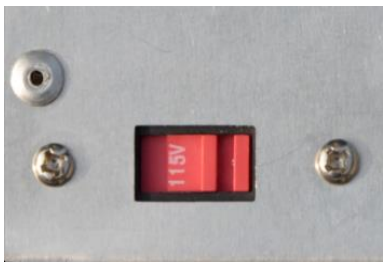
(17) Remote controller for the simplest adjustment

- Easy to bring with.
- Most of parameters can be set with.
- Experienced technicians can use it for tuning of 95% of systems on sites.

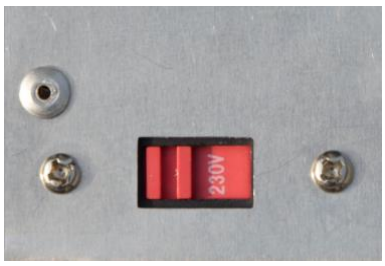
2.2 Power Adapter

Power to a system is provided through a power adapter. Power input is AC110 ± 10V or AC220 ± 20V selected by switching the red switch on the power adapter. **Make sure the selected voltage of the power adaptor is compatible with specifications of the local main before power the system on.**





AC110±10V

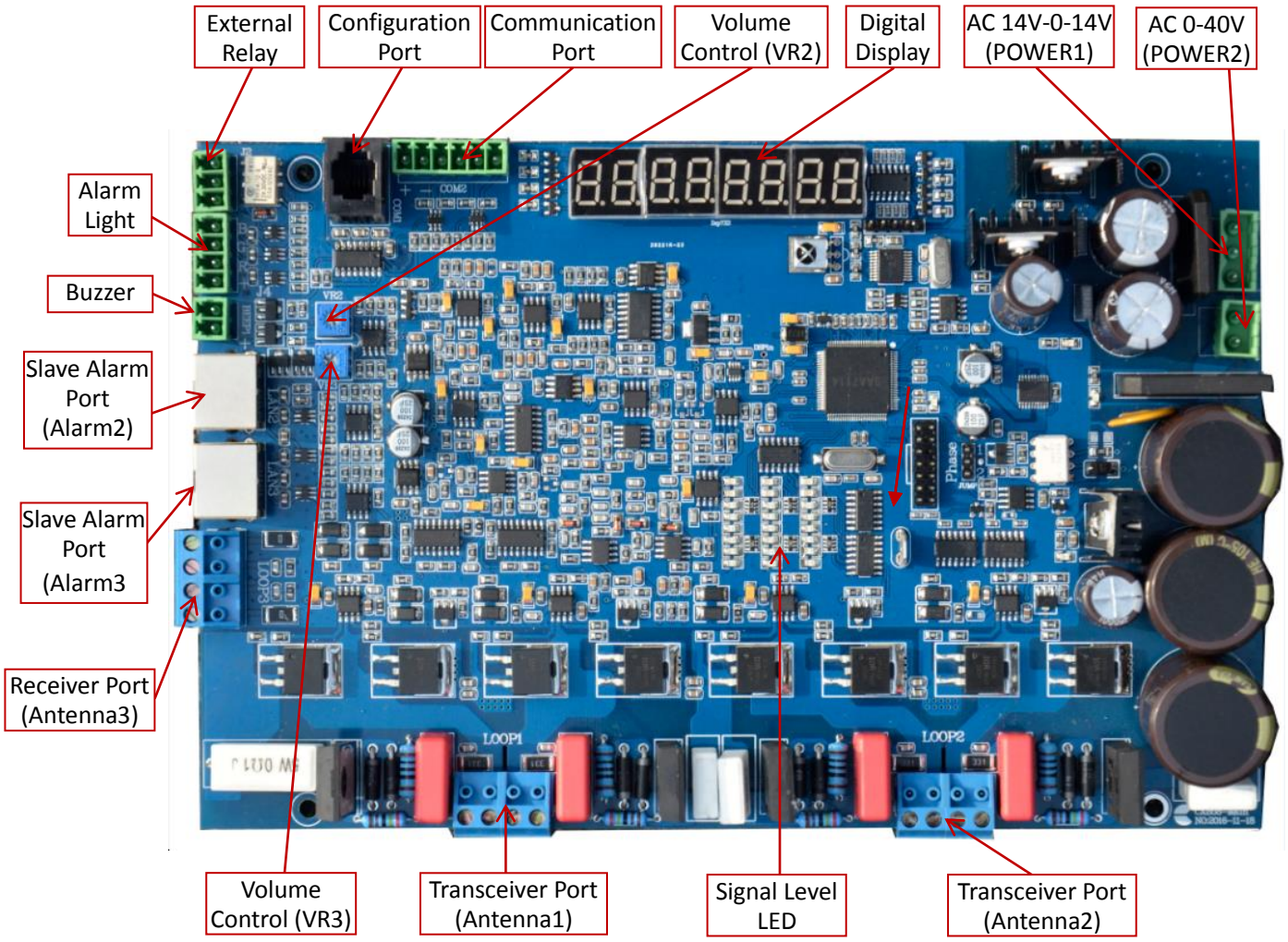


AC220±20V

Power is supplied to power adapter via power connector. When input wires of the power adapter are connected with the power supply wires, the colors of the wires must be matched with each other, i.e. blue to blue, yellow/green to yellow/green and brown to brown.



