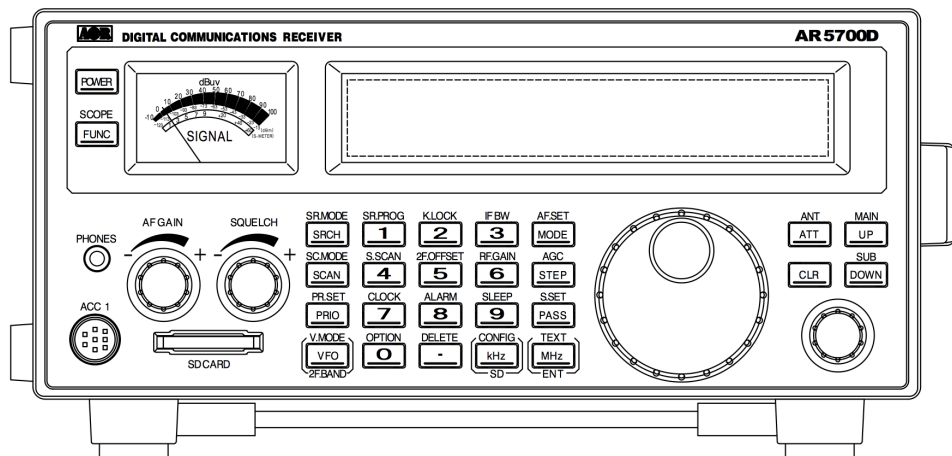# DIGITAL COMMUNICATIONS RECEIVER

AR5700D

Operating manual

AOR, LTD.
Authority On Radio Communications

INTRODUCTION

Thank you for purchasing the AR5700D.

AR5700D is a high-end table-top receiver with wideband coverage between 9kHz and 3.7GHz. It supports a variety of digital, as well as analog modes. Some of its outstanding features are:

1） Digital signal processing:
Input signals after the 45.05MHz IF are converted from analog to digital by a DSP processor. There is no AGC in the analog processing unit, as all processing, including AGC, is done by DSP.

2） High-performance analog front-end:
Analog signal processing is performed by a computer simulated, high-performance distribution constant filter .

3） DDS local oscillator:
Instead of the conventional PLL method, the first local frequency is produced by direct digital synthesis. That method allows frequency switching at high speed.

4） IF output:
An analog IF of 15MHz (+/-7.5MHz) bandwdth is output.

5） Digital I/Q output:
A digital I/Q signal of 0.9MHz is output via a USB 2.0 interface.

6） High precision frequency reference:
0.01ppm frequency stability of the 10MHz internal master oscillator is achieved when using the optiona GPS receiver unit.

7） FFT analizer:
Thanks to the onboard FFT processor, 10MHz wide spectrum data can be output at high speed via serial.

8） Multi-mode digital voice demodulation:
D-STAR, YAESU, ALINCO, D-CR, NXDN, P25, dPMR, DMR, Mototrbo, TETRA . (Mode dependant restrictions apply)

9） Video demodulation
By connecting and external TV monitor, it is possible to demodulate the signal of FM modulation security cameras and analog TV broadcasts. When you connect the TV monitor, you can check the demodulated video. Not compatible with digital terrestrial television.

10） Simultaneous monitoring
2 band reception, offset reception, triple reception (restrictions apply).

11） SD card slot
You can record the received audio, analog and decoded digital, as well as logs.

12） 12kHz analog I/Q output
Allows DRM broadcasts decoding via a PC and dedicated 3rd party software.

13） HF direct sampling
When receiving HF signals, the signals are converted directly to digital without entering the mixer. This allows very good linearity characteristics.

Please read this operating manual carefully. This information will allow you to enjoy maximum performance from your receiver. We sincerely hope that the AR5700D will be your monitoring companion for many years to come.

All product names referenced herein are trademarks of their respective manufacturers.
Marks such as TM and ® symbols are omitted in the body of the text.

TABLE OF CONTENTS

SAFETY PRECAUTIONS

DO NOT operate the receiver near unshielded electrical blasting caps or in an explosive atmosphere. This could cause an explosion and death.

DO NOT operate the receiver with a headset or other audio accessories at high volume levels. If you experience a ringing in your ears, reduce the volume or discontinue use.

DO NOT directly apply AC power to the DC socket on the receiver rear panel. This could cause a fire or damage the receiver.

DO NOT apply more than 16 V to the DC socket on the receiver rear panel. This could cause a fire or damage the receiver.

DO NOT reverse the DC power cable polarity. This could cause a fire or damage the receiver.

DO NOT let metal, wire or other objects contact the inside of the receiver, or make incorrect contact with connectors on the rear panel. This could cause an electric shock or damage the receiver.

DO NOT operate or touch the receiver with wet hands. This could cause an electric shock or damage to the receiver.

Immediately turn OFF the receiver power and remove the power cable from the receiver if it emits an abnormal odor, sound or smoke. Contact your AOR dealer or distributor for advice.

DO NOT put the receiver on an unstable place where the receiver may suddenly move or fall. This could cause an injury or damage the receiver.

DO NOT operate the receiver during a lightning storm. It may result in an electric shock, cause a fire or damage the receiver. Always disconnect the power source and antenna before a storm.

DO NOT expose the receiver to rain, snow or any liquids.

DO NOT change the internal settings of the receiver. This could reduce receiver performance and / or damage the receiver. The receiver warranty does not cover any problems caused by unauthorized internal adjustments.

DO NOT install or place the receiver in a place without adequate ventilation.

DO NOT use harsh solvents such as Benzine or alcohol when cleaning, as they will damage the receiver surfaces.

DO NOT leave the receiver in areas with temperatures below 0°C or above +50°C.

DO NOT place the receiver in excessively dusty environments. This could damage the receiver.

DO NOT place the receiver against walls or put anything on top of the receiver. This may overheat the receiver. The receiver will become hot when operating the receiver continuously for long periods of time.

Turn OFF the receiver's power and / or disconnect the DC power cable when you will not use the receiver for a long period of time.

The display may have cosmetic imperfections that appear as small dark or light spots. This is not a malfunction or defect, but a normal characteristic of LCDs.

