

# IC-7610

## Technical Report

### Volume 1



~ Profile ~

## Outstanding HF Experience Right Here...

Icom's mid class HF transceivers evolved especially with the IC-756, IC-756PRO and IC-7600, and were technology leaders in amateur radio. Even the IC-7610 inherits the genealogy of Icom's mid class transceivers, but its development concept, circuitry, adopted devices, and performance are innovative. The IC-7610 has superior performance and features far beyond the perception of current mid class HF transceivers. The performance and features are realized by fusing the proficient digital and analog technologies of the successive flag ship transceivers, and refined RF direct sampling technologies developed in the IC-7300.

The Reciprocal Mixing Dynamic Range (RMDR) characteristics show nearby signal rejection receiver performance, and the IC-7610's RMDR is 110 dB at 2 kHz separation (Receive frequency: 14.2 MHz, Mode: CW, BW: 500 Hz). This is an incredible performance for a mid-class transceiver, and it is close to that of our flagship IC-7851. The IC-7610 also has several flagship grade features, such as dual, identical, independent receivers and dual independent DIGI-SEL units for the Main and Sub bands. In addition, dual high-resolution and high sweep speed real-time spectrum scopes are built in.

The IC-7610 has a high resolution 7-inch wide (diagonal) touch screen LCD, and a server PC function for remote shack operation. In addition, a variety of external connectors, such as an external display connector, LAN port, USB ports for remote operation, are built into the IC-7610. Totally, the IC-7610 gives you not only flagship grade performance and features, but also flagship grade operability and scalability.

You can feel the flagship grade performance visually, audibly, and tactically. And you will have an advantage in contests and DX hunting.

