



CHCNAV AlphaAir 450

User Manual



Mobile Mapping | March 2021

Make your work more efficient

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1 Overview

This manual contains important information related to the system and software. Please read it carefully before its use.

1.1 Copyright

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Trademarks

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1.2 Symbol Explanation

Type	Description
 FORBID	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury.
 NOTICE	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in appreciable material, financial and environmental damage.
 INSTRUCTION	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

Warning messages are an essential part of the safety concept of the instrument. They appear wherever hazards or hazardous situations can occur. For the users' safety, all safety instructions and safety messages shall be strictly observed and followed! Therefore, the manual must always be available to all persons performing any tasks described here.

For your safety it is important to read and fully understand the different signal words and their definitions in the table below.

1.3 Recommendation

CHCNAV provides follow documents for user:

- AlphaAir 450 Mobile Mapping user manual

The above content is recommended for user to read carefully before first-time use.

1.4 Service & Support

CHCNAV website: <http://www.chcnav.com>

Service hotline: 400-620-6818

Wechat public account:



1.5 Disclaimer

- The customer should use and maintain the equipment in accordance with the requirements of the manual. If the service life of equipment is affected due to improper use or maintenance, even broken, CHCNAV will not bear the relevant responsibility. All repairs and maintenance services resulting from this will be charged at standard prices.
- The customer should provide a stable vehicle roof rack in accordance with the requirements of the technical indicators. If the equipment is broken or damaged due to 3rd brand's reason, CHCNAV will not bear the relevant responsibility.
- During the transportation, if the equipment is damaged due to improper logistics operation, CHCNAV will not bear the relevant responsibility.
- During equipment using time, if customer disassembles and assembles the equipment without CHCNAV's suggestions & permission, and resulting in damage, CHCNAV will not bear the relevant responsibility.
- Customer should use default batteries and accessories. If use non-dedicated batteries, the charger may cause unexpected situations like explosions, fires etc. The use of non-original accessories is not eligible for warranty; if occur accident, the manufacturer will not bear the corresponding responsibility.

2 Operation Requirements

2.1 Operation Environment

- It is not recommended to use in rainy, snowy, or foggy weather for safety. Also, the point cloud data will have more noise.
- It is not recommended to frequently use in dusty environment, which will affect the service life of equipment.
- It is forbidden to expose the device and accessories under extreme temperature. The environment temperature must not be lower or higher than the specification temperature.
- When the equipment is transferred from a cold environment to a warm environment, water may condense on certain components inside the scanner. To avoid this, it is recommended to place the scanner in a sealed plastic bag before transferring. When the condensate is evaporated, then turn on the plastic bag.

2.2 Attentions before Using

- Check whether the laser glass is normal, if there is dust exist, please use the cleaning kit to clean it.
- Check whether the ports are clean, and whether the pins are normal.
- Check whether the connecting cables are reliable and stable, and whether the GPS cable is stable and normal.
- Check whether the remote controller has sufficient power.

2.3 Attentions when Using

- Please ensure all cables are connected to correct ports based on one-by-one check to avoid mistake. Do not insert or extract cables forcibly.
- After powered on, check whether the connection between remote controller and equipment is normal, and whether the status of tracking satellite and board is normal (the "A" icon in the CHHAV logo on the upper left side of the controller will display orange which indicate the connection is normal, otherwise, the communication is abnormal if always show gray).
- The instrument should put at an open & good signal place when start work. Check whether GPS satellites' signal is normal.
- If buzzer is not ringing properly after startup or during data capture process, please check whether instrument is normal immediately.
- Check the rest volume of SSD drive before data capture start. If rest volume less than 10% or not enough for this time's requirement, please delete laser data files in advance.
- Before start work, please check whether the controller's laser parameter settings are

correct. If not correct, please reset it again according to the project requirements.

2.4 Attentions after Using

- After using, unplug the cable first, then place the equipment into equipment case and accessories into accessory case.
- During transportation, take care the equipment and try to avoid bump.

2.5 Compliance to Instructions



The product is designed to operate safely and reliably as long as it is used according to this operating manual. Please read this manual carefully before starting the system . All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product. The person responsible of the product would be in charge of making use of the sensor after a course arranged by CHCNAV.



The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial and environmental consequences
Non-compliance with these instructions may cause property damage and/or bodily injury. CHCNAV assumes no liability for damage caused by any activities contrary to the present operating manual.