The AR5700D may receive its own oscillated frequency, resulting in no reception or only noise reception including on the Spectrum displayed by control software, on some frequencies.
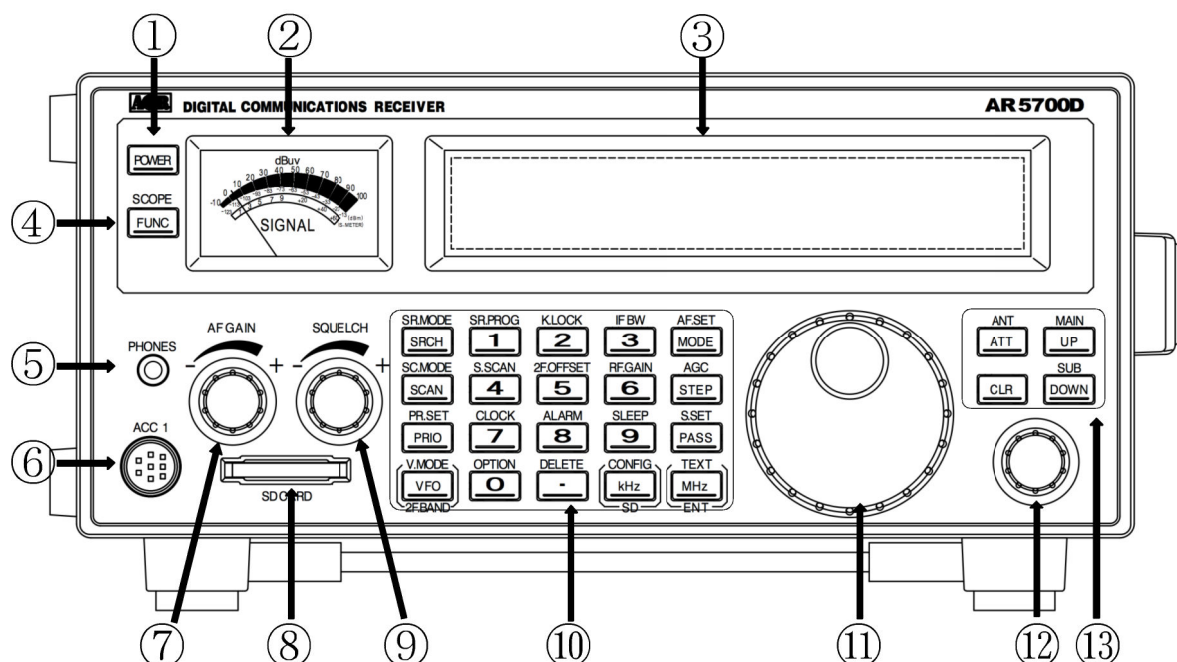
1. Supplied items

- AR5700D receiver·······································1
- AC power adapter······································1
- Printed user manual···································1
- SD card···1
- USB cables··2
- AR-IQ-III licence dongle·····························1
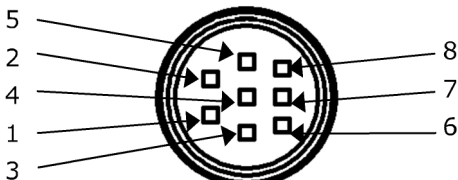 (also contains control software and USB driver)

A list of optional accessories is available at http://www.aorja.com/accessories/receiver_accessories.html

2. Front/rear panel description

2.1. Front panel

①	Power key	Press the switch briefly to turn the receiver ON. Press and hold it for 2 seconds to turn the receiver off. If you need to disconnect the AC power adapter, make sure that the receiver is shut down before.
②	Signal-meter	Indicates the received signal strength, measured at the antenna input, in S-units, dBm and dBuv. As it is measured at the antenna input, the displayed level does not change when the attenuator or AMP is used. However this only applies when there is an actual steady signal received.
③	LCD display	Shows the tuned frequency and selected operation conditions.
④	Funtion key	Activates a key's or a dial's sub-function. It's usually a sub-function written over a key.
⑤	Headphone socket	Three pin 3.5mm, stereo output. For stereo broadcasts, use the FMST receive mode with 100kHz or 200kHz bandwidth. In dual-band reception, the main frequency is audible on the right channel, and the sub-frequency on the left channel.

| ⑥ | Accessory socket 1 |

Pinout description

1	12V DC output. No current limitation. Power supply dependant.
2	Discriminator output Unfiltered audio limited to the NFM receive mode. 0.78V p-pEMF 10kΩ (NFM deviation 3kHz, audio 1kHz)
3	External mute input. Short this terminal to the ground to mute the receiver's audio output. Remember that this function does not protect the high frequency circuitry from strong nearby transmissions.
4,5	Control 1,2 When busy (squelch is open) the control closes between 1 and 2 terminals. Uses non-polar photo MOS relays. Up to 350mA on-resistance 2Ω or less, load voltage 40V)
6	Not used
7	Low level audio output (2.5mV@600Ω) Not affected by changes in AF GAIN.
8	Ground

⑦	AF GAIN knob	Volume control. Turn clockwise to increase volume, counter-clockwise to decrease.
⑧	SD card slot	Standard size SD Card Connector You can record and playback received audio, backup and restore memory data and receiver settings. Insert the surface of the SD card until it locks upwards. For microSD cards, use an SD card adapter.
⑨	Squelch knob	Adjust the squelch level to eliminate noise when there is no signal received.
⑩	Numeric keypad	To input frequencies, various values and access numerous functions.
⑪	Main dial	Tunes the frequency up and down and toggles memory channels.
⑫	Sub-dial	In VFO mode, tunes the frequency up and down. In SEARCH/SCAN modes, switches memory banks. Else, it selects various content on screen.
⑬	Sub-keypad	Used to access sub-functions.

LCD DISPLAY

■ Frequency display

Note: The LCD's display speed might slow down with lower tempearatures, it does not represent a malfunction.

F	Indicates that the FUNC key has been pressed. All keys have now their sub-function (written over the key) activated when pressed.
U	Offset function activated. Two offset frequencies are now received, main frequency + sub-frequency within +/-5MHz from main frequency. Above 25MHz only.
LU	2 band reception activated. One frequency below and one above 25MHz.
GPS symbol / 10MHz ref symbol	GPS status (option) for frequency accuracy. Indicator on: 0.01ppm, flashing: 0.1ppm, off: 1ppm (=no GPS) (It takes about 90 minutes to go from flashing to constant on indicator) Indicates that a 10MHz external reference signal has been applied.
key-lock symbol	Indicates that KEY-LOCK has been activated, or that remote control is taking place. When enabled, all controls except AF GAIN and POWER will be disabled. Press CLR to deactivate.
ALARM	Alarm function is active.
SLEEP	Sleep function is active
SD REC	SD: An SD card has been detected. REC : Audio recording ongoing.
PRIO	Priority receive function activated.
ANT:1	Displays the antenna terminal in use. "P" means as programmed.
bar indicators	Squelch level bar indicator / Volume level bar indicator
B	Busy (Squelch is open)
65.3dBu / **-47.1dBm**	S-meter value, in dBm or dBu units. Indicates the received signal strength. As it is measured at the antenna input, the displayed level does not change when the attenuator or AMP is used. However this only applies when there is an actual steady signal received.
ATT(A):0dB	Attenuator level indicator in dB. (A) means that attenuator is set to AUTO.
AMP	The RF amplifier is activated.
AUTO	The (analog) autoreceive mode function is activated.
ST:025.000k	Currently selected frequency step value.
L-BANK	The bank link function is activated.

VFO MEM SCAN SRCH CYBER S.SCAN V.SRCH	Currently selected operation mode.
PAUSE	Displayed when a SEARCH or SCAN is paused.
VCS or VID	Voice scan is activated Analog video output is enabled.
PASS	Pass frequency function is enabled.
AS-M	Auto-store function is enabled.
DCS	DCS function is enabled. DCS code also displayed when detected.
TONE	TONE function is enabled. CTCSS frequency also displayed when detected.
STEP-ADJ	Step-adjust function is anabled.
3700000000 145000000	Tuned frequency. MHZ, kHz and Hz blocks are in different sizes for easier reading.
≡	AGC function set to off.
00 (at the right of frequency)	Search group and scan group number.
BW 100k	IF bandwidth
FM (black font)	Currently selected receive mode.
DMR (white font)	Currently received digital mode.
VA00SRHF	(pending)

■ Digital signal info display

Receive mode	Indication examples	Description
DCR	CODE:NO UC:100	CODE: NO (The signal is unscrambled) UC: 100 (The user code is 100)
	CODE:00007 UC:100	CODE:00007 (The 15 bit scramble code is 00007) UC: 100 (The user code is 100)
DCR (for NXDN)	CODE:NO RAN:00	CODE: NO (The signal is unscrambled) RAN:00 (The Radio Access Number is 00)
	CODE:00012 RAN:33	CODE:00012 (The 15 bit scramble code is 00012) RAN:33 (The Radio Access Number is 33)
DMR	SLOT:1 COL :01	DMR slot is 1 DMR color code is 1
P25	NAC :293	The Network Access Code is 293
DSTAR	CAL:JA0000 RPT:DIRECT	The sender's callsign is JA0000 Repeater callsign, or direct communication
T-TC	SLOT:1	TETRA's traffic channel's slot number

Note: There is no signal info display function for other digital modes.