2.3 Mainboard



Alarm Light	Alarm light interface of LC/XC	**Communication Port**	People counter and remote service interface
Buzzer	Buzzer interface of master antenna	**Volume Control (VR2)**	Volume modulation interface of LC/XC
Slave Alarm Port (Alarm2)	Alarm interface of LS/XS 1	**AC 14V-0-14V (POWER1)**	AC 9.5V~0V~9.5V interface
Slave Alarm Port (Alarm3)	Alarm interface of LS/XS 2	**AC 0-40V (POWER2)**	40VAC interface
Receiver Port (Antenna3)	Receiver interface of LS/XS 2	**Volume Control (VR3)**	Volume modulation interface of LS/XS 2
External Relay	The external relay for CCTV, access control, etc.	**Transceiver Port (Antenna1)**	Transceiver interface of LC/XC
Configuration Port	Configuration cable interface	**Transceiver Port (Antenna2)**	Transceiver interface of LS/XS 1

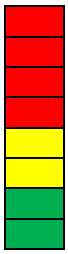
2.3.1 LED Indicators



There are 3 columns of display LED lights (each column has 8 LEDs). The first column is signal indication of LOOP1 (antenna 1); the second column is of LOOP2 (antenna 2) and the third one is the phase position noise indicator.

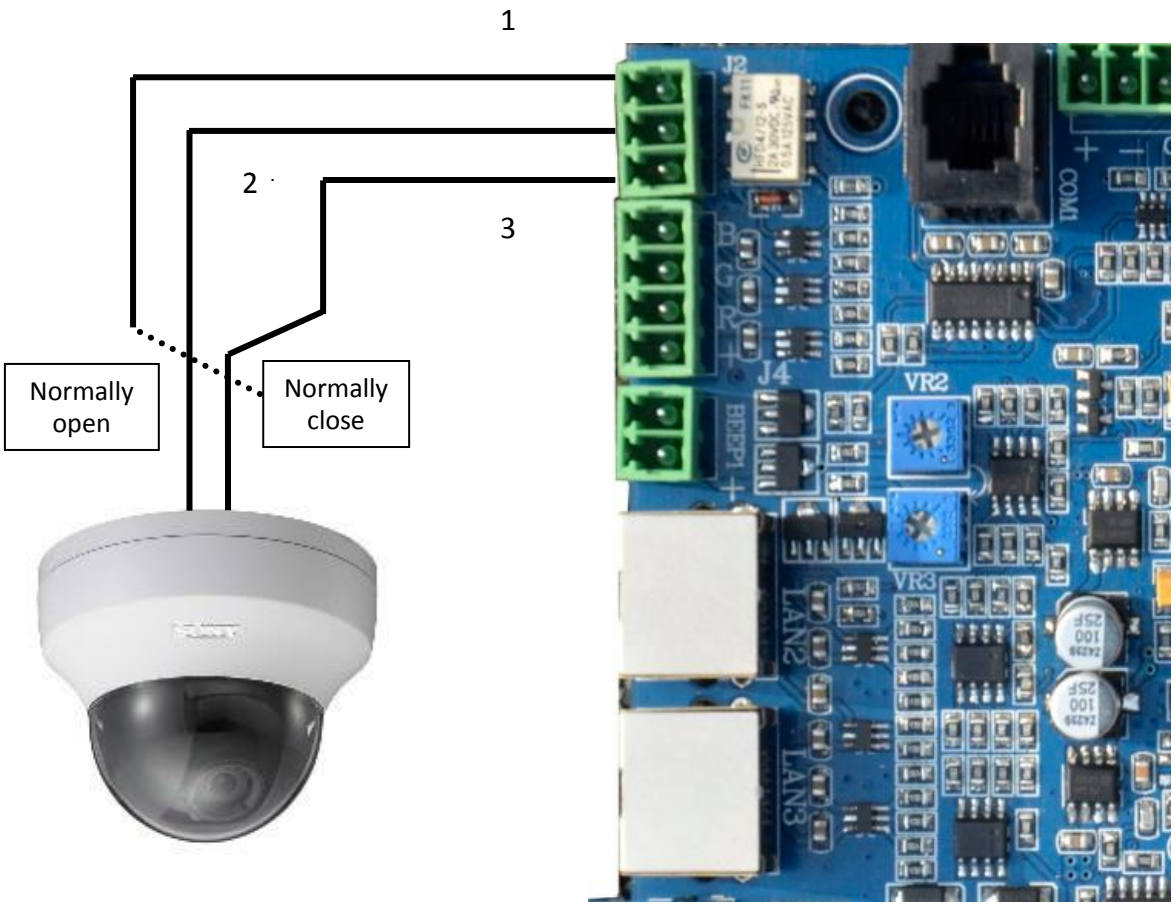
When no label is close to antenna, the LEDs indicate the level of environmental noise. When a label is closing to the antenna, the LEDs indicate the label's signal.

When adjusting phase of transmitting signal or phase of neutral/live (N/L), the three columns of LEDs represent noise levels of three phases (1st column=Phase A, 2nd column=Phase B and 3rd column=Phase C) in the receiving window. The LEDs display noise levels at three phases for JUST 10s. After that, it will start to display the noise levels of antennas again.