3 System Overview

3.1 General Introduction

AlphaAir 450 pocket lidar measurement system, the whole device is based on the lightweight and high integration design concept, carried on the BB4 or 3rd party UAV like DJI M300, can obtain longer endurance. As an emerging means of 3D data acquisition, it can quickly acquire terrain surface data, ground feature, power line information, etc., which can realize high-precision 3D terrain data and high-density 3D data acquisition of transmission lines. In addition, based on the image acquisition by the built-in camera, DOM, DSM, true color point cloud and other results can be generated, and road sections, power lines, vegetation and other results can be automatically extracted for analysis, and the inspection report can be output.

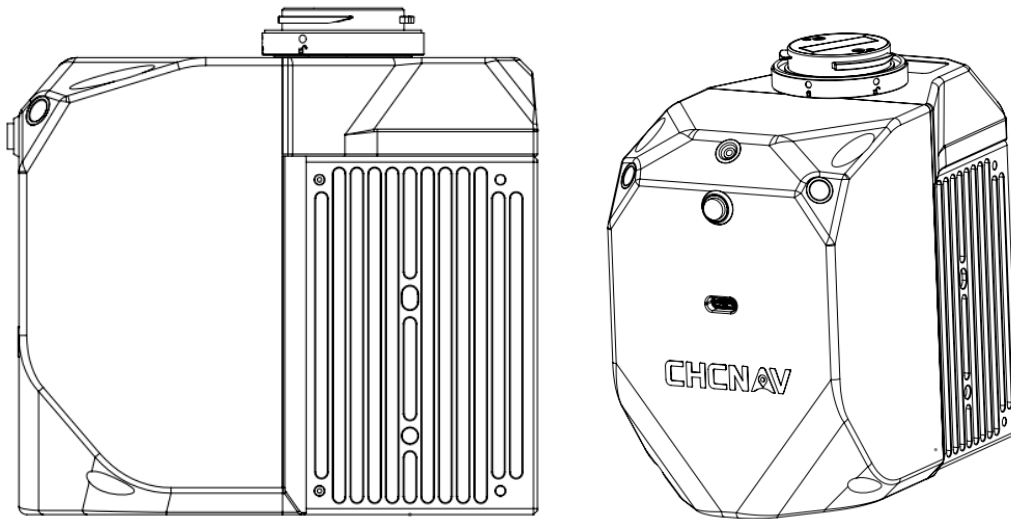
3.2 Configuration List

AlphaAir 450 mobile mapping system configuration list is shown below:

Part Number	Name	Pcs
System configuration		
0102 030 106	Livox AVIA scan head	1
-	Internal 24 MP camera	1
0105 030 123	Type-C to USB3.1 data copy cable (1 m)	1
3204 070 001	8 Gb USB flash disk (Installation documents and instructions)	1
System Components		
1903 110 018	Transport container	1
1911 110 017	Airborne GNSS antenna (TDXL-GGBR7I05)	1
8015 020 007	M300 antenna mount (incl. GPS antenna adapter and feeder)	1
8015 020 006	BB4 installation kit (incl. GPS antenna adapter and feeder, UAV platform quick release with shock-absorbing kit)	1

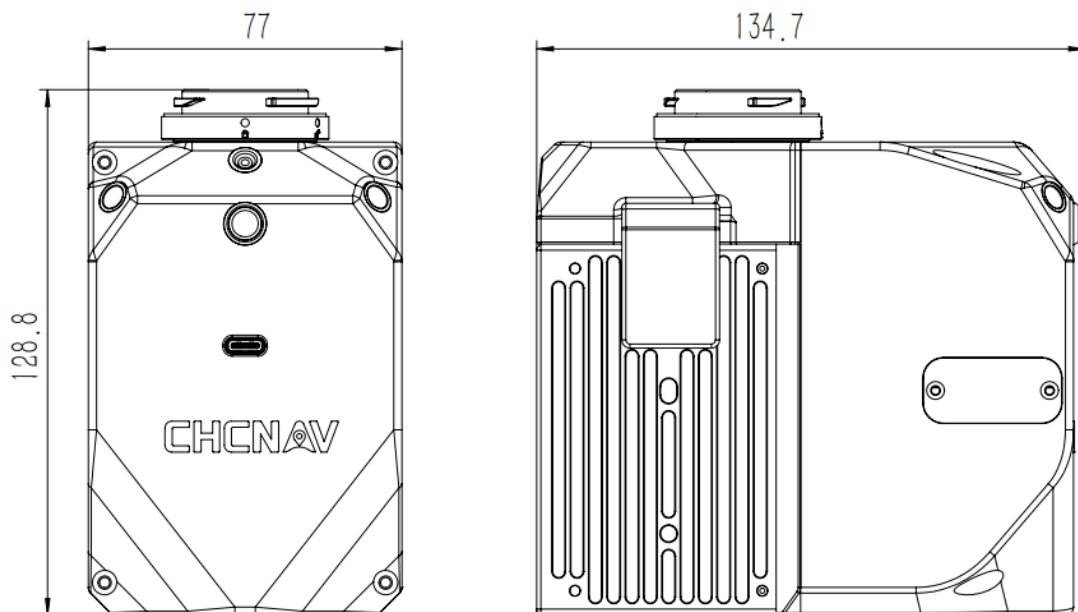
3.3 Product Introduction

The product diagrams are shown below:



