Comba

CriticalPoint Public Safety AMS

ANTENNA MONITORING SYSTEM

USER MANUAL

Public Safety AMS SERIES QE: 1-0-1

FIRMWARE: V271

Comba Telecom Ltd.

0.1 CONTENTS

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0.2 INDEX TO FIGURES AND TABLES

0.3 HISTORY

Change No.	ENU	Details Of Change
1	1-0-0	This manual first created and issued in June 2022.
2	1-0-1	Updated Company Phone Number and IPV4 address

0.4 GLOSSARY OF TERMS

Abbreviation	Definition
AHJ	Authority Having Jurisdiction
AMS	Antenna Monitoring System
BDA	Bi-Directional Amplifier
DAS	Distributed Antenna System
dB	Decibel
dBm	Decibels relative to 1 milliwatt
DL	Downlink
DIM	Digital Integrated Module
ESD	Electrostatic Discharge
FS	Frequency Selection
GUI	Graphical User Interface
Hz	Hertz
MCU	Main Control Unit
MHz	Megahertz
NF	Noise Figure
OMC	Operation & Maintenance Center
OMT	Operation & Maintenance Terminal
PA	Power Amplifier
PLL	Phase Locked Loop
PSU	Power Supply Unit
RF	Radio Frequency
RFID	Radio Frequency Identification
SMA	Sub-Miniature A Connector
UL	Uplink
VAC	Volts Alternating Current
VDC	Volts Direct Current
VSWR	Voltage Standing Wave Ratio

0.5 SAFETY NOTICES AND ADMONISHMENTS

This document contains safety notices in accordance with appropriate standards. In the interests of conformity with the territory standards for the country concerned, the equivalent territorial admonishments are also shown.

Any installation, adjustment, maintenance, and repair of the equipment must only be carried out by trained, authorized personnel. At all times, personnel must comply with any safety notices and instructions.

Specific hazards are indicated by symbol labels on or near the affected parts of the equipment. The labels conform to international standards, triangular, and are colored black on a yellow background. An informative text label may accompany the symbol label.

Hazard labeling is supplemented by safety notices in the appropriate equipment manual. These notices contain additional information on the nature of the hazard and may also specify precautions.

Note: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

For compliance with the general population RF exposure limits, each individual antenna used for this transmitter must be installed to provide a separation distance greater than 67.2cm or more from all persons during normal operation and must not be co-located with any other antenna for meeting RF exposure requirements.

Warning Notices:

Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

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, and can radiate radio frequency 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 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.

FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter

End of Section

0.6 GENERAL INFORMATION

The CriticalPoint Antenna Monitoring System (AMS) consists of a Main Control Unit (MCU) in conjunction with an unlicensed 900MHz transceiver and Radio Frequency Identification (RFID) monitoring tags installed in the Comba Distributed Antenna System (DAS) service antennas. The system utilizes RFID technology incorporated into the DAS service antennas to monitor the coaxial link status of the entire passive network. The AMS can report the status of any individual antenna link in real time via an easy-to-use GUI and transmit the overall alarm information through Form C dry contacts. This system will satisfy the Authority Having Jurisdiction (AHJ) requirements for monitoring service antennas as part of the overall System Component Failure alarming requirements. The system can also increase the efficiency and accuracy of monitoring a passive antenna system, as well as troubleshooting the passive network.

Main Features

- Monitor In-building DAS status in real time for all passive components, antenna coax, and Comba service antennas
- Report overall status through dry contact alarming - login to identify alarms from individual antenna paths
- Supports up to 25dB DAS cable loss
- Supports antenna monitoring of VHF, UHF & 700/800MHz bands
- Supports Form C dry contact alarms
- NEMA 4 enclosure
- Low Power Consumption

The following figure shows the enclosure of the Antenna Monitoring System (AMS).

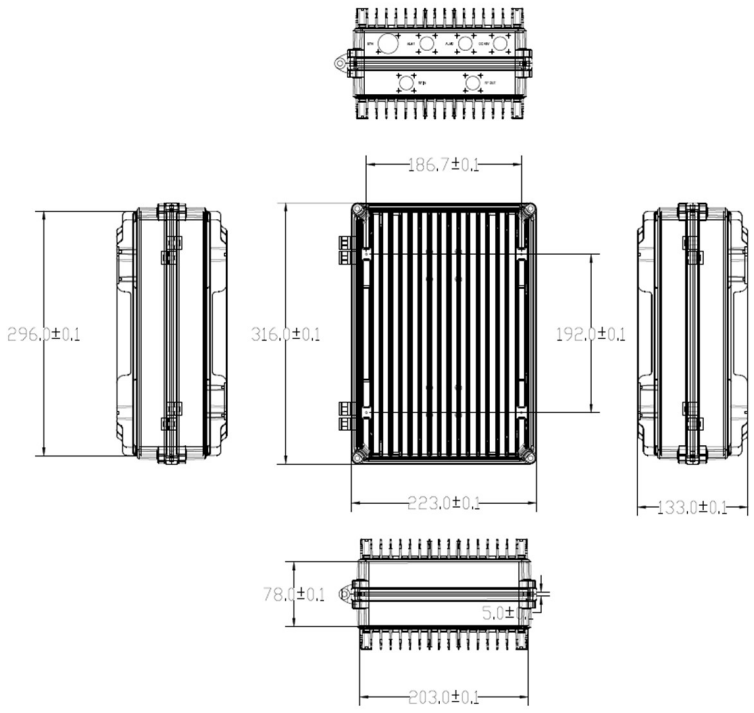


Figure 1: Front, Side and Bottom Views of the AMS Enclosure

1 EQUIPMENT DESCRIPTION

1.1 EQUIPMENT BOCK DIAGRAM

The AMS uses a diplexer to pass the Public Safety downlink/uplink (VHF/UHF/700/800) frequencies and inject/extract the unlicensed 900MHz frequency to monitor the antenna RFID tags. The unlicensed 900MHz frequency (user definable in the GUI) is pulsed from the AMS throughout the passive DAS network/antenna arrays, the antennas tag information is then reflected to the AMS. The AMS cross-references the received tag codes against a list of existing tag codes to see if any RFID tags are missing. The missing RFID tags will create a log in the “Alarm Log” and trigger an alarm if the “Polling” parameters (configured by installer) are met in Auto Mode or if “Status” scan is run in Manual Mode.

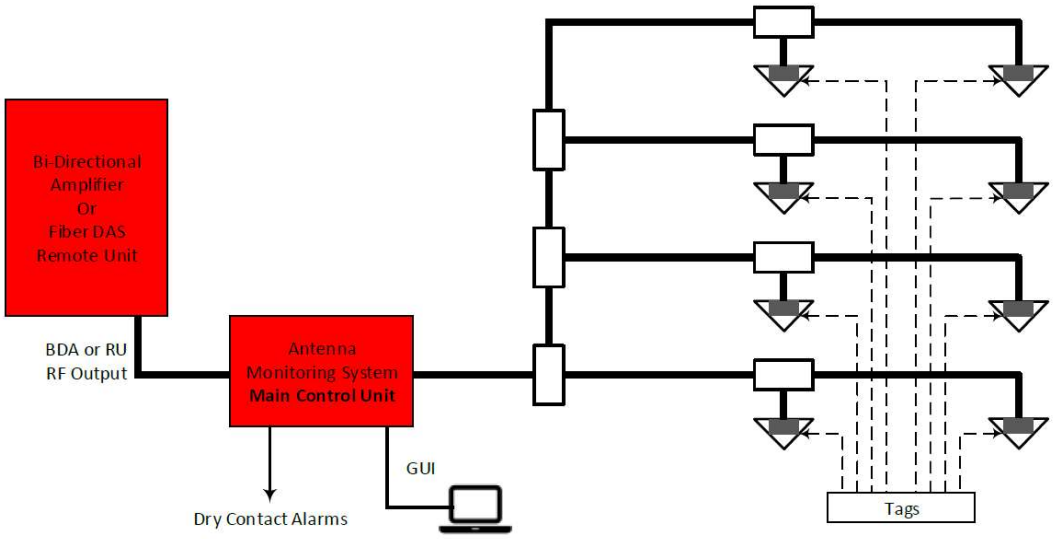


Figure 2: AMS System Block Diagram

1.2 EQUIPMENT LAYOUT

Shown below is the external layout of the AMS unit.

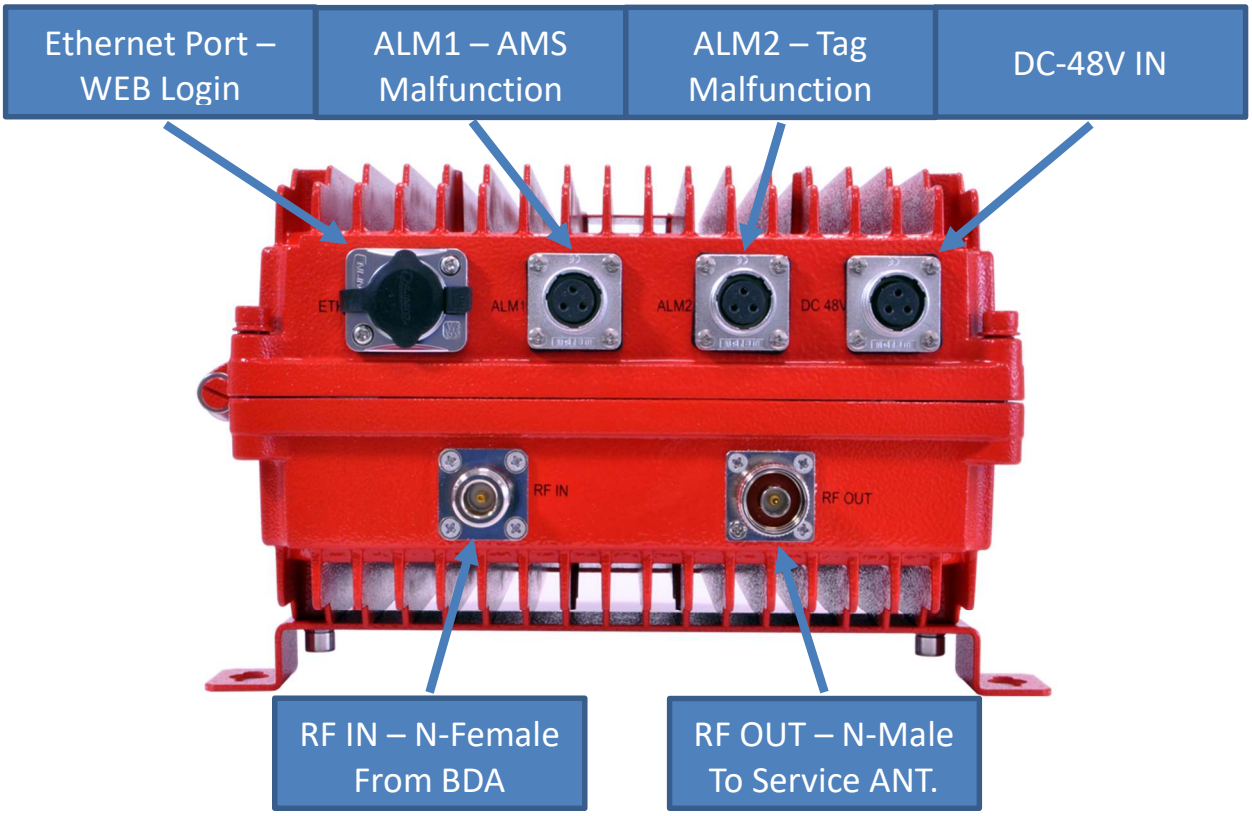


Figure 3: AMS External Layout

1.3 EQUIPMENT CONSTITUTION

The AMS unit consists of the following components:

Main Control Unit (MCU): The MCU is used to monitor and control the operation of the AMS.

