



ANTENNA GENIUS

User Manual

Software Version **4.1.16**

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1. WELCOME

Congratulations on your purchase of an Antenna Genius™ 8x2 v2 Plus Network-Enabled (TCP/IP) High-Isolation Antenna Switch, a member of the 403A Genius System™ advanced station automation line including Power Genius™, Rotator Genius™, and Tuner Genius™. More information on these products can be found at:

<https://4o3a.com/products/genius-family>

 **EXPERT TIP!** Antenna Genius™ is sometimes abbreviated as “AG” in this document.

AG is at home in all types of ham shacks: contest stations extravagant and modest, from single op to SO2R to full blown Multi-Multi, DXers, remote operators controlling their station from their living room via LAN or over the Internet from a hotel room thousands of miles away, to anyone wanting a better organized and more efficient station.

1.1. Software Version 4

This is the user manual for the new generation of Antenna Genius software - Version 4. This version is completely rewritten from scratch with the focus on stability, reliability, and a significant extension in features.

The new firmware has been designed to ensure that your Antenna Genius device operates optimally, with improved performance and an expanded range of capabilities. Our team of developers have spent countless hours working on this version to ensure that it is as solid and as stable as possible. This firmware version will provide you with a seamless experience, with minimal downtime or unexpected errors.

Fully compatible with all previous hardware versions of Antenna Genius. This means that you can upgrade to Version 4 with ease, and enjoy the new features without worrying about compatibility issues. Whether you are using the latest hardware or an older device, you can be sure that this firmware will work seamlessly with your system.

With Version 4, you can expect a significant extension in features, including enhanced capabilities, improved performance, and a more user-friendly interface. We have taken great care to ensure that this firmware is easy to use and navigate, even for those who may not be familiar with technical terminology. Whether you are a beginner or an experienced user, you can be confident that this firmware version will meet your needs.

We are committed to providing our users with the best possible experience, and this new version of Antenna Genius firmware is a testament to our dedication to excellence. We are confident that this new firmware will exceed your expectations and provide you with an even better experience than before. We encourage you to explore the new features and capabilities of Version 4 and discover the benefits of this latest release.

1.2. Considerations Before Upgrading

Important! The API and network protocol for this version have been completely redesigned and rewritten so any custom software that worked previously will not be compatible with new version out of the box, and will need to be updated.

If you have any third-party software or hardware integrated with your AG do not upgrade before checking if your software has been updated to be compatible with the version 4.

We put in a great deal of effort to ensure that the new API and network protocol are more reliable, easier to use, and offer enhanced functionality.

The new API is publicly available, and we encourage anyone who wants to use it to refer to <https://github.com/4o3a/genius-api-docs/wiki/Antenna-Genius-API> for more information.

Our website provides comprehensive documentation and resources that can help you get started with the new API and network protocol, as well as troubleshoot any issues that may arise.

While we understand that the transition to the new API and protocol may take some time, we are confident that the benefits of this update will be well worth the effort. We have taken great care to ensure that the new API is more efficient and user-friendly, with enhanced functionality that will provide a better overall user experience.

We would like to thank our users for their continued support and patience during this transition period. We are committed to providing you with the best possible experience, and we believe that this new version of the API and network protocol will help us achieve that goal. If you have any questions or concerns about this update, please do not hesitate to contact our support team for assistance.

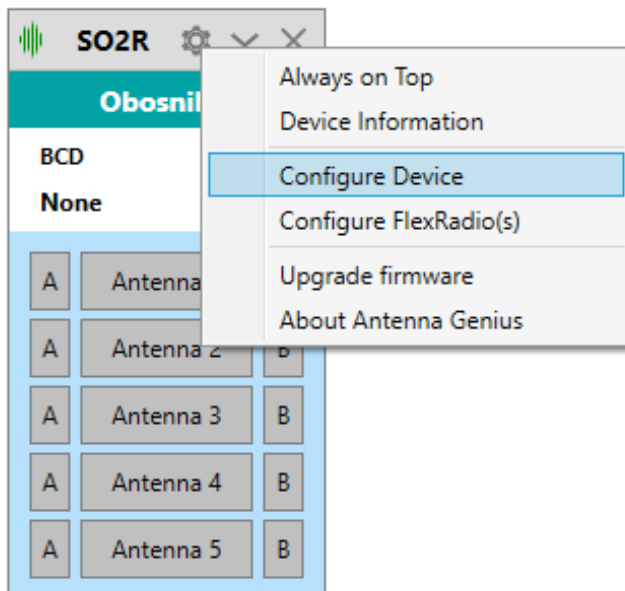
1.3. Backing Up Your Configuration

Important! During the process of upgrading to the new firmware the configuration will be lost.

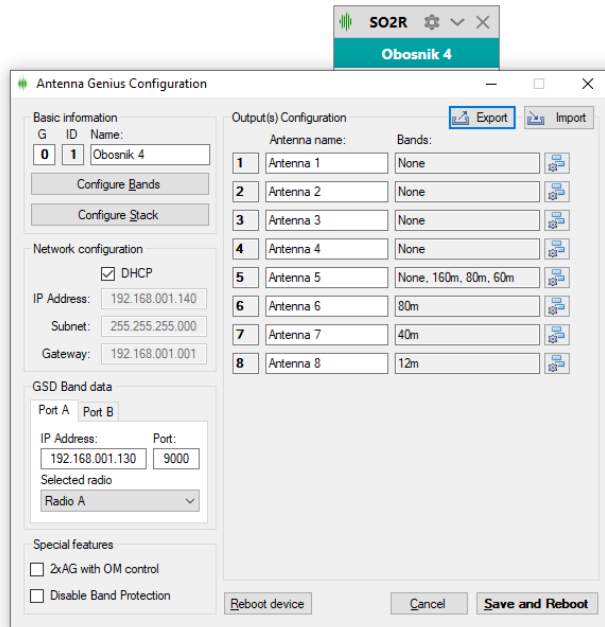
However, the new version is completely backwards compatible with the previous generation configuration file.

The configuration is stored in the memory on-board the Antenna Genius but it can be backed up into an XML configuration file stored on your PC.

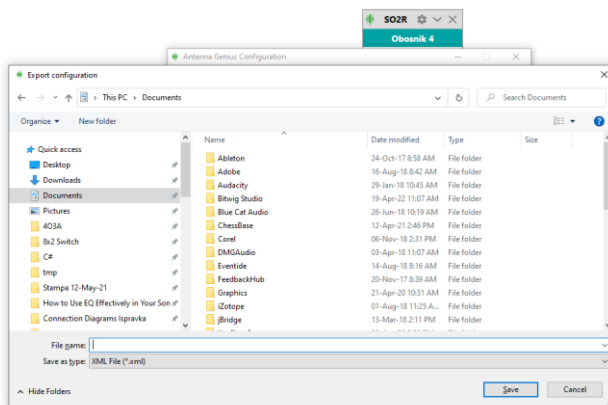
In order to back up your configuration:



1. Go to the **configuration menu** of your Antenna Genius.



2. Click on the **Export Configuration** button.



3. Choose a path and name and **save your config file**.

You can load this file into your Antenna Genius again after upgrading the firmware to version 4.

2. SPECS & FEATURES

Manufacturer	403A Signature™ by Sky Sat d.o.o.
Model	Antenna Genius™ 8x2 Plus v2
Functionality	8 antenna 2 radio RF matrix switch controlled via TCP/IP (LAN or WAN), BCD, or +12 VDC Pin-To-Port
RF connectors	UHF female (SO-239) standard, N female available by special order
Power handling	→ 3,000 Watts ICAS (SSB/CW) for 5 minutes @ 1.5:1 VSWR @ 30 MHz → 1,000 Watts ICAS (SSB/CW) for 3 minutes @ 1.5:1 VSWR @ 50 MHz
Ports	→ RJ-45 (LAN) → two DE-15 VGA-type (BCD band data or +12 VDC pin-to-port)
Network	100Base-T Fast Ethernet (100-Mbps), DHCP or manually-assigned network address, TCP/IP
Power consumption	300 mA @ 13.8 VDC
Frequency range	DC through 55 MHz
Port-to-port isolation	→ 90dB between ports worst case @ 14 MHz → 80dB between ports worst case @ 30 MHz → 70dB between ports worst case @ 50 MHz
CPU	Microchip Technology 32-bit PIC processor
Automation	Windows App, FlexRadio Systems SmartSDR API, Genius System devices, BCD, Pin-to-Port
Features	→ hardware interlock prevents two radios connecting to same antenna → unselected antenna ports grounded → LEDs indicate antenna ports in use → firmware updates via LAN
Case	Rugged stainless steel chassis with wall mount flanges top and bottom
Dimensions	6.75" W x 13.25" H x 3.25" D including mounting flanges (21 x 17 x 6 cm)
Net weight	approx. 4.4 lbs. (approx. 2 kg)

3. LEGAL

3.1. Radio & Television interference

(FCC Part 15 - §15.21 and §15.105)



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.

You may also find the following FCC booklet helpful: *"How to Identify and Resolve Radio-TV Interference Problems"* available from the U.S. Government Printing Office, Washington D.C. 20402. Info also available online at FCC.gov:

<https://www.fcc.gov/guides/interference-defining-source>

Changes and Modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission's rules.

3.2. European Community CE conformity



Sky Sat d.o.o. declares Antenna Genius™ 8x2 complies with the European Community EMC standards:

ETSI EN 300 330-1

ETSI EN 300 489-1

ETSI EN 300 489-15

CE compliance reports are available upon written request to Sky Sat d.o.o.

3.3. Product updates

Sky Sat d.o.o. reserves the right to make hardware and/or software product improvement or manufacturing changes without notice or any obligation to update units previously sold.

3.4. Limited warranty

This product is warranted to be free of defects in materials and workmanship for one year from the date of purchase. Sky Sat d.o.o. will repair or replace, at our option, any equipment proven to be defective within the warranty period. Warranty F.O.B. Sky Sat d.o.o., Vjecnih Junaka 27, Igalo 85347, Montenegro. Please contact the appropriate party for your region and obtain a return authorization (RA) number before returning any product for warranty service. RA number must be indicated on box used to return product for service.

What is covered: During the first year after date of purchase, 4O3A Signature will replace defective parts free of charge (post-paid) for AG components only. Any replacement hardware parts will be warranted for the remainder of the original warranty period or ninety (90) calendar days from the date of installation or repair, whichever is longer. 4O3A Signature will also correct any failure caused by defective parts and materials. The complete unit must be sent to 4O3A Signature at your expense in the original shipping container or other packaging sufficient to prevent damage in transit. 4O3A Signature is not responsible for damage or lost shipments from the customer. 4O3A Signature will insure the package and pay return shipping.

What is not covered: This Limited Warranty as it pertains to the Antenna Genius or components does not cover repair or damage caused by (1) misuse, negligence or user modifications; (2) any performance malfunctions involving non-4O3A Signature equipment; (3) connection to improper or unstable voltage supply; (4) the incorrect installation of any and all cables connected to the radio by the user; (5) the use of third-party software applications or hardware that directly or indirectly controls AG functions and/or operating state by utilizing a communication or control protocol, such as, but not limited to CAT or I2C commands, or (6)

random acts of nature such as flood, fire, water, weather related storm, lightning or electrostatic discharge damage.

Limitation of Incidental or Consequential Damages: This warranty does not extend to non-4O3A Signature equipment or components used in conjunction with our products. Any such repair or replacement is the responsibility of the customer. 4O3A Signature will not be liable or responsible for reimbursement for any special, indirect, incidental or consequential damages, including but not limited to any loss of business or profits, loss of property, loss of revenue, loss of use, loss of data, inconvenience or cost of unauthorized service.

3.5. Trademarks

4O3A Signature™, Antenna Genius™, Rotator Genius™, Station Genius™, Interface Genius™, and 4O3A Genius System™ are trademarks of Sky Sat d.o.o.

FlexRadio Systems™ and SmartSDR™ are trademarks of Bronze Bear Communications, Inc. d/b/a FlexRadio Systems.

PIC32™ is a trademark of Microchip Technology Inc.

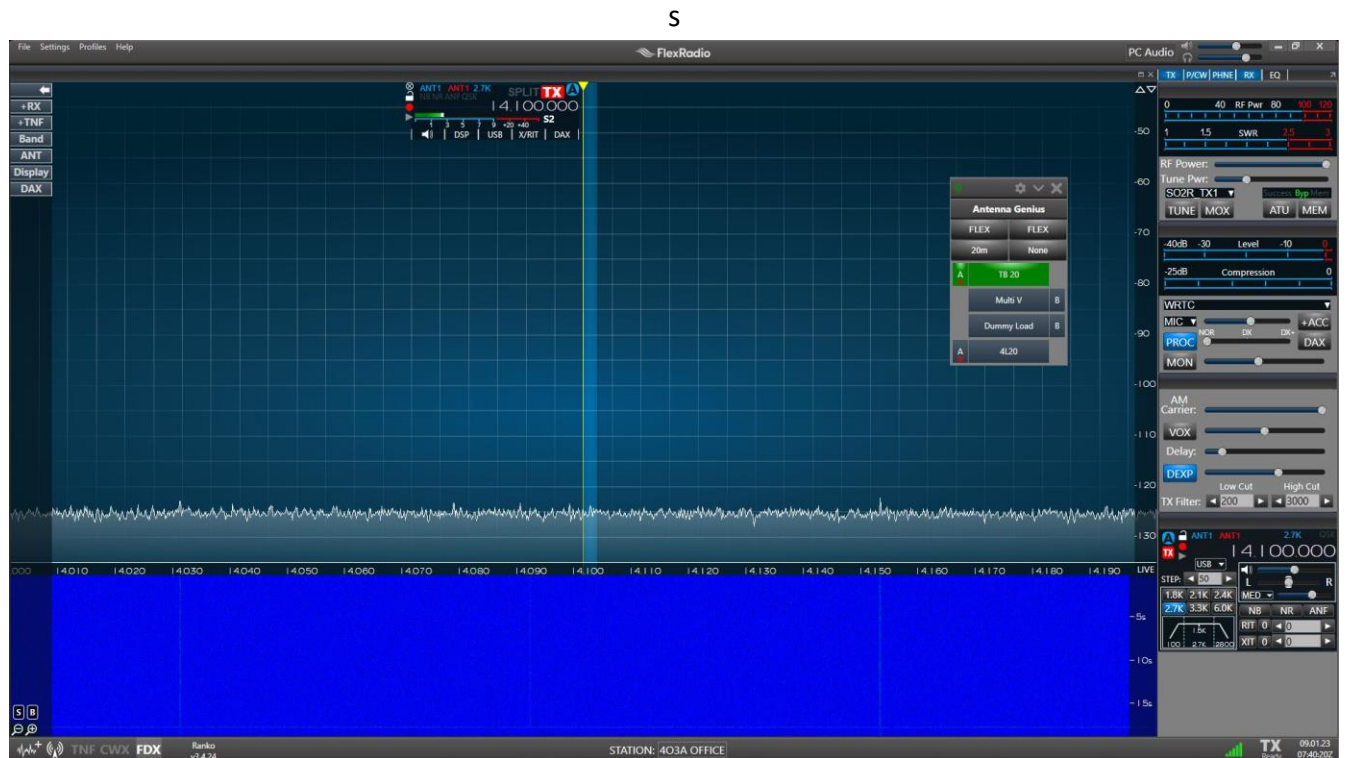
All other products, company names, brand names, and trademarks are the property of their respective owners.

