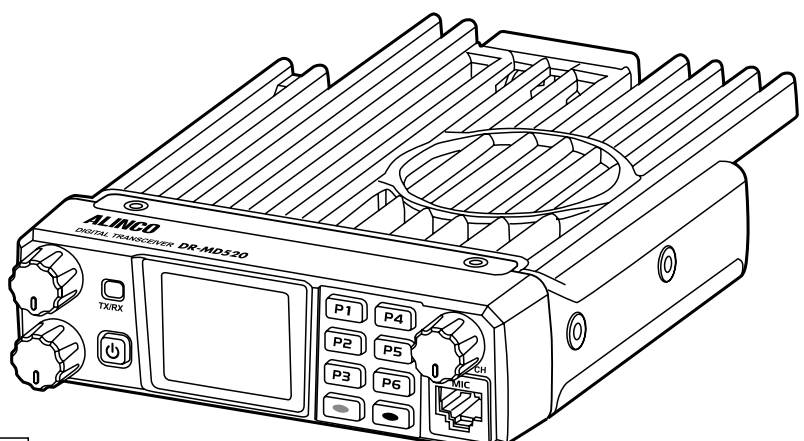
ALINCO

VHF/UHF FM Digital Transceiver

DMR

DR-MD520T/E

Instruction Manual



Thank you for purchasing your new Alinco transceiver. Please read this manual carefully before using the product to ensure full performance, and keep this manual for future reference as it contains information on after-sales services. In case addendum or errata sheets are included with this product, please read those materials and keep them together with this instruction manual for future reference.

NOTE: DR-MD520 may be delivered to you after dealer-programming. In such cases, please ask your dealer about the available features in your unit and how to operate this unit. Features and functions may be limited due to dealer-programming.

ALINCO, INC.

■ Introduction

Please read this manual completely from the first page to the last, to learn all the functions the product offers. It is important to note that some of the operations may be explained in relation to information in previous chapters. By reading just one part of the manual, you may risk not understanding the complete explanation of the function.

■ Safety

It is important that the operator is aware of, and understands, hazards common to the operation of any transceiver.

Before transmitting

There are many radio stations operating in proximity to the frequency ranges this product covers. Be careful not to cause interference when transmitting around such radio stations.

■ Covering ranges

It may vary drastically depending on the type and location of antenna system. Please consult your dealer for details as DR-MD520 requires an external antenna.

■ Lightning

Any person is not safe outdoors during thunderstorms and lightning. Note also that no car provides adequate protection of its passengers or drivers against lightning as well. Therefore, Alinco will not take responsibility for any danger associated with using radios outdoors or inside the car during lightning.

■ Enclosure protection

This transceiver is NOT water and dust protected. Avoid contacts with water and dust, and if wet or dirty, immediately wipe them out with clean dry cloth. This product is NOT anti-explosive.

Never use in close vicinity to explosive gas, combustible dust,on an oil rig or in an open mine.

■ Integrated GPS receiver

An internal GPS receiver is installed in T(FCC) and E(CE) models.

■ When using the GPS receiver

• A GPS receiver is installed under the top panel. When the GPS receiver is activated, do not cover the top part with anything that will block satellite signals.

• GPS signals can't pass through metal objects. When driving or navigating, you may risk not receiving GPS signals if covered by metal roof. External antenna can't be connected, so we recommend to operate near a window or on a deck.

• GPS signals can't reach to the receiver in places like:

- Tunnels or a shadow of tall buildings.
- Underground floors and parking lots
- Under a wide bridge
- In remote forested areas

Also in severe weather conditions, clouds, rain, snow etc may obstacles signals also.

• The Global Positioning System is operated by the U.S. Department of Defense. The Department is responsible for accuracy and maintenance of the system. Any changes by the Department may affect the accuracy and function of the GPS system.

ALINCO and authorized dealers are not responsible for any typographical errors there may be in this manual. The contents of

this manual may be updated without any notice or obligation. Alinco cannot be liable for pictorial or typographical inaccuracies. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

■ For North American users

Due to strict rules, this product is blocked for operations before sales and only dealers can program the radio before delivery to consumers. Manufacturer is not aware of details of such dealer-programming therefore please kindly contact your dealer first in case technical-service may be necessary.

■ Important Notice

The utility software may be available to distributors/dealers only. Programming cable is optional. The manufacturer will not release the software to unauthorized party so please contact your dealer for details. This product may be delivered to the consumer after being preprogrammed with the operating parameters, then certain operation may be disabled for user-accesses. The manufacturer and distributers are not aware of details of such dealer-programming. Therefore, please contact to your dealer in case any technical assistance may be necessary.

Conformity Symbols

Comformity information

Manufacturer:

ALINCO, Inc. Electronics Division

Yodoyabashi Dai-bldg. 13F

4-4-9 Koraibashi, Chuo-ku,

Osaka 541-0043 Japan

Check with your local waste officials for details on recycling or proper disposal in your area.

Hereby, ALINCO, INC. declares that the radio equipment type DR-MD520 is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: http://www.alinco.com/Ce/.

Compliance Information Statement

FCC WARNING

This equipment generates or uses radio frequency energy.

Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

INFORMATION TO THE DIGITAL DEVICE USER REQUIRED BY THE FCC

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 generate 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 the 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 to an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer for technical assistance.

Tested to Comply
With FCC Standards

FOR HOME OR OFFICE USE

Information in this document is subject to change without notice or obligation. All brand names and trademarks are the property of their respective owners. Alinco cannot be liable for pictorial or typographical inaccuracies. Some parts, options and/or accessories are unavailable in certain areas. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

■ RADIO FREQUENCY ENERGY SAFETY INFORMATION

This Alinco transceiver has been tested and complies with the standards listed below, in regards to Radio Frequency (RF) energy and electromagnetic energy (EME) generated by the transceiver.

• FCC RF exposure limits for Occupational Use Only. RF Exposure limits adopted by the FCC are generally based on recommendations from the National Council on Radiation Protection and Measurements, and the American National Standards Institute.

• FCC OET Bulletin 65 Edition 97-01 Supplement C

• American National Standards Institute (C95.1 - 1992)

• American National Standards Institute (C95.3 - 1992)

WARNING:

This Alinco transceiver generates RF EME while transmitting. RF EME (Radio Frequency Electric and Magnetic Energy) has the potential to cause slight thermal, or heating effects to any part of your body less than the recommended distance from this radio transmitter's antenna. RF energy exposure is determined primarily by the distance to and the powerof the transmitting device. In general, RF exposure is minimized when the lowest possible power is used or transmission time is kept to the minimum required for consistent communications, and the greatest distance possible from the antenna to the body is maintained. The transceiver has been designed for and is classified for Occupational Use Only. Occupational/ controlled exposure limits are applicable to situations in which persons are exposed to RF energy as a consequence of their employment, and such persons have been made aware of the potential for exposure and can exercise control over their exposure. This means you can use the transceiver only if you are aware of the potential hazards of operating a transceiver and are familiar in ways to minimize these hazards. This transceiver is not intended for use by the general public in uncontrolled environments. Uncontrolled environment exposure limits are applicable to situations in which the general public may be exposed to

RF energy, or in which the persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

CAUTION:

The following list provides you with the information required to ensure that you are aware of RF exposure and of how to operate this transceiver so that the FCC RF exposure limitations are not exceeded.

• The electro-magnetic exposure of this device may exceed the standards of the hazard level when transmitting at the high-power setting while connected to a unity gain antenna at a distance of 63cm (24.8 inch) or less from the operator. Furthermore, the hazardous RF exposure level depends on the conditions of the combination of the antenna gain, distance from the operator, output setting and installation environment, therefore the operator may be exposed to stronger RF even at a distance of more than 63cm. For safety purpose, it is recommended that the antenna be installed outside of, and as far as possible from, the operator's area. Avoid using an excessively high-gained antenna in case the distance between the operator and the antenna is very limited. Always use the minimum necessary output power for communications.

• Do not transmit for more than 50% of the total transceiver use time; transmitting over 50% of the total use time may exceed the limits in accordance to the FCC RF exposure requirements. Nominal transceiver operation is 5% transmission time, 5% reception time, and 90% stand-by time.

• Use only Alinco authorized accessories The use of other than recommended or approved body- worn accessories may result in RF exposure levels which exceed the FCC's occupational/ controlled environment RF exposure limits.

IMPORTANT:

Not all features are available to users due to programming. The units are programmed by the dealer before sales therefore some features may be prohibited for manual access by the users. For this reason, it is suggested that users learn how to operate the units directly from the dealer who programmed the functions and channels. Please contact the dealer for any technical inquiry because the distributor and manufacturer are notaware of the details of dealer-programming.

Electromagnetic Interference/Compatibility

Electronic devices are susceptible to electromagnetic interference (EMI) if they are not adequately shielded or designed for electromagnetic compatibility. Because this transceiver generates RF energy, it can cause interference to such equipment.

• Turn OFF your transceiver where signs are posted to do so. Hospitals and health care facilities use equipment that is sensitive to electromagnetic radiation.

Occupational/Controlled Use

This product is used in situations that users are exposed to RF as consequence of their employment provided those users are fully aware of the potential RF hazards and can exercise control over their exposure.

- This transceiver is NOT ATEX approved and NOT intended for the use in hazardous explosive atmospheres.