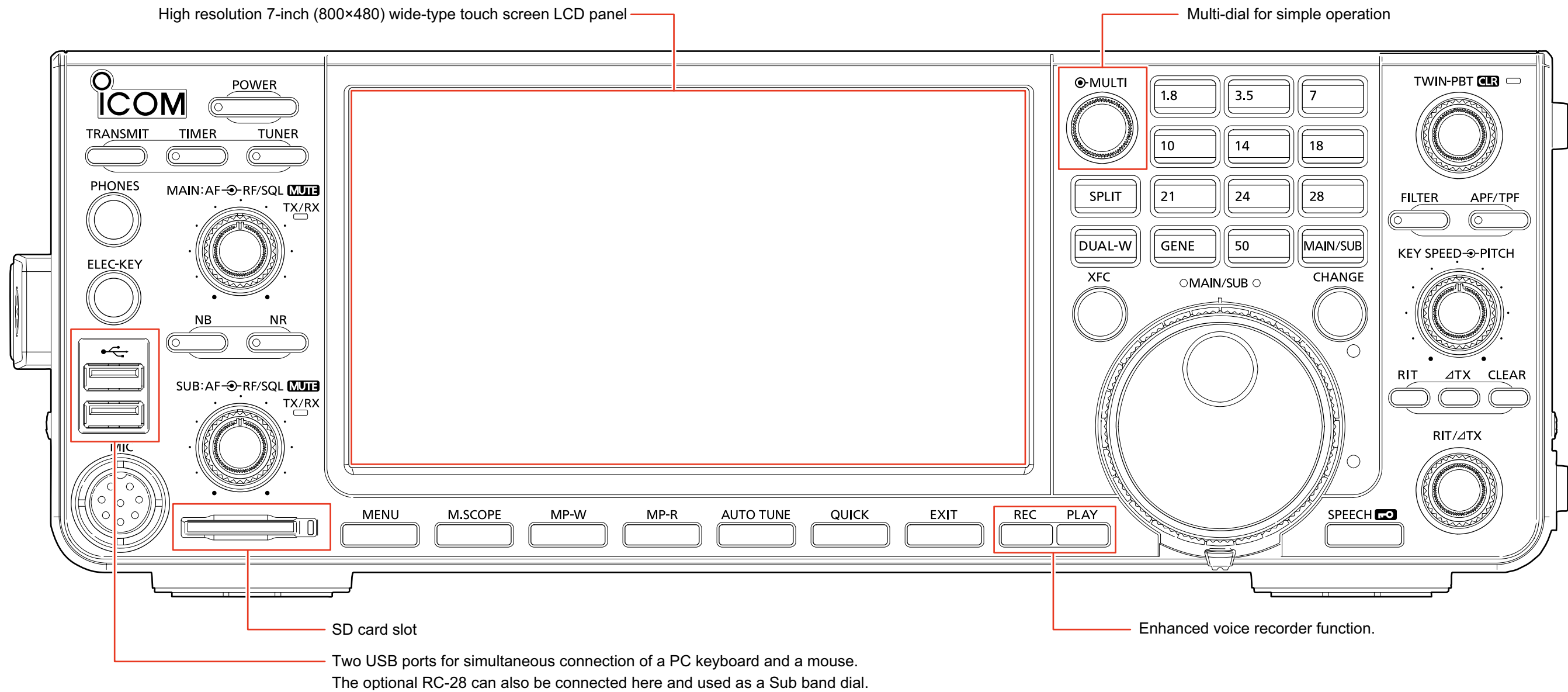
# Table of contents

<b>Section 01 Panel Description .....</b>	<b>01~02</b>
<b>Section 02 Major Features .....</b>	<b>03~07</b>
<b>Designs and technologies inherited from the IC-7851 .....</b>	<b>03</b>
Two completely independent receivers with identical performance.....	03
DUALWATCH operation on different bands and in different modes .....	03
Independent DIGI-SEL (Preselector) circuits for the Main and Sub bands .....	03
<b>Benefits of the latest digital technologies .....</b>	<b>04</b>
RF direct sampling system .....	04
Top class RMDR 110 dB .....	04
Excellent transmit phase noise characteristics .....	04
<b>Further evolution of the spectrum scope .....</b>	<b>05</b>
Dual spectrum scopes with amazing dynamic range .....	05
High resolution waterfall .....	05
Audio scope for flexible utilization .....	05
<b>Various functions and connectors built in .....</b>	<b>06</b>
Large 7-inch touch panel LCD .....	06
Easy operation with the Multi-dial .....	06
Two USB connectors on the front panel .....	06
Built-in SD card slot .....	06
TX voice digital voice memory .....	06
Simple remote operation with the server PC function and LAN port .....	07
Two USB ports for external control .....	07
<b>Advanced operations are possible with a variety of I/O terminals .....</b>	<b>07</b>
External display terminal built in.....	07
BNC connectors for the RX antenna lines .....	07
Reference signal input terminal built in .....	07
Two independent external speaker jacks .....	07
<b>Section 03 Inside Views .....</b>	<b>08~09</b>
<b>Section 04 Upgrade Options .....</b>	<b>10~13</b>
<b>Section 05 Specifications .....</b>	<b>14~15</b>