3.6. Copyright

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4. WHAT CAN ANTENNA GENIUS™ DO?

Antenna Genius™ 8x2 v2 Plus is a matrix antenna switch which can route eight antennas to two radios using a variety of control methods. Software and hardware interlocks - double protection - prevent the same antenna from being connected to both radios. This, along with AG's ultra-high port-to-port isolation help protect your radios from front end damage.



AG in action with SmartSDR @ 403A (AG Always on top option engaged)


4.1. Multiple control options

You have five ways to control your AG:

1. **FlexRadio** over your TCP/IP network; AG will automatically follow two different Slice band selections and obtain band data from them
2. **Manual band switching** from the AG Windows app connected via your network
3. **BCD** (Binary-Coded Decimal) signals via the DE-15 VGA-style connector from any radio (Yaesu, Elecraft...)
4. **Pin-to-Port**, a +12 VDC signal via the DE-15 VGA-style connector

4.2. SO2R and multi-op with a single FLEX-6000

AG's extreme port-to-port isolation is perfect for SO2R (Single Operator 2 Radio) contesting with a single Flex rig! With AG, you can operate SO2R with one radio using a single FLEX-6600 or FLEX-6700 transceiver in full duplex mode. In other words, the 'two radios' in SO2R are both inside your single Flex rig!

 **EXPERT TIP!** All 4O3A Genius System™ products use standard TCP/IP protocols to communicate with each other and with other suitably-equipped devices. The 4O3A Signature team believes in open standards in ham radio and makes its APIs (library of commands) available freely to other manufacturers and software authors.

5. HOW IT WORKS

Antenna Genius brings together a powerful CPU, fast network interface, rugged, high-power relays and a programming/control App that runs in all supported versions of Windows. We are confident AG is the best antenna switch you can buy.

5.1. Tech

AG is powered by a Microchip Technology PIC32 microprocessor, a 32-bit device. Why so much horsepower in an antenna switch? Advanced technology radios demand high-horsepower accessories! Also, the extra computing power enables the addition of new features via firmware updates in the future.

AG has 100BASE-T networking built-in. Based on the Ethernet standard, but ten times faster than 10BASE-T, it is often referred to as Fast Ethernet. Officially, the 100BASE-T standard is IEEE 802.3u. 100BASE-T devices will also work fine on older 10BASE-T networks albeit at slower speeds.

5.2. Hardware

AG uses high quality 16 Amp relays rated at 12,800 W DC and conservatively rated for 1,000 W RF at up to 50 MHz. AG's relays are used for RF switching and also for the hardware lockout that prevents two radios from being connected to the same antenna (there is also a software lockout for redundant protection). The design priority was maximum port-to-port isolation coupled with power handling 'headroom' - twice legal limit at high duty cycle - to enable reliable, long term operation.

5.3. Software

The AG App runs on all Microsoft-supported versions of Windows and is an integral part of the AG system. You will use the AG App for initial set up and programming of your AG and also for alternate antenna selection when you have more than antenna available for a particular band. The AG App can also serve as your AG control interface if you don't want automatic band selection controlled by FlexRadio Slice band changes.

5.4. FlexRadio Ecosystem

In the "FLEX-6000 Signature Series Ecosystem," the AG App collects frequency and other data directly from the SmartSDR (SSDR) API, a software-to-software connection performed inside your PC or over your LAN at very high speed. No RS-232 cables to set up, no "stop bits," nor lethargic baud rates. It is a truly modern, intelligent, and high-speed solution.

AG will monitor any two SSDR Slices to determine the bands in use and use this data to select the appropriate antenna(s) for each Slice.

6. ONLINE RESOURCES

403A Genius System™ owners have many online resources available to help them fully realize the capability of their Antenna Genius™, Rotator Genius™, Tuner Genius™ and more.

403A Web Site Downloads: current owners manuals, white papers, Apps, firmware, and changelog are available at:

<https://4o3a.com/support/downloads>

403A Web Site Forum:

<https://4o3a.com/support/forum>

FlexRadio Systems Community: a great resource for anything related to FLEX-6000 Signature Series™, SmartSDR™ and Maestro™:

<https://community.flexradio.com/flexradio/>

7. WHAT COMES IN THE BOX?

When you unpack your AG box you should have:

- Antenna Genius
- DC power connectors
- Quick-start Guide
- Other items, such as LAN, DC and coax cables, are user supplied
- Owner's Manual (this document) and other documentation is available for free download from:

<https://4o3a.com/support/downloads>

8. HARDWARE

EXPERT TIP! Read this and the following Software section carefully before installing any hardware.

8.1. Front panel

Front panel features:

- SO-239 (or N-female) connector for Port A
- SO-239 (or N-female) connector for Port B
- 8 SO-239 (or N-female) connectors for antenna inputs
- LEDs: red LEDs indicate which A port antenna has been selected and green LEDs indicate which B port antenna is selected

8.2. Bottom panel

Bottom panel features:

- LAN: RJ-45 jack connects to your home/shack network (assumes you are using the network control option as most Flex users will be)
- Two DE-15 VGA-type for users opting for BCD or +12 VDC pin-to-port control in lieu of network control, for controlling standard radios as Yaesu, Elecraft etc. These are left unconnected if you are using network control (most FlexRadio equipped stations won't use these ports)
- 12-15VDC: connect your shack 13.8 VDC power supply here paying attention to proper polarity, anywhere from 12 to 15 VDC with at least 300 mA will be OK
- OM module: enables connecting the 16 relay Output Module for station automation
- DIP Switches: The side panel has 8 DIP switches for resetting the configuration.

AG can be controlled four different ways: (1) LAN, (2) BCD, (3) Pin-to-Port. The control mode is set independently for Port A (Radio A) and Port B (Radio B) by the DIP switches. For example, Port A could be controlled over the network and Port B could be controlled by BCD signals.



8.3. Top panel

The top panel features:

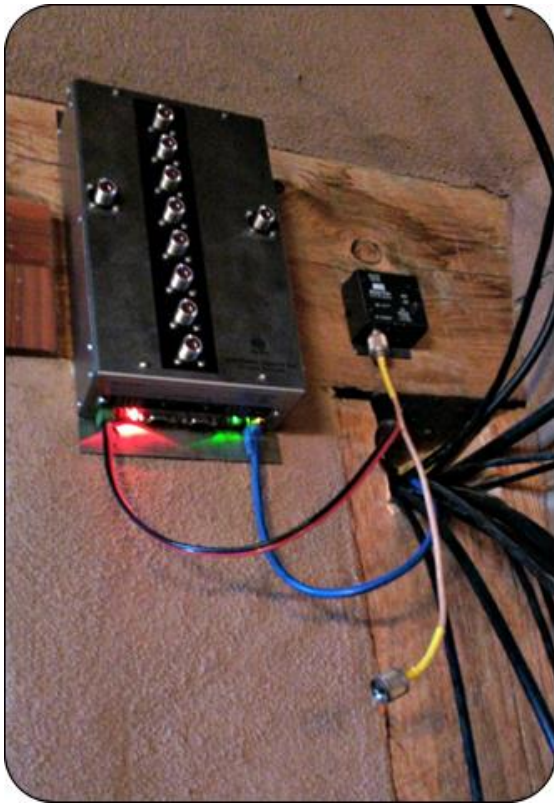
- A DC power connector for stacking multiple AG units. This enables a single switch to switching between 16, 24 or 32 antennas.
- Two pairs of dedicated PTT input and output RCA ports for hot switching protection. There are independent ports for both A and B radio.
- Red LED for indication that Port A protection is engaged. Green LED for indication that Port B protection is engaged.



8.4. Where to put it?

Most users will install AG near their station bulkhead, the location where their antenna feed lines, AC mains, DSL, cable TV, and/or other cables enter the shack and where the single point ground system nexus is located (you do have a single point ground system, don't you?). Locating AG at your bulkhead or other remote location means only three cables need to be run to the station operating position, coax for the A and B radios and a Cat5e (or higher) Ethernet cable for the LAN (if not using LAN, you will need a pair of control lines, one for Port A and for Port B).

At the left side is the bulkhead-sited AG @ WOLFA prior to connection of coax lines and ground connection:



AG can also be installed at the operating position or outdoors. If the later, install AG in an outdoor NEMA-rated enclosure and make sure it has a 'weep hole' at the bottom to allow air circulation and to let moisture out.

The picture on the right is an AG installed outdoors in very unfriendly conditions (temperatures down to $-28\text{ }^{\circ}\text{C}$ ($-17.6\text{ }^{\circ}\text{F}$) in Minnesota @ WOAD.

💡 EXPERT TIP! Reduce station clutter by mounting your AG near your station cable entrance "bulkhead." Slots for such mounting are provided on the top of the AG case.

AG is a 100BASE-T network device using standard TCP/IP protocols, it is therefore subject to the usual 328-foot (100m) LAN cable run limitations per TIA/EIA 568-5-A. If longer runs are required, the use of intermediate active hardware such as a repeater or switch will be necessary. Cat5e cable is recommended, and higher-rated cables such as Cat6 are also OK.

💡 EXPERT TIP! For outdoor UTP (Ethernet) cable runs, be sure to use outdoor-rated cable including UV-resistance properties if located in direct sunlight.

403A Signature encourages all amateur radio operators to employ single point ground systems for both protection from lightning induced power surges and also for RFI mitigation. A good source for information on this topic is the ARRL Handbook, updated annually and available from the ARRL Bookstore:

<https://arrl.org>

Another excellent resource for station grounding information and RFI mitigation are several documents written by Jim Brown, K9YC, available for free download at:

<http://www.audiosystemsgroup.com/K9YC/K9YC-old>

AG is a computer and thus its electronics will generate some heat. Also, the relays and other components will generate heat when under load. Make sure there is adequate clearance and airflow around the AG cabinet sides and top in its installation position.

8.5. DC power connection

Connect a DC power cable from your station 13.8 VDC power supply (anywhere from 12 to 15 VDC is OK, your shack DC power supply is likely 13.8 VDC) to the outlet marked 12-15VDC on the bottom panel. Center pin is + pole. We recommend using a DC fuse such as those provided on the popular RIGrunner and similar DC power distribution units (you can use the 1 Amp blade fuse that comes with RIGrunners). If you don't have a RIGrunner, we strongly suggest you place a 1 Amp DC fuse in series with the hot side of your DC power cable.

Make sure your power supply can supply at least 300 mA @ 13.8 VDC. We strongly advise using a clean, high-quality DC power source for AG and all your other station equipment. Many cheap switch mode power supplies and "wall warts" are unstable and can generate surprising amounts of RFI well into the VHF spectrum.

8.6. Network cabling

Most home networks (LAN) operate at Ethernet (10 Mb/s), Fast Ethernet (100 Mb/s) or Gigabit Ethernet (1000 Mb/s) speeds. All of these networks work fine over Category 5 UTP or better rated cable such as Cat5e, which is widely available, or Cat6. It's likely the cable you are already using for your home network will work great with AG.

If you are unfamiliar with or need a refresher on home networks, a good primer from PC World is online here:

http://www.pcworld.com/article/196049/the_ultimate_guide_to_home_networking.html

100BASE-T networking has 328-foot (100 m) limitation between active devices (such as Ethernet switches). Keep this in mind when locating your AG.

Use a Cat5e, Cat6 or Cat6a UTP cable (not supplied, please don't use a cheap cable here; poor-quality high-speed data cables are never a good idea!) between the Ethernet port on your AG

and your station LAN switch or hub (switches preferred over hubs). This should be the same place where your FLEX-6000 Signature Series radio connects to your LAN. Note this LAN connection can be as simple as a port on a DSL router or as fancy as a standalone Gigabit switch.

AG can be controlled by PCs connected over WiFi to your LAN as long as AG itself is connected directly to your LAN via a wired connection to an Ethernet switch or hub (switch recommended; Ethernet hubs will slow down your LAN).

8.7. DIP Switch configurations

As of version 4 DIP switches are no longer used to configure band data sources, ID or group ID.

Important: All these settings are now done through the Windows app utility program and the position of DIP switches 1 through 6 doesn't do anything.

DIP 7 is used to **force your AG into bootloader mode** to enable you to re-upload the firmware to the device.

This is used when your AG gets bricked (unresponsive) for whatever reason – due to configuration, power failure in some critical state etc.

DIP 7	
ON	force bootloader mode
OFF	normal operation

The most typical scenario of bricking an AG is interrupting a firmware upgrade or failing a firmware upgrade due to a bad network connection.

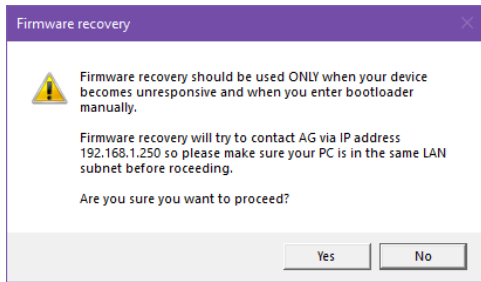
AG features a bootloader software enabling you to reinstall the firmware at any time.