◼ Spectrum display
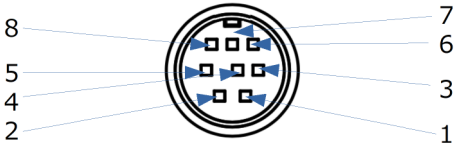
To activate, long-press the [FUNC] key. Long-press again to return to normal screen.

	Upper: Squelch level
	Lower: Volume level
	BUSY for when the squelch is open
	Funtion key has been pressed. Activates the sub-function of the next key to be pressed.
VA	Currently selected VFO (from A to E)
FM	Receive mode
200k	IF filter bandwith
SPAN:10.0M	Displayed spectrum bandwidth
91.900000M	Center frequency in MHz
71.0dBm	Signal level of the center frequency

2.2. Rear panel
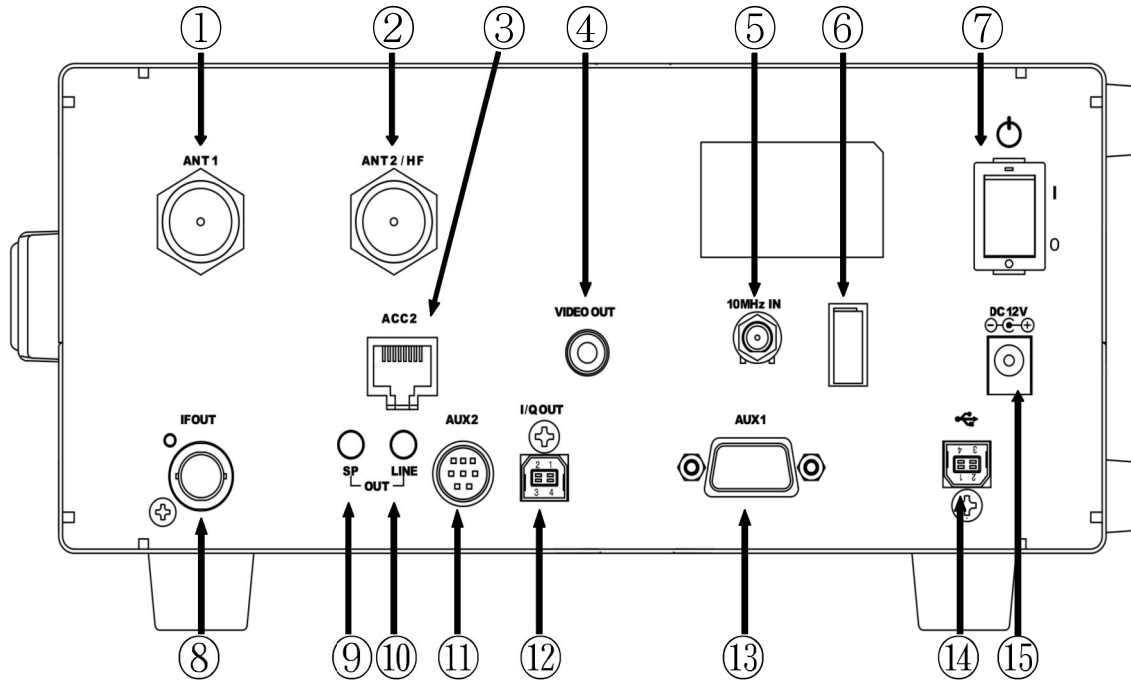
①	ANT 1	Type N socket (50Ω) for frequencies over 25MHz only.
②	ANT2/HF	Type N socket (50Ω) for all frequencies, including HF.
③	ACC2	Socket to connect the optional antenna selector unit. <u>Do not connect to a LAN network!</u> Not compatible with AS5001 Antenna selector unit.
④	VIDEO OUT	RCA type socket (75Ω 1 V p-p) to output the image of a demodulated analog video signal.
⑤	10MHz IN	SMA type socket (50Ω) External reference clock input of 10MHz (2dBm±2dB). When a valid 10MHz is entered, it automatically switches to that external input.
⑥	Power cable clamp	Secure the DC cable with this clamp to avoid the DC connector to be pulled out accidentally.
⑦	Power switch	Receiver's main power switch.
⑧	IF OUT	BNC type socket (50Ω) Outputs analog IF at 45.05MHz with a bandwidth of +/- 7.5MHz. (Output level is +10dBm relative to antenna input)
⑨	SP OUT	Φ3.5mm monoral jack (Up to 2W with 8Ω load) To connect to an external speaker.
⑩	LINE OUT	Φ3.5mm stereo jack (600Ω -10dBm) To connect to an external recording device, or an audio amplifier. Can be switched to ouput a 12kHz wide analog I/Q signal. In dual-band reception, the main frequency is audible at the right side and the sub-frequency at the left side.

⑪	AUX2 (not compatible with GP5001 GPS antenna unit)	Mini-DIN-8 socket | 1	GPS TXD
2	GPS 1Hz Pulse
3	12V
4	GND
5	GPS RXD
6	RTS
7	CTS
8	NC	
⑫	I/Q OUT	USB type B socket which outputs digital I/Q data (bandwidth 0.9MHz) for PC.
⑬	AUX1	D-SUB 9 male socket for receiver serial control or to connect the optional Ethernet Controller unit.
⑭	USB socket	USB Type B socket for receiver control by PC.
⑮	DC 12V	DC barrel socket (5.5/2.1mm), center positive, for power input. DC10.7V〜16V (2.0A@12V).

3. Basic operation

3.1. Connecting power

Connect the supplied AC power adapter. If using another power supply, make sure its DC10.7V~16V with at least 2 A of power.

3.2. Power on/off

First, set the power switch located at the back of the receiver to ON. The receiver will enter in standby mode and the display will show the clock as follows.

13-43-21   UTC

Then press the front panel's POWER key. This opening screen will briefly appear, followed by the standard operation screen.

AR5700D START

To put the receiver back into standby mode, press and hold the POWER key. After that, if you wish to completely power off the receiver, set the power switch at the back of the receiver to OFF.

3.3. Connecting and selecting an antenna

AR5700D has two type N (50Ω) antenna sockets, labelled ANT 1 and ANT 2/HF. Although that applies for a standard "stand-alone" receiver operation, please note that the frequency/antenna allocations are reversed when using the IF output, or when the receiver is controlled via the AR-IQ3 software.