Power Supply Unit (PSU): The PSU converts the input voltage into a stable DC supply to provide power for the internal modules.

Digital Integrated Module (DIM) and 900 MHz Transceiver: Transmits and receives a 900 MHz signal, defined by the MCU, that is sent to the diplexer and received by the RFID tags. RFID tags then send back a tag ID to this component that is interpreted and forwarded to the MCU to be recorded.

Diplexer: Located near the RF Input and RF Output terminals. Passes and combines the first responder RF signals with the unlicensed 900MHz pilot/responder signals to the passive DAS. NOTE: If the AMS powers down, the first responder signals are not affected.

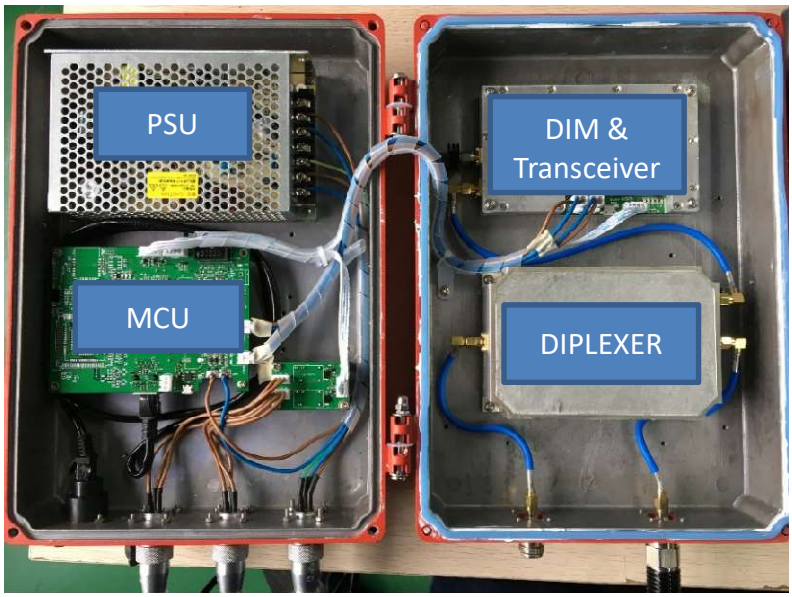


Figure 4: AMS Internal Components Diagram

End of Section

2 INSTALLATION

2.1 WARNINGS AND ALERTS

RF Emissions & RF Exposure

There may be situations, particularly for workplace environments near high-powered RF sources, where recommended limits for safe exposure of human beings to RF energy could be exceeded. In such cases, restrictive measures or actions may be necessary to ensure the safe use of RF energy.

High Voltage

The equipment has been designed and constructed to prevent, as far as reasonably practicable danger. Any work activity on or near equipment involving installation, operation or maintenance must be, as far as reasonable, free from danger.

Where there is a risk of damage to electrical systems involving adverse weather, extreme temperatures, wet, corrosive, or dirty conditions, flammable or explosive atmospheres, the system must be suitably installed to prevent danger.

Protective Earthing

Equipment provided for the purpose of protecting individuals from electrical risk must be suitable for the purpose and properly maintained and used.

Handling Precautions

This covers a range of activities including lifting, lowering, pushing, pulling, carrying, moving, holding, or restraining an object, or individuals from the equipment. It also covers activities that require the use of force or effort, such as pulling a lever, or operating power tools.

Where some of the abovementioned activities are required, the equipment must be handled with care to avoid damaged.

Electrostatic Discharge (ESD)

Observe standard precautions for handling ESD-sensitive devices. Assume that all solid-state electronic devices are ESD-sensitive. Ensure the use of a grounded wrist strap or equivalent while working with ESD-sensitive devices. Transport, store, and handle ESD-sensitive devices in static-safe environments.

2.2 SITE PLANNING CONSIDERATIONS

2.2.1 SITE PLANNING

Site Considerations

Outdoor equipment is designed to be waterproof, rainproof, and with snow protection. Temporary protection should be taken when the equipment enclosure is opened for installation or maintenance in an outdoor environment. The equipment must not be opened for installation or maintenance in bad weather (e.g., gale storm, rainfall, extreme temperatures, and high humidity)

Installation Location

Mounting surface shall be capable of supporting the weight of the equipment.

To avoid electromagnetic interference, a proper mounting location must be selected to minimize interference from electromagnetic sources such as large electrical equipment.

Environmental

Humidity has an adverse effect on the reliability of the equipment. It is recommended to install the equipment in locations having stable temperature and unrestricted airflow.

The installation location for the product should be well ventilated. The equipment has been designed to operate at the temperature range and humidity level as stated in the product specifications in the datasheet.

Direct sun light exposure to the equipment should be avoided. Provide additional shelter if necessary.

Power Supply

The power supply unit (PSU) provides power to all modules within the equipment. Depending on the product variant it is recommended that the PSU be operated on a dedicated circuit breaker or fused circuit.

Grounding Requirement

Verify that the equipment has been well grounded. This includes antennas and all cables connected to the system. Ensure lightning protection for the antennas is properly grounded.

Cable Routing

Depending on equipment configuration, a variety of types of cables are required. Where applicable, ensure cables are properly routed and secured so that they are not damaged.

Manual Handling

During transportation and installation, take necessary handling precautions to avoid potential physical injury to the installation personnel and the equipment.

2.2.2 INSTALLATION CHECKLIST

- Working space available for installation and maintenance for each mounting arrangement. Ensure unrestricted airflow
- Ensure earth ground point is within reach of the ground wire
- Ensure a power source is within reach of the power cord and the power source has sufficient capacity
- Where appropriate, ensure unused RF connectors are terminated
- Do not locate the equipment near large transformers or motors that may cause electromagnetic interference
- Reduce signal loss in feeder cable by minimizing the length and number of RF connections
- Ensure coax loss is no greater than 25dB
- Ensure equipment will be operated within the stated environment (see datasheet)
- Observe handling of all cables to prevent damage
- Service antennas should be selected based on the type of service area, e.g., indoor antenna for indoor application, and panel antenna for outdoor application. Additionally, DAS service antennas must be coordinated with Comba prior to installation, as RFID chips are required to be installed at the Comba factory

2.3 INSTALLATION PROCEDURES

2.3.1 GOODS INWARDS INSPECTION

- Verify the number of packages received against the packing list
- Check all packages for external damage; report any external damage to the shipping courier. If there is damage, a shipping agent should be present before unpacking and inspecting the contents because damage during transit is the responsibility of the agent
- Open and check each package against the packing list. If any items are missing, contact Comba
- Do not remove items from anti-static packing until ready for installation. If damage is discovered at the time of installation, contact the shipping agent

2.3.2 TOOLS

See Appendix A for a full list of the recommended tools required for installation and routine maintenance.

2.3.3 PREPARATION

- Wall mounting with the masonry bolts, which make use of the outer holes.

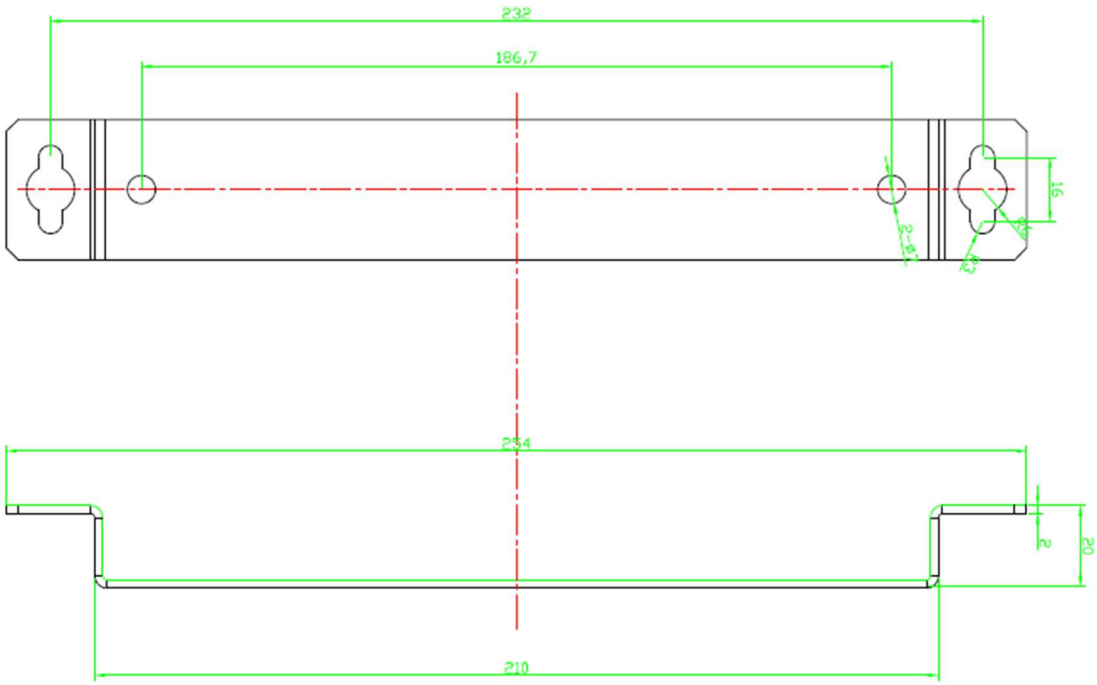


Figure 5: Mounting Rack Overview

2.3.4 WALL MOUNTING

- Drill two holes on the wall using the position of two holes on the mounting rack as a guide. Fix the mounting rack to the wall using four masonry bolts (M10x110mm)
- Install the Mounting Rack to the wall
- Hang the equipment and secure the enclosure to the mounting rack

2.3.5 DRIP-LOOP

Comba recommends that every horizontal cable entry to the equipment forms a 'U' before its entry to the equipment. Water on the cable will drip down at the bottom of the loop and will not accumulate at the equipment connectors.