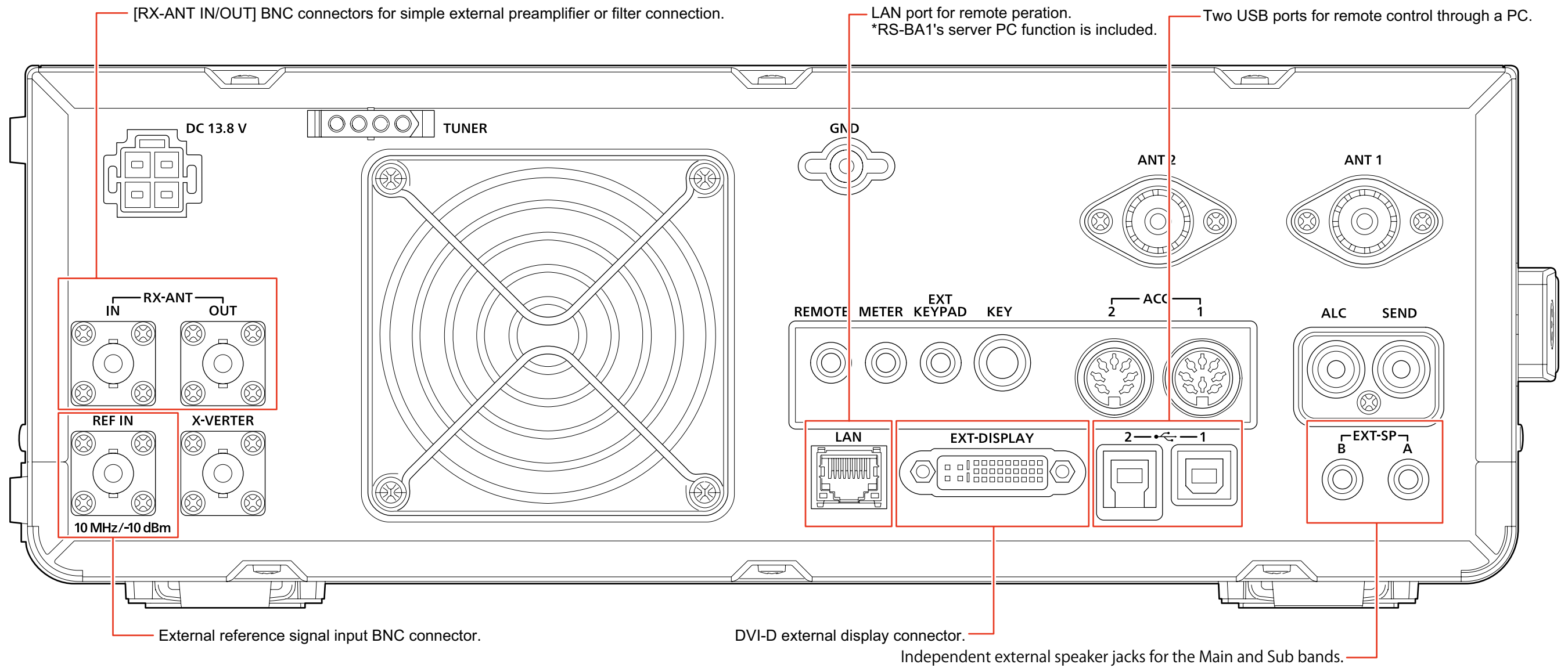
## TRADEMARKS

- Icom, Icom Inc. and the Icom logo are registered trademarks of Icom Incorporated (Japan) in Japan, the United States, the United Kingdom, Germany, France, Spain, Russia, Australia, New Zealand and/or other countries.
- Microsoft and Windows are registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- All other products or brands are registered trademarks or trademarks of their respective holders.

● Front panel



● Rear panel





**Designs and technologies inherited from the IC-7851**

**Two completely independent receivers with identical performance**

The IC-7610 has dual, completely independent, equally high performance receiver circuits for the Main and Sub bands. The circuits are in the stages from the antenna through the Field Programmable Gate Array, (FPGA), as illustrated in Figure 02-01 below.

The concept of the IC-7610 is the same as our flagship model IC-7851, even though there is a difference in the RF direct sampling system and the double superheterodyne system. Of course the receiver circuits are designed with enough isolation to not have any effect on each other.

The received signal is demodulated in the FPGA. However, the demodulation is done in independent demodulators inside the FPGA. The AF amplifier stages are also independent for the Main and Sub bands.

The IC-7610 has two antenna connectors. The DUALWATCH operation is possible by selecting different frequency coverage antennas to receive signals, receiving a signal with the diversity method, and connecting horizontal and vertical antennas.

**DUALWATCH operation on different bands and in different modes**

In the IC-7600, the same receiver circuits are used in both the Main and Sub bands, except the mixer circuit. Therefore, DUALWATCH operation has some limitations in the same band and mode. However, the IC-7610 enables DUALWATCH operation in different bands and modes, because completely independent and identical performance receiver circuits are employed.

This high performance flagship grade DUALWATCH function enables searching for a signal on the Sub band, while communicating on the Main band.

**Independent DIGI-SEL (Preselector) circuits for the Main and Sub bands**

The IC-7610 is the first in the mid class HF amateur radio market to employ automatic preselector circuits as standard.

A preselector is a type of RF filter with sharp skirt characteristics. Icom decided that the preselector is a necessary and useful tool in a mid class transceiver, even though up until now, the preselector had only been incorporated into our flagship grade transceivers.

The IC-7610's independent preselector circuits are built into both the Main and Sub bands.