Rules are as follows:

	Stand-alone (AF)	IF output	I/Q output
ANT 1	25MHz-3.7GHz	9kHz-3.7GHz	9kHz-3.7GHz
ANT 2	9kHz-3.7GHz	25MHz-3.7GHz	25MHz-3.7GHz

Selected antenna number↓

ANT:1
-115. 9dBµ ATT:0dB   AMP AUTO ST:100. 000k
VFO
                        FM
88000 000 BW 200k VA
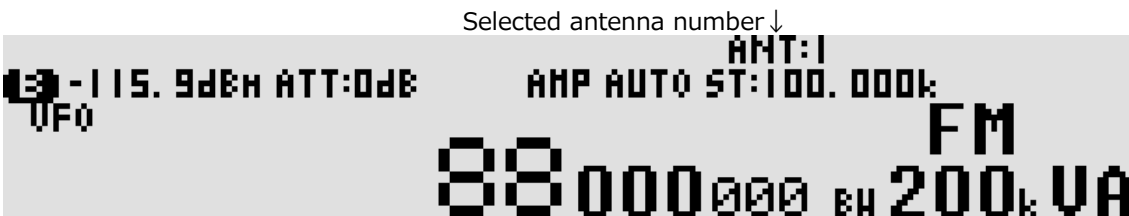
● **To select and antenna input:**

1. Press [FUNC] + [ATT].
2. Rotating the sub-dial, chose between ANT:1, ANT:2, ANT:3, ANT:4 and ANT:PRG.
3. Validate with [ENT].

Note:
ANT:3 and ANT:4 are only accessible with the optional antenna selector unit.

ANT:PRG selects the antenna input which has been previously registred for this particular frequency. If there is no registration, ANT:1 is used by default.

3.4. Volume

When starting the receiver for the first time, or after a system reset, volume level is set to zero. Using the AFGAIN knob, increase the volume up to a comfortable level.

3.5. Frequency input

- Enter the frequency via the numeric keypad, followed by the [kHz] key or the [MHz] key.

Example for 91.9MHz

Example for 1310kHz

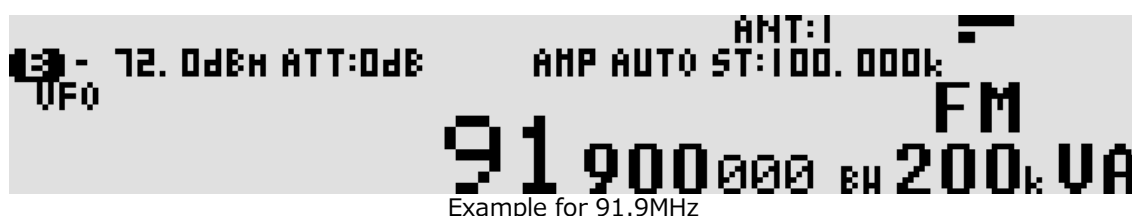- Alternatively you can select the frequency by rotating the main dial or the sub-dial. The frequency will be incremented by the set frequency step value (ST on the screen).

3.6. Receive mode and IF filter bandwidth

Following receive mode and IF bandwidth combinations are available:

MODE	IF FILTER BANDWIDTH	REMARKS
WFM1(IF100k)	100k	Reception frequency 25MHz or higher
WFM2(IF200k)	200k	Reception frequency 25MHz or higher
FMST(IF200k)	200k	Reception frequency 25MHz or higher
NFM(IF15k)	15k	Reception frequency 25MHz or higher
SFM(IF6k)	6k	Reception frequency 25MHz or higher
WAM(IF15k)	15k	
AM(IF6k)	6k	
NAM(IF3k)	3k	
SAM(IF6k)	6k	
USB(IF3k)	3k	
LSB(IF3k)	3k	
CW1(IF500)	500	
CW2(IF200)	200	Reception frequency 25MHz or higher
AIQ(IF15k)	15k	
FM	3k, 6k, 15k, 30k, 100k, 200k	Reception frequency 25MHz or higher
FMST	100k, 200k	Reception frequency 25MHz or higher
AM	3k, 6k, 15k, 30k	Reception frequency lower than 25MHz
	1k, 3k, 6k, 15k, 30k	Reception frequency 25MHz or higher

SAM	3k, 6k, 15k, 30k	Reception frequency lower than 25MHz
	1k, 3k, 6k, 15k, 30k	Reception frequency 25MHz or higher
USB	3k, 6k, 15k, 30k	
LSB	3k, 6k, 15k, 30k	
CW	500	Reception frequency lower than 25MHz
	200, 500	Reception frequency 25MHz or higher
AIQ	3k, 6k, 15k, 30k	
AUTO		According to band plan and region setting. For analog modes only.
DALL	Set automatically. Non changeable.	Reception frequency 25MHz or higher. For digital modes only. TETRA (T-DM, T-TC) are excluded.
DCR (= NXDN)	Set automatically. Non changeable.	Reception frequency 25MHz or higher
dPMR	Set automatically. Non changeable.	Reception frequency 25MHz or higher
DMR	Set automatically. Non changeable.	Reception frequency 25MHz or higher
P25	Set automatically. Non changeable.	Reception frequency 25MHz or higher
DSTAR	Set automatically. Non changeable.	Reception frequency 25MHz or higher
YAESU	Set automatically. Non changeable.	Reception frequency 25MHz or higher
EJ-47 (Alinco)	Set automatically. Non changeable.	Reception frequency 25MHz or higher
T-DM (Tetra direct mode)	Set automatically. Non changeable.	Reception frequency 25MHz or higher
T-TC (Tetra traffic channel)	Set automatically. Non changeable.	Reception frequency 25MHz or higher

● **To select a receive mode:**

1. Press [MODE] .
2. Rotate the subdial until the desired mode is displayed.
3. Vaildate with [ENT].

The most common modes are also available with a preset IF filter bandwidth in parenthesis, as in the illustration below.

MODE:WFM2(IF200k)

● **To change the IF filter bandwidth:**

1. Press [FUNC] + [3].
2. Rotate the subdial until the desired bandwidth is displayed.
3. Vaildate with [ENT].

Analog AUTO mode selected. Receive mode, IF bandwidth and frequency step are automatically selected depending on the frequency and the set region (US, Japan or Europe) .

-126. 2dBµ ATT:0dB   AMP AUTO ST:020. 000k
UFO   FM ← Receive mode
                  439 800 000 µ 15k VA

IF filter bandwidth

3.7. Squelch

The squelch function quiets the background "white" radio noise, when no signal is present. It operates in the analog modes and the digital auto mode (DALL). It has no effect for the individual digital modes as the receiver only lets audio pass through when a digital signal is detected.

The squelch can be manually "opened" and allow signals to be heard, or "closed" to mute the audio of the signal.

When the squelch is "open", the indicator [B] (for busy) appears on the left side of the LCD.

When doing a memory SCAN or SEARCH, the squelch setting is very important as it serves as a receiver signal treshold to determine whether or not a signal is present, and when to resume scanning.

- **Squelch is adjusted as follows:**

1. Tune to a desired frequency where white noise is occasionally interrupted by a signal.
2. While white noise is audible, rotate the SQUELCH knob to set the squelch threshold so that the receiver is just silenced. The squelch is now "closed" and no audio is heard. With the squelch level properly set, audio will only be heard when there is an actual signal.

In addition to the classic "signal level" squelch, AR5700D also features "noise" squelch and "voice" squelch. See the ADVANCED FUNCTIONS chapter about how to activate these particular squelch modes.