WARNING

To prevent any hazard during operation of Alinco's radio product, in this manual and on the product you may find symbols shown below. Please read and understand the meanings of these symbols before starting to use the product.

Danger	This symbol is intended to alert the user to an immediate danger that may cause loss of life and property if the user disregards the warning.
Alert	This symbol is intended to alert the user to a possible hazard that may cause loss of life and property if the user disregards the warning.
Caution	This symbol is intended to alert the user a possible hazard that may cause loss of property or injure the user if the warning is disregarded.

	Alert symbol. An explanation is given.
	Warning symbol. An explanation is given.
	Instruction symbol. An explanation is given.

ALERT

■ Environment and condition of use:

Do not drive while handling the radio for your safety. It is recommended that you check local traffic regulations regarding the use of radio equipment while driving.

Do not use this product in close proximity to other electronics devices, especially medical ones. It may cause interference to those devices.

Keep the radio out of the reach of children.

In case a liquid leaks from the product, do not touch it. It may damage your skin.
Rinse with plenty of cold water if the liquid contacted your skin.

Never operate this product in facilities where radio products are prohibited for use such as aboard aircraft, in airports, in ports, within or near the operating area of business wireless stations or their relay stations.

Use of this product may be prohibited or illegal outside of your country. Be informed in advance when you travel.

The manufacturer declines any responsibilities against loss of life and/or property due to a failure of this product when used to perform important tasks like life-guarding, surveillance, and rescue.

Do not use multiple radios in very close proximity. It may cause interference and/or damage to the product(s).

The manufacturer declines any responsibilities against loss of life and property due to a failure of this product when used with or as a part of a device made by third parties.

Use of third party accessory may result in damage to this product. It will void our warranty for repair.

■ Handling this product:

Be sure to reduce the audio output level to minimum before using a headset. Excessive audio may damage hearing.

Do not open the unit without permission or instruction from the manufacturer.
Unauthorized modification or repair may result in electric shock, fire and/or malfunction.

Do not operate this product in a wet place such as shower room. It may result in electric shock, fire and/or malfunction.

Do not place conductive materials, such as water or metal in close proximity to the product. A short-circuit to the product may result in electric shock, fire and/or malfunction.

Do not touch the heatsink (on/around the unit mostly found on mobile-base units) as it may become very hot during/after the operation that may risk burn your skin.

■ About power-supply:

Use only appropriate, reliable and certified power supply of correct voltage and capacity.

Do not connect cables in reverse polarity. It may result in electric shock, fire and/or malfunction.

Do not plug multiple devices including the power-supply into a single wall outlet. It may result in overheating and/or fire.

Do not handle a power-supply with a wet hand. It may result in electric shock.

Securely plug the power-supply to the wall outlet. Insecure installation may result in short-circuit, electronic shock and/or fire.

Do not plug the power-supply into the wall outlet if the contacts are dirty and/or dusty.
Short circuiting and/or overheating may result in fire, electric shock and/or damage to the product.

Do not modify or remove fuse-assembly from the DC-cable. It may result in fire, electric shock and/or damage to the product.

■ In case of emergency:

In case of the following situation(s), please turn off the product, switch off the source of power, then remove or unplug the power-cord. Please contact your local dealer of this product for service and assistance. Do not use the product until the trouble is resolved. Do not try to troubleshoot the problem by yourself.

- When a strange sound, smoke and or strange odor comes out of the product.
- When the product is dropped or the case is broken or cracked.
- When a liquid penetrated inside.
- When a power-cord (including DC-cables, AC-cables and adapters) is damaged.

For your safety, turn off then remove all related AC-lines to the product and its accessories including the antenna if a thunderstorm is likely.

Turn off the unit, remove the mobile antenna from its base and keep it in the vehicle if a thunderstorm is likely.

Please read cautions regarding the lightning-protection on page 9 also.

■ Maintenance

Do not open the unit and its accessories. Please consult with your local dealer of this product for service and assistance.

⚠ CAUTION

■ Environment and condition of use:

Do not use the product in proximity to a TV or a radio. It may cause interference or receive interference.

Do not install in a humid, dusty or insufficiently ventilated place. It may result in electric shock, fire and/or malfunction.

Do not install in an unstable or vibrating position. It may result in electric shock, fire and/or malfunction when/if the product falls.

Do not install the product in proximity to a source of heat and humidity such as a heater or a stove. Avoid placing the unit in direct sunlight.

Do not modify, dismantle, incinerate, or immerse the batteries that may be used in accessories you use with this product. Please check your local regulations for details on recycling option or disposal of the batteries in your area.

■ About transceiver

Do not connect devices other than specified ones to the jacks and ports on the product.
It may result in damage to the devices.

Turn off and remove the power-source (AC cable, DC cable etc) from the product when the product is not in use for extended period of time or in case of maintenance.

Use a clean, dry cloth to wipe off dirt and condensation from the surface of the product.
Never use thinner or benzene for cleaning.

■ About power-supply

Use only reliable power supply of specific DC output range and be mindful of the polarity of the cables and DC jack.

Always turn off the power supply when connecting or disconnecting the cables.

When using an external antenna, make sure that the antenna ground is not common with the ground of the power supply.

When a transceiver is powered from an external DC power source, make sure that this power supply has approval to the level of IEC/EN 60950-1.

CONTENTS

1 Supplied Accessories

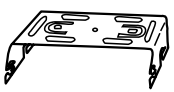
SUPPLIED ACCESSORIES

Carefully unpack to make sure the following items are found in the package in addition to this manual:

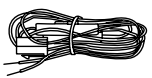
- Transceiver DR-MD520

- Microphone EMS-88 (with DTMF keyboard)

- Mobile Mounting Bracket



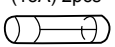
- DC Power Cable with Fuse Holder



- Hardware Kit for Bracket

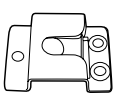
Black screws (M4X8mm) 4PCS | Tapping screws (M5X8mm) 4PCS | S-Washer

- Spare Fuses (15A) 2pcs

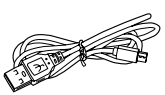


- User Manual

- Mic Hanger Unit



- PC Interface Cable



※ Utility software is available to dealers only.

The standard accessories may vary slightly depending on the version you have purchased. Please contact your local authorized Alinco dealer should you have any questions. Alinco and authorized dealers are not responsible for any typographical errors there may be in this manual. Standard accessories may change without notice.

Warranty Policy: Please refer to any enclosed warranty information or contact your authorized Alinco dealer/distributor for the warranty policy.

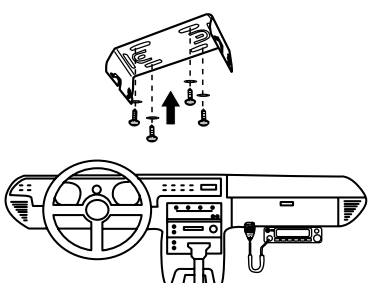
■ In order to operate this product, a properly tuned antenna, its feedline with connectors and fixing hardware are necessary. Please consult with your dealer for details.

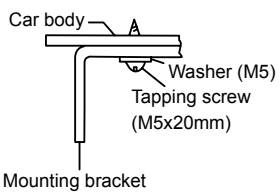
MOBILE INSTALLATION

The transceiver may be installed in any position in your car, where the controls and microphone are easily accessible and it does not interfere with the safe operation of the vehicle. If your vehicle is equipped with air bags, be certain your transceiver will not interfere with their deployment. If you are uncertain about where to mount the unit, contact your vehicle's dealer.

NOTE Prepare screwdriver to fasten and loosen screws.

1. Install the mounting bracket in the vehicle using the supplied self-tapping screws (4pcs) and flat washers (4pcs).





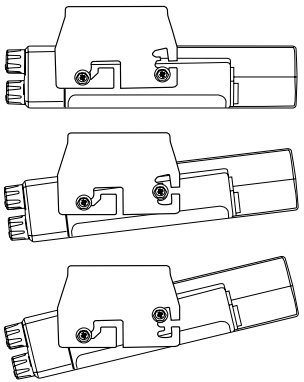
2. Position the transceiver, then insert and tighten the supplied hexagon SEMS screws.

▼ Double check that all screws are tightened to prevent vehicle vibration from loosening the bracket or transceiver.

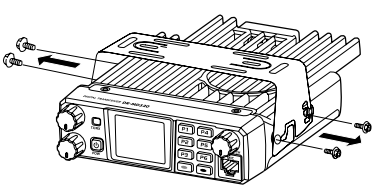
Caution:

Use only the provided screws otherwise you risk damaging the circuit board, components or fall-off of the unit.

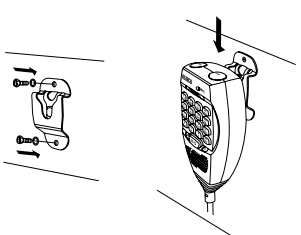
▼ Determine the appropriate angle of the transceiver, using the 3 screw hole positions on the side of the mounting bracket.



3. To remove the transceiver, unscrew all fixing hardware, and hold the transceiver in the way that it won't fall from bracket.



4. Install mic hanger unit. Install the mic hanger in the vehicle using the supplied self tapping screws (2pcs) and washers (2pcs).