2.4 EQUIPMENT CONNECTORS

2.4.1 AMS CONNECTORS

The AMS is designed for all cable entries from the right or the left of the enclosure, as shown below.

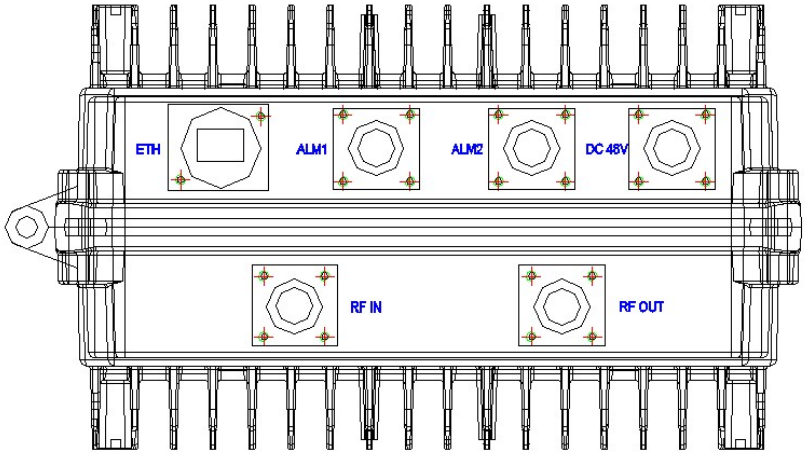


Figure 6: AMS Connector Locations

Table 1: Equipment Connectors

Identifier	Descriptions
ETH	RJ45 Connector for Ethernet connection (e.g., Remote Login)
ALM 1	Alarm cable connector for monitoring alarm associated to AMS device, such as device power loss
ALM 2	Alarm cable connector for monitoring alarms associated to RFID tags
DC -48V	Power cable connector for a pre-installed power cord for connection to DC (-48V)
RF IN	N-Female - Connects to the BDA or Signal Booster MT or Service port
RF OUT	N-Male – Connects to the passive DAS equipment/service antennas

2.4.2 GROUNDING CONNECTION

Ground Connection

To ensure safe operation of the product, a ground (earth) connection is required. For single phase AC power source, the product must be grounded by connecting the “earth wire” of the power cord to the ground terminal of the AC supply. For operating this product with DC power systems (such as DC output battery backup units, or rectifiers), the product should not be connected to power systems that switch open the return lead because the return lead could function as the ground (earth) connection for the equipment.

Protective Ground Connection

The enclosure must be grounded securely by connecting a copper wire (CSA 16mm^2) to the grounding terminal on the equipment/rack, and the other end to a protective ground (i.e., building earth point). An internationally acceptable color code of the ground connection wire is green/yellow.

Such a ground connection implements the “Protective Ground Connection” and must be connected to the equipment at the designated ground point. In general, do not connect the supply before establishing an adequate ground (earth) connection.

Construct the ground wire and use appropriate crimp connectors where necessary. Locate and connect the equipment grounding terminal to a protective ground (i.e., building earth point).

2.4.3 -48VDC POWER CABLE CONNECTION

-48VDC power cable connection is as follows:

- DC -48V port → Connects to -48VDC power source

Table 2: Power Cable Labeling

Wire Color	Connection
Blue	-48V
Red (Brown)	+48V

2.4.4 RF CABLE CONNECTION

RF cable connection is as follows:

- AMS RF OUT port → Connects to the feeder cable from service antennas.
- AMS RF IN port → Connects to the feeder cable from BDA downlink (Comba BDA MT port)

2.4.5 ETHERNET CONNECTION

Establish an Ethernet connection using the ‘LAN’ port located on the panel.

2.4.6 DRY CONTACT CABLE CONNECTION

Below are the pin definitions of the dry contact cables.

Table 3: Pin Definition of Dry Contact Cables

Pin NO.	Pin	Description	Color Code
ALM1			
1	CLOSE1	AMS Failure/Power Loss	Red (Brown)
2	COM1		Blue
3	OPEN1		Yellow
ALM2			
1	CLOSE2	Antenna RFID Tag Missing	Red (Brown)
2	COM2		Blue
3	OPEN2		Yellow

2.4.7 DRY CONTACT ALARMS

Port ALM1:

- Alarm 1 is fixed for **AMS Failure.** When the AMS loses power, this alarm is triggered
  - RED (Brown)-CLOSE, YELLOW-OPEN, BLUE-COM

Port ALM2:

- Alarm 2 is fixed for **Antenna RFID Tag Missing.** When an antenna RFID tag shows consecutively missing, this alarm is triggered
  - RED (Brown)-CLOSE, YELLOW-OPEN, BLUE-COM

Main Power Normal/Lost dry contact status:

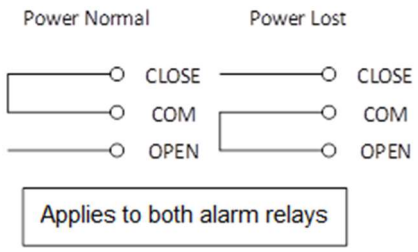


Figure 7: Dry Contact NO-NC Example

Sample Connection to Annunciator Panel

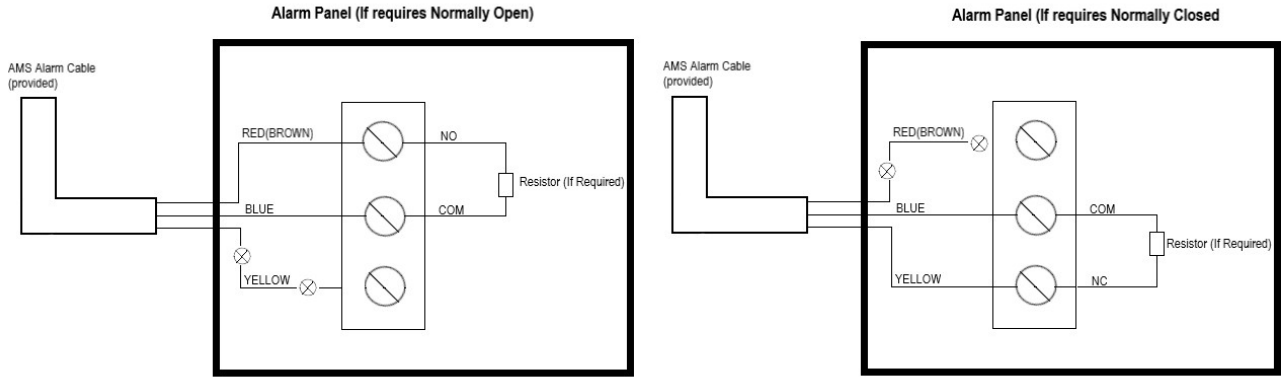


Figure 8: AMS Dry Contact NO-NC Layout

End of Section

3 AMS OMT GUI OVERVIEW

The AMS can be monitored and controlled via the AMS OMT GUI; use the following guide to finish system parameter setting and commissioning.

3.1 AMS OMT GUI CONNECTION

Step 1: Connect the ETH port from the AMS to your PC RJ45 port with the regular RJ45 cable to set up a physical connection. Setup Computer IP address: 192.168.1.100 / 255.255.255.0

The ending IP address must use 100. No other ending will work

Step 2: Open the OMT software, click [Connect].

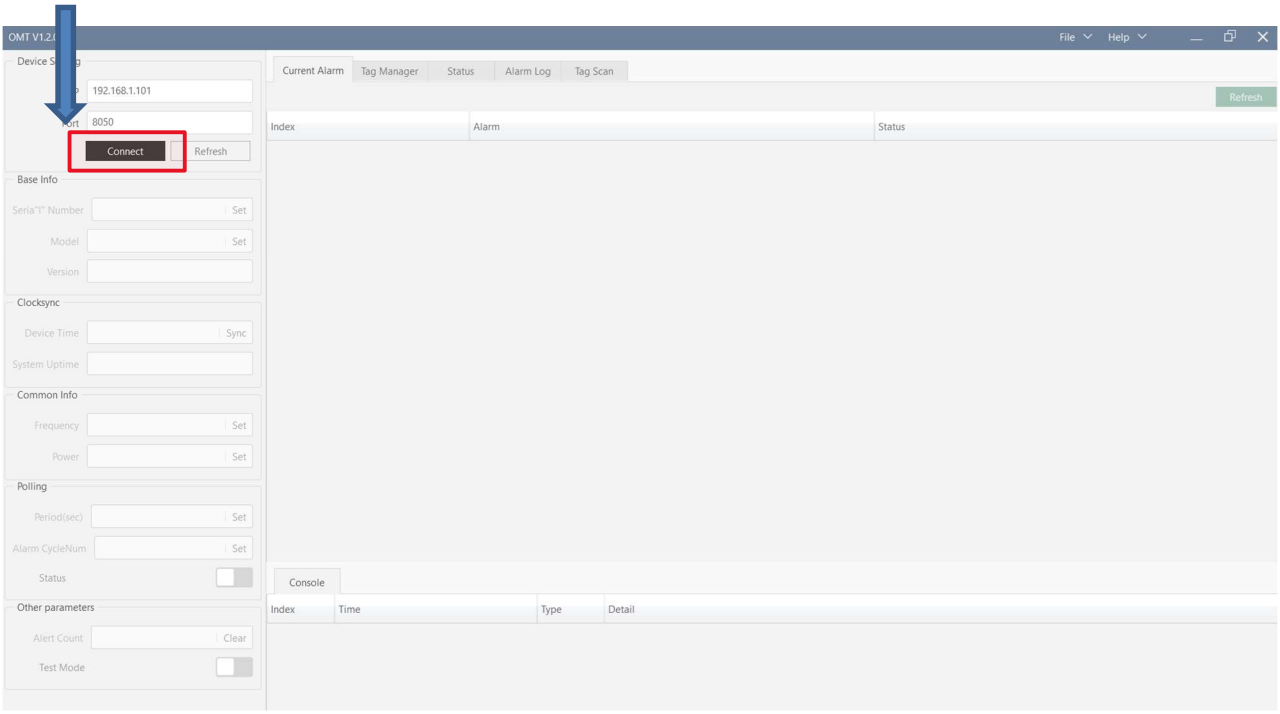


Figure 9: Web GUI Main Screen - Login

3.2 OMT GUI INTRODUCTION

After connecting, the GUI will un-gray a select group of options, pending if the AMS is in Auto or Manual mode. By default, the AMS is in Manual mode during first startup.