3.4 Product Dimensions

- Weight: 1.0 kg
- Length, width, and height are shown below:



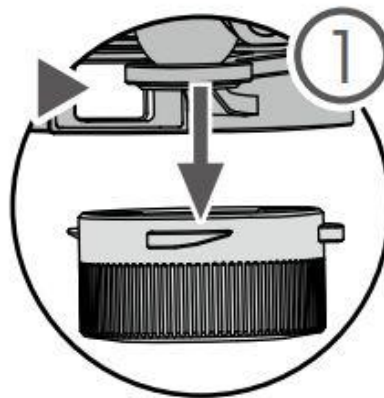
3.5 Electrical Characteristics

Input voltage	DC 12 V (12-14 V)
Rated power	32 W
Working temperature	-20° C to +50° C
Storage temperature	-20° C to +65° C
Humidity	<80%, non-condensation

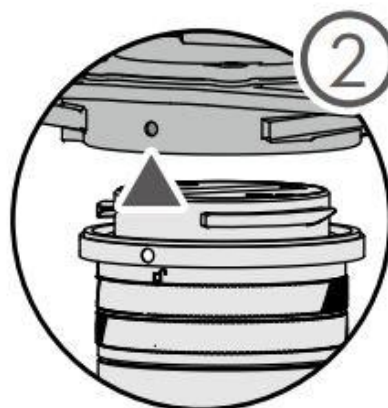
3.6 Airborne Platform

3.6.1 Airborne installation steps using Skyport

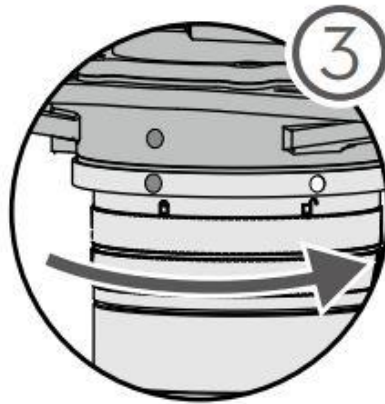
- Press the Skyport unlock button to remove the protective cover.



- Align the white dot on the AA450 Skyport interface with the red dot on the M300 interface and embed it in the installation location.



- Rotate the AA450 Skyport interface to the locked position (red dots align red dots) to be fixed.



- Rotate the GNSS antenna clockwise to the antenna bracket and tighten it. Connect the other end of the GNSS feeder to the GNSS interface of the AA450.

3.6.2 Airborne disassemble steps using Skyport

- Take out the GNSS feeder from the AA450 GNSS interface, rotate the GNSS antenna counterclockwise and take it out from the antenna fixing bracket.
- Hold the bottom of the AA450 with your left hand, press the Skyport unlock button with your right hand, and remove the device by turning the quick-release connector clockwise.

4 Product Using

4.1 Advance Preparation

- Take out the equipment from the container before using. Install it on the corresponding platform and connect all cables. Meanwhile, set up the base station at an open sky area. Turn on the equipment after the base station start recording static.
- Before data collection, it is necessary to check the remaining capacity of Alpha_LAS and Alpha_CAM memory cards. If the remaining capacity is less than 10% or does not meet the demand of current collection capacity, the data in card should be deleted in advance.

4.2 Equipment Installation

- First, install the equipment on the platform and lock it with screws. Remember to remove the camera protective cover.
- Connect both power supply cable and GPS feeder cable of equipment and start power on.
- Put the equipment at an open sky area and turn on LiDAR & remote controller. Check whether the controller and equipment status are normal.