The bootloader uses a fixed IP address – 192.168.1.250 so make sure your network is using the same subnet.

Follow these steps to take to reinstall firmware on a bricked device:

1. remove DC power from AG
2. move DIP 7 to ON position
3. turn DC power back on
4. Open the app,

5. Click on the **Settings** wheel and select **Firmware Recovery**
6. You will be prompted with a window that looks like this:



7. click **Yes**
8. wait for the progress bar to fill up
9. move DIP 7 to to OFF position
10. remove DC power from AG
11. turn DC power back on

DIP 8 is used to **reset your AG config settings to default** and **sets the IP setting to DHCP** (see Section 9.2 below).

DIP 8	
ON	restore factory settings on next power cycle
OFF	normal operation

To reset AG configuration and IP settings follow these steps in order:

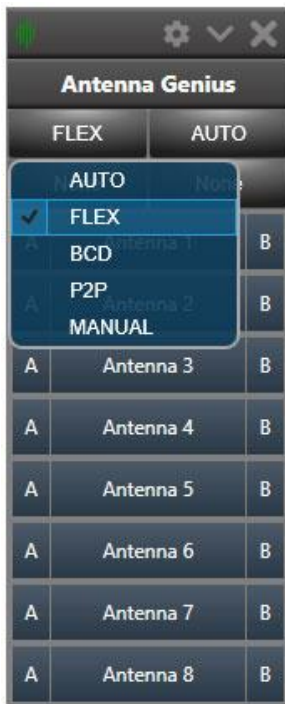
1. remove DC power from AG
2. move DIP 7 to ON position
3. turn DC power back on
4. move DIP 8 back to OFF position

DIPs 7 and/or 8 ON have no effect on the device in normal working mode without cycling DC power. After a successful configuration reset/firmware upload, make sure to set DIP 7 and/or 8 to OFF, otherwise you will reset your configuration/go to bootloader mode on every power up.

8.8. LAN Control Mode

LAN Control Mode is used if you want to obtain band data from a FlexRadio. In this mode AG gets band data from a FlexRadio using the TCP/IP network.

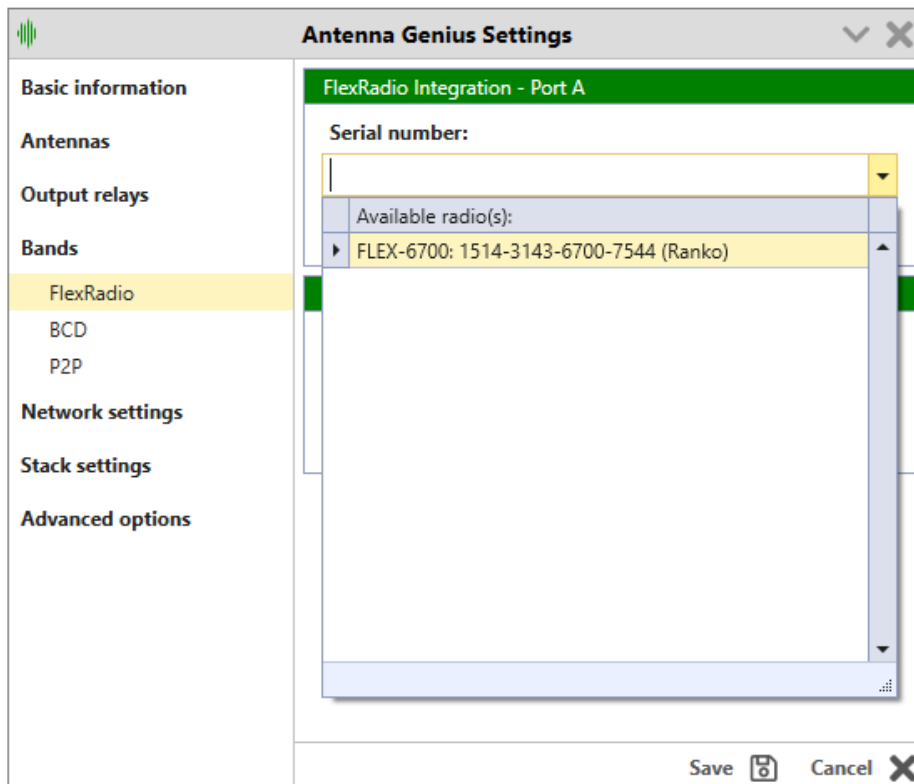
💡 EXPERT TIP! From software version 4 DIP switches are no longer used to set band data sources. It is now exclusively done through the Utility App. Click on the band source icon in the app and select the Flex as the source.



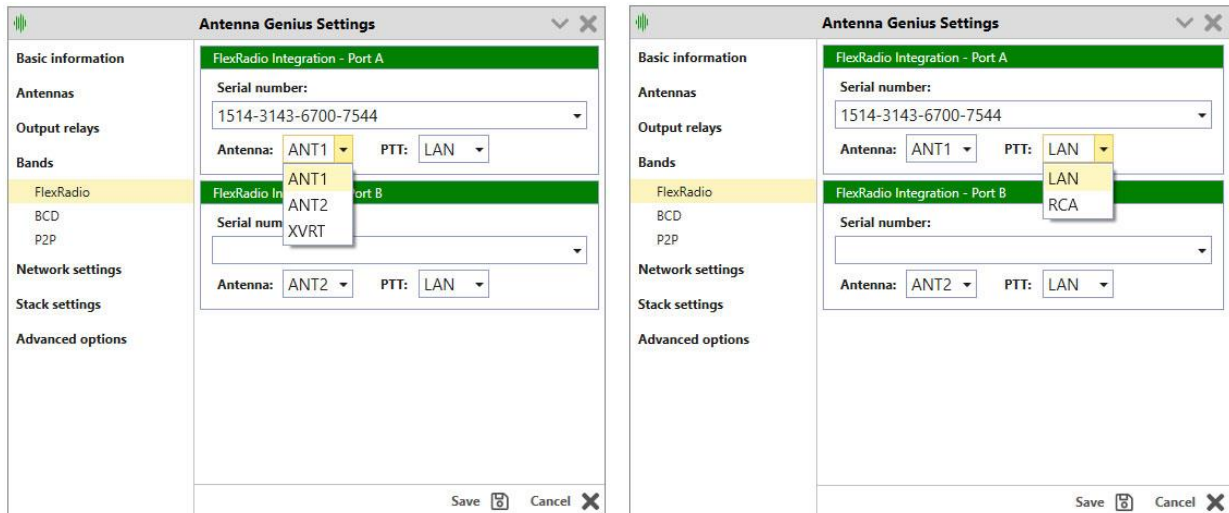
You can now connect your FlexRadio using the app. Click the configuration icon (gear icon) on top and choose Device settings:



Click on the FlexRadio under Bands and your FlexRadio will be discovered automatically and listed on the right:



Set **Antenna:** option to assign the desired Flex antenna port to Port A and Port B, respectively.
Set **PTT:** option to assign the desired Flex PTT source to Port A and Port B, respectively.



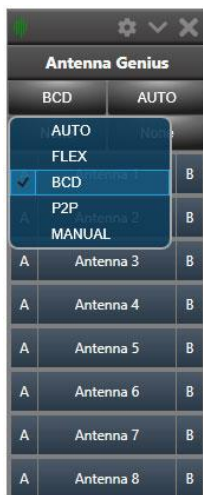
Click **Save**.

8.9. BCD Control Mode

In this mode AG gets band data from radios using the standard BCD protocol (Yaesu, Elecraft etc)

💡 EXPERT TIP!
From software version 4 DIP switches are no longer used to set band data sources. It is now exclusively done through the Utility App. Click on the band source icon in the app and select the Flex as the source.

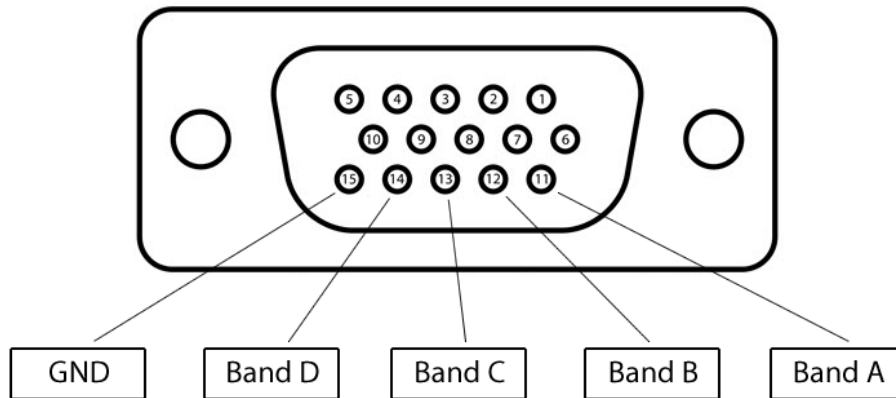
Typical radios using BCD band data include Yaesu FT-1000 MP, FT DX 5000, FT-1000D, Elecraft K3, Ten-Tec Omni V and Orion II and many more.



In order to use BCD mode on your Antenna Genius, go to the app and click on the band source button then select BCD.

Band sources for each radio port are selected independently so make sure to set both ports to the desired band source.

This is the pinout when looking at the device connector:



This is the BCD data table:

Band	160M	80M	40M	30M	20M	17M	15M	12M	10M	6M	None
Frequency	1.8	3.5	7	10	14	18	21	24	10	50	
Band A	H	L	H	L	H	L	H	L	H	L	L
Band B	L	H	H	L	L	H	H	L	L	H	L
Band C	L	L	L	H	H	H	H	L	L	L	L
Band D	L	L	L	L	L	L	L	H	H	H	L
HEX Code	1	2	3	4	5	6	7	8	9	A	0

Note that it is not possible to select 60M band through BCD.

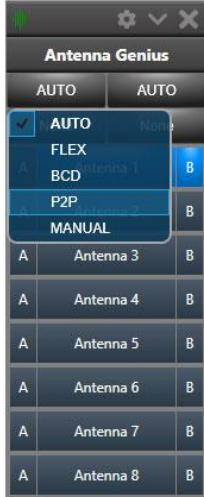
Different radio models use different pinout for their BCD output:

PIN	Antenna Genius in	Yaesu FTDX5k Band Data out	Elecraft K3 DB15 out	ICOM CI-V out	Kenwood out
GND	15	3	12	Connection through additional CI-V to BCD converter	Connection through additional IF-323C to BCD converter
Band A	11	4	13		
Band B	12	5	3		
Band C	13	6	9		
Band D	14	7	14		

8.10. Pin-2-Port Control Mode

In this mode you can use an external switch for manual switching.

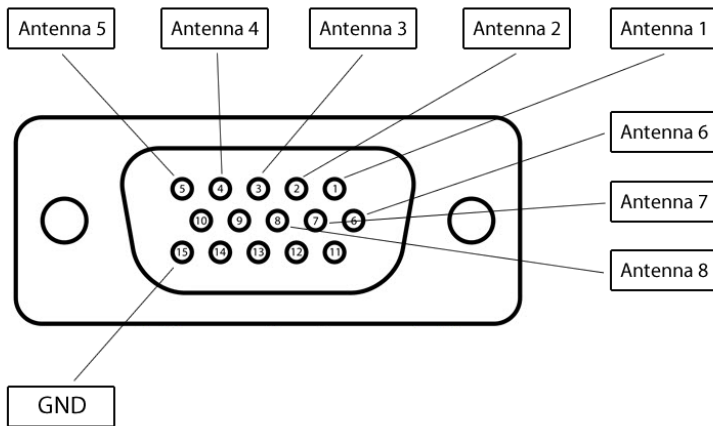
You will be able to switch up to 8 different antennas per port.



In order to use P2P mode on your Antenna Genius, go to the app and click on the band source button then select P2P.

Band sources for each radio port are selected independently so make sure to set both ports to the desired band source.

This is the pinout when looking at the device connector:



EXPERT TIP! To see always list of available antennas, in device configuration assign each antenna port to “None”.

For this purpose, you can use the 403A Manual Antenna Controller S8:



8.11. Automatic Mode

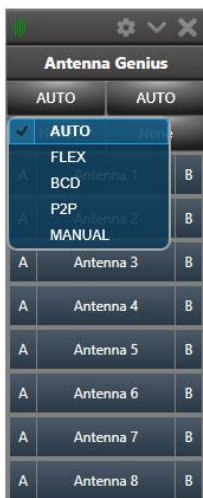
Automatic band selection is a new mode based on the priority of the data on the port (automatic detection).

In case there's **multiple band sources** available at the same time the following **priority list** is followed:

Band Source	Priority
P2P	Highest Priority
BCD	Medium Priority
FLEX	Lowest Priority

The logic being this is that connecting a hardware band source is more intentional than a software setup that can be configured accidentally more easily.

You will never be allowed to do manual band selection if in AUTO mode even if no band sources are available.



In order to use automatic mode on your Antenna Genius, go to the app and click on the band source button then select AUTO.

Band sources for each radio port are selected independently so make sure to set both ports to the desired band source.

8.12. Manual Mode

The manual mode is a new, special mode that's used for testing and debugging of your configuration.

When the manual mode is enabled, you will be able to see the band manually and by doing so, verify that your configuration is exactly as you want it to.



In order to use the Manual mode on your Antenna Genius, go to the app and click on the band source button then select MANUAL.

Below the band source selection button you are now be able to click on the band and manually select the band.

Band sources for each radio port are selected independently so make sure to set both ports to the desired band source.

9. ANTENNA GENIUS™ APP

The AG App is used to perform seven tasks:

1. Fully configuring your Antenna Genius.
2. Programming band-antenna assignments for automated operation: antenna selection driven by radio band data received directly from a FlexRadio, radio, manually, or relayed through a logging software.
3. Secondary antenna selection when there is more than one antenna available for a band. AG will default to last antenna selected for a particular band in automatic mode after which operator can manually select an alternative antenna for that band. Note that you will be prohibited from switching to antennas which have not been programmed for the band in question (unless band is set to none, rendering the antenna as band independent).
4. Providing a Windows interface for manual antenna selection, an alternative to automated antenna selection as well as powerful relay control for automation.
5. Allowing multiple users to use one switch.