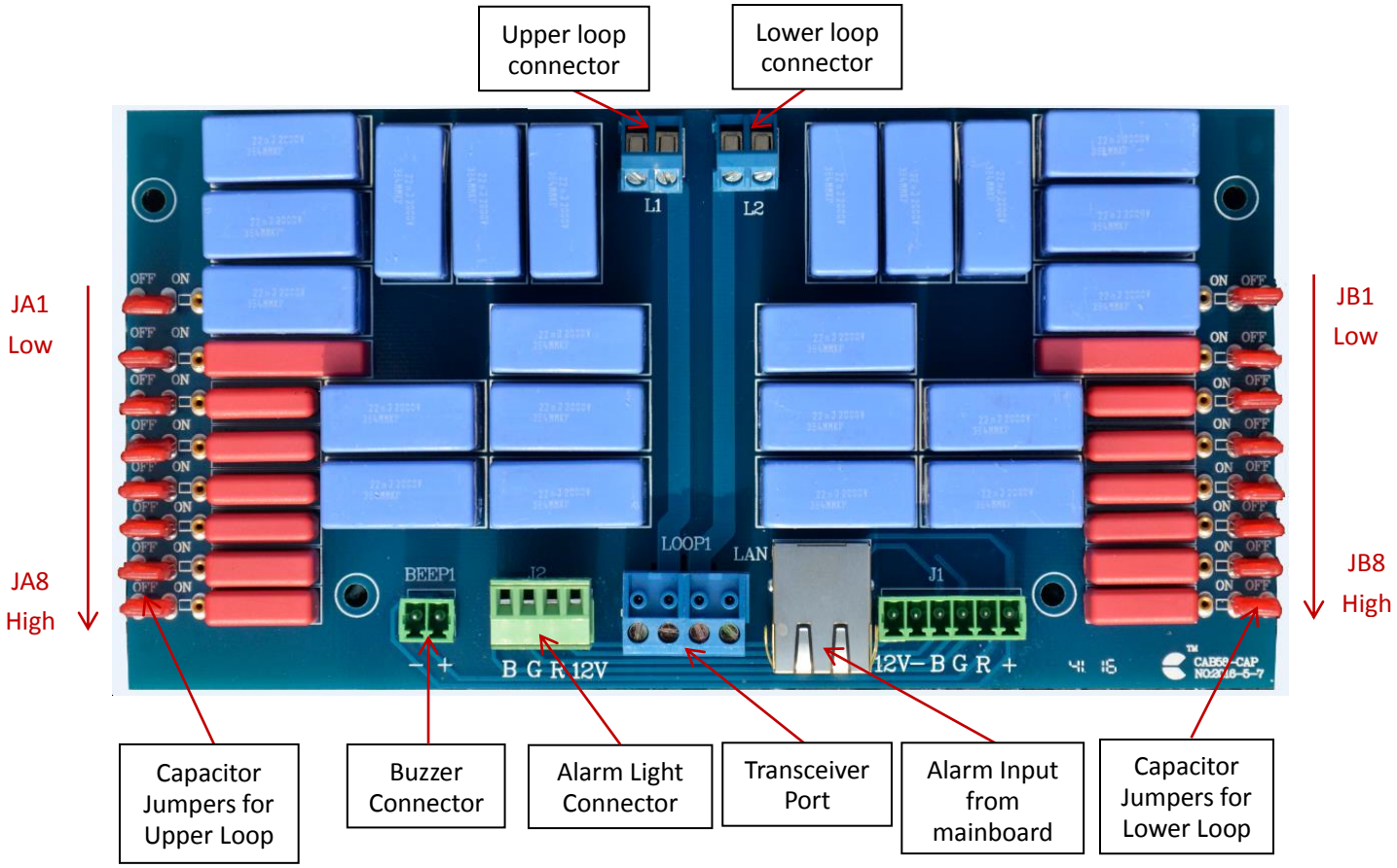
LED color		Description
Noise High  Noise Low	Only the 1st green blinks	Perfect environment
	The 2nd green LED blinks	Excellent environment
	The 3rd yellow LED blinks	Good environment
	The 4th yellow LED blinks	A little higher noise
	The 5th red LED blinks	Big noise
	The 6th red LED blinks	The environment noise is a little large which may be caused Sync problem.
	The 7th red LED blinks	The environment noise is large which may be caused Sync problem.
	The 8th red LED blinks	The environment noise is very large which may be caused Sync problem.

2.3.2 External Relay

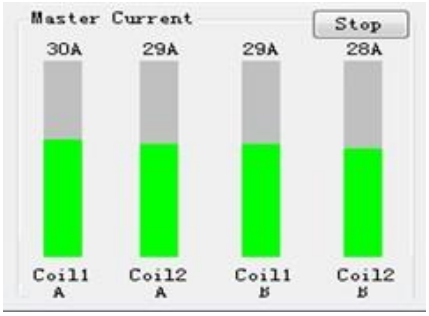
When an alarm is triggered, the signal can be exported for controlling CCTV, access control, external alarm device, etc. 1, 2 are the normally open contact and 2, 3 are the normally close contact.