3.8. Tuning step

A tuning step is the rate the frequency will be incremented per click when rotating the main dial or the sub dial. When the receive mode is set to AUTO, the step value is automatically set depending on the frequency and the set region (US, Japan or Europe).

The tuning step can be set manually in two ways:

- **Setting via the dial**

1. Press the [STEP] key.
2. Rotate the sub dial to select the desired step.
   Following step value are available:
   0.001, 0.010, 0.050, 0.100, 0.500, 1.000, 5.000, 6.250, 9.000, 10.000, 12.500, 20.000, 25.000, 30.000, 50.000, 100.000, 500.000 kHz
3. Validate with [ENT].

Displayed when the receive mode is set to AUTO.

STEP

020.000kHz

Manual step selection screen

- **Setting via the numeric keypad**

Lett's say you want to input 20kHz:

1. Press [STEP] .
2. Press [2] + [0] + [kHz].
3. Validate with [ENT].

3.9. Step-adjust

This function is useful when the array of desired receiver frequencies is not compatible with the default step frequency. Step-adjust allows setting the frequency steps accordingly.

The following example describes a situation where a 20kHz step needs to be shifted by 10kHz.
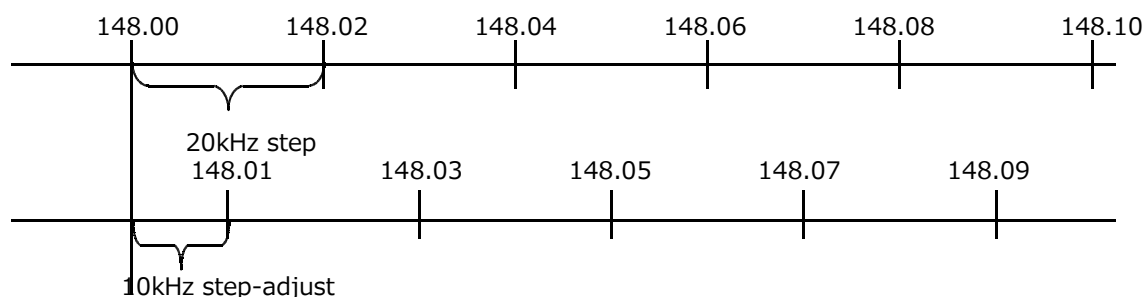
● **How to set step-adjust**

Let's say we want a 20kHz step to start at 148.01MHz:
1. Dial 148.01 with the numerical keys, followed by [MHz].
2. Press [STEP].
3. Select 20kHz with the sub-dial.
2. Press [PASS] .
    [∗] will be displayed

3. Validate with [ENT].
    ○ [STEP-ADJ] will appear on the main screen as follows:
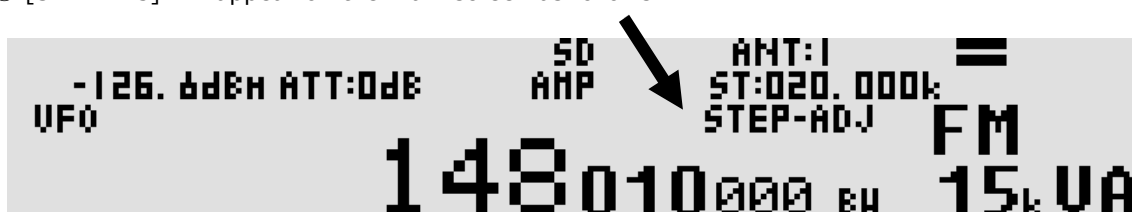
You can tune to the frequencies incremented by the step-adjust value by either rotating the main dial, or using the UP and DOWN keys.

4. Advanced functions

<table>
<tr><td></td><td>Access</td><td>Comments</td></tr>
</table>

DIGITAL MODES

	Access	Comments
P25 NAC CODE	[FUNC] + [0]. Go to P25 NAC with [DOWN] key.	When enabled, the receiver will only decode signals corresponding to the 3-digit hexadecimal NAC code. Each digit can hold the value 0 to9 or A to F. That makes 4096 possible NAC codes. Code 000: All NAC codes are decoded. • Use the sub-dial to select values. • [UP] or [DOWN] key to change selection. • [PASS] to set the function OFF. • [ENT] to validate.
NXDN RAN NUMBER	[FUNC] + [0]. Go to NXDN RAN with [DOWN] key.	When enabled, the receiver will only decode signals corresponding to the RAN code. There are 63 possible RAN codes, from 01 to 63. Code 0: All RAN codes are decoded. • Use the sub-dial to select a value. • [PASS] to set the function OFF. • [ENT] to validate.
DMR COLOR CODE	[FUNC] + [0]. Go to DMR COL with [DOWN] key.	When enabled, the receiver will only decode signals corresponding to the color code. There are 16 possible color codes, from 01 to 16. Code 0: All color codes are decoded. • Use the sub-dial to select a value. • [PASS] to set the function OFF. • [ENT] to validate.
DMR SLOT NUMBER	[FUNC] + [0]. Go to DMR SLOT with [DOWN] key.	Only the selected slots will be decoded. 1+2: Slot 1 or slot 2 but priority on slot 1. 2+1: Slot 1 or slot 2 but priority on slot 2. 1: Slot 1 only. 2: Slot 2 only. • Use the sub-dial to select a value. • [ENT] to validate.
TETRA SLOT NUMBER	[FUNC] + [0]. Go to TETRA SLOT with [DOWN] key.	Only the selected slot (1 to 4) will be decoded. AUTO: Whichever slot is active first will be decoded. • Use the sub-dial to select a value. • [PASS] to set to AUTO. • [ENT] to validate.
DCR USER CODE	[FUNC] + [0]. Go to DCR UC with [DOWN] key.	When enabled, the receiver will only decode signals corresponding to the user code. There are 511 possible user codes, from 001 to 511. • Use the sub-dial to select a value. • [UP] or [DOWN] key to change selection. • [PASS] to set the function to ALL. • [ENT] to validate.
DCR / NXDN 15 BIT SCRAMBLE CODE	[FUNC] + [0]. Go to DCR CODE with [DOWN] key.	Set the 5 digit number to decode a scrambled signal. 32767 possible combinations from 00001 to 32767. • Use the sub-dial to select a value. • [UP] or [DOWN] key to change selection. • [PASS] to set to 00000 for no scramble code used. • [ENT] to validate.

ANALOG MODES

	Access	Comments
ANALOG VOICE DESCRAMBLER	[FUNC] + [0]. Go to SCR with [DOWN] key.	Limited to FM mode with IF bandwidth 6kHz and 15kHz. • Use the sub-dial to select a value between 2000 and 7000Hz. • [PASS] to set the function to OFF. • [ENT] to validate.