6. Allowing remote operation.
7. Updating AG with the latest firmware.

EXPERT TIP! AG will default to last antenna selected for a particular band in automatic mode after which operator can manually select an alternative antenna for that band. Note that you will be prohibited from switching to antennas which have not been programmed for the band in question.

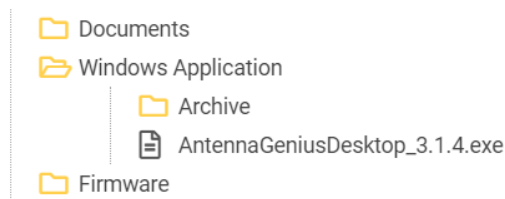
9.1. Initial set-up

9.1.1. Download and install the latest AG Windows App

The AG Windows App has been tested to run on Windows 10 and 11 and is available free from the Downloads page on 403A.com:

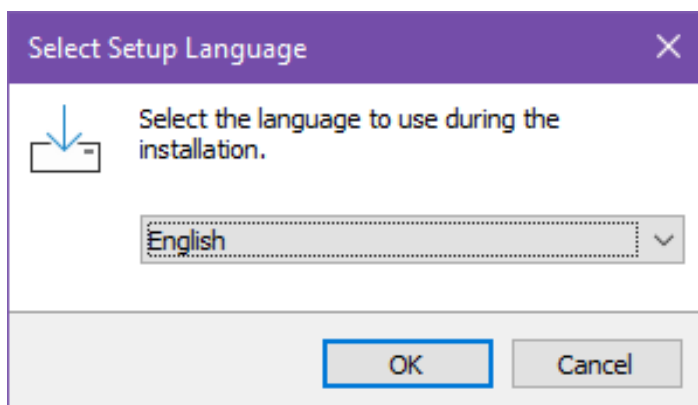
Antenna Genius

The firmware file is now included in the app and there is no need to download it separately.

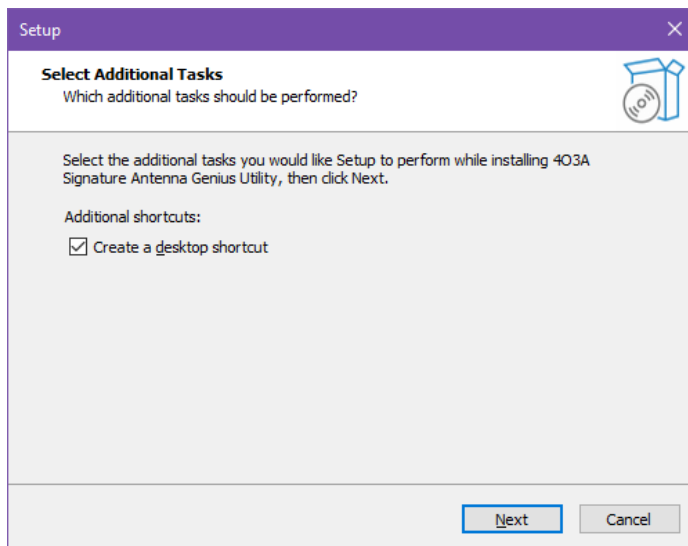


Download the AG Windows App to your PC's Downloads folder. You may see a warning message from your browser or security software for trying to download a Windows executable file (.exe file), you may override this warning if you are confident you have downloaded the file from 403A.com.

Select the installation language from the pull-down menu and select **OK**.



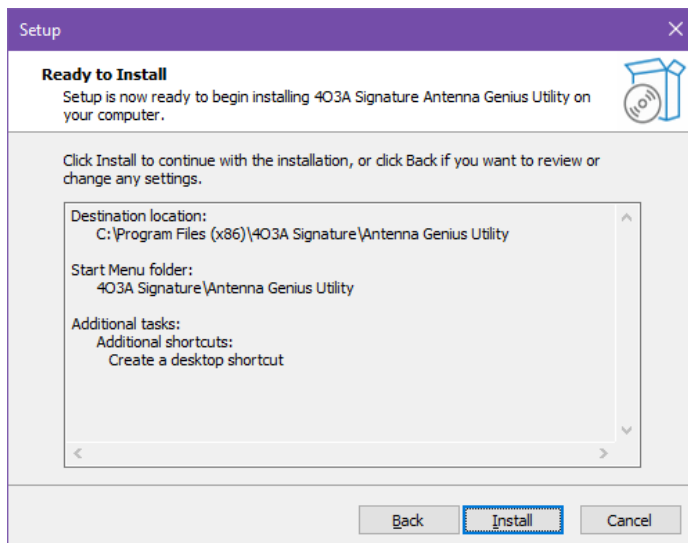
After closing all other applications, launch the Setup Wizard by selecting **Next**:



Select Destination Location, we recommend you keep the default location:

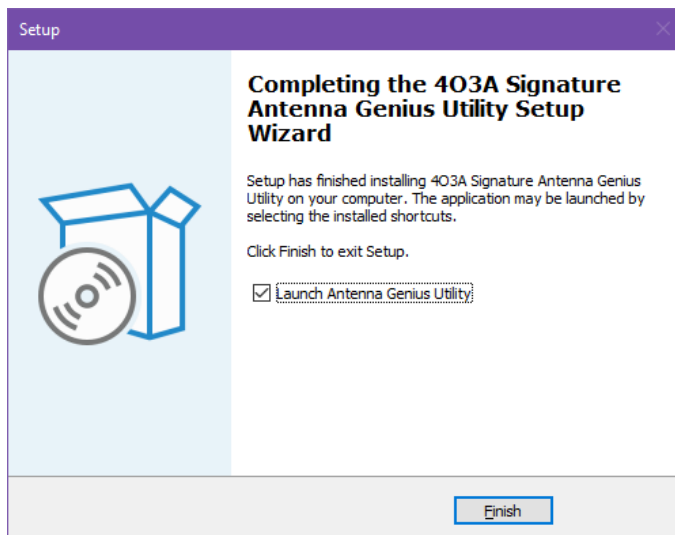
C:\Program Files (x86)\403A Signature\Antenna Genius

and hit **Next**:



Now you should see the Ready to Install window. Double check the data, if correct, hit **Install**. If not correct, use the Back button to navigate to the applicable window and revise

Hit **Finish** to launch Antenna Genius Windows App:



9.1.2. Using DHCP to set the network address

AG comes factory preset for using your network's DHCP server (Dynamic Host Configuration Protocol), which is built into an Ethernet switch or DSL router on most home networks.

See Section 9.1 below for information on setting up a static IP address.

Take a look at the green and yellow LEDs on your AG LAN port. A lit green LED indicates network connection and a flashing yellow LED indicates network 'traffic.' It is normal for the yellow LED to flash even if you are not actively sending band change data to AG.

💡 EXPERT TIP! The terms "LAN," "home network," and "network" are used interchangeably in this document, both referring to the small TCP/IP-based Ethernet networks many hams will have in their homes and shacks. "TCP/IP" is the basic set of protocols that runs the Internet and also powers most modern home networks. The router built into DSL or cable modems demarcates and routes data between the "Local Area Network" (LAN) in the home from the "Wide Area Network" (WAN) on the side, usually the Internet.

9.1.3. Launch the Windows App

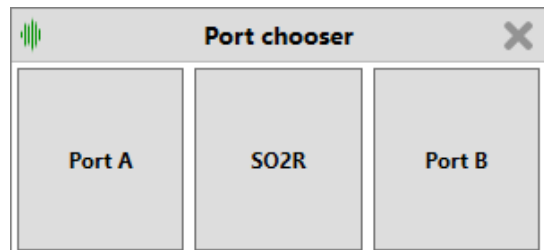
When you first run the AG Windows App, it will open the AG Launch window:



Your AG should be detected automatically by the app. If so, just click on Connect.

If you don't see your AG under local devices, it is possible your LAN subnet does not correspond with your AG device network settings. Try resetting the device IP address via DHCP.

In Mode Selection, choose Single port mode (A or B) or SO2R mode (both A and B ports are engaged)



You should see the AG Control window
(Both - SO2R mode pictured)



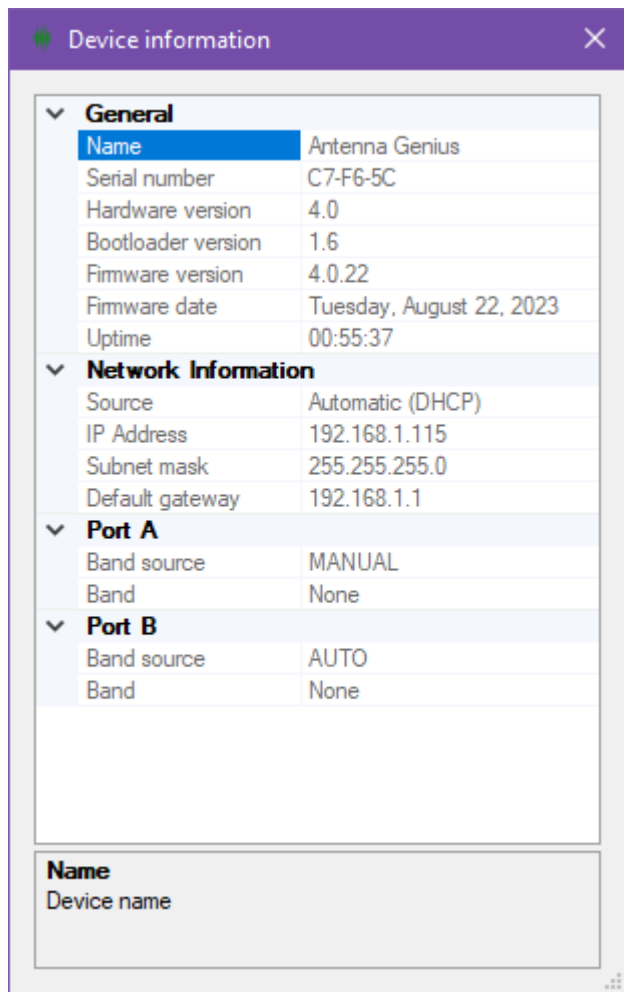
EXPERT TIP! You can select “Always on top” the AG App in Windows to make it easy to find and launch. Just click on configure and select **Always on Top**

9.2. Device Information

Click on the gear icon and select “Device Information”.



The Device Information selection in the Windows App Gear menu has comprehensive info on your Antenna Genius and its settings. You cannot change any settings in this window, it is for displaying device status only.



Name	Up to sixteen user selected alphanumeric characters
Serial Number	The serial number of your Antenna Genius
Hardware Version	There are several versions of the AG hardware over time, version 4 is the latest version - 8x2 v2 Plus
Bootloader Version	The version of your bootloader – the small software on the device that’s used to update the firmware.
Firmware Version	AG firmware is upgradable so that new features can be added over time, see section 9.3 below for instructions on updating your AG firmware
Firmware Date	Date that corresponds to your AG’s firmware revision
Device Uptime	Time since last device power cycle or reboot
Source	IP address assignment method: DHCP or manual

IP Address	Internet Protocol Address, a numerical label assigned to each device participating in a computer network that uses the Internet Protocol for communication, AG uses IPv4 addresses set by DHCP or manually
Subnet Mask	Set by DHCP or manually, usually 255.255.255.0
Default Gateway	The LAN address of the router, set either by DHCP or manually
Port A Mode	Control method for Radio Port A as set by DIP switches, either LAN, GSD, BCD or PTP.
Port A Band	Current band detected for Port A Radio
Port B Mode	Control method for Radio Port A as set by DIP switches, either LAN, GSD, BCD or PTP.
Port B Band	Current band detected for Port B Radio

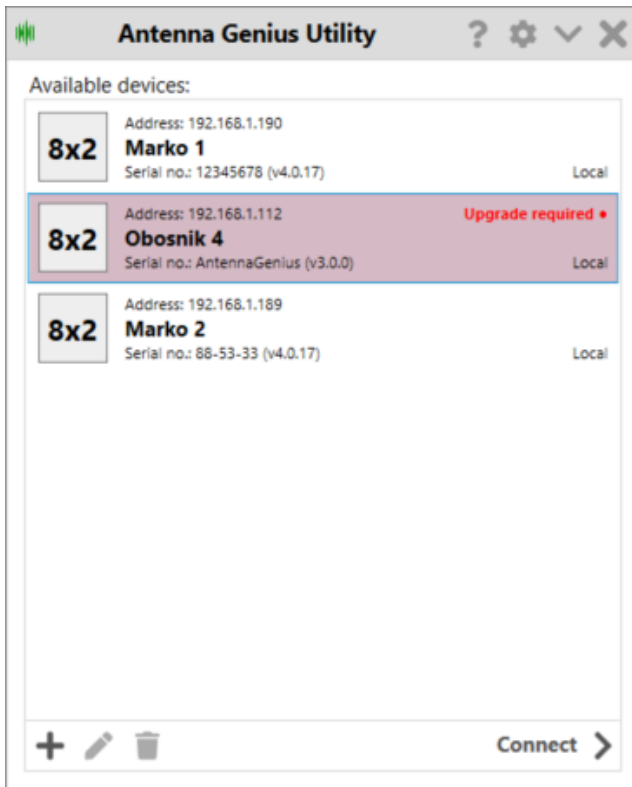
9.3. Is your firmware up-to-date?

If the firmware on your AG is older than the latest AG firmware, you should update your AG before proceeding to the rest of the setup sets.

The firmware version should always match the app version.