2.4 Capacitor Board



The standard value of transmitting current is 30±5A. If the AMC software shows that the current is too low (due to poor matching of capacitors or large metal object closing to the antenna), the sensitivity of the antenna will be reduced. If the current is too high, the circuit board might be damaged. In these cases, it is necessary to change position of jumpers on the capacitor board to adjust the current.

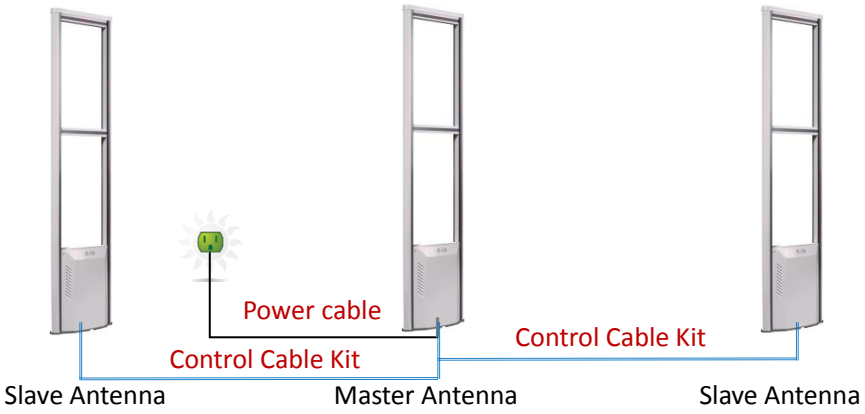


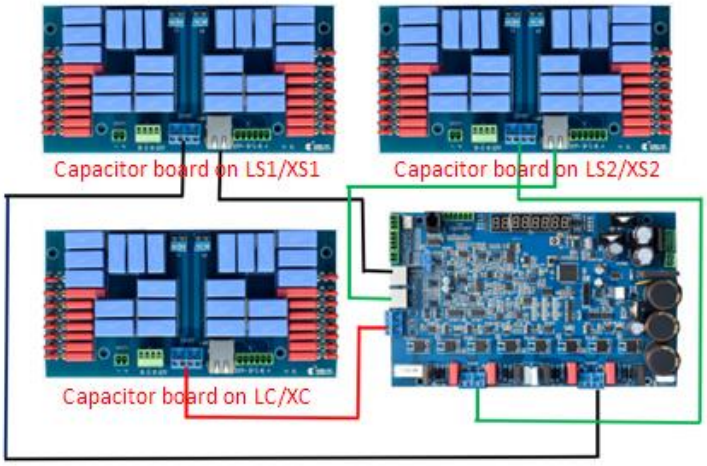
There are two groups of capacitors on the capacitor board (shown as the picture before). The left group of capacitors (jumpers JA1 to JA8) is for upper loop of the antenna and the right group of capacitors (jumpers JB1 to JB8) is for lower loop of the antenna.

There are two positions for each jumper. Capacitor is ON when the jumper is attached to two pins. Capacitor is OFF when the jumper is attached to one pin. Always adjust capacitors from value HIGH to LOW to create enough transmitting current for the corresponding loops. When the current meets the standard value where a jumper is adjusted, stop adjusting the rest of the jumpers. For example, if the standard current value is resulted from adjusting JA2, there is no need to adjust JA3~JA5.

2.5 Cabling between Master and Slave Antennas

The mainboard can support up to three antennas, including two transmitter antennas and one receiver antenna. In this case, the connection diagram will be shown as below.





LC/XC and LS/XS are connected by 4-core cable. Antenna 1 or antenna 2 connectors on mainboard and antenna connector on capacitor board of LS/XS are as follows:

Antenna 1 & antenna 2 connectors on mainboard of LC/XC Antenna



Antenna connector on capacitor board of LS/XS antenna



Note: For easy memory (not a must), we suggest to connect electronics on LC/XC and LS/XS antennas as described below. Antenna 1 connector on mainboard is connected to capacitor board of LC/XC antenna. Antenna 2 connector on mainboard is connected to capacitor board of LS/XS antenna.

The wires of the cable kit shall be fixed in following sequence:

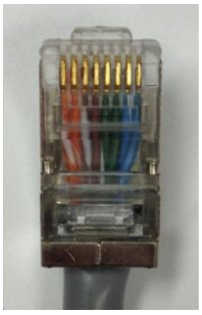
Pin No.	Color of Wires
1	GREEN
2	WHITE
3	BLACK
4	RED

Note:

- If the power cable between antennas is not long enough, the length of cable can be increased according to technical specifications. The maximum length is 50 meters.
- When the power cable, which is used to connect master antennas to 220V/110V power socket, needs to be buried under the ground, it has to be protected by metal or PVC pipe, complying with the installation requirements in different countries.
- If the cable kit for connecting master and slave antennas is not long enough, the length of cable kit can be increased according to technical specifications. The maximum length is 10 meters.
- When the cable kit, which is used to connect master and slave antennas, needs to be buried under the ground, it has to be protected by metal or PVC pipe, complying with the installation requirements in different countries.