- Click "Status" bar to switch between Auto and Manual mode
  - Status Red – AMS is in Manual Mode. All information is editable
  - Status Green – AMS is in Auto Mode. Information is NOT editable. Alarms will trigger based on configured parameters and listed tags.

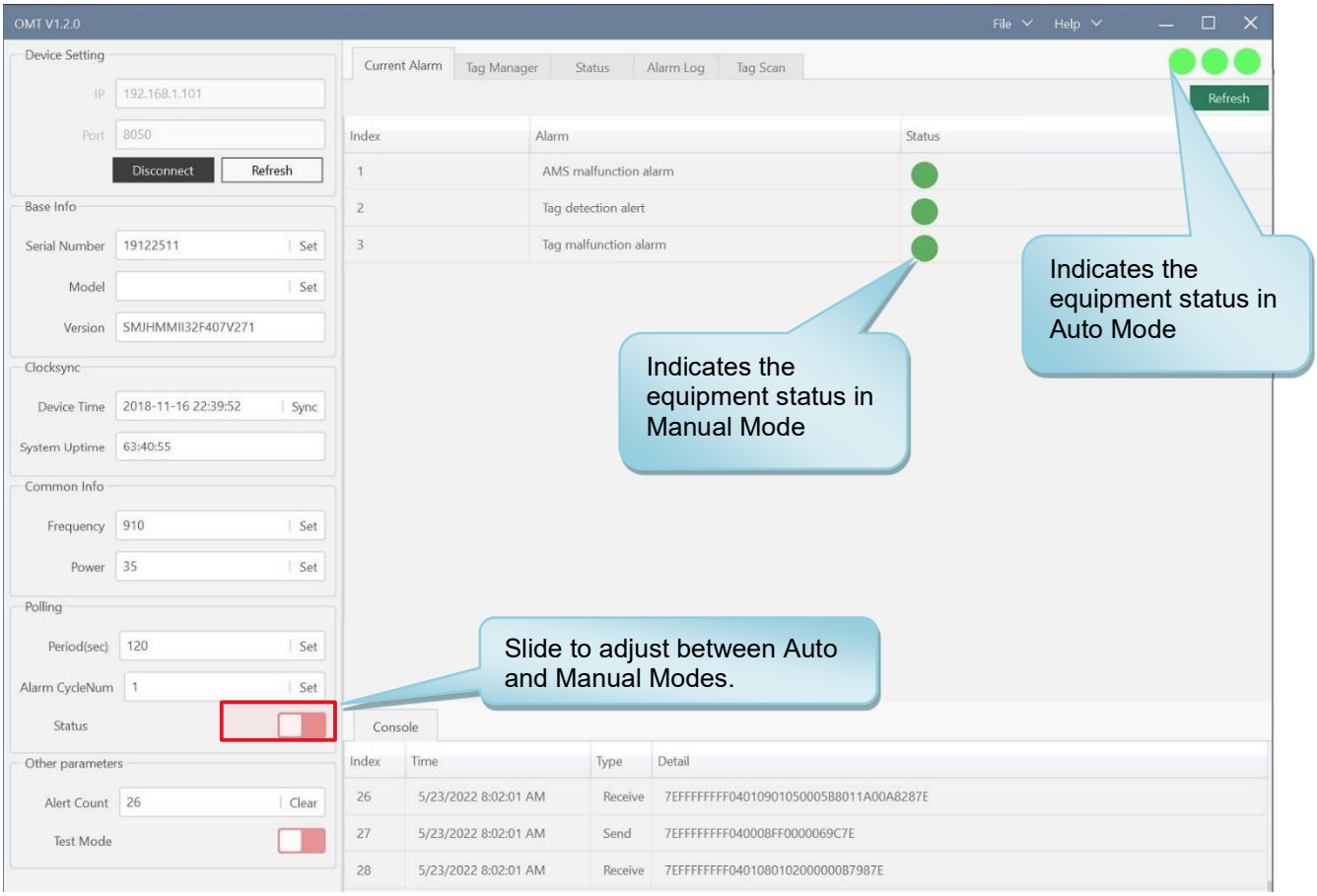


Figure 10: Web GUI Main Screen

3.2.1 [CURRENT ALARM]

When selecting the [Current Alarm] Tab, the screen will show the equipment status consisting of: AMS malfunction alarm, Tag detection alert, and Tag malfunction alarm.

- AMS malfunction alarm – If AMS losses power, this is triggered on ALM 1.
- Tag detection alert – Antenna RFID tag was missing during last scan performed.
- Tag malfunction alarm – Antenna RFID tag has met “Polling” requirements for consecutive scans missed. ALM 2 is triggered.

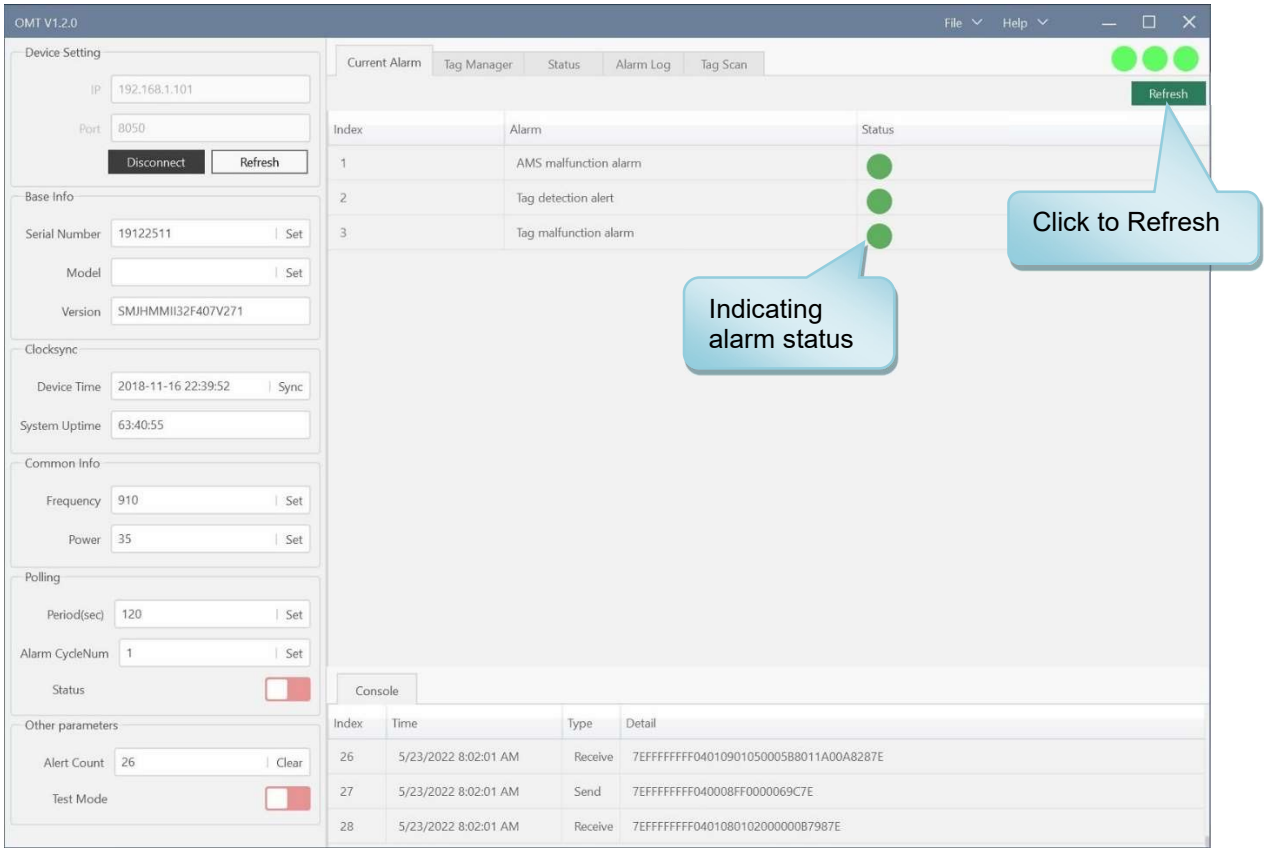


Figure 11: [Current Alarm] Screen

3.2.2 [TAG MANAGER]

When selecting the [Tag Manager] Tab, the screen will show tags currently registered on the AMS. Tags can be manually added, removed, or modified on this screen.