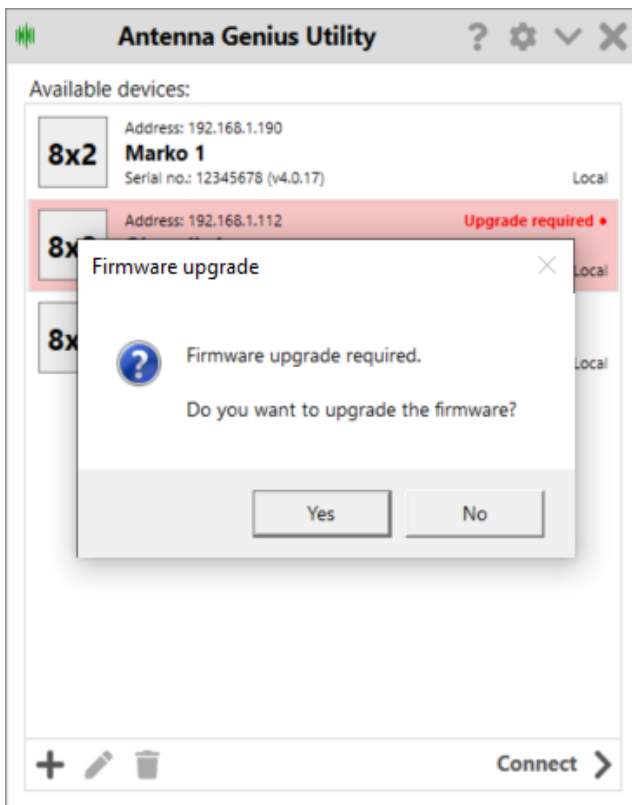
Since version 3.03 the firmware file is included into the app. There is no need to download a separate file anymore.

Before updating the firmware, you should make sure you have the latest version of the AG Windows app by checking the www.4o3a.com/downloads page. Updating the app is simple, just download and install using the same procedure as in an Initial Set-up described in 9.1 above. Don't worry, your current app user data will *not* be overwritten.



Your AG will be detected on the network automatically.

Double click and connect to your AG.

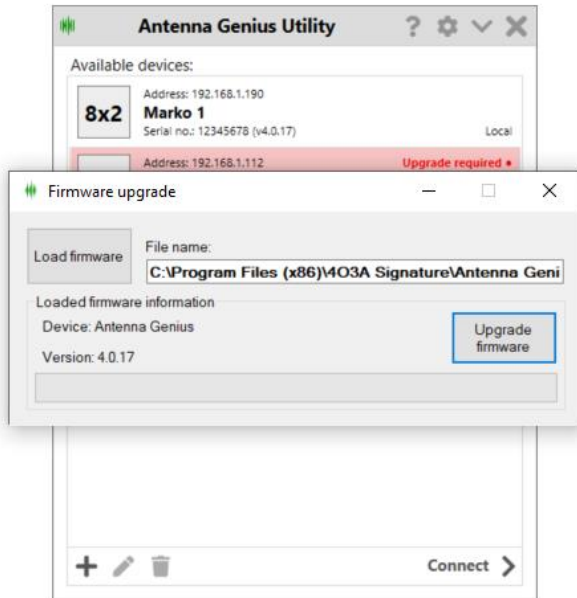


You will be prompted to confirm the upgrade process.

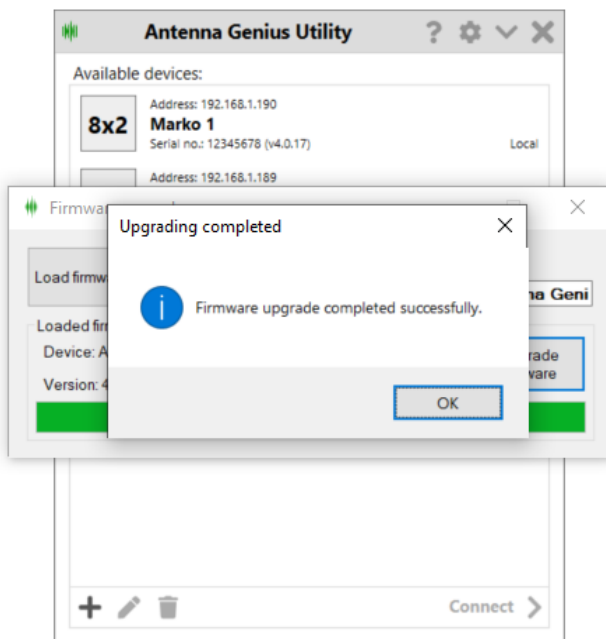
Considerations:

Make sure your network connection is stable and reliable.

Otherwise, you might brick your Antenna Genius. This is always worth considering when upgrading any type of firmware.



The firmware installation file comes pre-loaded with the Utility application.



Click the Upgrade Firmware button and wait for the process to finish. Should not take longer than a few seconds.

Click the OK button when done.

Your AG is now up-to-date!

9.4. Initial Configuration

If you have selected Port A or Port B mode, your AG Control Window prior to initial antenna programming will look like this, in this example both Radio Port A and Radio Port B are using LAN mode.

The main window consists of (from top to bottom):

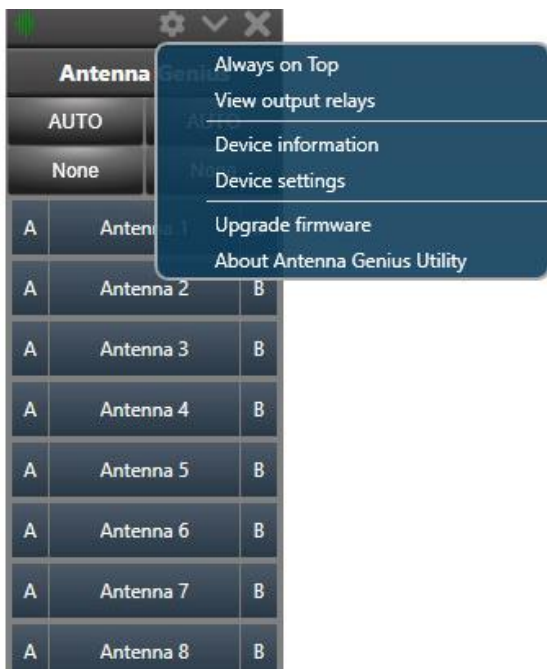
1. The title bar that hosts the **Configure**, **Minimize** and **Close** buttons.
2. Your Antenna Genius device name.
3. Band source selection for both ports.
4. Current band for both sources.
5. The Antenna Selection menu.

More information on the working mode in separate sections.



We will connect to a FlexRadio in this example. Select “Configure” from the Gear icon menu.

9.5. The Configuration Menu

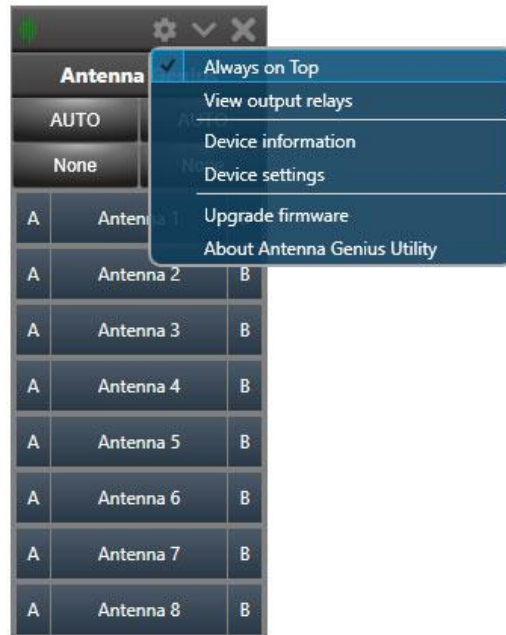


Click the gear icon to access the main configuration menu on the AG and features all the options for configuring your device.

9.6. Always On Top

Check the **Always On Top** option to keep the window on top of all other windows.

Clicking on this option will toggle between enabled and disabled.



9.7. View Output Relays

The screenshot shows the 'Output relays' window with a grid of 48 relay outputs, numbered 1 to 48. The grid is organized into three rows of 16 columns each.

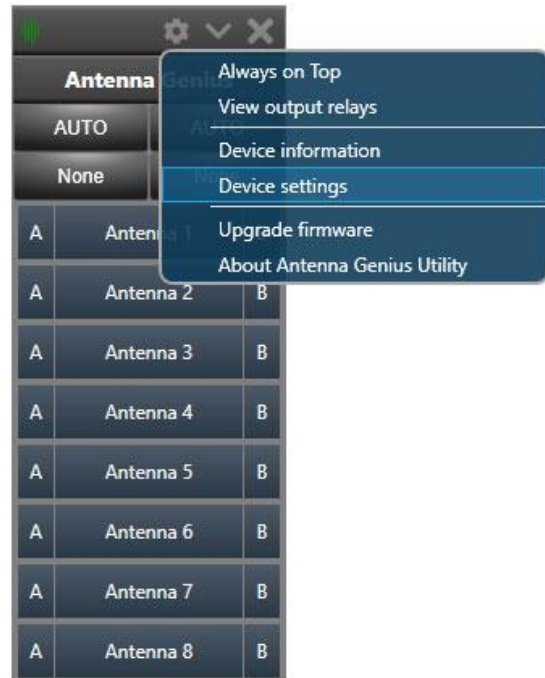
Output relays															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

This feature displays the status of all the output ports on the relay output module. It is designed for debugging and making sure you configured your device as intended.

Antenna Genius v4.1 supports up to 3 Output Modules, each module having 16 relay outputs. This window is not used for configuration but for viewing only.

9.8. Device Settings

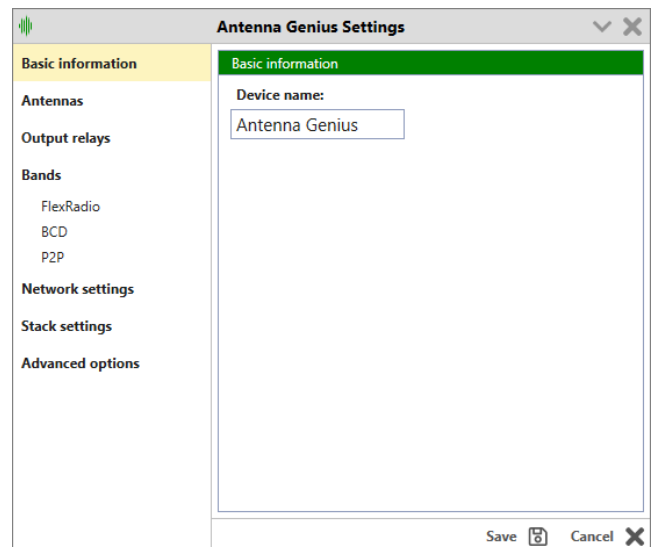
Click on the Device Settings in the config menu to access the main configuration menu for the AG.



9.8.1. Basic Information

Under the basic information tab, you can name your Antenna Genius device.

This is mainly useful if you have multiple units in your station to prevent any mistakes in usage and configuration.



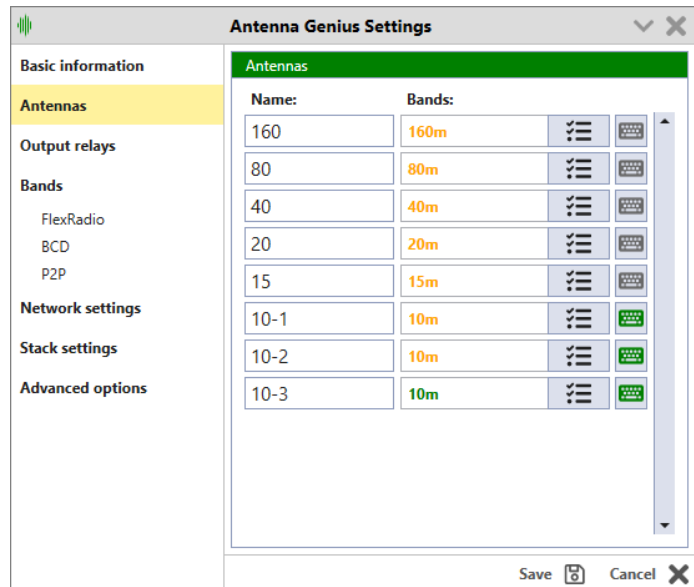
9.8.2. Antennas

Fill in your antenna info giving each antenna a unique name.

For each antenna, select the applicable band or bands that are usable with that particular antenna.

The bands assigned to the antennas are listed here for an overview.

To assign a band or bands to your antenna port click the icon to the right of the antenna.



9.8.3. Individual Antenna Settings - Bands, TX/RX/INB

Every antenna can be and assigned a band, or multiple bands.

There is no limit to the number of multiple bands. Antennas can be now configured as RX (receiving), TX (transmitting) or inband.

You can have multiple antenna options for a particular band; for example, in the set-up above “Multi V” is a wideband RTX vertical usable on 20 through 10 meters and can therefore be selected by clicking on the A or B buttons if not first automatically selected by AG.

When there is more than one antenna available for a particular band, AG will return to the last antenna used for that band when that band is selected.

The ‘None’ option in the Band selector allows selection of an antenna for use outside of the ham bands, for example, a long wire to be used to listen to WWV or shortwave broadcast stations.



After you're done programming your antenna and band connections, select Save and Reset, AG App will write your antenna-band logic to your AG. The Reset device button re-sends the current antenna-band data to AG.