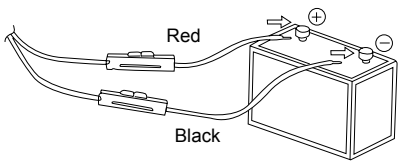


DC POWER CABLE CONNECTION

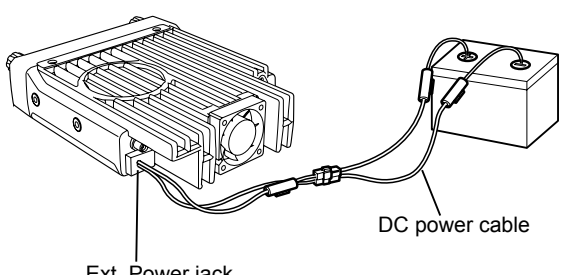
MOBILE OPERATION

The vehicle battery must have a nominal rating of 12V. Never connect the transceiver to a 24V battery. Be sure to use a 12V vehicle battery that has sufficient current capacity. If the current to the transceiver is insufficient, the display may darken during transmission, or transmitting output power may drop excessively.

1. Route the DC power cable supplied with the transceiver directly to the vehicle's battery terminals using the shortest path from the transceiver.
   - ▼ Never use the cigarette lighter socket as a DC source.
   - ▼ The entire length of the cable must be dressed so it is isolated from heat, moisture, and the engine secondary (high voltage) ignition system/cables.
2. After installing cable, in order to avoid the risk of damp, please use heat-resistant tap to tie together with fuse box. Don't forget to reinforce whole cable.
3. In order to avoid the risk of short circuit, please cut down connection with negative (-) of battery, then connect with transceiver.
4. Confirm the correct polarity of the connections, then attach the power cable to the battery terminals; red connects to the positive (+) terminal and black connects to the negative (-) terminal.
   - ▼ Never remove the fuse holders from the cable.
5. Reconnect any wiring removed from the negative terminal.



6. Connect the DC power cable to the transceiver's power supply connector.
   - ▼ Press the connectors firmly together until the locking tab clicks.

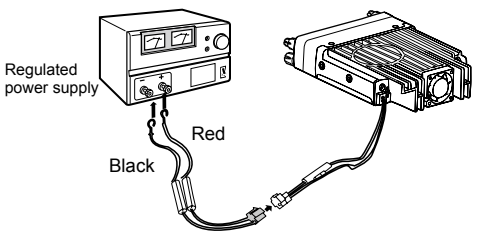


FIXED STATION OPERATION

In order to use this transceiver for fixed station operation, you will need a separate 13.8V DC power supply (not included), Please contact local dealer to require.

The current capacity of your power supply must be 12A or more.

1. Connect the DC power cable to the regulated DC power supply and ensure that the polarities are correct. (Red: positive, Black: negative).
   - ▼ Never directly connect the transceiver to an AC outlet.
   - ▼ Use the supplied DC power cable to connect the transceiver to a regulated power supply.
   - ▼ Do not substitute a cable with smaller gauge wires.



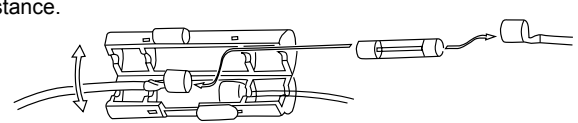
DC power cable with fuse holder

2. Connect the transceiver's DC power connector to the connector on the DC power cable.
   - ▼ Press the connectors firmly together until the locking tab clicks.

NOTE
- ▼ Before connecting the DC power to the transceiver, be sure to switch the transceiver and the DC power supply OFF.
- ▼ Do not plug the DC power supply into an AC outlet until you make all connections.

REPLACING FUSES

If the fuse blows, determine the cause, then correct the problem. After the problem is resolved, replace the fuse. If newly installed fuses continue to blow, disconnect the power cable and contact your dealer for assistance.



Fuse Location	Fuse Current Rating
Transceiver	15A
Supplied Accessory DC power cable	15A

Only use fuses of the specified type and rating, otherwise the transceiver could be damaged.

NOTE If you use the transceiver for a long period when the vehicle battery is not fully charged, or when the engine is OFF, the battery may become discharged, and will not have sufficient reserves to start the vehicle. Avoid using the transceiver in these conditions.

ANTENNA CONNECTION

Before operating, install an efficient, well-tuned antenna. The success of your installation will depend on the type of antenna and its correct installation.

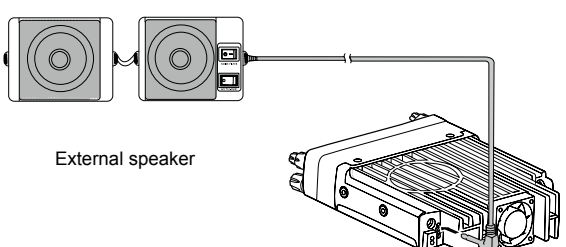
Use a 50Ω impedance antenna and low-loss coaxial feed-line that has a characteristic impedance of 50Ω, to match the transceiver input impedance. Coupling the antenna to the transceiver via feed-lines having an impedance other than 50Ω reduces the efficiency of the antenna system and can cause interference to nearby electronic equipment.

NOTE Transmitting without first connecting an antenna or other matched load may damage the transceiver. Always connect the antenna to the transceiver before transmitting.
All fixed stations should be equipped with a lightning arrester to reduce the risk of fire, electric shock, and transceiver damage.

ACCESSORIES CONNECTIONS

EXTERNAL SPEAKER

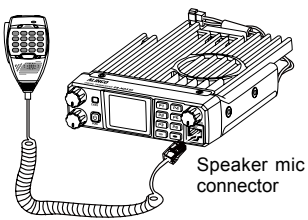
If you plan to use the optional external speaker/s, There are 2 options. For a single speaker, plug into the 3.5mm SP Jack on the rear of the transceiver to hear both bands through one speaker. To use dual speakers, use the stereo plug into the 3.5mm ST Jack on the rear of the transceiver to split the left and right bands between the 2 speakers.



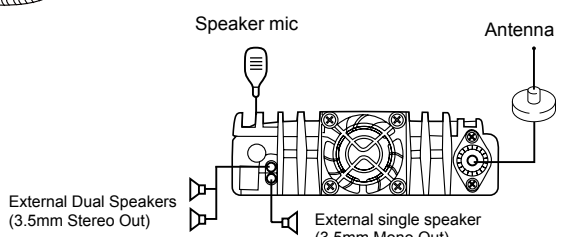
External speaker

SPEAKER MIC

For voice communications, connect a provided Speaker mic into the socket on the front of the main unit. Turn the ring firmly on the plug until it locks. Attach the supplied Speaker mic hanger in an appropriate location using the screws included in the screw set.

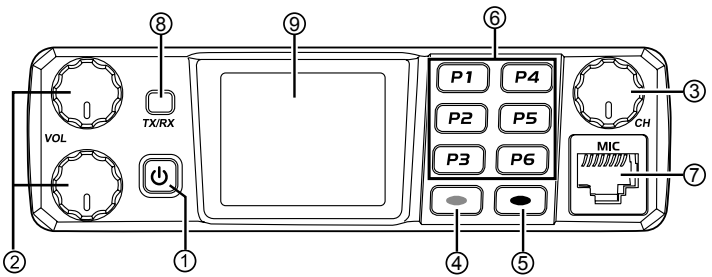


Speaker mic connector



NOTE After installing your antenna, ensure that you have the best possible SWR reading.

FRONT PANEL

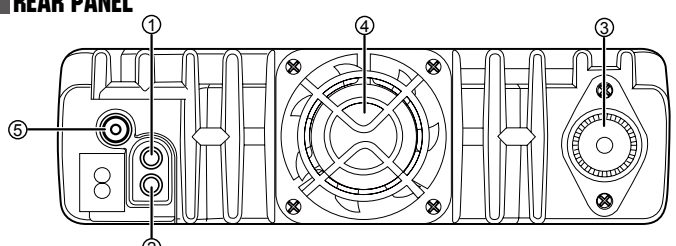


• Basic Functions

NO.	KEY	FUNCTION
1	Power Key	Press to power On. Press and hold for 2 seconds to turn Off the transceiver.
2	VOL A knob VOL B knob	Adjust audio level of channel A. Adjust audio level of channel B.
3	CH knob (channel selector)	Rotate to choose a frequency/channel. In scan mode, rotate to change scan directions.
		Press: To use the pre-programmed function.
		Press and hold: To use the pre-programmed function.
4	MENU key	Press to enter function menu set up. Press to select/confirm a selection.
		Press and hold[MENU] key until the LCD display "Next Please Press Dial Key", press the number key, it will perform the programmed function. Combination key function shall be setup in PC software-Public-Hot key.
5	EXIT key	Press : Press to return to previous menus. Press to delete characters when texting message.
		Press and hold to active keypad lock.
6	P1-P6 key	Press/ press and hold these keys to use the pre-programmed functions. In the radio menu setting, P1 is up key and P2 is down key.
7	MIC connector	Connector to connect the speaker mic.
8	LED indicator	Constant Red : Transmitting Constant Green : Analog Receiving Constant Cyan : Digital Receiving Flashing Green : Scan Constant Orange : Repeater function.
9	LCD Display	Displays frequencies, channels and other operating parameters.

Features, channels of operation and functions may be blocked by the dealer programming.