Figure 02-02 Automatic Preselector

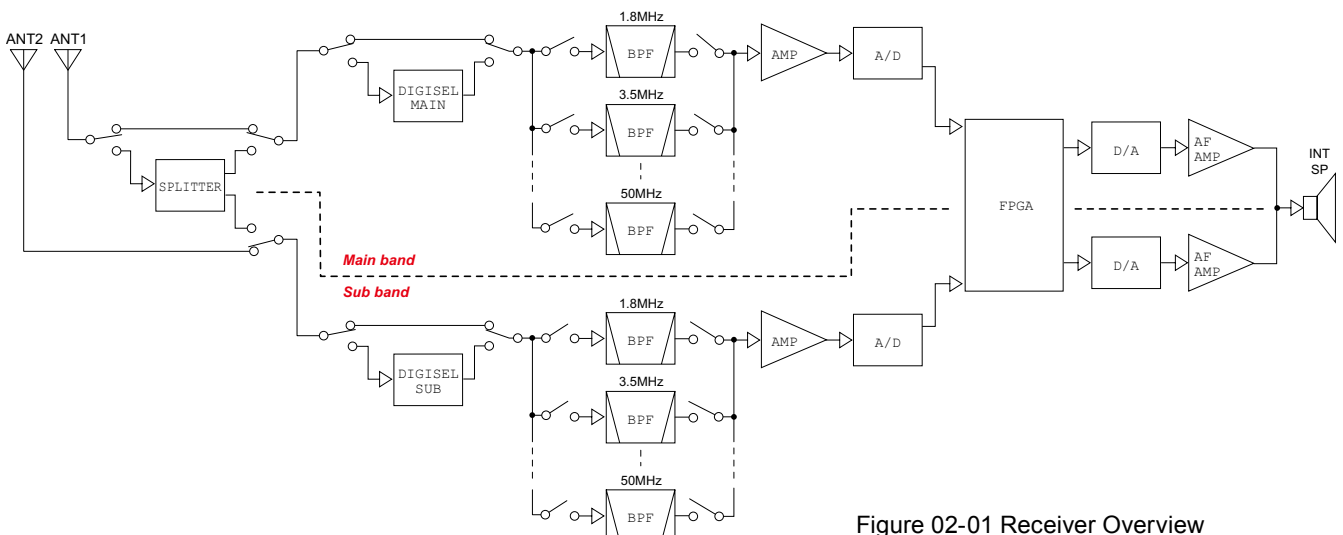


Figure 02-01 Receiver Overview

## Benefits of the latest digital technologies

### RF direct sampling system

The RF direct sampling system is employed in the IC-7300, ahead of its competitors. The RF direct sampling system has been improved and is used in the IC-7610.

The RF direct sampling system directly converts the received RF signals into digital signals, and batch complex signal processing is done in the Field Programmable Gate Array (FPGA). There is no nonlinear distortion, which occurs in a mixer circuit of the superheterodyne system receiver, because there is no analog mixer.

In the RF direct sampling system, received signal detection and demodulation, and transmit signals are directly generated in the FPGA. So the purity of the signal is very high, and it's a large contributor to the excellent characteristics in transmit and receive.

### Top class RMDR 110 dB\*

The Reciprocal Mixing Dynamic Range (RMDR) is used as one of the standards representing receiver performance. The RMDR of the IC-7610 is 110 dB\*, approaching the 116 dB\* of our IC-7851 flagship model.

The RMDR is a standard that shows how much the receive sensitivity deteriorates due to blocking from strong adjacent signals. A larger RMDR value means that the blocking effect is less. In general, a lower LO phase noise provides better RMDR characteristics.

It is an outstanding improvement of approximately 30 dB in the IC-7610, as the IC-7600 RMDR is approximately 80 dB. You can clearly see this difference, not only in a contest, but also in any operating situation.

\*Sample configuration (2 kHz offset, Rx frequency: 14.200 MHz, Mode: CW, BW: 500 Hz)

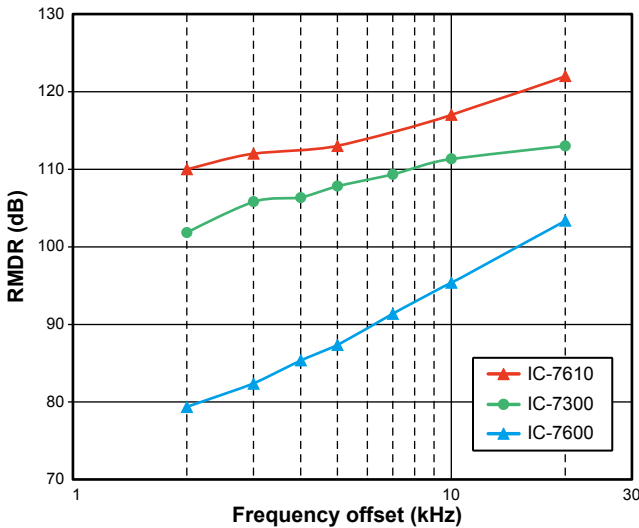


Figure 02-03 RMDR characteristics comparison

### Excellent transmit phase noise characteristics

A transmit signal is directly generated by the FPGA, as previously described. So, a signal is not generated by mixing several LO signals, like in the superheterodyne system.