9.8.4. Antenna Keyboard Shortcuts

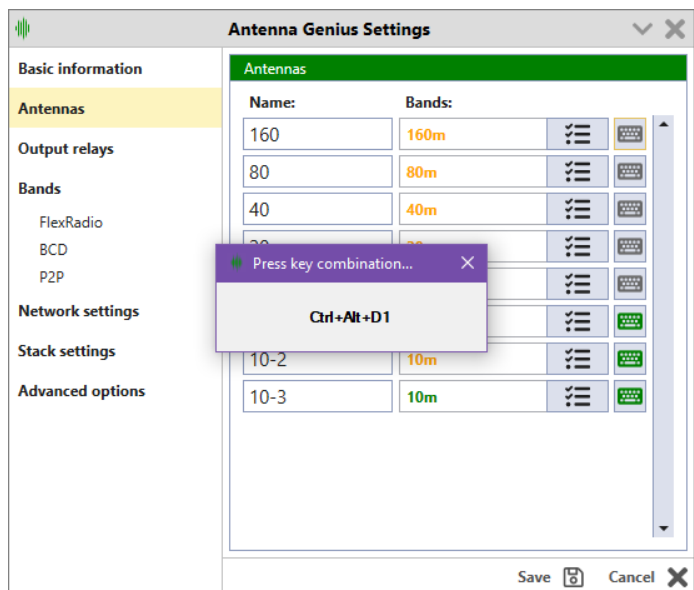
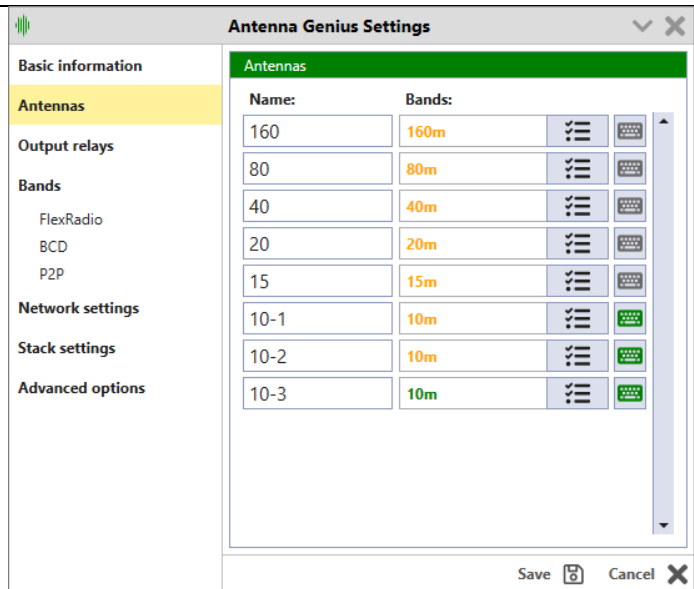
You can assign custom keyboard shortcuts for antenna selection.

Click the icon to the right of the antenna to set the shortcut.

Set the desired key combination – in this example its **Ctrl + Alt + 1**. (D stands for digit).

Press **Enter** when you are done or **Escape** to cancel.

You can identify which antennas have shortcuts assigned by the color of the icon – green is set, gray is off.



9.8.5. Output Relays Designer

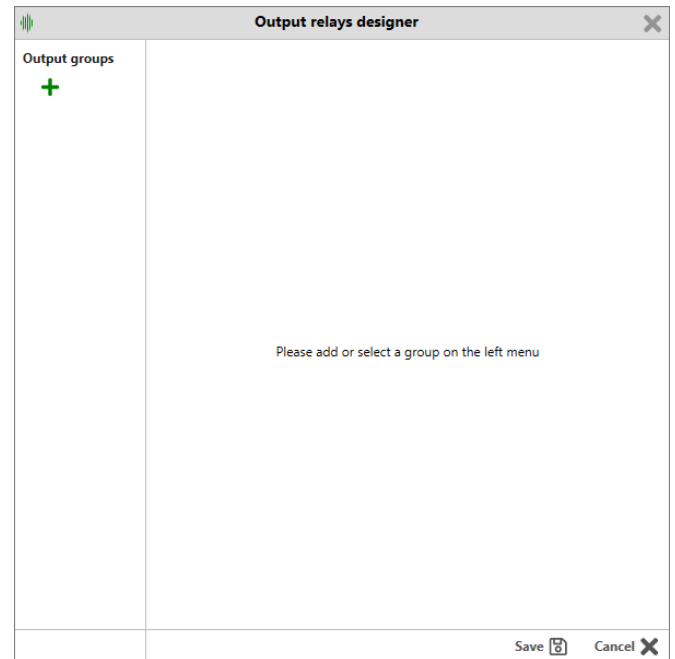
Output relay designer is used to configure your output relay module.

Relays are controlled by buttons and buttons are organized into groups.

You need the OM Module (output module) in order to use this functionality.

This is an optional accessory used with the AG. It features 16 relay ports and can be chained together for a maximum of relay 48 outputs

Click on the green plus symbol to start creating groups.

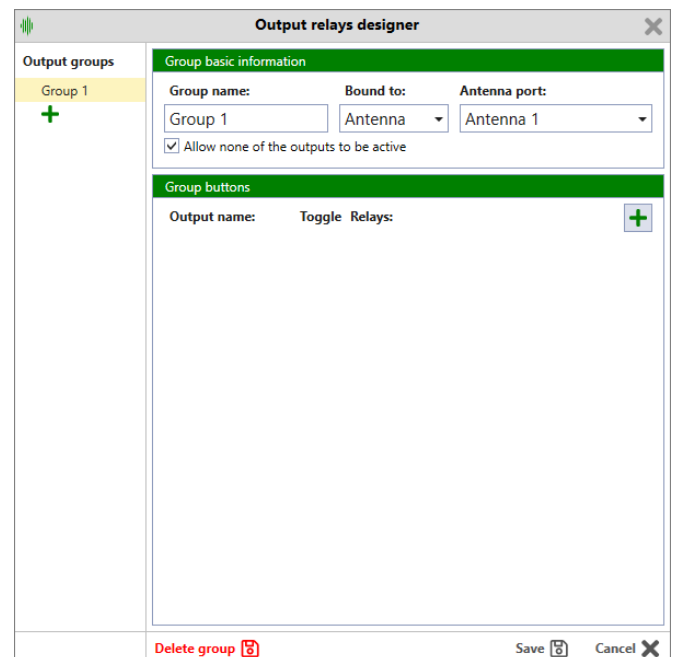


EXPERT TIP! Pro tip: Starting from 4.8.14. the output modules have separate states for RX and TX. You can change outputs and that will be only affected for the next TX.

9.8.6. Output Groups

Relay outputs are organized into Groups of buttons.

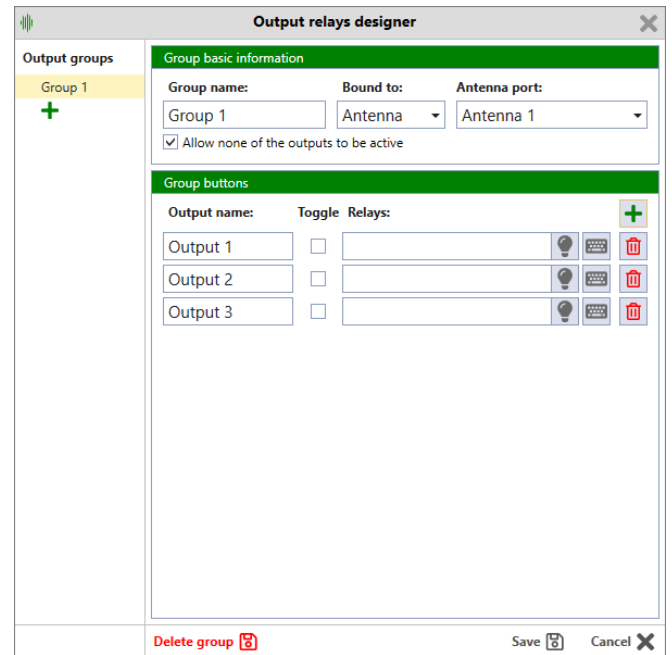
A group can be bound to Antenna Ports or a band (or multiple bands).



The green plus button adds another Output button.

If Toggle is checked this button will turn off all the other buttons in the group.

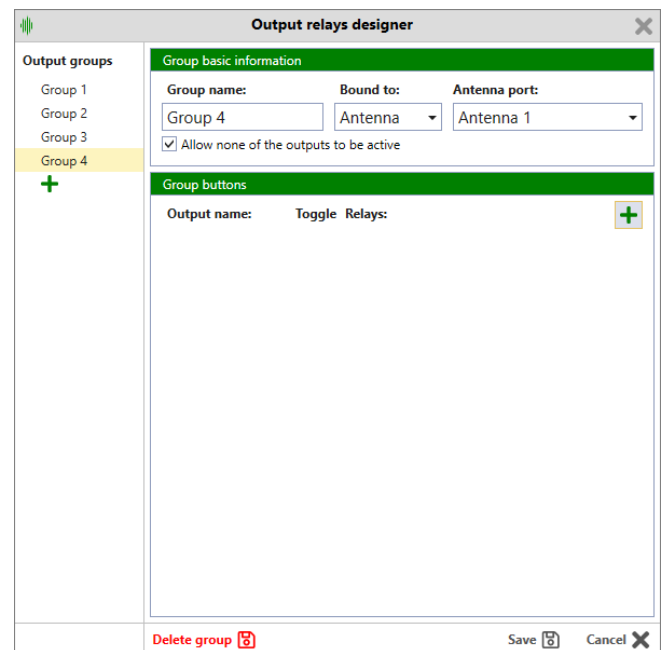
If Toggle is unchecked you will be able to turn on multiple buttons in the group at the same time.



Groups are listed on the left side of the window.

Clicking the green plus icon on the left adds one more group.

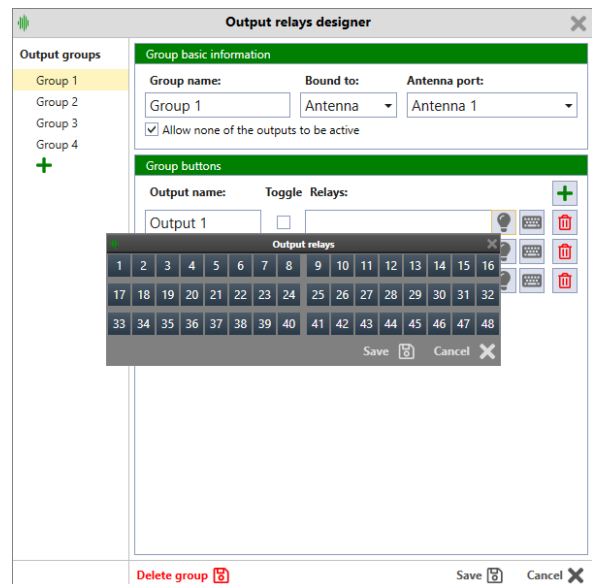
You can delete groups by clicking on the Delete Group button on the bottom of the screen.



The output relay window shows three rows of 16 relays and represents 3 OM modules connected together (daisy chained).

Relays 1-16 correspond to the first OM, 17-32 to the second and 33-48 to the third.

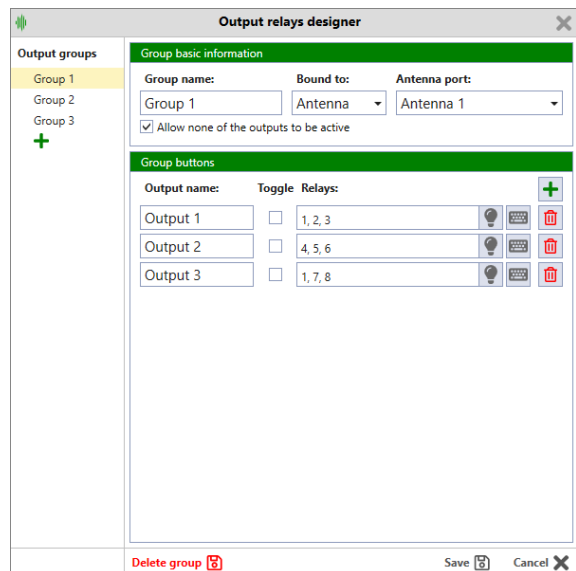
If you are using less than 3 output modules just ignore the unused outputs.



Selected relay outputs will be show in the relays text box.

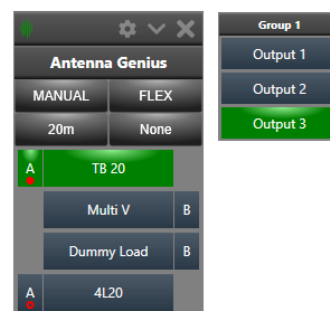
Again, If Toggle is checked this button will turn off all the other buttons in the group.

If Toggle is unchecked you will be able to turn on multiple buttons in the group at the same time.



Your group will now appear in a separate, movable window when the corresponding antenna is selected.

The selected output will be marked in green.



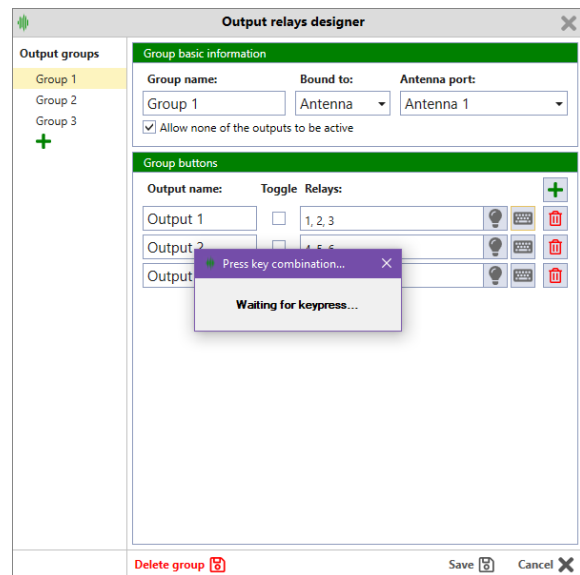
You can use the output relay window to verify that your relay selection is correct and as desired.

The output relay window can be checked in the main configuration menu:



9.8.7. Keyboard Shortcuts

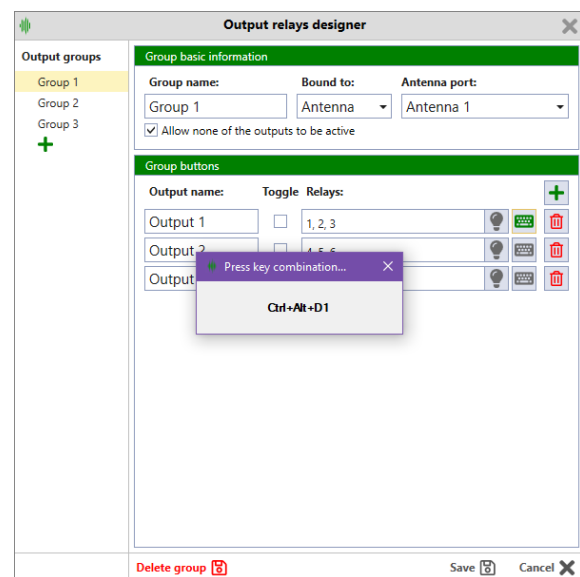
Clicking on the keyboard symbol on the right will allow you to assign a custom keyboard shortcut to activate your relay outputs.



You can use any combination of ctrl, alt, shift keys, as well as just plain keystrokes.