REAR PANEL



NO.	KEY	FUNCTION
1	Ext. Dual Speakers	To connect external stereo speaker.
2	Ext.Single Speaker	To connect external mono speaker.
3	Antenna Connector	Connect a 50Ω antenna.
4	Fan	Set fan control in PC software and by manual setting.
5	GPS Connector	To connect GPS scanner.

PROGRAMMED KEY

It is possible to set different functions for [P1], [P2], [P3],[P4],[P5],[P6]. A,B,C,D.

Method 1: In radio Menu - Settings - Radio Set - P1~P6, PA-PD.

Method 2: In PC software - Public - Optional Setting - Key function.

OFF	No Function
Volt	Check the current battery capacity voltage
Tx Power	Switch the power between high, middle, low and small power.
TalkAround	Switch between Talk Around and Repeater mode
Reverse	Turn on/off the frequency reverse function.
Digi Encrypt	Choose the digital encryption group for digital channel
Call	In Analog mode, send the DTMF/5TONE/2TONE encode. This function is only valid for analog channel. Before use call function, set optional signal in advance.
VFO / MR	Switch between VFO mode and memory channel mode.
Scan	Scan on/off
AM/FM	AM/FM On/Off, Off =>FM =>AM mode A =>AM mode B =>Off
Alarm	Long press the key to start alarm, short press again to exit the alarm.
Record Switch	Enable/disable the recording function
Record	Start/stop recording. When stop recording, the radio will remind repeat or send the record. This functin is only valid for digital channel.
SMS	In digital mode, press to enter into SMS messages
Dial	Start the manually dial
GPS Info	Check the GPS position information
Monitor	Monitor the weak signal or the signal with unmatched ID.
Main CH Switch	Choose channel A or channel B as the main channel
Hot Key 1~6	Selects Hot Keys 1-6 Note: Hot key setup details on next page
Work Alone	Turn on/off the work alone function.
Nuisance Delete	During scanning, press the key to skip the unwanted channel
Digi Monitor	In DMR mode, press the key to turn on/off digital monitor
Sub CH On/ Off	Turn on/ off the sub channel
Priority Zone	Switch to Priority Zone
Program Scan	"Press the key to start the scan in VFO channel scan start and end frequency must be programmed in PC software - Optional Setting - VFO scan."
Enhanced Sound	In digital channel, switch the microphone tone to normal or enhanced mode.
LastCall Reply	In digital channel, press the key to access the last call and press PTT to call back.
Switch ChType	Switch the channel type(Analog, Digital, Ana+Dgi, Dgi+Ana)
Ranging	When the radio receives a call and the suspension time is on, press the key programmed as" Ranging" to obtain the caller's position and distance. (Both party need GPS positioned, or will receive only GPS information)
Roaming	In standby, press the key programmed as "Roaming" to search and lock on the repeater with strongest signal. (Note: After lock on a repeater, the radio will return to last frequency only after channel or frequency is changed. The repeater frequency list must pre-programmed in CPS.)

CH Ranging	In standby, if the call contact type for a channel is "Single call" , press the key programmed as " Channel Ranging" to turn on this function. The radio will automatically start ranging function when turn to this channel.
Max VOL Set	In standby, press the key programmed as" Max Volume", will enable users to set the maximum RX volume.
Slot Set	Choose Slot for current channel, this function is only valid in repeater mode.
Aprs Type	Choose analog or digital Aprs Type for current channel.
Zone Select	In standby, press the programmed "Zone Select" key, it will allow you input the zone number and then press confirm key will switch to the zone.
A CH Mute	Mute the main channel
B CH Mute	Mute the sub channel
Roaming Set	Enter into Roaming menu quickly
APRS Set	Enter into APRS menu quickly
Zone Up	Switch the zone upwardly
Zone Dn	Switch the zone downwardly
Exit	Exit the menu (only for A-D short press)
Menu	Enter into the menu (only for A-D short press)

Call	Analog	Should edit the analog quick call first, then choose analog in the hot key set. Press the key to transmit 2Tone/5Tone/ DTMF to start the analog quick call.
	Digital	It allows to select a contact from the digital contact list, press the key to switch the channel to the contact temporary. It will switch back to the original contact after the group/personal call hold time.
Menu	SMS	Quick access to Messages in the menu
	New Msg	Quick access to New Msg in the Menu - Messages
	Hot Text	Quick access to Quick Text in the Menu - Messages
	Received SMS	Quick access to Inbox in the Menu - Messages
	Send SMS	Quick access to Out box in the Menu - Messages
	Contact list	Quick access to Contact list in the Menu - Contacts
	Manual dial	Quick access to Manual Dial in the Menu - Contacts
	Call Log	Quick access to Call Log in the Menu
	Dialed Calls	Quick access to Dialed Calls in the Menu - Call Log
	Received Calls	Quick access to Answered Calls in the Menu - Call Log
	Missed Calls	Quick access to Missed Calls in the Menu - Call Log
	Zone	Quick access to Zone in the Menu
	Radio set	Quick access to Radio Set in the Menu - Settings

HOT KEY SETTING FOR P1,P2,P3,P4,P5,P6, PA-PD

Enter radio Menu-Settings-Radio Set-P1-P6,PA-PD,sub menu.

Users can choose settings for Hot Keys 1-6.

Hot Key function details must be setup in PC software – Public - Hot key.

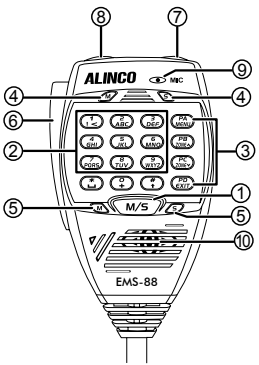
COMBINATION KEY FUNCTION

[MENU] + number key operation:

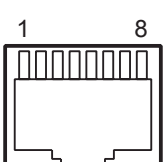
Press [MENU] key and hold until the LCD display "Next Please Press Dial Key", press the number key, it will perform the programmed function.

Combination key function shall be setup in PC software-Public-Hot key.

SPEAKER MIC



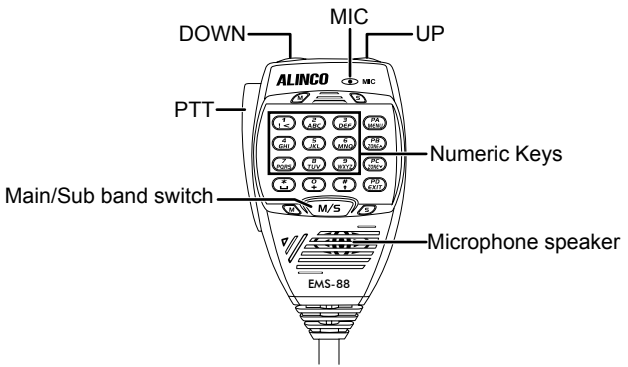
Speaker mic connector (Front view)



1. Red : URX
2. Brown : 5V
3. Yellow : UTX
4. Green : SP+
5. Black: MIC GND
6. White : MIC
7. Blue: SP–
8. Grey : GND

NO.	KEY	FUNCTION
1	M/S	Switches between Main and Sub bands.
2	Number Key	Input VFO frequency or DTMF dial out etc.
3	PA MENU	Programmed key [Set the programs in PC software]. The MENU key is set as default setting.
	PB ZONE UP	Programmed key [Set the programs in PC software]. The ZONE up key is set as default setting.
	PC ZONE DOWN	Programmed key [Set the programs in PC software]. The EXIT key is set as default setting. Key Lock / Unlock is set as default setting of holding key in advance.
	PD EXIT	Programmed key [Set the programs in PC software]. The EXIT key is set as default setting.
4	TX/RX Indicator (Main/Sub)	Illuminates red while transmitting, green while receiving signals. M lights on when: RX/TX Channel A. S lights on when: RX/TX Channel B.
5	Band Indicator	The indicator light on when select as Channel A or Channel B.
6	PTT	Push-To-Talk key: Press this key to transmit.
7	UP	Increase frequency, channel number or setting value.
8	DOWN	Decrease frequency, channel number or setting value.
9	MIC	Speak here during transmission.
10	Speaker	Allows the voice come out from the speaker on microphone.

MICROPHONE OPERATION



You can operate the transceiver by keypad or input desired frequency and channel through the EMS-88 microphone.

SEND DTMF SIGNALING

Hold the [PTT] key; input the desired DTMF signaling by the numeric keys.

MAIN/SUB BAND SWITCHING

At the default setting, both MAIN and SUB bands are displayed. The transmitting is possible only on the frequency/channel.

To switch main / sub band, press the **[M/S]** or **[P1]** key to set the desired frequency or channel.

RESUME FACTORY DEFAULT

If your transceiver seems to be malfunctioning becuase of wrong operation or setup, this function will be able to resume all setup and channels to factory default.

Press and hold [P2] Key + CH knob + Power key at the same time to power on the transceiver.

The transceiver will start up with a note on the display "Are you sure you want to initialize radio?"

Press [Menu] Key to proceed the reset, on the screen displays “Initialize Radio” Then radio will resume to factory default setting status.

(Channel A: 155MHz, Channel B: 456MHz)

NOTE Reset function may be prohibited by PC programming. The memory channels will be erased and can't recall after reset.