The purity of a transmit signal, that is generated at the Digital Analog Converter (DAC) using the Digital Up Conversion (DUC) method is extremely high, and this provides improved transmit phase noise characteristics.

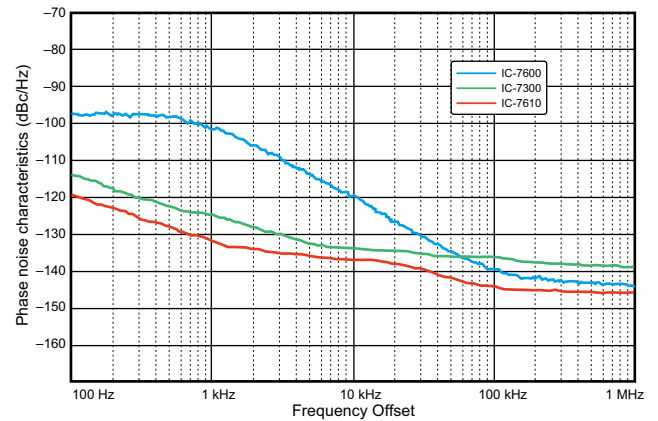


Figure 02-04 TX phase noise characteristics comparison (TX Freq.: 14.200 MHz)

## Further evolution of the spectrum scope

### Dual spectrum scopes with amazing dynamic range

The high-spec spectrum scope that is in our flagship IC-7851, and its know-how, are also built into the IC-7300. The spectrum scope is further improved and incorporated in the IC-7610.

The excellent 100 dB dynamic range of the scope display is achieved by cooperative processing with the FPGA and CPU software. Off course, the sweep speed and resolution are also improved to the level of our flagship model. This spectrum scope can also be used during DUALWATCH operation to show both Main and Sub bands conditions, and its performance is the same in single band operation.

	IC-7610	IC-7600
Span	5 kHz~1000 kHz	5 kHz~500 kHz
Resolution*1	Minimum 1 dot*2	Minimum 20 dot*3
Sweep speed	29.3 sweep/sec.*4	4 sweep/sec.*4
Dynamic range	100 dB	70 dB
Noise floor	-30 dBμ	-19 dBμ

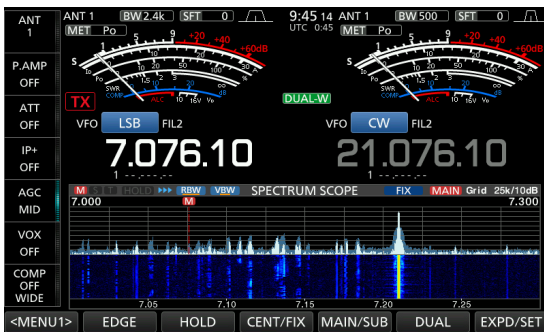
Table 02-01 Spectrum scope comparison

\*1Number of dots when receiving a single carrier with 60 dB bandwidth

\*2Approximately: SPAN=20 kHz, SPEED=SLOW, RBW=MID

\*3Approximately: SPAN=500 kHz, SPEED=SLOW

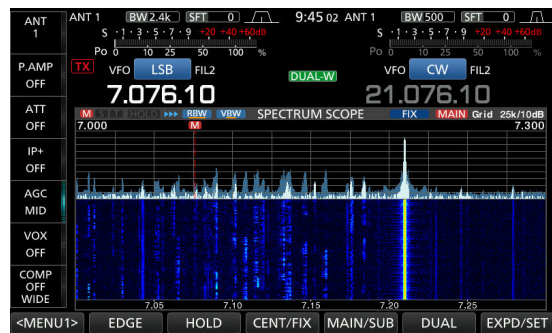
\*4Approximately: SPAN=20 kHz, SPEED=FAST



### High resolution waterfall

The waterfall can display received signal history in moving time, and shows weak signals that are difficult to discriminate with only the spectrum scope. The waterfall is simultaneously displayed with the spectrum scope, so you can easily see the details of the band condition and clear frequencies. When you select the expanded screen, a longer history can be displayed on the waterfall.