5 Data Acquisition

5.1 LiDAR Power On

- Before power on check all cables are connect correctly and power supply is normal.
- M300 Power On: short press the power button, then long press it within 3 seconds to power on the M300.Indicator light is always on after power on.
- LiDAR Power On: short press the device's "ON/OFF key", the indicator lights up and the buzzer sounds , the indicator light flashes which means the lidar is powered on successfully.
- Device initialization: about two minutes after lidar is powered on, the indicator light is normal on which means device initialization successfully completed!
- Start project: after successfully initializing the device, short press the device's "ON/OFF key", the indicator status changed from normal on to flash. After standing still for 4 minutes, the device automatically enters the acquisition state, at this time, both the laser and the camera start to work.
- Stop project: when the collection is over, short press the device's "ON/OFF key", the laser and camera will stop working. Long press the "ON/OFF key" after standing still for 4 minutes, the device will stop the project.

6 LiDAR Turn Off

- Before turning off equipment, please make sure the project is already stopped.
- Long press the “ON/OFF key” to turn off equipment .

7 Data Copy

7.1 Manual copy

Connect the device to the computer with type-c to USB data cable, the computer will pop up two SD cards ALPHA_LAS and ALPHA_CAM.



Open ALPHA_LAS ,the folder is named by the date of collection.



070231_I.imr	Waypoint Raw I...	4,000 KB
070231_L.lv	LV 文件	9,301,248...
070231_S.txt	文本文档	252 KB
070231_T.gps	GPS 文件	38,490 KB

- xxxxxx_I.imr, IMU data
- xxxxxx_S.TXT, synchronizes data
- xxxxxx_T.gps,GNSS data
- xxxxxx_L.lv, laser data

Open ALPHA_CAM, the images are stored in DCIM folders, each containing 4000 photos.



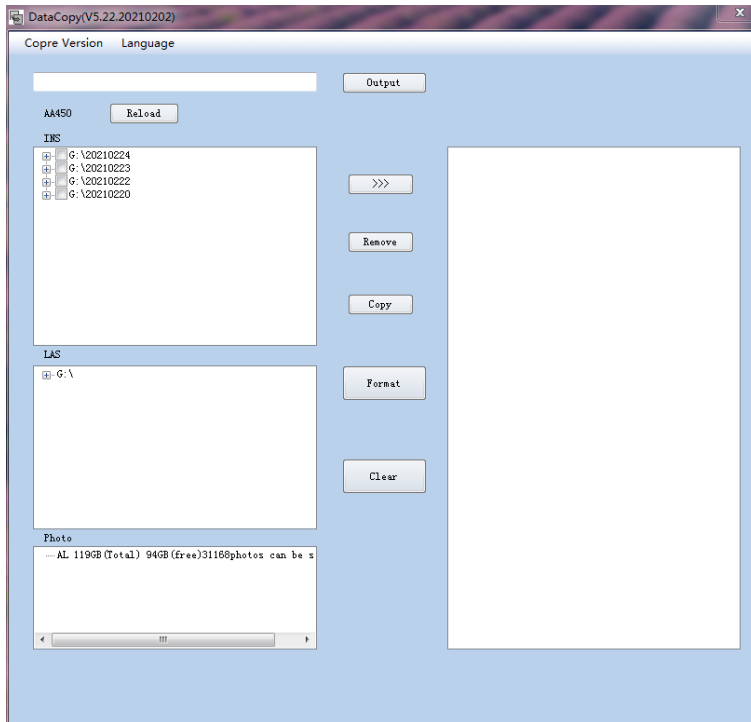
You can't format the ALPHA_CAM.

7.2 Automatically copy

Connect the device to the computer with type-c to USB data cable, the computer will pop up two SD cards ALPHA_LAS and ALPHA_CAM.



Double-click to open CopyDataTool.exe, Enter the following interface:



The left column is POS data, and the right column is selected data to be copied. Check the POS data to be copied, then create the directory and select the copy path. At this time, the directory bar will automatically display the selected path and automatically create the project file according to the POS time (multiple groups of data can be copied at the same time).

Click the data into icon, and the selected data name will be moved to the right bar. Then click copy, and the software will automatically find the laser data according to the POS time. The data will be automatically copied to the selected path.



After the data copy is completed, please eject the ALPHA_CAM and ALPHA_LAS, and then pull out the type-c to USB data cable.

Please format the ALPHA_CAM regularly by clicking “Format” button.

Please clear the ALPHA_LAS regularly by clicking “Clear” button.