TURNING ON THE POWER

Turn on the transceiver by pressing the power key, and the LCD displays "Booting, please wait". Then it will show a start-up message, and you will hear a beep after 7 seconds.

TURNING OFF THE POWER

Turn off the transceiver by pressing and hold the power key for 2 seconds, and the LCD light is turned off.

ADJUSTING THE AUDIO OUTPUT (VOLUME)

Turn the VOL A or B knob clockwise to increase the audio level, counter-clockwise to decrease audio level of channel A or channel B.

MAIN BAND/SUB BAND SWITCH

Press the [SubPTT M/S] key on microphone or programmed [Main Channel Switch] key to switch the main channel to the other channel if there is 2 channels shown on the display. The channel with bold characters is the main channel.

VFO/CHANNEL SWITCH

Press the programmed [VFO/MR] key to switch between VFO and channel display.

SET UP VFO FREQUENCY

Turn the radio to VFO mode , then switch the channel to the main band, the VFO frequency can only be set up when the channel is in the main "bold text" channel.

Operation 1: Input the VFO frequency directly by the keyboard.

Operation 2: Turn the channel selector to adjust the VFO frequency steps.

SELECT A CHANNEL

Press the programmed [VFO/MR] key to switch the radio between VFO and Channel mode, select Channel mode.

Operation 1: Turn the channel switch to select a channel.

Operation 2: Input the channel numbers by the keyboard. For example, if you want switch to channel 99, input 0+0+9+9 a total of 4 digits, and it will switch to channel 99.

A channel can either be Analog or Digital.

For the analog channels the Push-To-Talk button is always available, and on the Digital Channels the parameters can be set up by the users / system operators by individual channel to allow talk permit.

There are four possible settings that can be selected in the CPS channel:

(1) Always Allow: The user can transmit all the time.

(2) Channel Free: The radio can transmit only if the channel is free

(3) Different Color Code: The radio can transmit if the channel is free, but the color code is mismatch.

(4) Same Color Code: The radio can transmit only if the channel is free and the color code matches.

RECIEVING

When a signal is received on the channel that you selected, then the received signal can be heard.

The indicator lights green while transceiver is receiving in analog channel or lights cyan if it is receiving in digital channel.

TRANSMITTING

1. Press the PTT key. The red TX indicator turns on while transmitting.
2. While holding down the PTT key, speak into the unit at normal voice from the distance of 5cm.
3. Release the PTT key to receive.

NEW CHANNEL

(1) Enter radio Menu-Settings-Chan Set-New Chan.

(2) Input the channel number and name.

(3) Select a zone from zone list, then Confirm To Save. The radio will start channel saving, and saving is completed when it displays "Saved".

(4) Now select the new channel in the radio and go to Channel Settings menu to set up all the new channel's parameters.

DELETE CHANNEL

Enter radio Menu-Settings-Chan Set-Delete Chan, it allows to delete the current channel.

RECEIVING AND RESPONDING TO A RADIO CALL

When the radio is in the digital mode, it can receive and respond to a call with the same frequency/color code/ slot. When receiving a call:

a. If the radio is programed with callers DMR ID number in the digital contact list, when receiving a call, the radio will ring or vibrate briefly.

b. The blue LED lights up.

c. The left top corner of LCD shows the RSSI icon, and the LCD display will show DMR ID/name/city/state/country/call type and incoming icon based on what is in the contact list.

d. When the call is ended, it will display “Call end”, and you can press [PTT] to respond the call. Make sure to respond the call within the digital hold time, otherwise the radio will drop the connection after the digital hold time is expired.

MAKE A DIGITAL CALL

A. Talk to the preset TG/DMR ID in channel

Choose a programmed channel and press PTT to start the call.

B. Talk to a temporary TG/DMR ID not in the channel

Method 1: Select a temporary TG/DMR ID from the Talk Group list.

(1) Choose a programmed channel.

(2) Press [EXIT] key to enter the TG List, turn the channel switch or press the UP/DN key on microphone to choose a TG/DMR ID.

Method 2: Select a temporary TG/DMR ID from the keypad.

(1) Choose a programmed channel.

(2) Press [Menu] key to Talk Group, select Manual Dial.

(3) Input the ID number by keypad on microphone, press [#] key to switch group ID or Private DMR ID.

Press the [PTT] key to start the call, the red LED lights up, the receiver ID/name/city/state/country/call type and call out icon will be display on the LCD. Release [PTT] key to receive the reply.

NOTE The temporary call will be droped when the digital hold time is expired and the radio will return to the preset TG/DMR ID in channel.

MONITOR

In standby, press the programmed [Monitor] key to enter Monitor. When receiving matched carrier but the signaling / ID is unmatched or the signal is too weak, this function allows monitor the weak signal and signal with unmatched ID. Press the key again to shut off speaker and return to standby.

NOTE When in analog mode, if no signal, it will emit noise when press the Monitor Key. ** The Rx icon is seen when monitor is activated.

EMERGENCY ALARM

Press the programmed [Emergency Alarm] key to turn on alarm function, then press this key again to return.

6 Advanced Features for Private Call

ACCESS ADVANCED FEATURES FOR PRIVATE CALL

Method 1: To Access a Private Call from Contact list

a. Press the [MENU] key to enter the Talk Group, select a private call ID.

b. Press Option to access the advanced features.

Method 2: Access from Manual Dial

a. Press the [MENU] key to enter theTalk Group, select Manual Dial.

b. Input the Private ID, press Option to access the advanced features.

SET UP ADVANCED FEATURES FOR PRIVATE CALL

(1) **Call Alert**

Select Call Alert, it will send out a call alert, the target radio will sound a beep or vibrate when receiving the call alert, and it will return a success call or failed call message to the transmit radio.

(2) **Remote Monitor**

Select Remote Monitor, and it will send out a signal for the target radio will turn on its microphone and transmit when receiving the signaling, it will send back the voice to the transmit radio. With this feature you can monitor the sound activity near the target radio remotely.

***You have to check on the function in CPS-Optional Setting-Digital Func- Remote Monitor first.*

(3) **Get GPS info**

Select Get GPS info, and it will send out a signal to the target radio which will start the GPS positioning and send a message of its GPS position to the transmit radio.

***You have to check on the function in CPS-Optional Setting-GPS/ Ranging- Get GPS positioning first.*

(4) **Check Radio**

Select Check Radio, and it will send out a radio check to the target radio which will send back a message if it is available or not available to the transmit radio. With this feature, you can determine if another radio is active and powered on in the system.

(5) **Kill**

Select Kill, and it will send out a kill signaling to the target radio which will be killed (No display, no operation) when receiving the signaling and it will send back a kill successful message to the transmit radio.

***You have to check on the function in CPS-Optional Setting-Digital Func- Digital Remote Stun&Kill first.*

(6) **Wake**

Select Wake, and it will send out a wake signaling to the killed radio and the target radio will return to standby when it receives this signaling and send back a Wake successful message to the transmit radio.

***You have to check on the function in CPS-Optional Setting-Digital Func- Digital Remote Stun&Kill first.*

(7) **Ranging**

When caller and receiver both GPS positioned, if the caller turn on ranging function and the receiver is within communication range, Tx radio will detect the distance and direction between two radios at fixed interval, and then show the information on the display of Tx radio.

TALK GROUP

TG List: Will display the talk group list which had been programmed in the PC software. This list is used as a look-up table to display the contact TG information when receiving a call.

New Contact: Allows to create a new TG.

Manual Dial: Input the group ID or private ID to access a TG quickly. Press [#] key to switch group ID or Private DMR ID.

Talker Alias: Allows Alias Tx Set / Alias Rx Display.

SMS

New Msg: Create a new message and send to a contact.

InBox: Shows all the received messages, and allows forward or delete the message.

OutBox: Shows all the sent messages, and allows resend, forward or delete of the message.

Quick Text: Pre-saved messages, and allows to send, edit or delete the message.

Draft: Draft messages, and allows send, edit or deleting of the message.

CALL LOG

Last Call: The Last Call List show the last caller ID and time information.

It allows you save the last caller as a new contact if it is not in your contact.

Sent: The Sent List shows sent messages until selected and deleted.

Answered: Shows all the answered calls, and allows deleting the call record or saving the ID as a new contact.

Missed: Shows all the missed calls, and allows deleting the call record or saving the ID as a new contact.

ZONE

1. Select a Zone

A Zone is a group of channels grouped together. The radio has 250 Zones. A Zone can have the maximum of 160 analog and/or digital channels.

Operation 1: Press A/B key directly to switch the zone, the LCD will display the selected zone number or name.

Operation 2:

Go to radio Menu - Zone, select a zone from the zone list, radio will change to selected zone.

2. Add or delete a Zone

It allows you manually add or delete a zone in the zone menu directly.

SCAN

In the PC software – Public – Scan list, it allows to save 250 scan lists, and to program the required scan lists and write it into radio.

Switch the radio to channel mode, as the scan list is only valid in the channel mode.

1. Scan On/Off

Allows turn on or turn off scan manually.

2. Scan List

Allows create a new scan list or edit the existing scan list.

ROAMING

Roaming enable users to search the roaming channel list by a programmed time interval and lock on the repeater with the strongest signal.This function is only valid for digital channels.