The waterfall is one of the features that increases the possibility to communicate using the optimized IC-7610 receiver performance, without missing weak signals from DX stations.



### Audio scope for flexible utilization

The audio scope displays an FFT scope and an oscilloscope, for both transmit and receive audio. The received signal's modulation characteristics, filter width and notch characteristics, and the microphone compression effect of your transmit audio can be displayed.

While receiving, audio of either the Main or Sub band can be displayed.





## Various functions and connectors built in

### Large 7-inch touch panel LCD

The IC-7610 has a large and wide 7-inch LCD. It is 120% larger compared with the one for the previous model, the IC-7600. The display resolution also is much better, increased from 400 × 240 pixels to 800 × 480 pixels.

With the tremendous increase in display size and resolution, the LCD can display a variety of information on the transceiver's condition. The spectrum scope on the real time display gives you a higher accuracy of the band conditions. To get an idea of the spectrum scope quality, for example, when you look at a signal spectrum on the previous LCD, you may see it like an unfocused mountain. However, when you look at it, you can clearly find that it is a large number of signals of stations calling in a pile up.

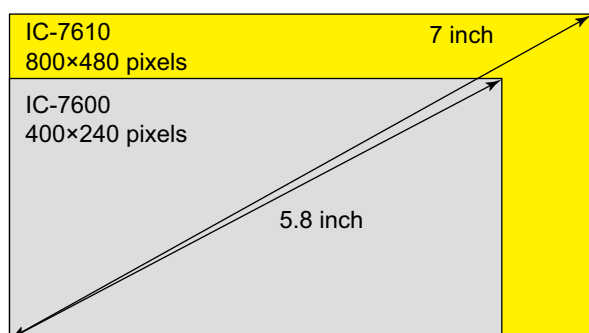


Fig 02-05 Comparison of LCDs

The LCD built into the IC-7610 is also a touch screen. This gives you intuitively action under various operations so that it makes settings easier.

### Easy operation with the Multi-dial

The IC-7610 has the unique Multi-dial, the same as the one on the popular IC-7300. This dial makes not only a simple panel layout, without installing individual function knobs, but also makes the operation easier with the addition of the touch operation.



- TX output power
- Monitor gain
- NOTCH width
- NB width
- APF width
- Microphone gain
- DIGI-SEL
- NB level
- NR level
- APF AF level
- NOTCH
- NB depth
- APF frequency
- DRIVE gain

You can also change the settings of the following functions assigned to the multi-function keys with the Multi-dial.

- VOX gain
- VOX voice delay time
- TX bandwidth
- Break-in delay time
- ANTI VOX gain
- VOX delay time
- COMP level
- Attenuation level

### Two USB connectors on the front panel

Two USB connectors are basically to connect a keyboard for PSK or RTTY operation. In addition, the connectors on the IC-7610 can be used for mouse operations on the spectrum scope. The mouse operation enables you to quickly select a signal on the spectrum scope. For this reason, two USB connectors enable you to use to simultaneously use a keyboard and a mouse. You can also connect an optional RC-28 Remote encoder to this connector and use it as your sub-dial. When you insert a USB memory stick to a connector, you can save the memory contents, various transceiver settings, or screen capture data of the IC-7610.



### Built-in SD card slot

You can save not only memory channel contents and a wide variety of transceiver settings, but also a QSO log for RTTY or PSK operations, and screen capture data, on the SD card memory.



For example, when your group participates to a contest as a multi-operator class, an individual operator can quickly start QSOing with their favorite transceiver settings saved on the SD card memory, if each operator saves their favorite transceiver settings in advance. You do not have to waste time manually resetting the transceiver each time the operator changes.

It is convenient to reuse the QSO record data, QSO log, or the screen capture, if you store the data on your PC.

### TX voice digital voice memory

The recording time limited to a maximum 30 seconds for only the receive signal has been improved to record unlimited transmit voice as well as receive voice\*.