In this case we've set it to Ctrl + Alt + 1. (D stands for Digit)

Notice that the keyboard icon has become green, showing you that the output has a shortcut assigned to it.



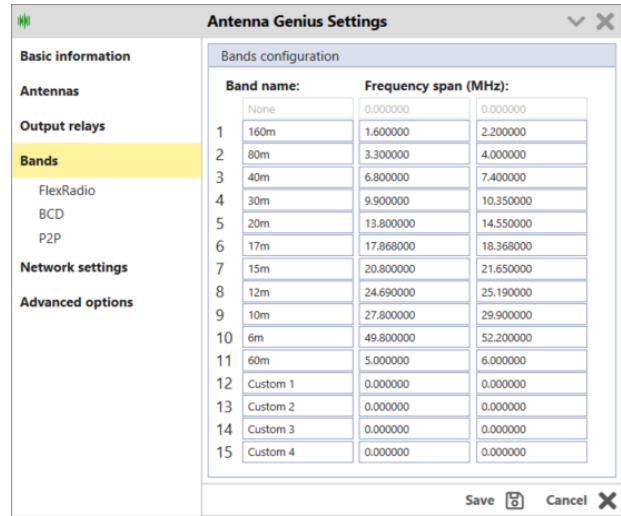
9.8.8. Bands Range Configuration

Like in the previous version you can fully customize your band ranges.

Note you have 4 custom bands at the bottom of the table.

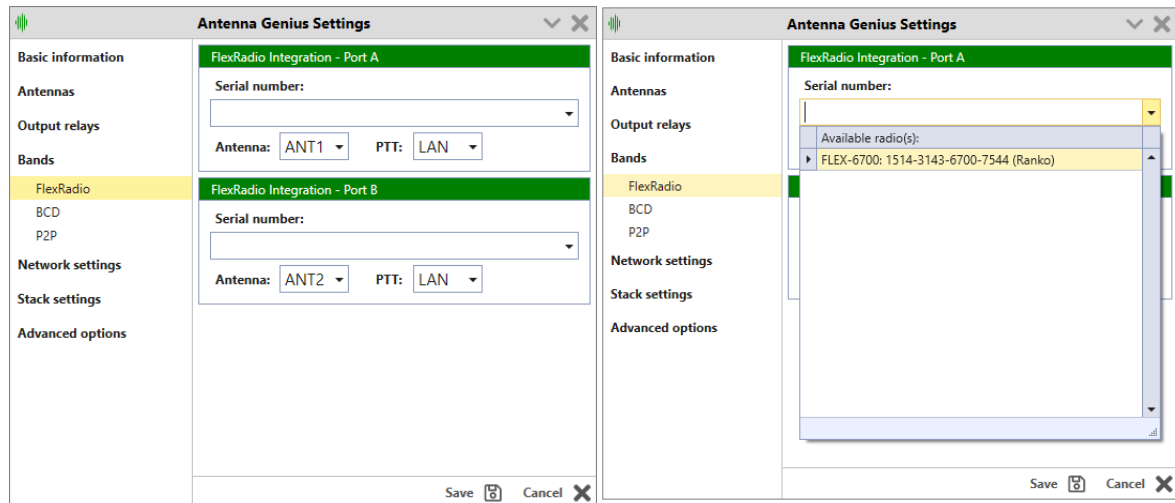
The frequency ranges are relevant when using FlexRadio as band source only.

BCD and PTP modes are fixed – you only select the band by a fixed number instead of reading frequency data.

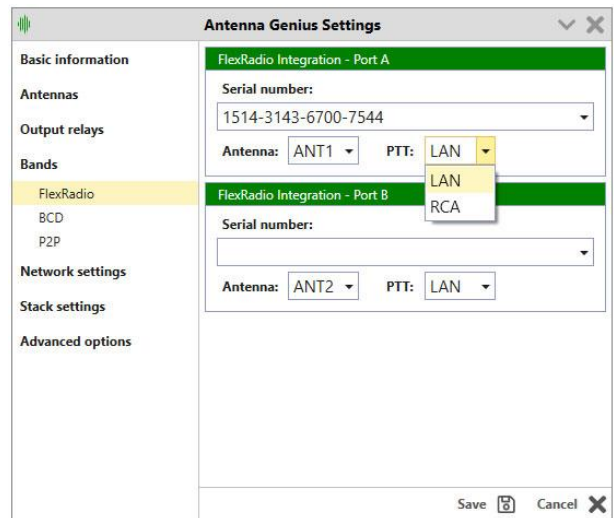
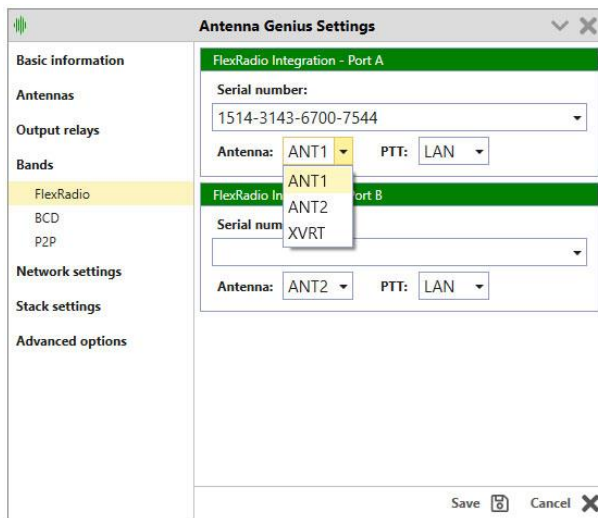


9.8.9. FlexRadio

Click on the **FlexRadio** button under **Bands**. Click the **Serial Number** field and your FlexRadio will be discovered automatically and listed below:



Set **Antenna:** option to assign the desired Flex antenna port to Port A and Port B, respectively. Set **PTT:** option to assign the desired Flex PTT source to Port A and Port B, respectively.



Click **Save**.

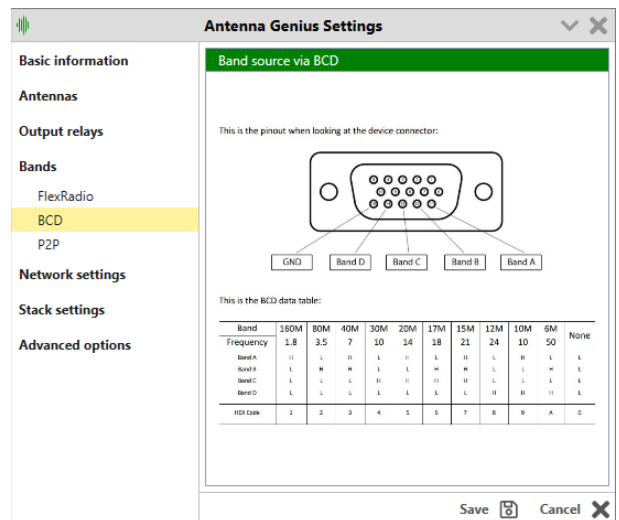
9.8.10. BCD

BCD as band source works exactly the same as in version 3 and has the exact same pinout.

If your radio doesn't have a BCD output but rather a CAT or CI-V you can use the B2BCD Genius accessory to convert it to BCD:



<https://4o3a.com/b2bcd-band-to-bcd-decoder>



9.8.11. PTP

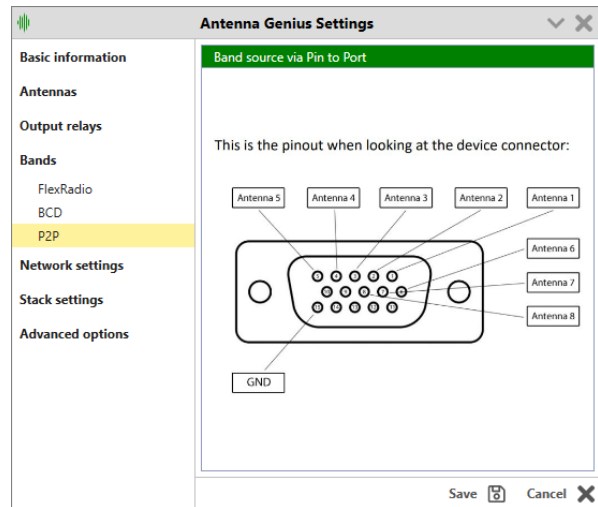
P2P or Pin To Port is the most direct and primitive way to control AG, turning it into a classic switch.

One pin corresponds to the port on the AG, not taking into account frequency at all.

In case you prefer this option, we offer the S8 manual controller switch:



<https://4o3a.com/manual-antenna-controller-s8>



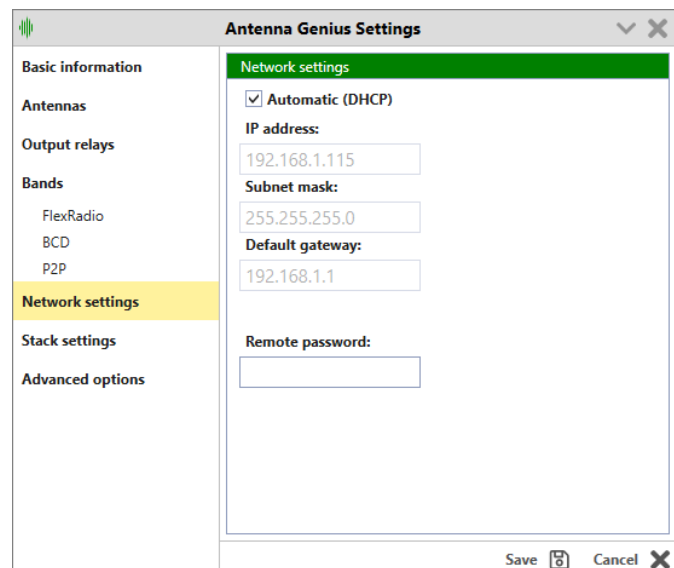
9.8.12. Network Settings

By default, the DHCP is enabled and is the recommended option for most users.

If you are knowledgeable about computer networks you can set a static address.

Make sure to set the correct gateway for remote work (as well as configure your router for incoming outside connections). You can set the remote password for extra security on remote work.

The password will be required any time the connection comes from outside the LAN.



9.8.13. Stacking

The current version supports 16x2 stacking only.

It is possible to achieve other stacking modes with more limited support and logic (24x2, 32x2 and 8x4, 8x6, 8x8). These will be described in another document.

To activate stacking check the **Enable Stacking (16x2)** checkbox.

For more information on AG stacking visit the 403A website:

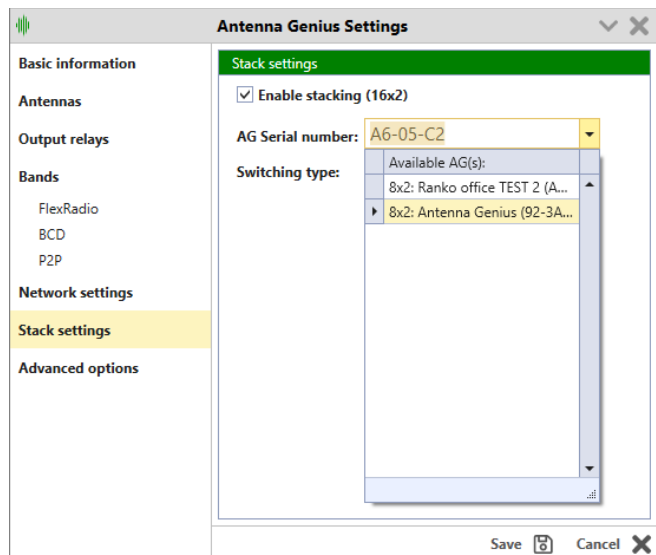
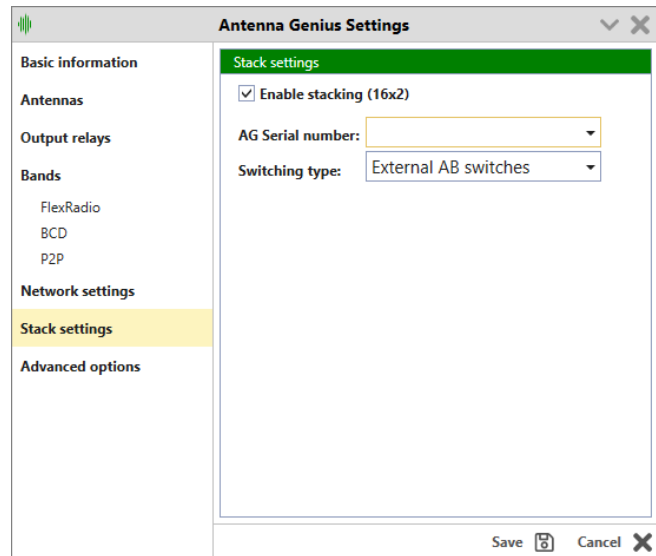
<https://4o3a.com/antenna-genius>

Option is using 2 AB Switches to achieve this.

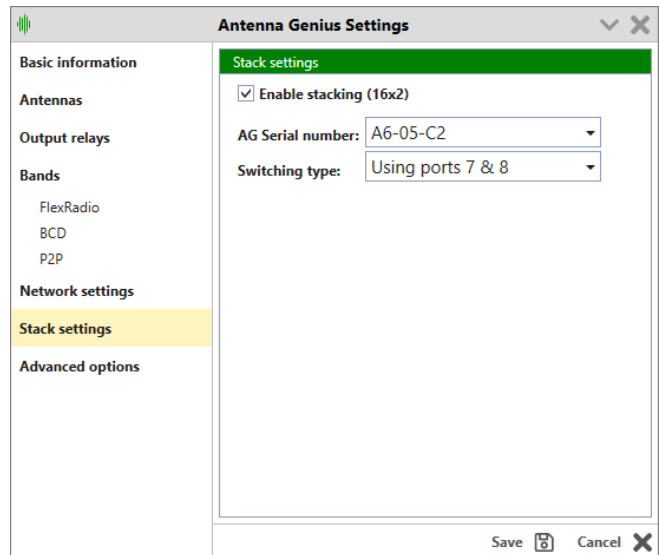
Click the drop-down list.

Your AG will be detected automatically. Use the serial number to determine the exact AG you want to use if you have more than one on the network.