(1) **One Time Roam**

Allow you turn on the roaming manually. After the roaming is finished, it will return to the off state. ** *Manually Roaming is a onetime action only.*

(2) **Roaming Zone**

Select **Roam Zone:** select a Roaming Zone from the list to set it as active zone. You can also scroll down the list of Zones and select Add Channel to add a new channel to the current Roaming Zone and set the parameters.

Select **Add Channel:** Add a new roaming channel to the current zone.

New Roam Ch: Allows you modify the RX frequency/TX frequency/ CC/ TS/CH name for the roaming channel. Also allow you remove the roaming channel from the zone.

Edit Name: Edit the zone name.

Select Zone: Select the roaming zone for current channel.

Delete Zone: Delete the roaming zone from the current channel.

(3) **Auto Roaming settings**

Set the fixed time waiting interval to begin automatic roaming when the repeater cannot be found, roaming will begin at the end of this time.

On/Off: Turn on or turn off the auto roaming function.

Fixed Time Set: The roaming will be started at preset fixed time or set to off.

Start Roaming:

Fixed Time: Starts timed roaming

Repeater check: The roaming will be started when the radio cannot find a repeater - "The repeater is out of range" icon will appear, then the radio will perform roaming one time, and return to roaming off automatically.

(4) **Repeater Check**

On/Off: Turn on this function will allow the radio to check the repeater status.

Interval Set: When the repeater is out of range, the radio will try reconnect to the repeater, this function allows to set the interval for reconnections.

(5) **OutRange Note**

When the repeater is out of range after the repeater check, the radio will remind out of range.

Note kind: It allows to set beep or sound to remind out of range.

Note Times: It allows to set the “out of range” display times on screen.

(6) **Effect wait**

During roaming, when the radio finds a repeater within range, it will stay at the repeater for a short time. This function allows to set the stay time on the repeater.

SETTINGS

1. Radio Set

(1) **Beep**

Beep On: The radio will beep when you press the keypad

Beep Off: No beep when you press the keypad.

(2) **Speaker Mode**

Mic Spk: Allows the voice come out from the speaker on microphone.

Radio Spk: Allows the voice come out from the speaker on radio.

Both: Allows the voice come out from both speakers on microphone and on radio.

(3) **Mic Spk Set**

When you allows the voice come out from the speaker on microphone, you have to set it is for A channel or B channel.

A channel: Only the voice from A channel will come out.

B channel: Only the voice from B channel will come out

(4) **Back Light**

LCD backlight intensity is adjustable in 5 steps

(5) **Ch. Name**

CH name: The radio will work in channel mode and display the channel

name, and then the programmed VFO/ MR key is not valid.

Frequency: The radio will work in VFO mode and display the frequency, which allows the programmed VFO/MR key to switch the VFO and Memory channels.

(6) **Key Lock**

Manual Lock: Long press the [*] key to lock the keypad. Press [MENU] key, then press the [*] key to unlock the keypad.

Auto Lock: Radio will auto lock the keypad when standby for a while. Press [MENU] key, then press the [*] key to unlock the keypad

Note: *To get the key lock function working, some options should be set ON in CPS -> Optional Setting -> Key function first.*

- *Knob Lock: Set On to lock the knobs on radio, and up/down keys on microphone.*
- *Keypad Lock: Set On to lock the keypad on microphone.*
- *Side Key Lock: Set On to lock the P1-P6 keys on radio.*
- *Forced Key Lock: Set On to prevent the key from unlocked. When this function is ON, the keys are not able to unlock manually.*

(7) **Auto Power Off**

Allow to set automatic power off when not used for a period of 10 minutes, 30minutes, 1 hour or 2 hours of inoperation.

Off: Turn off the function

(8) **TX Timer**

30S-240S: The TX will be limited in the set time. When this time is reached, the radio will auto stop transmission.

OFF: Turn off the TX time limit, and there is no limit for the transmission time.

(9) **Max Vol Level**

Indoor: Very low volume, suitable for the indoor use.

Level 1-8: Set up the maximum volume level.

(10) **Enhanced Sound(For digital mode only)**

It will allow you set up the audio pitch.

Normal: Low pitch,for TX audio only.

Enhance: High pitch,for TX audio only.

Indoor: Improved both the TX and RX audio.

Outdoor: Improved both the TX and RX audio.

(11) **Fan Open**

PTT: The fan will open when PTT is pressed.

Temperature: The fan will open when the temperature is high.

Both: The fan will open either PTT is pressed or the temperature is high.

(12) **Language**

Choose the Chinese or English.

(13) **Menu Exit Time**

5S-60S: When enter the menu, the radio will stay at the menu in the set time. When the time is reached, the radio will auto exit the menu.

(14) **Start Display**

Picture: The radio will display an AnyTone picture when powered on.

Character: The radio will display the characters set up in PC software when powered on.

Customer's Pic: The radio will display the picture uploaded by PC software. In CPS -Tool -Boot Image, it will allow you upload a Power-on Picture.

(15) **CHG Background**

Defualt Picture: In standby, the radio will display default picture.

Customer's Pic: The radio will display the picture uploaded by PC software. In CPS-Tool-Standby BK Picture, it will allow you upload a standby background picture.

(16) **CHG Font Color**

White: In standby, the channel and other information will display color in white.

Black: In standby, the channel and other information will display color in black.

(17) **CH Color A**

Set color for the band A channel display.

(18) **CH Color B**

Set color for the band B channel display.

(19) **Zone Color A**

Set color for the band A zone display.

(20) **Zone Color B**

Set color for the band B zone display.

(21) **Main Ch**

Channel A: The upper displayed channel will be set to become the main channel.

Channel B: The lower displayed channel will be set to become the main channel.

(22) **Sub Ch On/Off**

Sub Channel On: Turns on the sub channel, and the radio will display both channel.

Sub Channel Off: Turns off the sub channel, and the radio will display the main channel only

(23) **SMS Notify**

Different prompt options when receive a new message.

(24) **Call Ring**

Different prompt options when receive a new call.

(25) **Freq Step**

2.5K,5K,6.25K,10K,12.5K,20K,25K,30K,50K, total of 9 frequency steps.

(26) **Ana SQ Level**

Adjusts the squelch level to receive signal with
different signal strength, and a total of 5 levels offered.
This function is only valid for analog channel.

(27) **TBST Sel**

TBST frequency is used to activate some dormant repeaters, 1000Hz, 1450Hz,1750Hz, 2100Hz a total of 4 options are offered.

Hold pressing PTT key, at the same time press UP or DN key on microphone to transmit the TBST tone.

(28) **Scan Mode**

SCM TO: When scanning and stopping for a signal, stays at the channel 5s before resuming the scan.

SCM CO: When scanning and stopping for signal, stays at the channel until the signal disappears, and resumes scan 2s later.

SCM SE: When scanning and stopping for a signal, will terminate the scan. This function is only valid for a VFO scan.

(29) **Mic Level**

Allows to adjust the Microphone gain, level 1 is the lowest, level and 5 is highest gain.

(30) **DTMF Speed**

Offers DTMF encode speed which will help the receiver decode successfully, 50~500ms are the options.

(31) **AM/FM Radio**

Off: AM or FM function is off.

FM Mode: Turn on FM radio.

AM Mode A: Turn on AM function,the AM channel will default at band A in display.

AM Mode B: Turn on AM function,the AM channel will default at band B in display.

(32) **FM Radio Moni**

Radio Mon On: When FM radio is used, you can still receive or transmit on the channel.

Radio Mon Off: When FM radio is used, the radio will not permit a transmission or reception.

(33) **Start Up Pwd**

On: Set up the password for start up. You need to input the password to power on the radio.

Off: No password is required for the radio power on start up.

The password shall be set up in CPS-Optional Setting-Power on-Power-on Password Char.

(34-35) **AuRepeater A or B (For VFO A or B)**

Turn on the Auto Repeater function, the TX frequency in VFO mode will auto increase or reduce frequency base on the set up offset frequency in CPS.

Off: Turn off the function.

Positive: TX frequency= RX frequency + Offset frequency.

Negative: TX frequency= RX frequency - Offset frequency.

(36-57) **Key P1-P6,PA-PD**

You can program these keys for different functions.(Refer to page 8-9)

(58) **Weather Alarm**

Turn on or off the weather alarm function.

(59) **Weather Channel**

When the Weather Alarm is on, the weather channel will work as sub channel. Once the weather alarm is received, the radio speaker will open and start the alarm.

(60) **Repeater (Cross-band)**

Turning on the cross-band repeater function will allow the radio to work as a small local repeater. The radio will TX on one channel, RX on the other channel.

Note: Cross-band Analog-Analog: Must be UHF-VHF, or VHF-UHF cross bands.

Cross-band Analog- Digital: Must be UHF-VHF, or VHF-UHF cross bands.

Cross-band Digital- Digital: UHF-VHF, or VHF-UHF cross bands, different times lot.

Cross-band Digital- Digital: Same UHF or same VHF bands, different times lot.

Cross-band Same frequency Digital-Digital: TX and RX are at same frequencies, but different times lots on VFO A and VFO B. Radio must also be in Double Slot operation.

*** Please Turn Off Digital Monitor when using the Cross-band repeat function***

Analog (A) to Analog (A) Cross band Repeater Setup

a. To set the channels or frequencies you will want to use with cross band operation, the radio must be set to display both the Main Channel (VFO A) and the Sub-Channel (VFO B).

b. Set the analog channel with simplex or repeater frequency.

c. Turning the Repeater function ON in the Radio Settings menu.