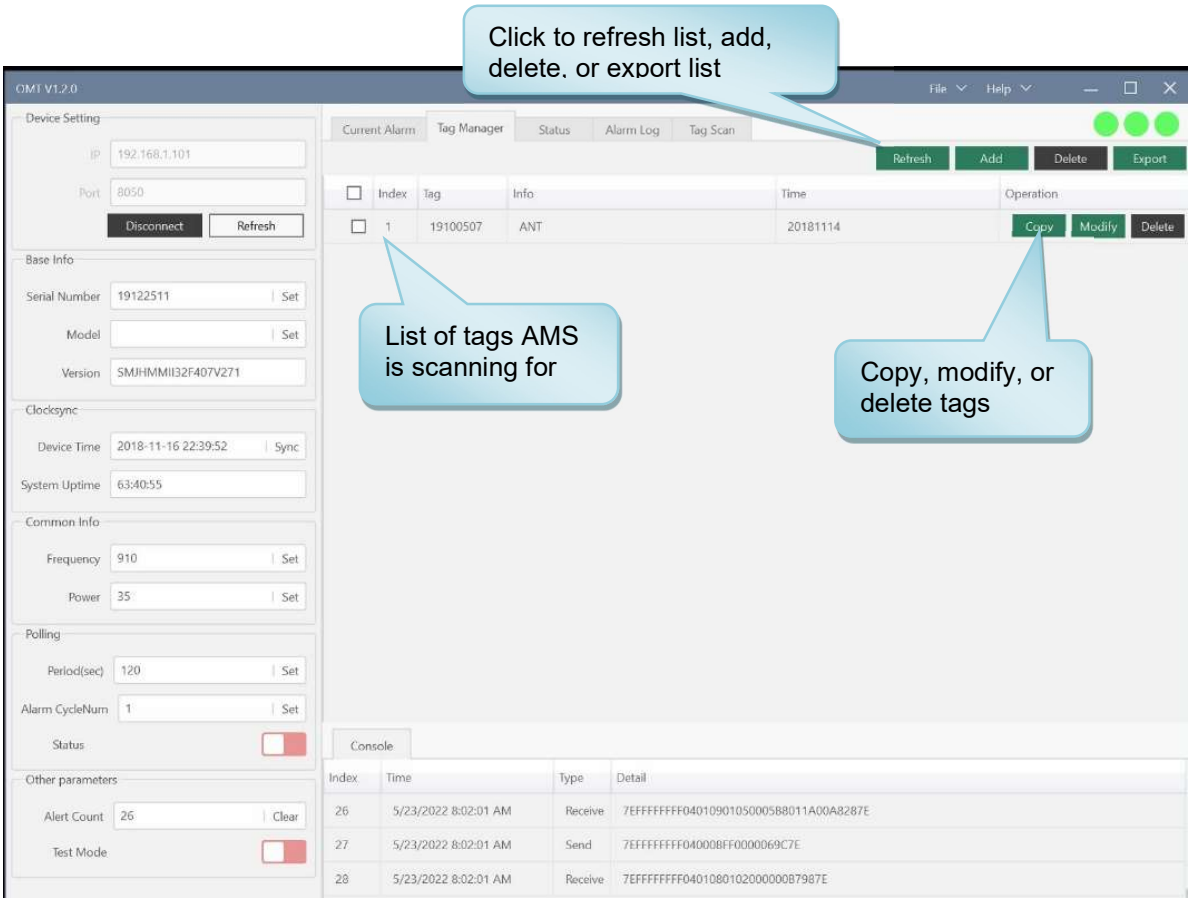


Figure 12: [Tag Manager] Screen

3.2.3 [STATUS]

When selecting the [Status] Tab, the screen will show the status of each tag. If the tag is “green”, there are no issues. If the tag is “red”, the AMS is not receiving information from the tag.

- Refresh – Checks status of tags while operating in manual mode
- Export – Exports .cvs file containing index, tag number, info, and time.

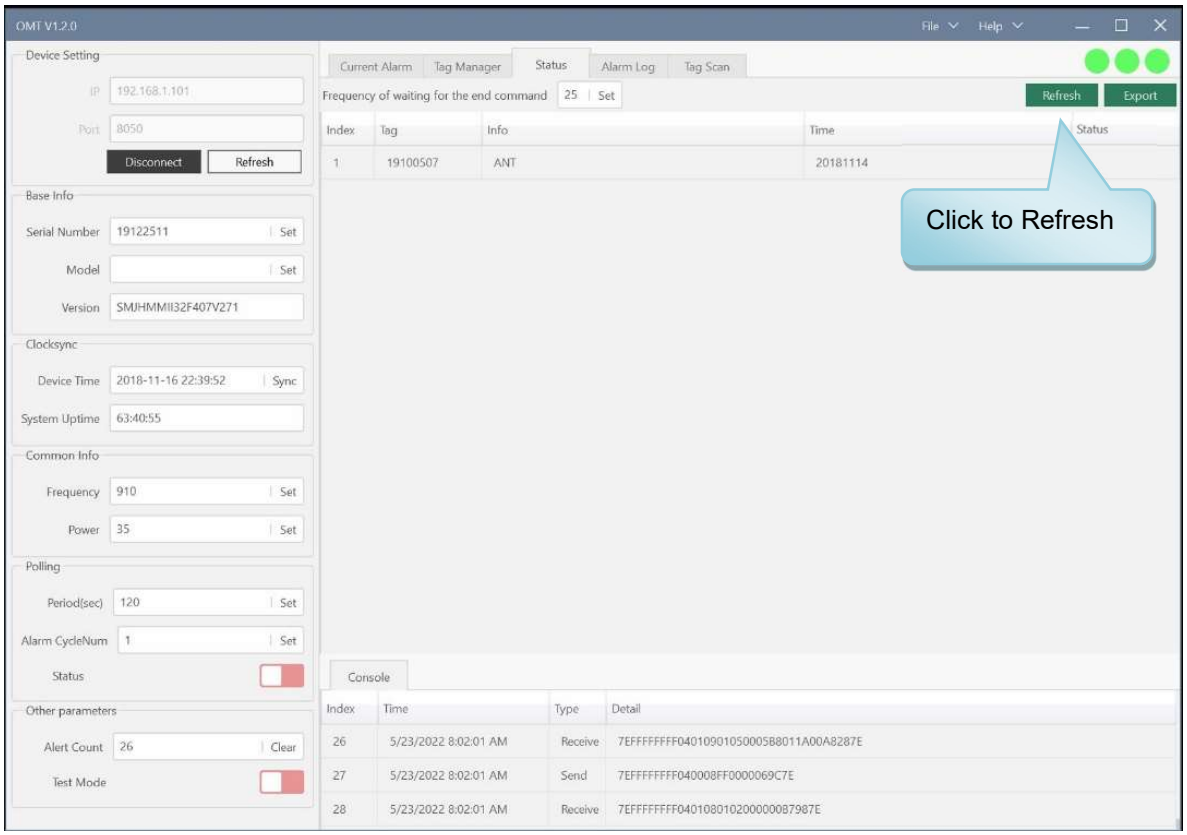


Figure 13: [Status] Screen

3.2.4 [ALARM LOG]

When selecting the [Alarm Log] Tab, the screen will show all alarms logged during auto and manual mode.

- Refresh – Checks alarms from tags while operating in manual mode.
- Clear – Clears the alarm log.
- Export – Exports .cvs file containing index, tag number, alarm, and time.

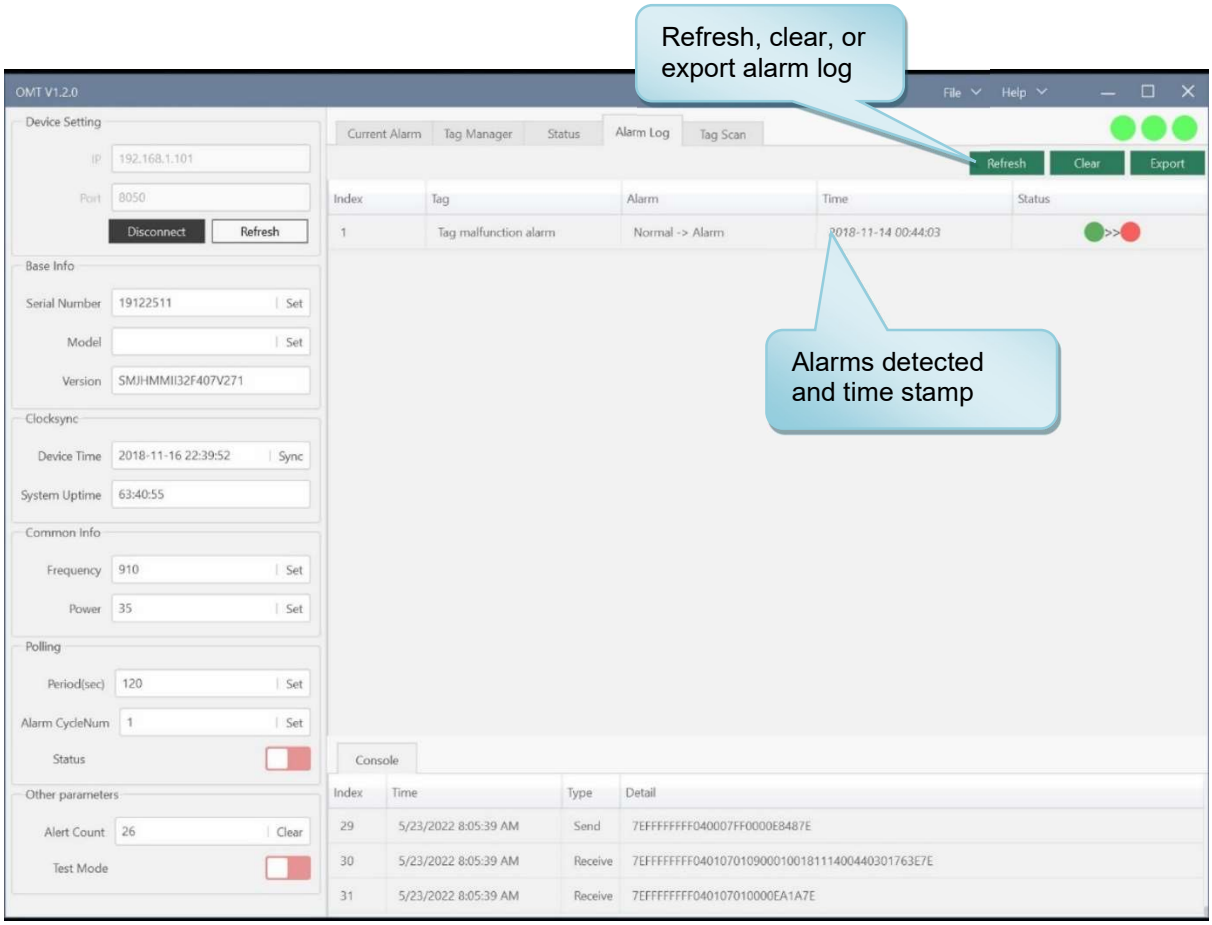


Figure 14: [Alarm Log] Screen

3.2.5 [TAG SCAN]

When selecting the [Tag Scan] Tab, this screen is used to automatically scan and add tags that the AMS can read on the passive DAS to the [Tag Manager].