ADVANCED SQUELCH

CTCSS	[FUNC] + [0]. Go to	Function which opens the squelch only when a preset tone frequency

	CTCSS with [DOWN] key.	is detected in the signal. Limited to FM mode with IF bandwidth 6kHz and 15kHz. • With the subdial select a value between 60.0 and 254.1, or ALL to open the squelch for all codes. • [PASS] to set the function to OFF. • Validate with [ENT].
DCS	[FUNC] + [0]. Go to DCS with [DOWN] key.	Function which opens the squelch only when a preset code is detected in the signal. Limited to FM mode with IF bandwidth 6kHz and 15kHz. • With the subdial select a value between 017 and 754, or ALL to open the squelch for all codes. • [PASS] to set the function to OFF. • Validate with [ENT].
DTMF	[FUNC] + [0]. Go to DTMF with [DOWN] key.	Function which decodes characters from a DTMF tone, and displays those on screen. • Use the sub-dial to select ON or OFF. • Validate with [ENT].
VOICE SQUELCH	[FUNC] + [VFO]. Go to VOICE with [DOWN] key.	Funtion which only opens the squelch when "voice" is detected in the signal. Common to all VFOs. Limited to NFM and AM modes. When activated, a VCS icon appears at the left of the frequency. • Use the sub-dial to select a level between 1 and 7 (or OFF). • Validate with [ENT].
NOISE SQUELCH	[FUNC] + [0]. Go to NOISE SQL with [DOWN] key.	Funtion which only opens the squelch for signals above a set "noise" level. Limited to AM, all the FM modes and the digital auto mode (DALL). • Use the sub-dial to set the level between 1 and 255, or OFF by pressing [PASS]. • Validate with [ENT]. When activated, a NSQ icon is visible at the top right of the screen.
LEVEL SQUELCH HYSTERESIS	[FUNC] + [0]. Go to LSQL HYS with [DOWN] key.	Sets the squelch hysteresis depth. For ex.: When squelch is -100dB and hysteresis is 6dB, the squelch opens when the reception level exceeds -100dB. The squelch does not close until the reception level is -106 dB or less. • Use the sub-dial to set the value between 0dB and 9dB. • Validate with [ENT]. Open ······· Close ······· -106dB -100dB signal level

ANTENNA

ANTENNA SIGNAL ATTENUATOR	[ATT]	This function is used to lower the receiver sensitivity in case the signal is too strong (audio is distorted), thus overloading the receiver RF stage. • Use the sub-dial to select 20dB, 10dB, 0dB, 0dB AMP or AUTO. • Validate with [ENT]. When AMP is activated, an AMP icon appears on top of the screen. **Note:** In normal operation conditions, when an antenna is connected, the displayed signal level does not change even when the attenuator is used. That is because the signal level is measured at antenna input, before attenuation is applied. However when no antenna is connected, the displayed signal level might vary for the following reasons: -When you switch the receive mode, the S-meter value changes because the IF band varies depending on the mode and the amount of internal noise distributed to the IF bandwidth

		varies accordingly. The higher the bandwidth demodulation mode, the larger the noise floor. The S-meter value is changed by the attenuator amount to add the adjusted value of the attenuator to the noise floor. The noise floor is internal noise that does not decay in the attenuator.
ANTENNA PROGRAMMING	[FUNC] + [kHz]. Go to ANT PROGRAM with [DOWN] key, then [ENT].	Allows to program automatic antenna switching depending on the receive frequency. Each antenna input can have 10 different patterns, labeled No.0 to No.9. • Input HI and LO frequencies with the numerical keys, followed by [ENT] after each. • Press [CLR] once finished. • Toggle the pattern numbers with the sub-dial. • Toggle the antenna input numbers with the main dial. • Erase the last entered digit with the [UP] key. • Erase both HI and LOW entries with the [PASS] key. To use ANT: 3 and ANT:4, the optional antenna selector unit is required.

RF PROCESSING

PRE-SELECTION FILTER	[FUNC] + [0]. Go to PRESEL with [DOWN] key.	This funtion automatically selects a filter depending on the receive frequency, to avoid interference due to strong nearby signals. Only concerns frequencies up to 25MHz. • Use the sub-dial to toggle between ON and OFF. • Validate with [ENT].
AGC	[FUNC] + [STEP]	AGC (automatic gain control) balances the average volume despite amplitude variations in the input signal. The recovery time of AGC can be adjusted to fit particular receive modes. Typically FAST for CW, SLOW for USB and LSB, and MIDDLE for AM. Does not work for FM. • Use the sub-dial to select between OFF (MANUAL), FAST, MIDDLE, SLOW. • Validate with [ENT]. When set to OFF, a horizontal double line icon appears on top of the 3 last digits of the frequency.
RF GAIN	[FUNC] + [6]	You can manually adjust the RF gain to decrease noise or interference from a nearby strong signal. Especially useful for SSB and CW modes. (AGC must first be set to MANUAL for RF GAIN to work.) • Use the squelch knob to increase or decrease the gain level. Refer to the S-METER while adjusting the level. When RF GAIN is activated, an RFG icon will appear on the top right of the screen.
AFC	[FUNC] + [0]. Go to AFC with [DOWN] key.	AFC (Automatic Frequency Control) follows the receiving frequency in case it is drifting. Only valid for FM mode with IF filters bandwidths up to 30kHz. • Use the sub-dial to toggle between ON and OFF. • Validate with [ENT].

ANTI-NOISE

AUTO NOTCH	[FUNC] + [0]. Go to NOTCH with [DOWN] key.	Automatically attenuates beat tones and tuning signals. • Use the sub-dial to toggle between OFF, LOW, MID and HIGH. • Validate with [ENT].
NOISE REDUCTION	[FUNC] + [0]. Go to NR with [DOWN] key.	Digitally reduces random noise components and enhances desired signals that are buried in noise. • Use the sub-dial to toggle between OFF, LOW, MID and

		HIGH.
		• Validate with [ENT].
NOISE BLANKER	[FUNC] + [0]. Go to NB with [DOWN] key.	Eliminates pulse-type noise such as from car ignitions. • Use the sub-dial to toggle between ON and OFF. • Validate with [ENT].
IF SHIFT	[FUNC] + [0]. Go to IF-SFT with [DOWN] key.	This function shifts the pass band of the IF filter without changing the received frequency. Useful to escape from a strong signal in the proximity of the receive frequency. • Select the shift level (-1200 to +1200Hz) with the sub-dial. • Validate with [ENT]. Does not work with FM modes.

DISPLAY

SPECTRUM DISPLAY	Long-press of [FUNC].	Displays a basic spectrum. (Over 25MHz only. Disable ANALOG VIDEO OUTPUT before use!). • You can adjust the bandwidth from 0.4 to 10MHz with [FUNC] + main dial rotation. • Adjust the vertical scale with [FUNC] + sub-dial rotation. • To fix the spectrum and tune within it, press [CLR]. The received signal is then marked by a black square. • To toggle the waveform averaging function, long-press [1]. Spectrum display disabled during "dual-band" reception. When spectrum display is enabled, AVG appears on the right of the screen.

VIDEO

ANALOG VIDEO OUTPUT	[FUNC] + [0]. Go to VIDEO OUT with [DOWN] key.	• Use the sub-dial to toggle between ON and OFF. • Validate with [ENT]. • Only for frequencies over 25MHz.
ANALOG VIDEO IF DIRECTION	[FUNC] + [0]. Go to VIDEO IMG with [DOWN] key.	• Use the sub-dial to toggle between +(normal) and -(reverse). • Validate with [ENT].

MEMORY

ALLOCATING MEMORY CHANNELS	[FUNC] + [0]. Go to MEMORY CHANNEL ALLOCATION with [DOWN] key + [ENT].	Although 50 channels are allocated by default for each of the 40 banks, you can decide how to allocate the available 2000 channels, from 5 to 95 channels per bank. • Select the bank number with the sub-dial. • Using the main dial, chose the number of channels to allocate to this bank. • Once finished, validate with [ENT].