Analog (A) to Digital (D) or Digital (D) to Analog (A) Cross band Repeater Setup

a. To set the channels or frequencies you will want to use with cross band operation, the radio must be set to display both the Main Channel (VFO A) and the Sub-Channel (VFO B).

b. Set the analog channel with simplex or repeater frequency, and set the digital channel with simplex frequency only.

c. Turning the Repeater function ON in the Radio Settings menu.

Digital (D) to Digital (D) Cross band Repeater Setup

a. To set the channels or frequencies you will want to use with (D) to (D) cross band operation, the radio must be set to display both the Main Channel (VFO A) and the Sub-Channel (VFO B).

b. Enter the Simplex channel or Simplex frequency for VFO A and the Simplex channel or frequency for (VFO B).

c. Set the correct Color Code and set the two (VFO) channels to DIFFERENT Time Slots (TS)

d. Set the radio to Double Slot operation.

e. Turning the Repeater function ON in the Radio Settings menu.

**Allows the VFO A and VFO B at same frequency but different time slot, the radio will work as a digital single frequency repeater.

(61) **SMS Format**

M-SMS: Allows SMS text communication with Motorola DMR radio.
H-SMS: Allows SMS text communication with Hytera DMR radio.

(62) **CTC ste**

Squelch Tail Eliminate(STE) setting with CTCSS.

(63) **No-Signal Ste**

Normal Squelch Tail Eliminate(STE) setting(no signaling).

(64) **Hand Type**

Set for different microphone use.

Uart-Det: For EMS-88 microphone use.

Volt-Det: For simple PTT microphone(no display) use.

(65) **Time Zone**

Set up the time zone of your location.

(66) **Date Time**

Time Set: Allows to set up the date and time manually. Use the channel swtich to set the current year. Move to the month by pushing channel switch. Set the month, and push the channel switch to move forward each step. Once done, click the Menu key to save the date and time.

GPS Check: When GPS is positioning successfully, enter this menu, select GPS check to do the date & time correction automatically.

2. Chan Set

Channel set menu Route: Main Menu- Settings - Chan Set. The channel set menu will change accordingly to the channel type. When the channel type is digital, it will automatical hide the analog menus.

※**Chan Set (Digital Channel)**

(1) **New Chan**

Allows creat a new channel and save current set up to the new channel.

a. Select "New Chan", then input new channel number and confirm.

b. Input channel name and confirm.

c. Select a zone and confirm. The new channel will be saved to the selected zone.

(2) **Delete Chan**

Allows to delete current channel.

a. Select "Delete Chan",the radio will remind " Delete? "

b. press confirm, the current channel will deleted.

Note: After delete one channel, the radio will move to next channel.

(3) **Channel Type**

A-Analog : Set up to analog channel.

D- Digital : Set up to digital channel

A+D TX A: Mixed analog, allow receive analog and digital signal, TX is analog.

D+A TX D: Mixed digital, allow receive analog and digital signal, TX is digital.

(4) **TX Power**

Set up the TX power for current channel.

(5) **Offset**

Press [UP]/[DOWN] to adjust offset frequency.

(6) **Band Width**

Only narrow band 12.5KHz for digital channel.

(7) **RX Freq**

Input the RX frequency by keypad, click the Menu key to save, press P2 key to return.

(8) **TX Freq**

Input the TX frequency by keypad, click the Menu key to save, press [P2] key to return.

(9) **Talk Around**

Allows a Repeater Channel to be used as Simplex. When the TX radio and RX radio both are set up with Talk Around on, they can communicate directly without a repeater. The analog channel will use the RX frequency as TX/RX frequency, the RX CTCSS/DCS decode as TX CTCSS/DCS encode.

(10) **Name**

Allow reset the channel name, this function is only valid in channel mode.

(11) **TX Allow**

Always: Always allow transmit

Channel Free: Allow transmit when the channel is free

Different CC: Allow transmit when receive matched signal but different color code.

Same CC: Allow transmit when receive matched signal and same color code.

(12) **TX Prohibit**

TX ON: Will allow transmit on the current channel.

TX OFF: Will not allow transmit on the current channel.

(13) **Radio ID**

In Digital channel, it will show the DMR ID which must be programmed in the PC software – Digital – DMR ID list- DMR ID. Allows edit and select an ID for the channel, each channel allows one ID.

In Analog channel, it will show the radio self ID which is programmed in PC software – Analog –Analog Address Book – Number.

(14) **Color Code**

The digital channel should have the same color code for communication as defined by the repeater to be used; which can be programmed in the PC software or defined in the Menu.

(15) **Time Slot**

Set up Slot 1 or Slot 2 for the current channel.

(16) **Digi Encrypt**

With the digital encryption, the communication will be confidential. A total of 32 digital encryptions is offered, and it can be programmed in the PC software or defined in the Menu.

(17) **RX Group List**

It will allow edit the RX Group List and assign a new RX Group List to the channel.

Select Cur List: Select the current RX Group List. Add Group: Add a TG to the current RX Group List.

Remove Group: Remove a TG from the current RX Group List.

(18) **Work Alone**

In the PC software – Public – Alarm settings – Work Alone, you have to set up the response time, warn time and response method initially.

Turn on the work alone function for the current channel. When the radios predetermined time has been reached for the alone working time, the radio will beep a sound and show “Work Alone Predict”. The user has to confirm by pushing the programmed work alone key to confirm continuing work alone, otherwise, the radio will start its alarm and send the alarm on the channel when reaching its preset response time

(19) **CH Ranging**

In standby, if the call contact type for a channel is "Private call", The radio will automatically start ranging function when turned to this channel. The other radio's location will be showed on screen at intervals.

(20) **GPS Receive**

Turn on GPS Coordinates, if both radio GPS is positioned, the radio will display the other radio's distance and position when radio is receiving.

(21) **DMR Mode**

Simplex: Enable to communicate by repeater frequencies directly with another radio with opposite TX/RX frequncies.

Repeater: Enable talk with other radio by repeat frequency throught repeaters.

Double Slot: When TX/RX frequency is same, turn on this function to communicate by the slot set in simplex mode.

Note: *If DMR mode not choosed Doube Slot, the radio will work on Slot in repeat mode. if choose Double Slot, it is necessary to Double choose a slot by time slot setting.*

(22) **Tx Interrupt**

This feature allows the supervisor to start the transmission while another person is talking. It allows supervisor to override the ongoing transmission brings other radios hear what the supervisor is saying, the radio that is transmitting at the time of this override will not hear the supervisor until he release keys his radio and then he will be able to hear the rest of the conversation.

※Chan Set (Avaiable in Analog Channel only)

When the channel type is analog, it will automatically hide the digital menu, The below listed menus are for analog channel only, unlisted menus are are the same as the digital channel, please refer to Chan Set (Digital Channel).

(4) **TCDT**

Set up the CTCSS/DCS code for the TX.

(5) **RCDT**

Set up the CTCSS/DCS code for the RX.

(6) **RTCDT**

Set up the CTCSS/DCS code for both TX and RX CTCSS code: 62.5Hz~254.1Hz, a total of 51 groups DCS code: 000N~7771, a total of 1024 groups.

(7) **Optional Signal**

Allows the setup of DTMF/5TONE/2TONE encode and decode for the Analog channels.

(10) **Squelch mode**

When the analog channel is set up for both CTCSS/DCS decoding and optional signaling, you can set up the RX condition in this menu.

SQ: You can hear the call once the channel receive matched carrier.
CDT: You can hear the call when receive matched CTCSS/DCS signal.
TONE: You can hear the call when receives a matched signaling.

C&T: You can hear the call when receives a matched CTCSS/DCS and matched signaling.

C|T: You can hear the call when receives a matched CTCSS/DCS or.

(11) **Band Width**

Choose wide band or narrow band for the analog channel.

(12) **Reverse**

When this function is enabled, the RX frequency, TX frequency and CTCSS/DCS encode/decode will be reversed.

(13) **Compander**

Enable this function to reduce background noise and enhance audio clarity, especially in long range communication.

(14) **Scrambler**

An analog voice inversion scrambler can be equipped.This special audio process can offer a more confidential communication.

Other radios at same frequency will receive only disordered noises.

The radio has 11groups standard Scrambler and 1 group self-defind Scrambler. It works with the CML128 and CML138.

(19) **Busy Lock**

Always: Always allows transmissions

RL: Will not allow transmit when receiving matched carrier but unmatched CTCSS/DCS.

BU: Will not allow transmit when receiving matched carrier.

(21) **OWN ID**

When the analog channel set up with optional signal, you can check the radio ID number in this menu. The ID number should be set up in PC software – Analog – Analog Address Book.

(22) **DTMF Enc**

Set a DTMF ID as the default call ID for the current channel.

Press the PTT key to transmit the selected DTMF ID.

Edit the DTMF ID in Menu or with the PC programing software.

(23-24) **2Tone Enc/Dec**

Set a 2Tone as the default call ID for the current channel. Press the [PTT] key to transmit the selected 2Tone.

Edit the 2Tone in the PC programing software before it can be selected.

(25) **5Tone Enc**

Set a 5Tone as the default call ID for the current channel. Press the [PTT] key to transmit the selected 5Tone.