2.6 Antenna Signal Output Interface

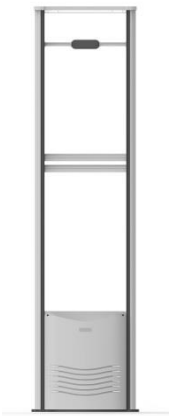
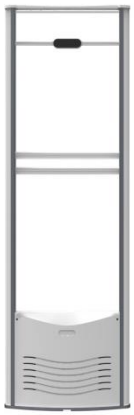
The communication wire is the CAT5e network cable. The connection order is as below.



Pins	Mainboard	Capacitor Board
1	Orange-white	Orange-white
2	Orange	Orange
3	Brown-white	Brown-white
4	Brown	Brown
5	Green-white	Green-white
6	Green	Green
7	Blue-white	Blue-white
8	Blue	Blue

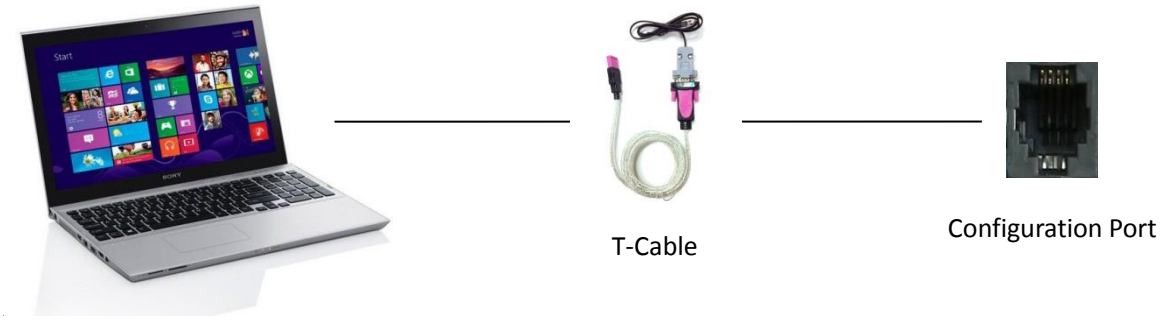
Note: Number of pins means the serial number of terminals from left to right as shown on the photo.

2.7 Appearance & Structure of Antenna

		CA78X/F1	CA79L/F2	CA79X/F2
Antenna frame				

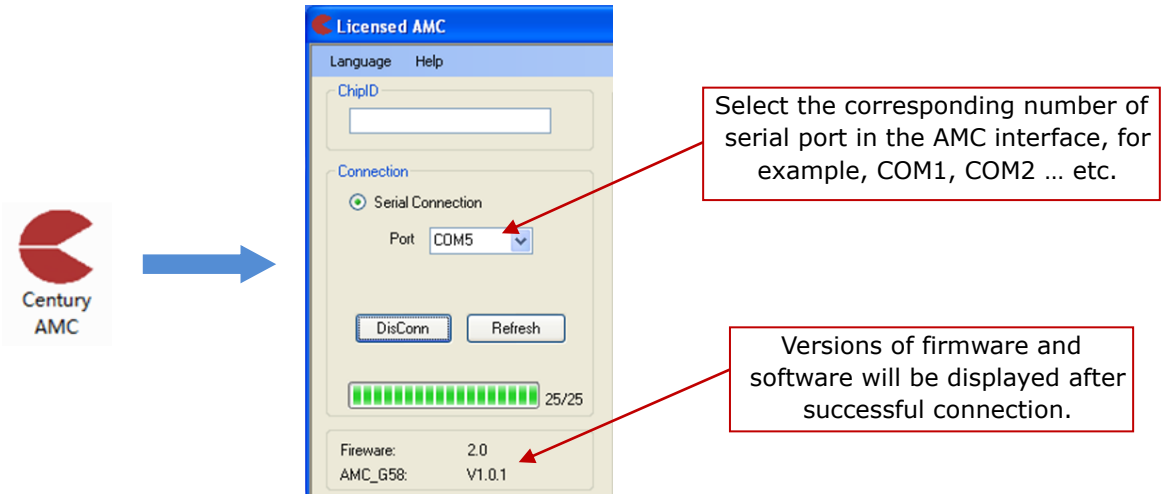
3. SOFTWARE CONFIGURATION

The communication can be realized when the debugging port on the mainboard is connected with PC through USB converter.