- Read – Starts the auto scan of tags the AMS can read. Automatically adds tags to [Tag Manager] once scan is finished.
- Export – Exports .cvs file containing index & tag number

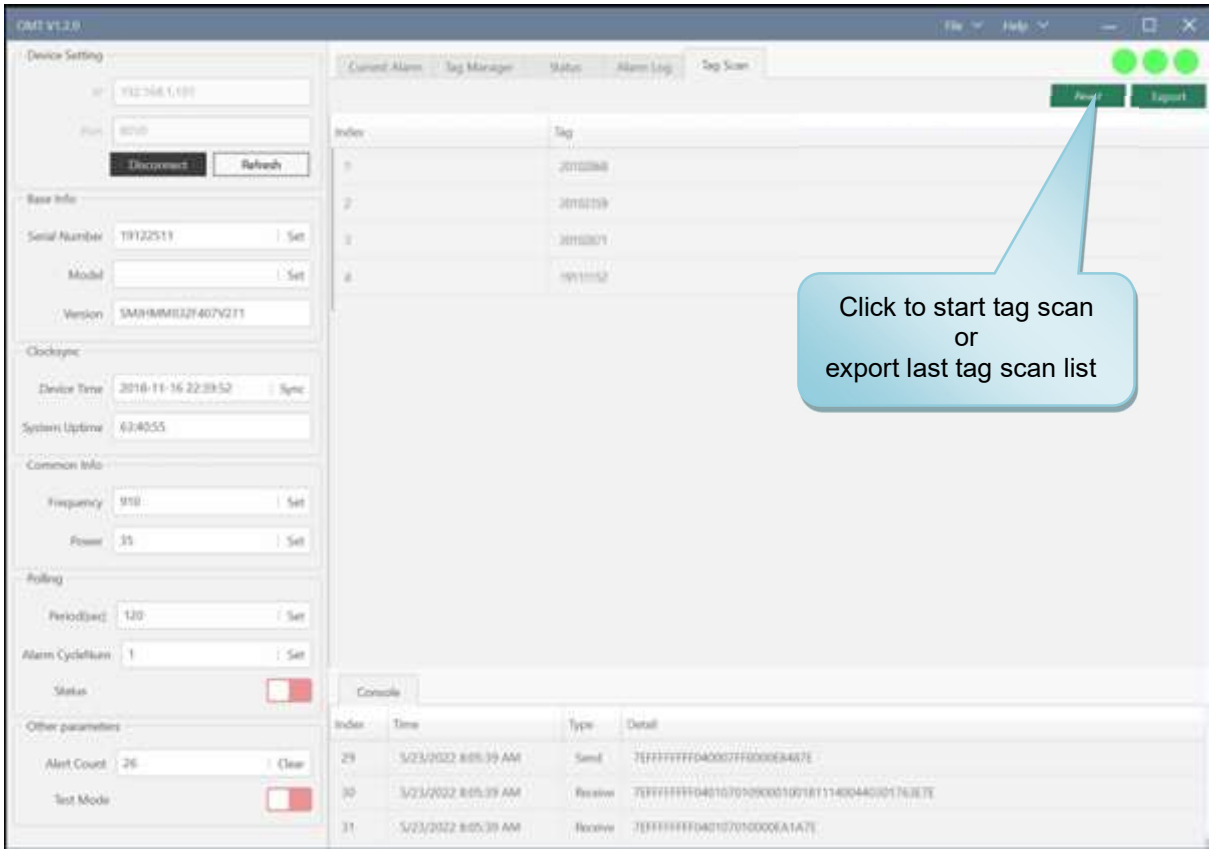


Figure 15: [Tag Scan] Screen

End of Section

4 COMMISSIONING

4.1 PRE-COMMISSIONING TASKS

After AMS installation, perform the following steps BEFORE POWERING UP and COMMISSIONING the equipment:

- Verify that the expected voltage, current and power levels do not violate any ratings.
- Visually inspect the power connection within the equipment. Ensure that the power cable is correctly and securely connected, including the grounding wire, RF cable and other cables.
- Check the grounding connection and verify that the ground resistance is less than 5Ω.
- Test the antenna system and ensure that the cable loss is no greater than 25 dB between the operating frequencies of 902 to 928MHz.

4.2 PRE-COMMISSIONING PROCEDURE

Perform the following for system commissioning.

Table 4: Commissioning Task Explanation

Commissioning Tasks	Observation
Tag List Creation	● Run “Scan Tags” if tag ID is unknown ● Tags can be added manually through Tag Manager
Time Sync	● In Manual Mode, sync the time with technician’s computer ● Time will reset if AMS is powered off.
System Alarms	● Alm 1 and Alm 2 are automatically on and cannot be edited. Connect to alarm cables to monitor alarms for power loss and tag missing.
Polling	● Edit Period and Alarm CycleNum to change number of continual alarms through a set number of cycles before reporting alarm for tag missing
Common Info	● Adjust power based on RL results

4.3 COMMISSIONING THE AMS EQUIPMENT

To complete the installation and commissioning, users need to follow the below steps and wait 45 seconds between actions:

Step 1: Click “Sync” to adjust the time of the AMS to match the computer’s time.

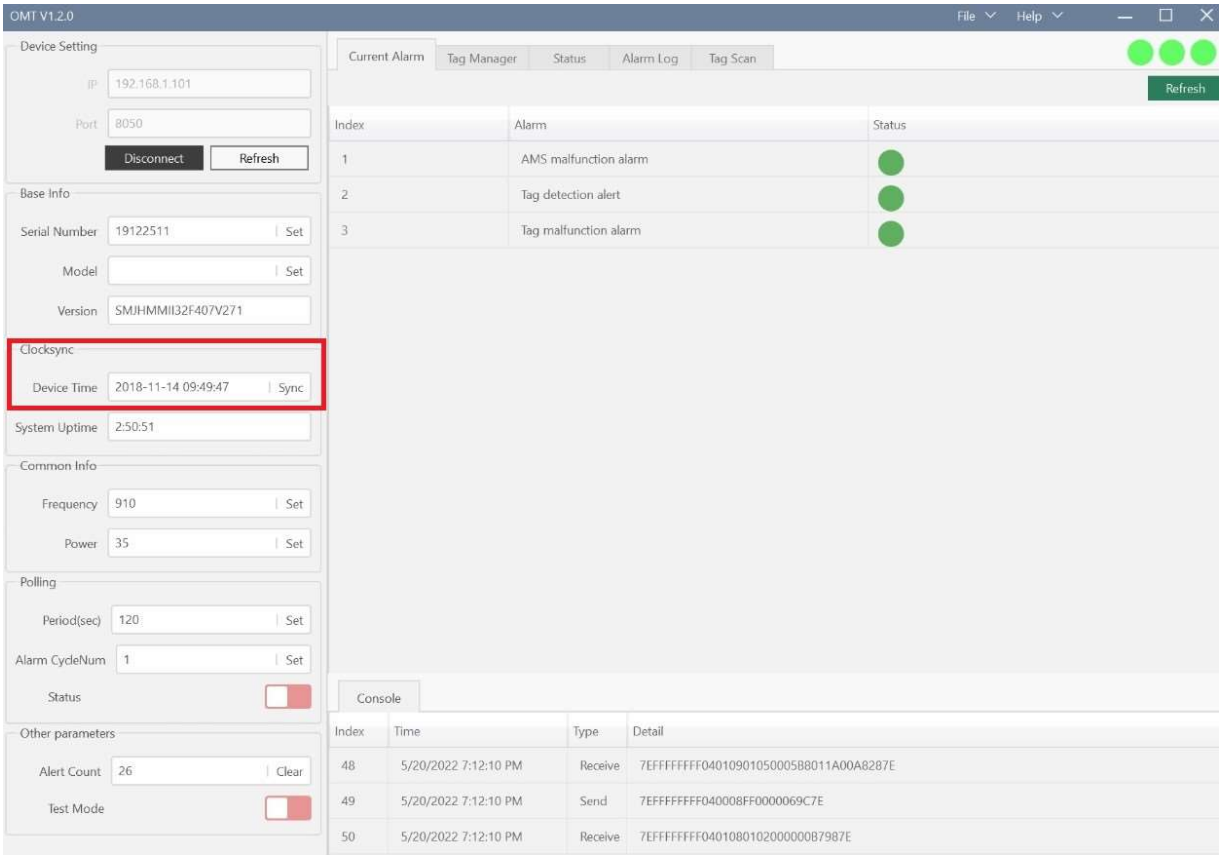


Figure 16: Commissioning Procedure – Time Clock Editing

Step 2: Scan the cable connected to the RF Out port on the AMS with a spectrum analyzer. Look for any traffic or noise between 900 to 935 MHz. If these is no noise or traffic on 910 MHz, keep “Frequency” at 910 under “Common Info”. If there are issues on 910 MHz, adjust “Frequency” in 1 MHz intervals higher to a frequency clear of noise and traffic. Click “Set” to save number.