5. System settings

LOCATION

REGIONAL SETTINGS	[FUNC] + [kHz]. Go to LOCAL with [DOWN] key.	• Select the analog band plan region (USA, Japan or Europe) with the sub-dial. • Validate with [ENT].

DATE & TIME

DUAL CLOCK & CALENDAR SETUP	[FUNC] + long press on [7] .	• Main dial and sub-dial to change values. • [UP] or [DOWN] key to change selection. • [PASS] to erase. • [ENT] to validate and next page.
CLOCK DISPLAY SELECTION	[FUNC] +[7]	• Toggle clocks with the sub-dial.
SET UP ALARM & RADIO START/REC TIMER	[FUNC] + long press on [8] .	Time based on CLOCK #1. • Main dial and sub-dial to change selection. • [UP] or [DOWN] key to change selection. • [ENT] to validate. Timer max. length 120 min.
ACTIVATE/ DEACTIVATE ALARM & RADIO START/ REC TIMER	[FUNC] +[8]	ALARM icon on top of screen when active.
SLEEP SETUP	[FUNC] + long press on [9] .	• With the sub-dial select length in minutes (1-120) or OFF. • Validate with [ENT].
ACTIVATE/ DEACTIVATE SLEEEP	[FUNC] + [9]	SLEEP icon on top of screen when active.

OPERATION

KEY LOCK ACTIVATION/DEACTIVATION	[FUNC] + [2]	All front panel keys and knobs are locked, except AF GAIN and SQUELCH. KEY icon on top of screen when activated.
BACKLIGHT	[FUNC] + [kHz]	• Toggle ON/OFF with the sub-dial and validate with [ENT].
BEEP SOUND	[FUNC] + [kHz]. Go to BEEP with [DOWN] key.	• Select beep level between 0 and 7 with the sub-dial. • Validate with [ENT].

READ-OUT

SIGNAL LEVEL UNIT	[FUNC] + [kHz]. Go to UNIT with [DOWN] key.	• Select the signal level unit on screen (dBm or dBu/dBuv) with the sub-dial. • Validate with [ENT].

AUDIO

SETTING LOW/ HIGH-PASS FILTERS, DE-EMPHASIS, CW PITCH	[FUNC] + [MODE]	• Sub-dial to change values. • [UP] or [DOWN] key to change selection. • [ENT] to validate. Pass filters do not work in CW mode. De-emphasis only for WFM

		mode.

INTERFACING

SERIAL PORT SPEED	[FUNC] + [kHz]. Go to BPS with [DOWN] key.	• Select the desired serial port speed with the sub-dial. • Validate with [ENT]. Possible selections: 9600, 19200, 38400, 57600, 115200 bps.

SD

SD CARD INFORMATION	[FUNC] + [kHz]. Go to SD INFO with [DOWN] key, then [ENT].	Shows the SD card's total size and available free space in kB, and how many hours of audio which can still be recorded on that card.
FORMATTING THE SD CARD	[FUNC] + [kHz]. Go to SD FORMAT with [DOWN] key, then [ENT].	• Press the [MHz] key to start the formatting (FAT32), or the [CLR] key to cancel. Formatting the SD card will destroy all its data!

BRAINS

DISPLAY THE RECEIVER FIRMWARE VERSION	[FUNC] + [kHz]. Go to VERSION with [DOWN] key, then [ENT].	The receiver hosts 3 different firmwares: MAIN, D for DECODER and P for PANEL. Each firmware number has 4 digits.
FACTORY RESET (method 1)	[FUNC] + [kHz]. Go to INITIALIZE with [DOWN] key, then [ENT].	• Press the [MHz] key to start the reset, or the [CLR] key to cancel. Note: Resetting the receiver will revert all its settings to factory default and erase ALL memory data. It is advised to do a backup to SD before applying a reset.
FACTORY RESET (method 2)	(Switch off the back panel's main power switch)	• While pressing and holding the [5] and [7] keys, swith the back panel's main power switch to ON. • Release the keys when the S-Meter lights up. Note: Resetting the receiver will revert all its settings to factory default and erase ALL memory data. It is advised to do a backup to SD before applying a reset.

6. Receiver data backup and restore

● **Receiver data backup**

Receiver settings and memory data may be saved to an SD card.

1. Insert the supplied SD card into the [SDCARD] slot located on the front panel. The receiver will read the card's file structure and then display the [SD] icon on top of the LCD screen once ready. (The larger the SD capacity, the longer it can take, so please be patient.)
2. Press [FUNC] + [kHz] to access the CONFIGURATION menu.
3. Press the UP key until WRITE TO SD is selected and validate with [ENT].

```
CONFIGURATION 2/3
ANT PROGRAM        READ FROM SD
SD INFO            SD FORMAT
WRITE TO SD        VERSION
```

4. Chose a file name of up to 8 ASCII characters for this backup. The selected digit is underlined.

```
ENTER FILE NAME
00000000
─
```

-Use the subdial key to toggle between numbers and letters. Spaces are invalid.
-Go to the next digit with the [UP] key. [DOWN] key for previous digit.
-The last digit to the right can be erased with the [PASS] key.
-If you already have a backup file with the same name on the SD card, it will be overwritten!

5. Press [ENT] to save to SD.

```
╔══ MESSAGE ══╗
║ NOW WRITING... ║
╚═══════════════╝
```

```
╔══ MESSAGE ══╗
║ COMPLETED ║
╚═══════════╝
```

● Receiver data restore

Receiver settings and memory data previously saved to an SD card, can be imported to the receiver.

Insert the SD card into the [SDCARD] slot located on the front panel. The receiver will read the card's file structure and then display the [SD] icon on top of the LCD screen once ready. (The larger the SD capacity, the longer it can take, so please be patient.)

Press [FUNC] + [kHz] to access the CONFIGURATION menu.
Press the UP key until READ FROM SD is selected and validate with [ENT].

```
CONFIGURATION 2/3
ANT PROGRAM          READ FROM SD
SD INFO              SD FORMAT
WRITE TO SD          VERSION
```

Select the desired file with the [DOWN] key and validate with [ENT].

```
<[SUB -]      PAGE 0      [SUB +]>
00000000.HMC        165376  2019/06/26 15:25:04
```

-Use the sub-dial to change pages in case there are many files.
-NOW READING is displayed during the file reading process.
-To delete selected files on SD, press [FUNC] + [.] .
-To rename selected files, do a long press on [MHz].