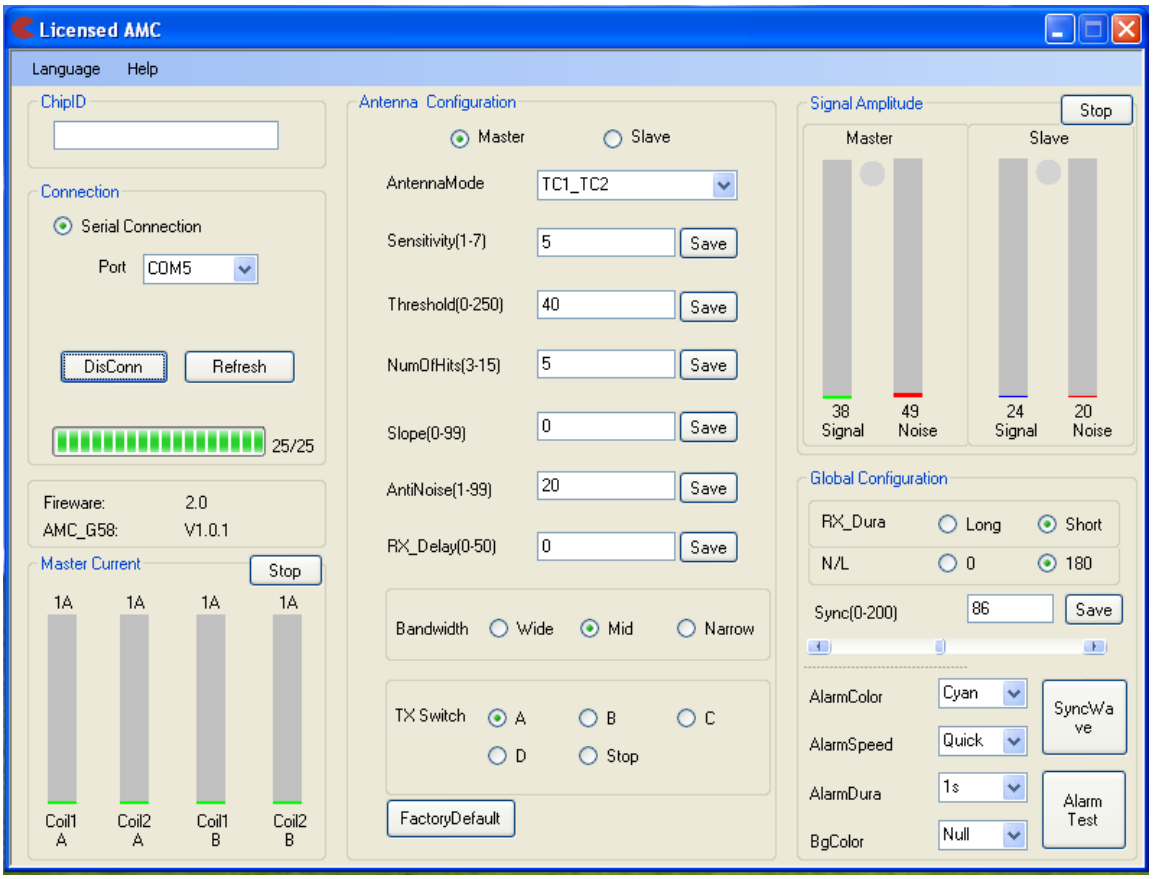
3.1. Start-Up

Connect the PC with the antenna by T-Cable. Then double click the icon to open the software interface.

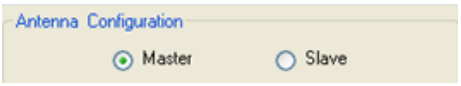


3.2. Configuration

Configuration interface:



3.2.1. Antenna Configuration



1. Select Master or Slave to set parameters of the antenna(s).
2. “Master” and “Slave” means two transmitter antennas controlled by the same mainboard (with max. two transmitter outputs).
3. “Receiver” means the receiver bound with “Master” or “Slave” transmitter antenna.

3.2.2. Antenna Mode



There are 9 optional modes for CAB58 mainboard:

- ✓ TC1_TC2: Two transceiver antennas (default)
- ✓ TC1 & TC2: One single transceiver antenna connected to port Antenna 1 or Antenna 2
- ✓ TX1_RX2 or RX1_TX2: One transmitter and one receiver antennas
- ✓ RX1_TX2/TX1_RX2: One transmitter and one receiver antennas. Both antennas are switching between TX and RX continuously (but always with one TX and one RX at the same time)
- ✓ TC1_TX2 & TX1_TC2: One transceiver and one transmitter antennas
- ✓ TX1_RX3_TX2: Transmitter antennas on both sides and one receiver in the middle

3.2.3. Sensitivity



Sensitivity: Gain of the receiver. The higher the value, the longer detection, the worse noise immunity. Default: 1.

3.2.4. Threshold



Threshold: The limit preventing an alarm from being triggered. The higher the value, the shorter detection, the better noise immunity. Default: 30.

3.2.5. NumOfHits



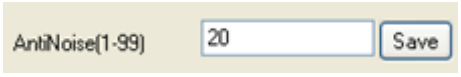
NumOfHits: The min. times required for signals received hitting criteria for triggering an alarm in certain period. The higher the value, the less possibility of false alarm, the slower response of detection. Default: 5.

3.2.6. Slope



Slope: Selected when only hard tags are used. The higher the value, the lower pick-up rate for labels, the better noise immunity. Default: 0.

3.2.7. AntiNoise



AntiNoise: A combined parameter which helps to increase noise immunity. The higher the value, the lower pick-up rate for labels, the better noise immunity. Default: 20.

3.2.8. RX Delay



RX_Delay: Postpone the start time of the receiving window to avoid interference of the noise signal coming from the TX signal reflected by closing metal object. The higher the value, the better noise immunity to the signal as mentioned above. Default: 0.

3.2.9. Bandwidth



Bandwidth: Tolerance of the tags' frequency. "Wide" for larger tolerance of frequency of tags but with higher possibility of false alarm. "Narrow" for smaller tolerance of frequency of tags which means higher quality requirement on tags. Default: Mid.

3.2.10. TX Switch



TX Switch: Selecting different modes of transmitting and receiving of signals.