The serial number is now displayed on the connect screen upon opening the AG utility app.



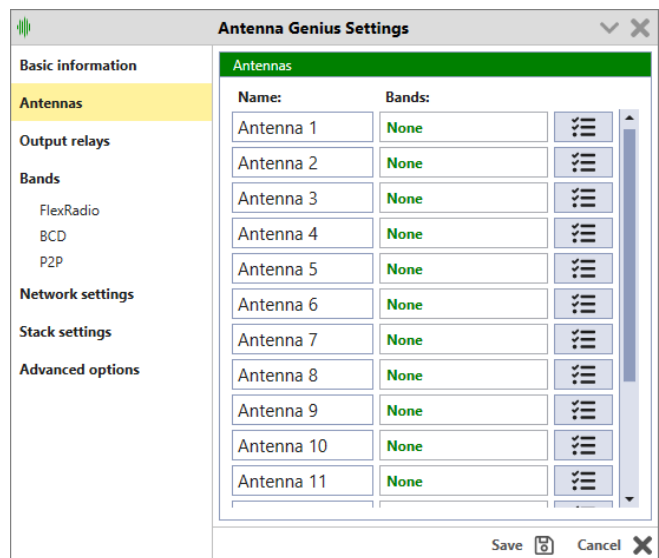
Option two is not using the AB switches but rather using use two ports from the master AG, reducing the amount of hardware but reducing the number of antennas by two – so it’s a 14x2 stack technically.



Once stacking has been enabled your master Antenna Genius (the one you used to set stacking up) will now have 16 antenna slots.

The system will work as one logical switch.

You control the 16x2 switch from the master AG and there’s no need to connect to the slave one.



All 16 (or 14) antenna ports will now be available.

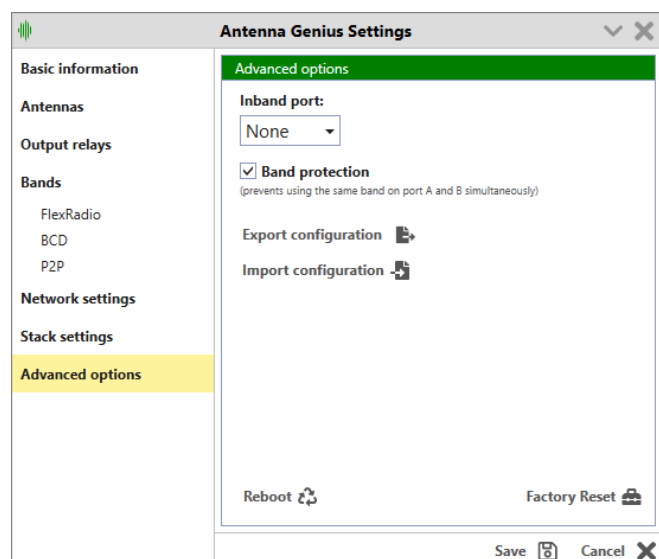
Note: You will be able to connect to the slave AG in order to see and verify that switching is occurring correctly but you will not be able to control it directly.

Antenna Genius		
AUTO		AUTO
None		None
A	Antenna 1	B
A	Antenna 2	B
A	Antenna 3	B
A	Antenna 4	B
A	Antenna 5	B
A	Antenna 6	B
A	Antenna 7	B
A	Antenna 8	B
A	Antenna 9	B
A	Antenna 10	B
A	Antenna 11	B
A	Antenna 12	B
A	Antenna 13	B
A	Antenna 14	B
A	Antenna 15	B
A	Antenna 16	B

9.8.14. Advanced Options

In the Advanced Options you can:

- 1) Set your Inband port. The chosen port will show only in band antennas that will be removed from other ports.
- 2) Disable band protection to enable using the same band on both ports.
- 3) Import and Export your configuration file (XML format, on your PC).
- 4) Reboot your AG remotely
- 5) Do a complete factory reset.



9.8.15. Static Entries / Remote Operation

You can add a static entry for your AG if it has a fixed IP address.

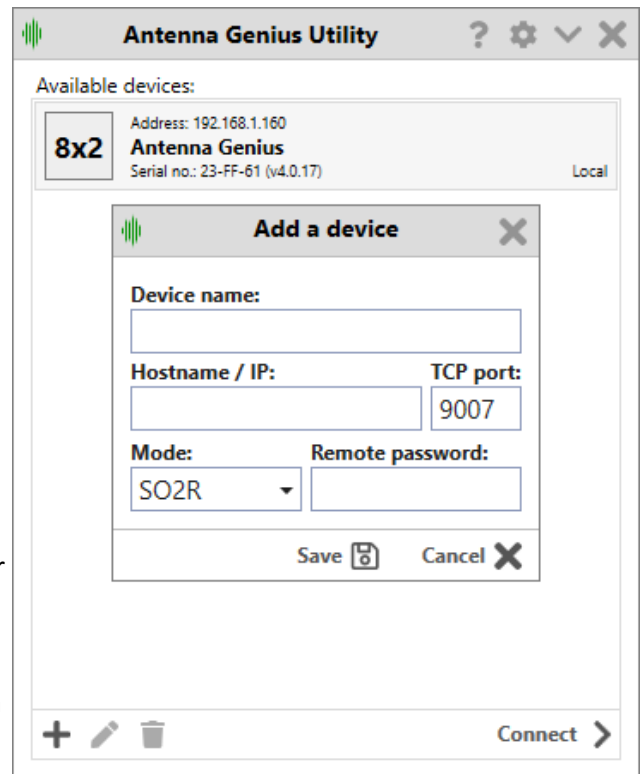
This is mainly used for remote operation.

The other prerequisite for remote operation is setting up your router with port forwarding so you can access the switch from outside the network.

This is a topic that is outside the scope of this manual.

The discovery protocol does not work outside your local (LAN) environment.

You can also use this in LAN if you set a static IP on your device.

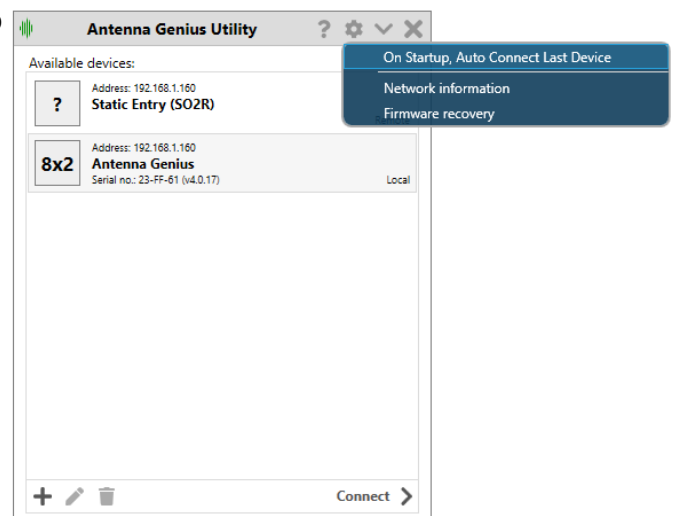


9.8.16. Auto Connect on Startup

If you use only one AG you can check this option to connect to your AG automatically, bypassing the selection menu.

If you are using DHCP, the app will connect to your AG based on the serial number so you don't have to worry about the IP address changing.

If you are using a static entry the app will connect to your AG based on the name of the AG.



9.9. Network Considerations

The AG Utility and AG device are designed to work together seamlessly, but they need to be able to find each other on the network in order to communicate effectively. To do this, they use a discovery protocol which allows them to identify and connect to each other automatically.

However, for this discovery protocol to work properly, there are a few prerequisites that need to be met. First and foremost, your computer must be connected to the same network as the AG device. This means that they must be sharing the same local area network (LAN), which is usually created by a router that provides internet connectivity to all devices on the network.

Secondly, the network needs to have a router that acts as a Dynamic Host Configuration Protocol (DHCP) server. DHCP is a protocol that automatically assigns IP addresses to devices on the network. The AG device needs an IP address to connect to the network and communicate with other devices, and the router provides this by assigning an available IP address to the AG device.

Once these conditions are met, the AG Utility and AG device can find each other using the discovery protocol and establish a connection.

10. OPERATION

AG can operate both locally and remote.

Locally, it is the part of your own LAN and the most common

Remotely, AG is part of another network. It is up to you to choose how to access to that other network. The common way is to use VPN. Remote AG does not require remote PC.

11. ADDITIONAL FEATURES

11.1. Output Module Relay Control

You can now control our OM modules, originally designed for Station Genius. OM Module is actually a relay switching board, with 16 pairs of outputs.

11.2.1 Output Module Hardware

Outputs P1A and Outputs P1B are different contact of DPDT relays. Each port can be used

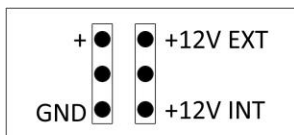
differently to supply internal 12V (not recommended), any external voltage, or GND.

In other words:

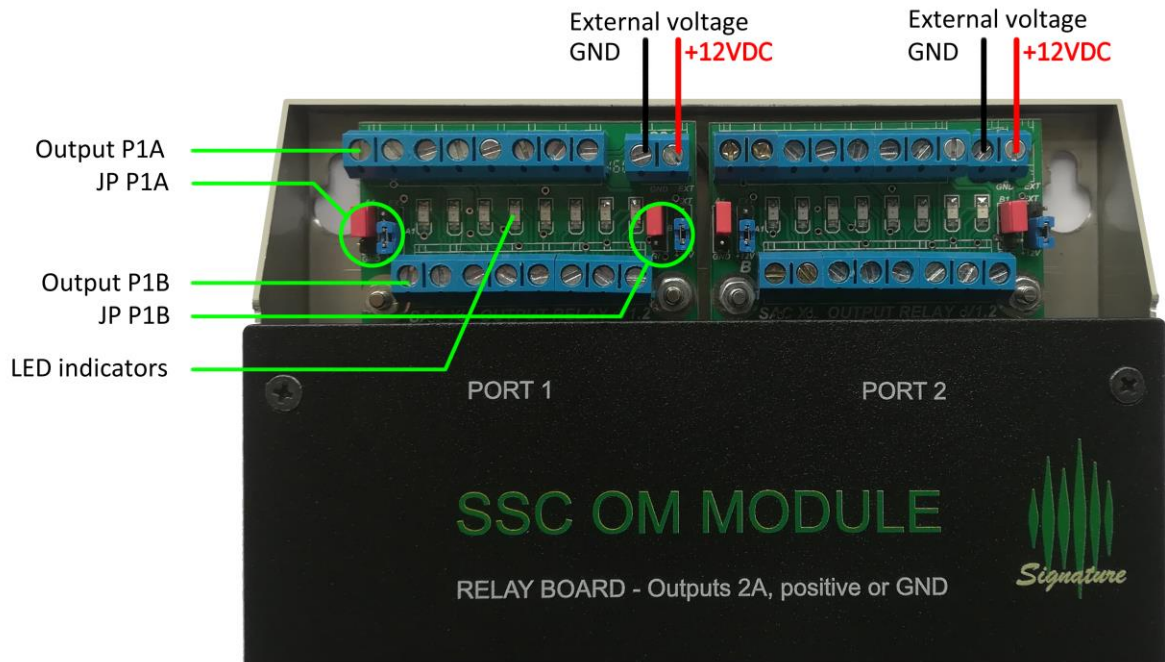
- Every logical output (Outputs labeled 1,2,3... in software/on the sticker) has two physical outputs (P1A, P1B).
- This is to enable switching of two separate independent devices.
- These two physical outputs can be configured differently.
- Either one of them can be set to internal +12V, external voltage or GND.

Port 2 outputs, pinout, jumpers are the same as for Port 1.

If you select GND as output control signal, position of EXT/INT jumper doesn't matter.



JP P1A, P1B, P2A, P2B settings



Internal voltage is used for testing and programming, and it is strongly recommended to use proper external power supply and set jumpers to EXT. Internal power supply in AG is 1A, which is on the margin if all relays are in use.

11.2.2 Output Module Connection

Connect your OM module to the OM module connector at the bottom panel of AG. Use a straight 9 pin RS232 cable.

11.2.3 Software configuration

See chapter [9.8.4. Output Relays Designer](#).

12. TROUBLESHOOTING

12.1. Re-riving a bricked device

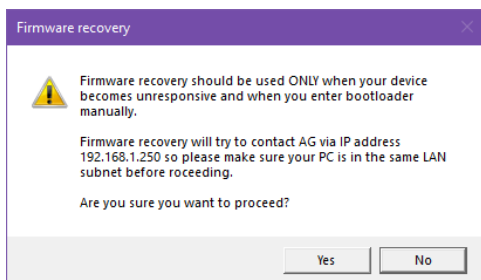
The most typical scenario of bricking an AG is interrupting a firmware upgrade or failing a firmware upgrade due to a bad network connection.

AG features a bootloader software enabling you to reinstall the firmware at any time.

The bootloader uses a fixed IP address – 192.168.1.250 so make sure your network is using the same subnet.

Follow these steps to take to reinstall firmware on a bricked device:

12. remove DC power from AG
13. move DIP 8 to ON position
14. turn DC power back on
15. Open the app,
16. Click on the **Settings** wheel and select **Firmware Recovery**
17. You will be prompted with a window that looks like this:



18. click **Yes**
19. wait for the progress bar to fill up
20. move DIP 8 to to OFF position
21. remove DC power from AG
22. turn DC power back on

13. CHANGELOG

v4.1.16**22-Oct-2024**

- OM control bugfix.

v4.1.14**20-Mar-2024**

- Fixed Reboot/Factory button bug
- When switching from band to band, the same antenna will be initially marked for both TX and RX
- Minor bugfixes/optimization

v4.1.7**20-Dec-2023**

- Minor bug fixes.
- Band protection enable/disable feature.

v4.1.6**24-Oct-2023**

- Fixed network issue when LAN cable disconnected
- Implemented Zero-configuration network (when no router is present)
- Main socket handling improved
- FLEX integration improved
- Stacking socket handling improved

4.1.0**28-Aug-2023**

- New generation of AG firmware and Windows app released.
- This version has been written from the ground up and has nothing in common with the previous versions under the hood.
- This version is backwards compatible with every hardware version of Antenna Genius.