Edit the 5Tone in the PC programing software before it can be selected.

(26) **5TONE BOT**

Set ON to send the 5Tone encode ID when press the [PTT] key.

(27) **5TONE EOT**

Set ON to send the 5Tone encode ID when release the [PTT] key.

(29) **APRS Receive**

Turn on this function to enable the radio receiving the analog APRS information in current channel. Make sure your channel setting Frequency, CTCSS/DCS match to the transmit radio's setting.

The radio will display the callsign, coordinates,direction,distance, digipeater paths, etc., when receive the analog APRS from the other radios.

Radio Menu-> APRS -> Ana APRS Info, allows to check the receive analog APRS logs.

CPS -> Public->APRS ->Analog APRS -> Receive Allow set to "On", and input the Callsign and SSID you want to receive. The radio will only receive and display the analog APRS information of the filter callsign, instead of display all analog APRS.

3. Device Info

Show the Radio ID, Radio name, model name, frequency range, firmware version and hardware version, radio data version, latest production date, picture version, language version, sct version and BT module version.

RECORD

The voice record is designed for security use purpose. Each call will be saved as a separated recording file with DMR ID and time details. The standard voice 10hours record allows in digital channel only. The optional 500 hours voice record allow in both digital and analog channels (It requires to implement an optional recording board).

1. Record Switch

Select on or off to turn on or off the recording.

2. Record List

Select a Record list to enter the Record file. Click on a Record file to see the Detailed Information. It allows different options.

(1) Record Play, it will play one record at a time, you can turn the channel switch to choose another recording without return to previous menu.

(2) Loop Playback, it will play all records in circle.

(3) Record Send, it allows you choose a TG or private ID from TG list or manually, and transmit the record.

3. Record Delete

This function allows you delete all the recordings.

4. Recording Manually

In the PC software, Public – Optional Setting – Key function, program a key as Record.

a. Press the programmed Record key, and the radio will start the recording, and speak into the microphone.

b. Select Record Play, and the radio will play the record

c. Select Record Send, and the radio will display Contact list or Manual Dial.

d. Select Contact list to choose a contact, and press select to send the Record.

e. Select Manual Dial, input the DMR ID, press [#] key to switch group ID or private ID, press select to send the Record.

GPS POSITIONING FUNCTION

1. GPS On/Off

Turn the GPS on or off manually.

2. GPS Info

Method 1: Check GPS info from Menu

Press [MENU] key to enter Main Menu, select "GPS", then select "GPS Info".

Method 2: Check GPS info from programmed key

In the PC software, Public – Optional Setting – Key function, program a key as "GPS Info", then press the programmed key to check the GPS info.

NOTE: If the GPS is not positioning, it will display "No Fixed Position", and the GPS icon shows a grey color. Move the radio to an open window or outdoors, and it will take a few minutes to connect to the GPS Satellites.

3. Send GPS Information

a. When the GPS is positioning successfully, the GPS icon shows a red color. Follow the above step to check the GPS info, press edit key to Text edit.

b. Press Confirm, and it will display Send or Save. If you select Save, the GPS info will be saved as a draft message.

c. Choose Send and it will display Contact list or Manual Dial.

d. Select Contact list to choose a contact, press select to send the GPS info. or

e. Select Manual Dial, input the DMR ID, press [#] key to switch group ID or private ID, press [MENU] to send the GPS info.

APRS LOCATION REPORTING

APRS menu is not in menu list when GPS is off, you have to turn on GPS first if you want to use APRS menu.

***(1)* Upload Type**

None: No APRS.

Sel A Aprs: Select analog APRS. Sel D Aprs: Select DMR APRS.

***(2)* Ana APRS**

PTT Upload: Set the PTT transmit method.

- Off: Not transmit APRS.
- Tx Start: Transmit analog APRS when press the PTT.
- TX End: Transmit analog APRS when release the PTT.

Upload Power: Set the transmit power.

Upload frequency: Set the transmit frequency.

Signal Path: Set the signal path to transmit the APRS.

Upload text: Set the text to be shown on aprs.fi.

***(3)* Ana APRS Info**

The received analog APRS information will be saved in radio for look back use. Click on "Ana APRS Info" will show the received APRS information.

Click on "Delete All" will clear the information.

***(4)* Digi APRS**

PTT Upload: Set the PTT transmit method.

- Off: Not transmit APRS.
- On: Transmit DMR APRS when release the PTT.

Report Channel: Allow user to select a channel to transmit the DMR APRS, please set the 8 report channels in CPS-APRS-Digi page first.

Upload Slot: Allow user to select a slot to transmit the DMR APRS.

- Channel Slot: It uses the slot of current channel
- Slot 1: Use slot 1

● Slot 2: Use slot 2

Upload ID: Allow user to set an APRS TG as the destination.

(5) **Digi APRS Info**

The received APRS information will be saved in radio for look back use. Click on "Digi APRS Info" will show the received APRS information.

Click on "Delete All" will clear the information.

(6) **Intervals Set**

This function allows you to set the analog APRS or DMR APRS auto transmit at fixed times.

(7) **Upload Beacon**

GPS Beacon: The APRS will transmit the GPS data, only if the GPS is set

to on first, then GPS must also successfully lock on the satellites.

Fixed Beacon: The APRS will transmit the fixed beacon data. Someone can transmit the fixed beacon without setting the GPS on. The fixed beacon location information should be set in CPS firstly.

Note: *More setup are available by PC software only. CPS-Tools-Options-APRS, you have to check on the APRS box first to get APRS menu add to the left Digital menu.*

(APRS is a registered trademark of Bob Bruninga, WB4APR)

DIGITAL MONITOR

(1) **DigiMoni Switch**

off: Turn off Digital Monitor

Single Slot: Monitor the current TS

Double Slot: Monitor TS1 and TS2

(2) **DigiMoni Cc**

Any Cc: Monitor any color code

Same Cc: Monitor the same color code

(3) **DigiMoni Id**

Any Id: Monitor any TG

Same Id: Monitor the same TG

(4) **Slot Hold**

Off: Turn off the slot hold

On: Turn on the slot hold

Recommend to turn on slot hold when monitor double slot TS1 and TS2, when the signal is disappear in one slot, instead of switching to the other slot at once, the radio will hold on some seconds and wait for the audio drop.

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1. How to Respond and Save a call in Digital Monitor Mode

During Digital Monitor, when receive a call with unmatched ID, press **[*]** key, the screen will display "*Monitor Response Setup Successfully* ", press **[PTT]** key will reponse to the call.

Press [#] key, the radio will remind you choose a Zone, you can choose a zone and save the new channel to the Zone.

A. Power off the radio.

B. Then power it on while holding the [P2] and the channel switch at the same time.

C. The radio will start up with a note on the display – "Are you sure you want to initialize radio?"

Press Exit to exit the reset and power on the radio.

Press Confirm to proceed the reset, it will come with a screen display note – Initialize Radio.

D. After a re-start the radio will display the setting of time zone and the date and the time. Use the channel switch to set the current year. Move to the month by pushing the channel switch. Set the month, and use the channel switch key to move forward each step. Once done, click the Confirm key to save the date and time.

Please remember set up the time zone to avoid the date/time error.

Make sure the codeplug is saved to PC before your do the update and reset.

GENERAL

Frequency Range (DR-MD520T)	RX: 136MHz~174MHz, 220MHz~225MHz, 400MHz~480MHz TX: 144MHz~148MHz, 222MHz~225MHz, 420MHz~450MHz FM: 88MHz~108MHz
Frequency Range (DR-MD520E)	RX : 136Mhz~174MHz, 400Mhz~480MHz TX : 144MHz~146Mhz, 430MHz~440MHz AM : 108MHz~137MHz FM : 76MHz~108MHz
Number of Channels	4000 channels
Channel Spacing	Analog: 12.5/25KHz
	Digital: 12.5KHz
Zones per Radio	250 zone (MAX 250ch/zone)
Operating Voltage	13.8V DC ±15%
Operating Temperature Range	-20~+60˚C
Frequency Stability	±2.0ppm
Antenna Impedance	50Ω
Dimensions (WxHxD Approx)	141x40x188 mm (5.55x1.57x7.40 inches)
Weight (Approx)	1.04kg /36.68 ounces
Recording time	4 Hours

TRANSMITTER

RF Power Output	VHF: 55W/25W/10W/1W
	222~225MHz:5W(High)/1.5W(middle low small)
	UHF: 40W/25W/10W/1W
Channel Spacing	Less than 1GHz: -36dBm
	More than 1GHz: -30dBm
FM Hum & Noise (Analog)	25kHz: 40dB
	12.5kHz: 36dB
Modulation	16K0F3E/11K0F3E/7K60FXD/7K60FXE

RECEIVER

Sensitivity (Analog/12dB SINAD)	25kHz: 0.25uV
	12.5kHz: 0.35uV
Sensitivity (Digital/BER)	5%: 0.3uV
	1%: 0.7uV
FM Hum & Noise (Analog)	25kHz:45dB
	12.5kHz:40dB
Audio Distortion	≤5%
Audio Output	2W / 8Ω

A1.210310

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Electrical and electronic equipment and batteries should be recycled at a facility capable of handling these items. Contact your local authority for details of disposal rules.