A: The transmitting electromagnetic field switches between X and Z directions. The advantage of the setting is that the detection ranges for tag at both X and Z orientations will be almost same. The disadvantages of the setting are: (1) in the middle of the antenna, the detection range for tag at X orientation is shorter than the detection range for tag at Z orientation; (2) higher requirement on quality of grounding.

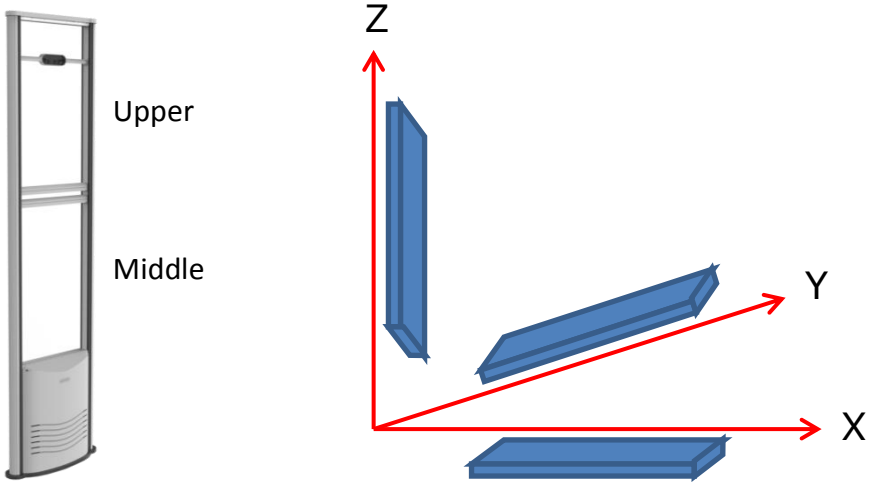
B: The electromagnetic field is transmitted only in the X direction. The purpose of the setting is to solve the passive interference effect in the Z direction. The result of the setting is that the detection range for tag at Z orientation is normal, but the detection range for tag at X orientation is shorter.

C: The transmit electromagnetic field switches between X and Z directions. Receives only signal in X direction. The purpose of the setting is to solve the passive interference in the Z direction. The result of the setting are: (1) good detection range for tag at all orientations at all positions; (2) lower requirement on quality of grounding.

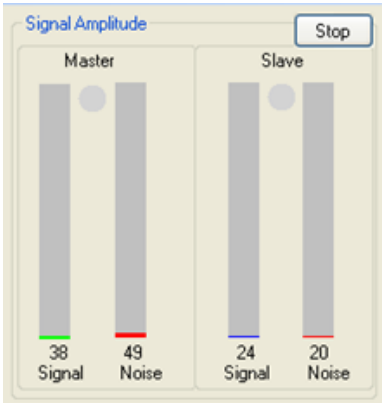
D: The transmit electromagnetic field switches between X and Z directions. Receives only signal in Z direction. The purpose of the setting is to solve the passive interference in the X direction. The result of the setting are: (1) good detection range for tag at all orientations at all positions; (2) lower requirement on quality of grounding.

Note: The only difference of the detection performance at C and D TX Switches is the minor difference in detection ranges at upper and lower coils of the antenna.

Stop: The antenna stops transmission. The purpose of the setting is to determine whether there exists passive tag-similar interference in surrounding area of the antenna.



3.2.11. Signal Amplitude



Signal: Real-time strength of signal received when TX is working (closing tag will be detected).

Noise: Real-time strength of signal when TX is stopped (closing tag will have no influence).

3.2.12. RX Dura



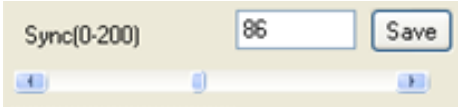
RX Dura: Duration of the receiving window. Set the RX Dura as Short is to avoid the receiving antenna from being interfered by certain type of noise, which cannot be completely removed from the receiving window. Default: Long.

3.2.13. N/L



N/L: Position of neutral and live wires on the power socket. Default: 180.

3.2.14. Sync



Sync: Phase shift of TX signal for synchronization. Default: 185 (for sync with Century AM systems based on CAB64 mainboard).

3.2.15. SyncWave



SyncWave: Synchronize antennas with different mainboards by visualized waveform.

Function: (1) Observe environmental noises clearly;

(2) Remove noise to outside of the receiving window;

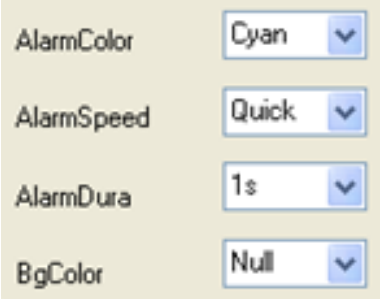
(3) Synchronize the antenna(s) with foreign antenna(s).

3.2.16. AlarmTest



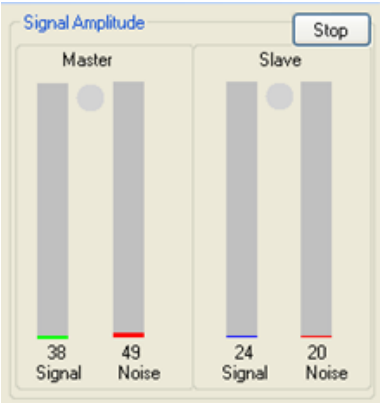
AlarmTest: Test status of buzzers and light LEDs.