Step 3: Ensure “Power” under “Common info” is set to 35. Click “Set” to save number

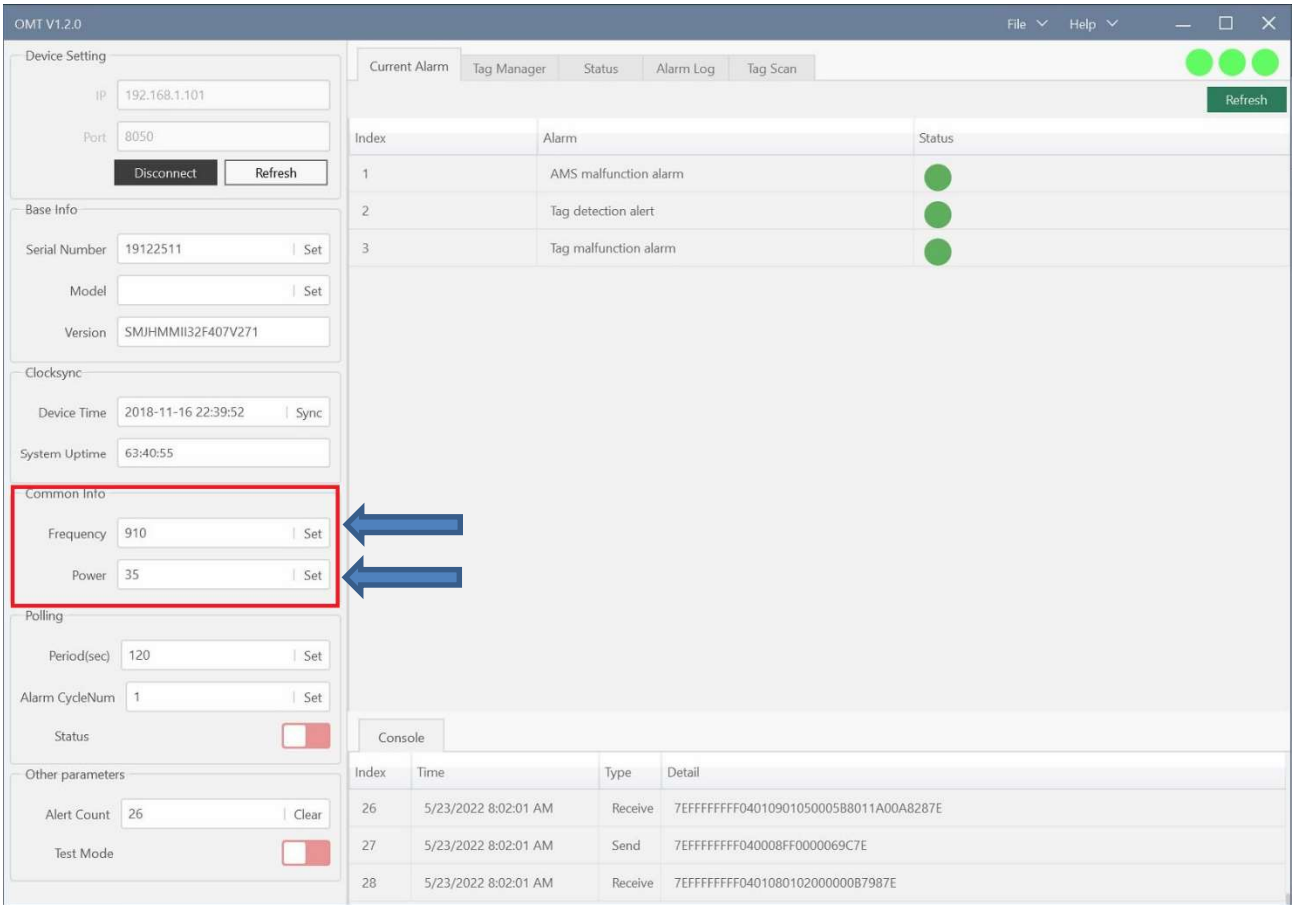


Figure 17: Commissioning Procedure – Frequency & Power Editing

Step 4: Click on the [Tag Scan] tab and then “Read” to gather tag information. Click “Export” to save the list of tag IDs.

Step 5: Adjust “Polling” for desired dry contact alarming cycles. Click “Set” to save settings.

- Period(sec) – The time between each scan.
  - Must be minimally 120 sec.
- Alarm CycleNum – The number of consecutive scans that must occur to the same tag ID error before an alarm is triggered on the dry contacts.
  - EX: If period is 120 sec and Alarm CycleNum is 1, the AMS must have 2 scans **back-to-back** with the same tag ID in alarm, to trigger the dry contact alarm. This would mean that the alarm won’t appear until 6 minutes have passed (120 sec before each scan + 60 seconds to complete the RFID Tag scan. The first scan being the reference scan and second scan being the **1** back-to-back comparison). This will trigger if any of the tags are consecutively missing after the scan. It does not have to be the same consecutive tag. If any scan finds a missing tag in the next scan, this will break the consecutive count needed for that tag to trigger an alarm. It does not affect other tags in their own consecutive count.

- 180 or 300 seconds with 3 or 2 cycles respectively, is generally acceptable for AHJ inspections. If there are no false alarms at the default settings, this is most recommended for testing and post inspection.
    - Maximum Cycle length of 250 with 5 min periods is 20.8 hrs before first alarm will appear at FACP.

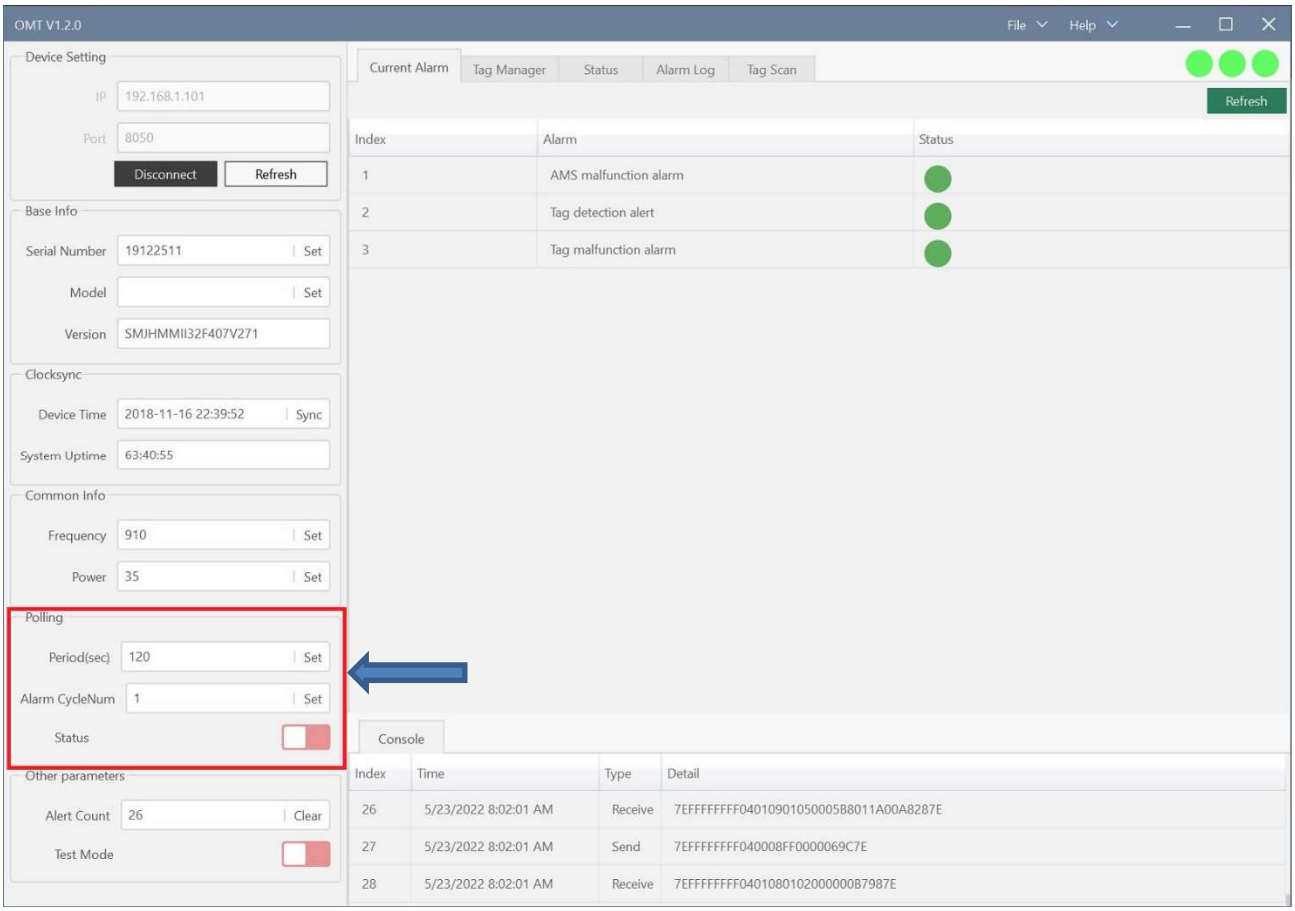


Figure 18: Commissioning Procedure – Poll Editing

Step 6: Slide “Status” bar green under “Polling” to engage auto mode. All other settings and tabs will be locked during this mode.
Step 7: Close OMT software. Keeping software open while AMS is in auto mode for extended periods causes software to freeze. To resolve, see section: Commissioning Troubleshooting Steps.

End of Section

4.4 TROUBLESHOOTING TIPS

4.4.1 TAGS & ALARMS

If Tag and other Tags are in alarm but no alarms under “Status” after refreshing

1. Refresh “Status”
2. Shift + right click “Console”
3. Click “Export”
4. Open exported .cvs file.
5. Scroll down to bottom of file.
6. Look for the start of the last RFID Tag scan at. See reference photo “Figure 21”
7. Look for antenna with string of 0000000000000 interrupted.
8. Note RFID Tag ID.

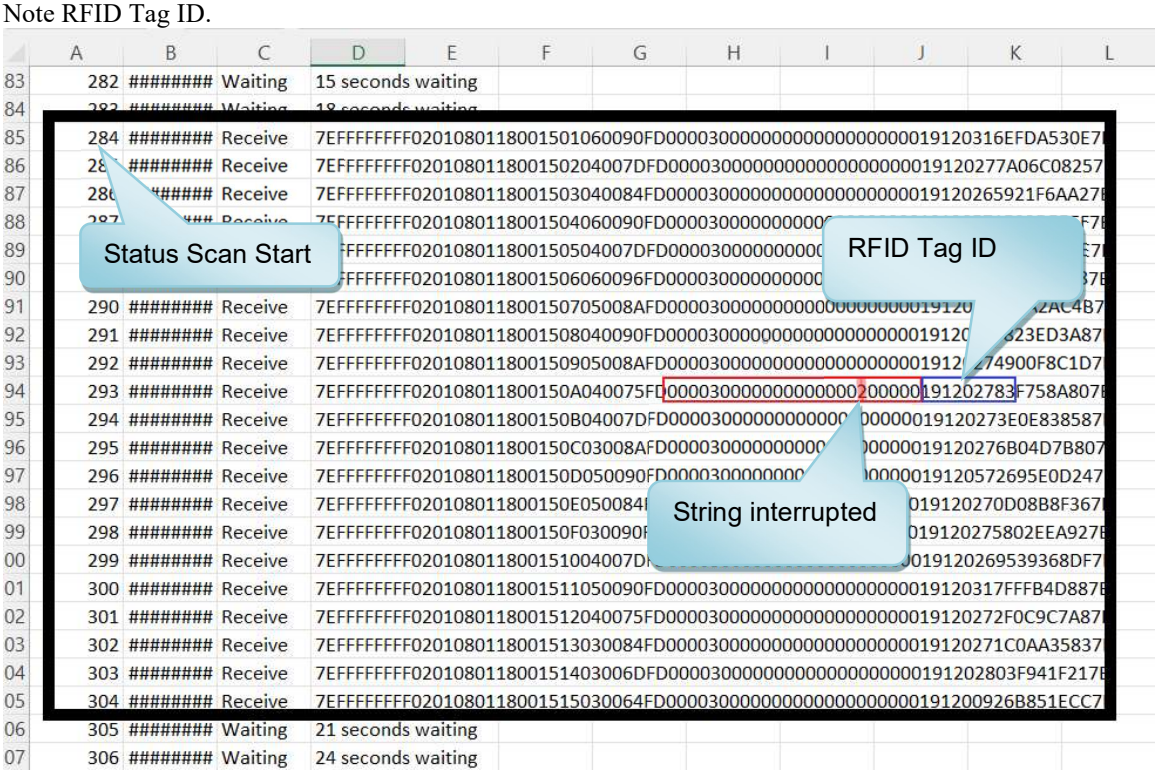


Figure 19: Example Tag Table

9. Click [Tag Manager].
10. Delete malfunctioning tag.
11. Power cycle AMS.
12. Call Comba Support for repair or replacement of faulty antenna.