7.3 Data structure

> 20210302-AA450-04-M300 > @@2021-03-02-021835 >

名称	修改日期	类型
GPS	2021/3/4 10:41	文件夹
IMG	2021/3/4 10:41	文件夹
SCAN	2021/3/4 10:41	文件夹
TRACE	2021/3/4 10:41	文件夹

20210302-AA450-04-M300 > @@2021-03-02-021835 > GPS >

名称	修改日期	类型
Base	2021/3/4 11:02	文件夹
Ctrl	2021/3/4 10:41	文件夹
Post	2021/3/4 11:27	文件夹
Rover	2021/3/4 11:02	文件夹
Rtk	2021/3/4 10:41	文件夹
Sync	2021/3/4 10:41	文件夹

- **BASE:** This folder contains base station files which copied from base receiver or download from CORS station. Generally, we need Rinex format. If base data is other formats, please convert it into Rinex format first. (For example, **HCN** file)
- **ROVER:** This folder contains GNSS data and IMU data which recorded by AlphaAir 450. These two files will automatically save in this folder.
- **SYNC:** Store log and TRIG data.
- **IMG:** Store pictures.
- **SCAN:** Store raw data of laser scanner.
- **TRACE:** Store trace data.

8 Frequently Asked Questions

- Equipment can't power on or power off normally: Check whether the power supply and connect port are normal. If still can't power on or power off, please contact CHCNAV Support team for repair.
- Equipment can't be timed or need long time: Check whether the GPS feeder cable connection is stable.
- Alpha_LAS memory card insufficient capacity: When the Alpha_LAS memory card is below 10G, the device will not pass successful initialization.
- The camera can't take photos: Alpha_CAM memory card is full and cannot store photos.

9 Matters Need Attention

9.1 Important Notes

LiDAR measure system is a complex and precise survey system. In daily carrying, using, and storing, please operate equipment correctly and maintenance properly. There are some important notes listed below:

- Do not disassemble equipment privately. If equipment has issue, please contact CHCNAV Support team.
- Please use the default battery and accessories. Use non-dedicated battery may cause charger exploding or burning. The use of non-original accessories is not eligible for warranty.
- When using charger for charging, please keep away from fire, flammable or explosive materials to avoid serious consequences such as fire.
- Do not dispose of waste batteries at will. Please follow local laws or standards.
- Strictly follow this manual to connect all cables. Make sure each connector plugs tightly, and the power switch should be turned on in order.
- It is forbidden to plug and unplug each connection without cutting off the power supply.
- Do not continue using any broken cables. Please purchase and replace new cables in time to avoid unnecessary damage.
- Avoid any strong impact or vibration.
- Use an umbrella or tarpaulin to prevent water inside.
- After the equipment is used, move it to the container quickly and make sure the container inside is dry.
- If need to continue using the instrument for a long period of time or under special conditions such as high humidity environment, please consult the relevant precautions of CHCNAV Support team in advance. Generally, the damaged occurred under a special environment is not covered by the product warranty.

9.2 Product Transportation

- CHCNAV AlphaUni product equipped special container. During transportation, make sure the container is fixed at a stable location.
- During transportation, please tell relative person that this is precise system container, and it needs to be handled gently. Also, with fragile label on container.
- If the equipment is sent by express service, the container needs an outer box with foam inside also for safety.
- The equipment should be used and kept by designated personal and it is not allowed to borrow to others without permission.

9.3 Using Tips

- The equipment should be handled gently during use to avoid soiling and scratching its surface, and it is strictly forbidden for surveyors or others sit on the container.
- After the external test or operation, the surface of equipment should be cleaned regularly by provided clean suits (3-5 days), and check whether the structural screws and plugs are loose, and whether the peripheral cables are loose.
- After long time storage in store, it needs to be taken out regularly (about one month) for power-on test to check whether the function is normal.
- The limitation of environment temperature is between -20°C to $+50^{\circ}\text{C}$, the humidity limitation is $<80\%$ RH and no condensation.
- During the assembly and testing phases, the equipment should be placed on a cabinet or a special shelf and covered with a dustproof cloth. The laser head should be protected with a dustproof cover.
- If the equipment is disassembled or loosen, it should be re-calibrated.
- When it is difficult to rotate any rotating parts of the equipment, please do not forcibly rotate. After the equipment is damaged, please do not continue using, otherwise the damage of the equipment will increase. Do not disassemble equipment in field.
- If faced rain or snow in field during work, please move the equipment into the container quickly. Do not work in the cold environment with low temperature in winter, in case to prevent condensation of water vapor on the optical lens and inside the instrument.
- The single camera memory card cannot be formatted, and the internal folders cannot be deleted except photos, otherwise there will be a phenomenon that the photos cannot be taken.

9.4 Storage Tips

- When the equipment is not using, the battery must be removed and handled gently to avoid bumps. The battery cannot be inverted.
- The equipment should be placed at a dry area in store. Try to avoid long-term stacking and placing
- The room where the equipment is stored should be clean, dry, bright, and well ventilated. It should be placed flat or upright, and it should not be leaned casually to prevent distortion.

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