3.2.17. Alarm Light and Sound Settings



- AlarmColor: It supports 7 optional colors LED for alarms, which is changeable.
- AlarmSpeed: Default: Quick.
- AlarmDura: Default: 2s.
- BgColor: It supports 7 optional colors LED for background light, which is changeable.

4. TROUBLESHOOTING



For Century AM systems, signal amplitude on the software is the main tool for troubleshooting. Details will be explained in the following chapters.

4.1 TX Current

When a tag is closing to an antenna, the amplitude of Signal of the antenna shall increase obviously. Stop transmission by TX Switch, the amplitude of the Signal of the antenna shall be similar as that of the Noise. This means the TX current is fine.

If the amplitude of Signal is not increased obviously when a tag is approaching to the antenna, it means either the antenna is closing to big metal object (can be verified by TX Current) or the electronics has defects.

4.2 Passive Interference

In the situation that the antenna continuously alarm, the amplitude of the Signal is high or higher than the amplitude of the Noise, but the amplitude of the Signal has almost no variation, stopping TX, if the amplitude of the Signal drops at once, most probably there is/are tag(s) closing to the antenna.

Solution: Try to find the tag(s) and remove it/them.

4.3 Noise from Environment or Power Source

If noise fluctuates seriously, the antenna has false alarm and low detection, the noise is normally caused by surrounding electric devices, e.g. escalator, electric motor, etc. Or the noise comes from the power source (the noise might be generated by other electric device and conducted into the power source).

Solutions: (1) Remove the noise caused by the surrounding electric devices;
(2) Grounding the power source;
(3) Change the power source.

4.4 Noise from Nearby and Stable Source of Radiation

The amplitudes of Signal and Noise are all high and stable. If the amplitude fluctuates when moving the antenna, most probably, there is stable source of radiation, such as spotlight, switch power supply unit, etc.

Solutions: (1) Remove the source;
(2) Change the frequency of the device radiating the noise.

4.5 Interfered by Foreign AM Systems

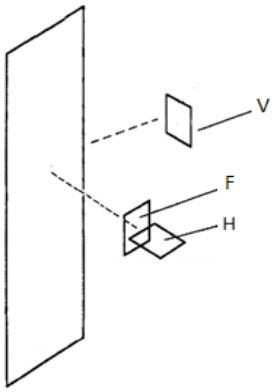
If the amplitude of Signal and/or Noise continuously fluctuates, but the maximum and minimum of the amplitude is relatively stable, it means the system is interfered by foreign AM system.

Solution: Synchronize the system with foreign AM system.

5. INSTALLATION GUIDE

5.1 Recommended Installation Range for on-site Environment

Model	T041 (Unit: CM)	T010 (Unit: CM)	RS01 (Unit: CM)			R001 (Unit: CM)		
			F	V	H	F	V	H
CA35L_CAB09	120	110	95	80	70	85	70	60
CA35X_CAB09	125	115	100	85	75	90	75	65
CA36L_CAB09	110	100	90	73	68	80	63	58
CA36X_CAB09	115	105	95	75	70	85	65	60



Note: The detection of antenna is range for each side. T041:33mm ferrite tag;
T010: 25mm ferrite tag; RS01: 3-piece label; R001: 2-piece label.

5.2 Preparation before Installation

1. Installation environment.

(1) Good ventilation for electronics.
(2) Clean environment.
(3) Not too humid environment with no water condense. Preventing water from entering the base.
(4) No big metal object closing to the antennas, such as metal door-frame, cabinet, shopping cart, etc.
(5) No tag within three (3) meters to the antennas.
(6) No serious noise at frequency closing to 58 KHz.

2. Requirement on power source

(1) No other electronic or electric load on the line except the EAS systems to be installed.
(2) If there is no completely independent power source, then try to use power source for lighting.
(3) The power source has good grounding (the voltage between live and ground wires shall be same as the voltage between live and neutral wires).
(4) The live and neutral wires must be fixed at the same positions inside the sockets (neutral on left and live on right).
(5) UPS and temporary power generator are forbidden since systems cannot be synchronized when using UPS and temporary power generator normally has not stable electricity.

3. Requirement on fixing antennas

(1) The installation distance is determined according to the actual situation. The recommended distance between antennas has considered certain level of environmental interference when two yellow LEDs light up. When both labels and hard tags are used, the recommended distance between antennas shall be based on performance of labels.
(2) Confirm the position and width of the floor before installation, and leave enough space to ensure the antenna's installation.
(3) Guarantee all cables inside the floor shall be protected with metal or PVC pipes.
(4) Antennas shall be fixed firmly onto the ground, especially when a system has integrated metal detection feature. If the concrete floor is not solid enough, special treatment shall be done for reinforcing the positions, where bolts are to be fixed, with quick-drying cement or Hilti's bolt glue.

6 SERVICE SUPPORT

If you have any questions or suggestions about the Essential Series of Century AM systems, please do not hesitate to contact our technical support by email technicalsupport@century-cn.com, or our salespersons directly.

Revision History

Date	Revision	Description
03/21/2019	1.01	First Release