4.4.2 TAG SCAN FAIL

Tag Scan Fail

- If the Tag Scan is unable to see tags after ensuring all cables are connected and RL is within specifications, reduce power by 3 dB from 35 dBm until AMS is able to scan for all antennas.
- Check over the air signals with a spectrum analyzer from 905 – 935MHz for any interference. Adjust frequency up 1 MHz at a time after each scan. After all tags are found, continue adjusting up 1MHz at a time till all tags are lost, then adjust frequency back down by 1MHz.
- **OMT Software Freezes After System in Auto Mode**
    - If the OMT software seems to be frozen, wait for 1 minute before any other actions performed. If the "Console" has not changed, close OMT Software and reopen.
        - If "Notice: Failed. The device is busy. Click Yes to repair it?" appears after clicking "Connect" once OMT is open again, click "No".
        - Next, click "File" -> "Reset"

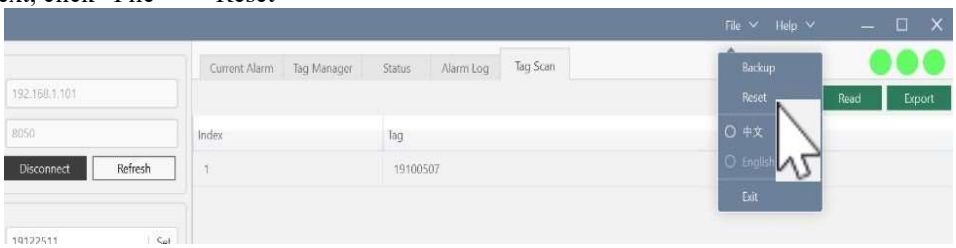


Figure 20: Reset Screen

- Then click "Connect" again. Click "Yes" to repair.

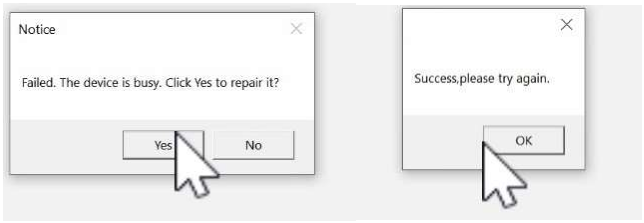


Figure 21: Repair Device Notice Screen

- You can now successfully click "Connect".

End of Section

5 MAINTENANCE

The AMS is designed for trouble-free operation and generally does not need maintenance. Maintenance activities should only be carried out by trained personnel.

Periodic inspection of the AMS is recommended, the recommended tasks include:

- Manually run tag check through the [Status] screen.
- Use the “Test” function to verify alarms from AMS will be triggered in the event of a failure.

End of Section

6 APPENDICES

6.1 APPENDIX A: TOOLS

The following are the recommended list of tools for new installation and routine maintenance.

- Philips Screwdriver
- Electrically operated drill and masonry drill bits ∅12mm
- Anti-static Wrist Strap
- Side Cutter
- Spectrum Analyzer

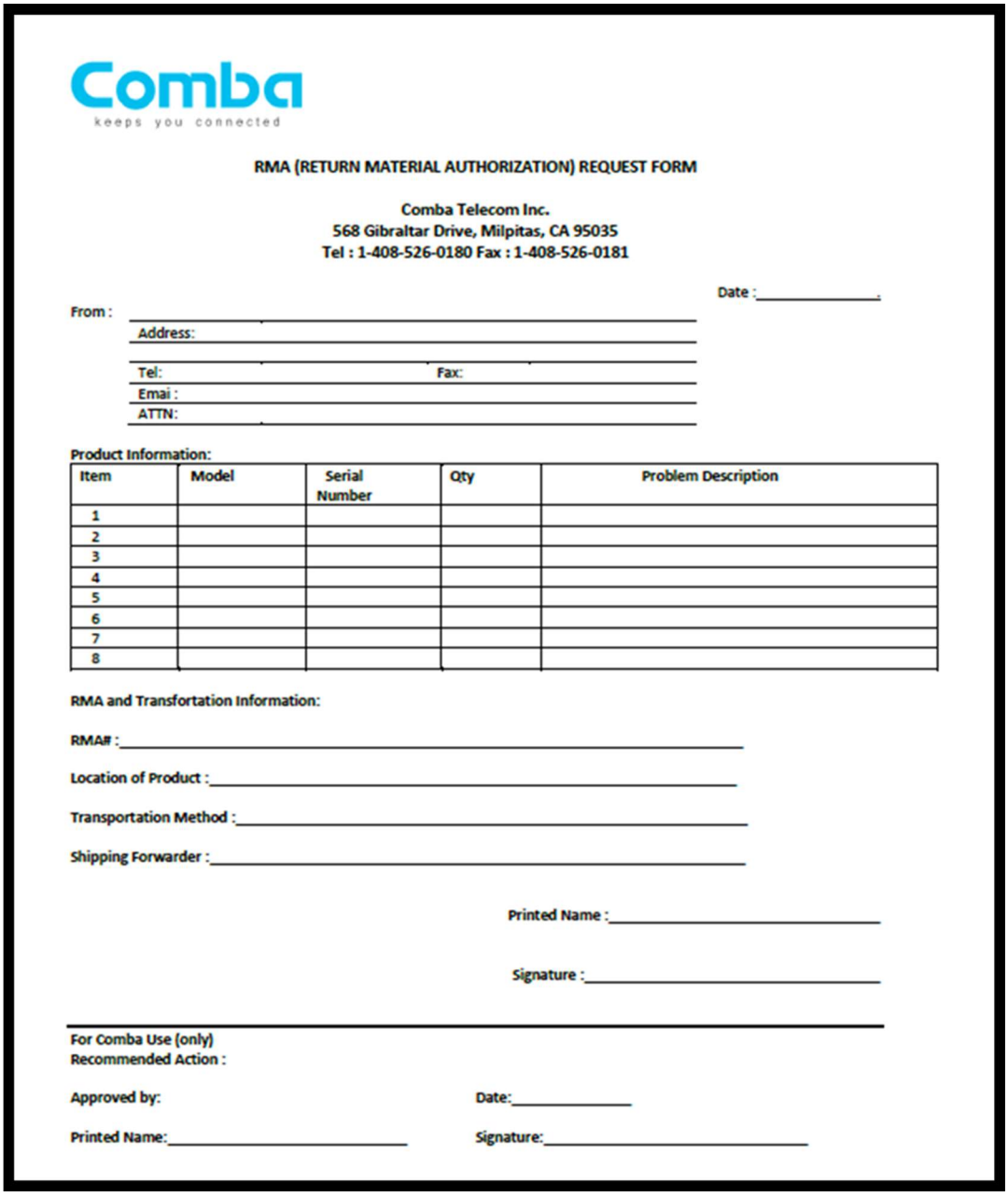
6.2 APPENDIX B: TAG LIST .CVS EXAMPLE

	A	B	C	D	E
1	Index	Tag			
2	1	20102868			
3	2	20102359			
4	3	20102871			
5	4	19111152			
6					
7					
8					
9					
10					
11					
12					

6.3 APPENDIX C: ALARM LOG .CVS EXAMPLE

	A	B	C	D	E
1	Index	Tag	Alarm	Time	
2	1	20102871	Normal -> Alarm	11/13/2018 13:29	
3	2	20102868	Normal -> Alarm	11/13/2018 13:29	
4	3	20102359	Normal -> Alarm	11/13/2018 13:29	
5	4	19111152	Normal -> Alarm	11/13/2018 13:29	
6	5	20102871	Alarm -> Normal	11/13/2018 13:36	
7	6	20102868	Alarm -> Normal	11/13/2018 13:36	
8	7	20102359	Alarm -> Normal	11/13/2018 13:36	
9	8	19111152	Alarm -> Normal	11/13/2018 13:36	
10	9	19111152	Normal -> Alarm	11/13/2018 13:38	
11	10	19111152	Alarm -> Normal	11/13/2018 13:45	
12					
13					
14					
15					
16					

6.4 APPENDIX D: RMA (RETURN MATERIAL AUTHORIZATION)



Comba
keeps you connected

RMA (RETURN MATERIAL AUTHORIZATION) REQUEST FORM

Comba Telecom Inc.
568 Gibraltar Drive, Milpitas, CA 95035
Tel : 1-408-526-0180 Fax : 1-408-526-0181

Date :_____.

From : _____
Address: _____
Tel: Fax:
Emai :
ATTN:

Product Information:

Item	Model	Serial Number	Qty	Problem Description
1				
2				
3				
4				
5				
6				
7				
8				

RMA and Transfortation Information:

RMA# :_____

Location of Product :_____

Transportation Method :_____

Shipping Forwarder :_____

Printed Name :_____

Signature :_____

For Comba Use (only)
Recommended Action :

Approved by: Date:_____

Printed Name:_____ Signature:_____

End of Section

End of Document

Comba

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