7. AR5700D specifications

Frequency range	9kHz～3.7GHz
Tuning steps	1Hz～999.999kHz
Operation modes	VFO (A～E), memory channel, memory channel scan, select scan, program search, FFTsearch (cyber search), analog video demodulation
Analog receive modes	FM, FM stereo, AM, AM synchronous (SAM), USB, LSB, CW, AIQ (analog I/Q)
Digital receive modes	D-STAR / GMSK / AMBE DV mode only
	YAESU / C4FM / AMBE+2 V/D mode only
	ALINCO / GMSK / AMBE EJ47 (F1E) mode only
	D-CR / C4FM / AMBE+2
	NXDN / C4FM / AMBE+2 6.25kHz mode only
	P25 Phase 1 / C4FM / IMBE Conventional mode only
	dPMR / C4FM / AMBE+2 Tier 1 only
	DMR / C4FMx2 / AMBE+2 Tier 1 and Tier 2 only
	TETRA direct mode (T-DM) / π/4 shift QPSK / ACELP
	TETRA traffic channel (T-TC) / π/4 shift QPSK / ACELP
Number of VFO's	5
Memory channels	2000 (50 channels x 40 memory banks). Banks customizable from 5 to 95 channels.
Priority channel	1
Select memory channels	100 (via memory banks)
Search banks	40
Pass frequencies	1230 (30 per memory bank + 30 for VFO search)
Typical scanning speed	100 channels / steps per second (for analog modes)
Temperature range	0℃～+50℃ (32°F～122°F)
Frequency stability	0.1ppm (after 5 min. warm-up) or 0.01ppm with optional GPS unit.
Power requirements	DC10.7V～16V (2.0A@12V)
Audio output	>1.5W into 8Ω load
Current consumption	Stand-by: Approx. 200mA, Max. audio: Approx. 1.5A
Grounding method	Minus grounding
Dimensions	Approx. 304mm(D) x 220mm(W) x 97mm(H) (excluding projections)
Weight	Approx. 5kg
Circuit type	9kHz～25MHz: Direct conversion
	25MHz～3.7GHz: Double super heterodyne
Intermediate frequencies	First: 321.95MHz / 421.05MHz
	Second: 45.05MHz
Demodulation method	Digital signal processing
IF filter bandwidths	200Hz, 500Hz, 1kHz, 3kHz, 6kHz, 15kHz, 30kHz, 100kHz, 200kHz (choice is mode dependant)
	Automatically selected and non changeable for digital modes.
Selectivity (typical values)	CW 500Hz 380Hz (>-3dB) 500Hz (>-80dB)
	AM 6kHz 5.5kHz (>-3dB) 6.9kHz (>-80dB)
	SSB 3kHz 2.7kHz (>-3dB) 3.1kHz (>-80dB)
	NFM 15kHz 14.2kHz (>-3dB) 15.6kHz (>-80dB)
	WFM 200kHz 200kHz (>-3dB) 250kHz (>-80dB)
IP3 (typical values)	14.1MHz +20dBm Preselector off
	50MHz +6dBm Preamp off
	620MHz +5dBm Preamp off
	1250MHz +3dBm Preamp off

	2450MHz	+3dBm	Preamp off
Spurious rejection	40kHz～25MHz	>60dB	Preamp off
	25MHz～2GHz	>60dB	Preamp off
	2.0GHz～3.7GHz		>60dB Preamp off
Noise figure (typical values)	25MHz～1GHz	<7dB	Preamp on
	1GHz～2.75GHz	<14dB	Preamp on
	2.75GHz～3.7GHz		<16dB Preamp on

Sensitivity	SSB 10dB S/N 3kHzBPF	AM 10dB S/N 6kHzBPF	NFM 12dB SINAD 15kHzBPF
40kHz ～ 50kHz	<6.0µV	<15.0µV	
50kHz ～ 60kHz	<4.0µV	<10.0µV	
60kHz ～ 70kHz	<3.0µV	<7.0µV	
80kHz ～ 100kHz	<1.5µV	<4.0µV	
100kHz ～ 25MHz	<0.7µV	<2.0µV	
25MHz ～ 2.75GHz	<0.5µV	<1.0µV	<0.4µV
2.75GHz ～ 3.7GHz	<0.7µV	<1.7µV	<0.6µV

Simultaneous reception:

2 band reception	One frequency below and one above 25MHz.
Offset reception	Main frequency + sub-frequency within +/-5MHz from main frequency. Above 25MHz only.
Triple reception	Combination of one HF frequency + offset reception

Squelch modes	CTCSS, DCS, data-mute
Demodulation support	Auto-notch filter (NOTCH), de-noiser (NR), noise blanker(NB), analog voice descrambler (SCR), IF shift (IF-SFT), Cwpitch (CW PITCH), AGC, AFC, DTMF
FFT features	FFTsearch (Cyber search), spectrum display

Digital signal info display:

D-STAR	Call sign (sender & repeater)
D-CR	User ID, 15-bit scramble code
NXDN	RAN code, 15-bit scramble code
P25	NAC code
DMR	Color code, slot number
TETRA traffic channel	Slot number

Audio recording

Types of recording	Received audio recording / playback and logging via SD card.
SD card compatibility	SD or SDHC type, 256MB to 32GB. File system FAT 16 or FAT 32 only. MiniSD and microSD cards require an SD card adapter.
File format compatibility	Windows compatible WAV file format. RIFF (little-endian) data, WAVE audio, Microsoft PCM, 16-bit mono 17.578kHz.
Recording time	Approx. 8h of continuous recording per 1GB. Squelch synchronization possible to eliminate inative tim.
Log recording	Logs are written into the audio wav file and can be accessed and played back with a special PC utility.

Inputs & outputs:

Antenna inputs	(ANT1)	25MHz~3.7GHz	N-J socket	50Ω
	(ANT2)	9kHz~3.7GHz	N-J socket	50Ω

10MHz reference input   SMA-J socket
Typical input +2dBm, 50Ω

45.05MHz IF output   BNC-J socket, 45.05MHz±7.5MHz
Typical output: Antenna input + 10dB, 50Ω

Digital I/Q output   1MHz bandwidth via USB 2.0 compatible isochronous transfer. Use PC software AR-IQ3.
USB type B socket

Analog I/Q ouput   12kHz offset output via 3.5mm stereo phone socket
Mode: AIQ, via LINE socket)

LINE ouput   3.5mm stereo phone socket

Headphones ouput   3.5mm stereo phone socket

External speaker output   3.5mm mono phone socket

Accessory outputs (ACC1)   8-pin miniature DIN socket
                (ACC2)   RJ-45 socket for optional antenna selector

RS-232C   (AUX1)   9-pin D-subminiature (male). For firmware updates and remote control per PC.

GPS input   (AUX2)   8-pin miniature DIN socket. For optional GPS receiver unit only.

USB   USB 1.1/2.0 compliant, USB type B socket. For remote control per PC.

Analog video out   RCA socket, 75Ω 1V p-p

DC power input   DC barrel socket(5.5/2.1mm), center positive

Supplied accessories:

AC power adapter, SD card, operating manual, PC control software, two USB cables

A list of optional accessories is available at http://www.aorja.com/accessories/receiver_accessories.html

FCC COMPLIANCE STATEMENT

Changes or modifications to this device not expressly approved by AOR could void the user's authorization to operate this device.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference including interference that may cause undesired operation.

The scanning receiver in this equipment is incapable of tuning, or readily being altered, by the user to operate within the frequency bands allocated to the Domestic Public Cellular Telecommunications Service in the Part 22.

WARNING: MODIFICATION OF THIS DEVICE TO RECEIVE CELLULAR RADIOTELEPHONE SERVICE SIGNALS IS PROHIBITED UNDER FCC RULES AND FEDERAL LAW.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy; and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

FCC ID: NVJAR5700D

ISED COMPLIANCE STATEMENT

The scanner receiver is not a digital scanner and is incapable of being converted or modified to a digital scanner receiver by any user.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAN ICES-3(B) / NMB-3(B)

IC: 22833-AR5700D

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