In addition, the number of voice memory channel is increased from 4 channels to 8 channels. Recording time is also increased from 99 seconds to 200 seconds in total for the 8 channels.

\*If the voice data file reaches 2 GB, the transceiver automatically makes a new file on the SD card to continue recording.

20170601						1/2
2017/06/01	13:46:51	18,162.85	USB	RX	0:22	
		18,135.01	USB			
2017/06/01	13:47:17	18,162.85	USB	RX	0:10	
		18,135.01	USB			
2017/06/01	13:47:30	18,162.85	USB	RX	2:19	
		18,135.01	USB			
2017/06/01	13:53:27	18,162.85	USB	RX	1:10	
		18,135.01	USB			
2017/06/01	16:46:29	21,219.79	USB	RX	0:19	
		14,200.00	USB			
2017/06/01	16:46:48	21,219.79	USB	TX	0:06	
		14,200.00	USB			

### Simple remote operation with the server PC function and LAN port

The IC-7610 has a server PC function and a LAN port built in. The server PC function is convenient for building your remote control operation through a network using the RS-BA1 optional remote software. You do not need to connect a server PC to the base station. This function and the LAN port make it easier to set up the connections and networking.

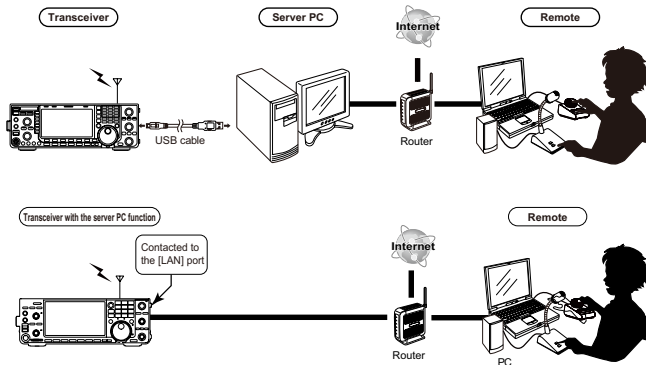
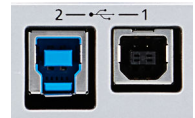


Fig. 02-06 Connection through a LAN

### Two USB ports for external control

The IC-7610 has two USB ports (USB-B type) to control the transceiver from external devices. One is used to control the transceiver with a PC through a CI-V (Communication Interface-V) commands and application software, such as RTTY/PSK/JT-65 software. QSO logging software installed on your PC can also be used through the port.



The other one is for a wideband digital IQ signal output, and connects to your PC.

\*The IQ signal output will be supported by a future firmware update. (as of September 2017)

## Advanced operations are possible with a variety of I/O terminals

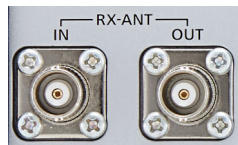
### External display terminal built in

An external display terminal is built in. The terminal uses the DVI-D (Digital Visual Interface) format, and you do not need settings for the resolution or synchronized frequency on the transceiver. You can monitor the transceiver condition and the receiver condition changes moment to moment with a large external display, the same as the displayed on the front panel display.



### BNC connectors for the RX antenna lines

We listened to the voices of contesters, too. We know that their operating environment in a contest is always severe and abnormal because of heavy QRM among high power stations that participate the contest. You can install a filter between the RX-ANT connectors to meet your operating needs. This is very useful when using a filter to eliminate unwanted signals. You do not need to be concerned with RF loss on the transmission line by installing the filter on the reception line. As the connectors are installed on the receive line, you can use them for other purposes.



The connectors are reliable BNC type and have better electrical specifications than previously used RCA jacks.

### Reference signal input terminal built in

The IC-7610 has a 10 MHz reference signal input terminal installed on the rear panel. The terminal is reliable 50 Ω BNC connector, and is used to process internal signals on the circuits. You can switch a reference signal between the internal and the external signals.



The reference signal is one of the important signals to generate transmit and receive signals. It is not actually necessary to apply the reference signal to the terminal externally. However, you can have a more precise frequency if you apply the accurate reference signals externally from a device that has a more accurate signal. If you have several Icom transceivers that have a reference signal input terminal, and if you apply the reference signal from one source signal generator, all your transceivers will have the same frequency accuracy.

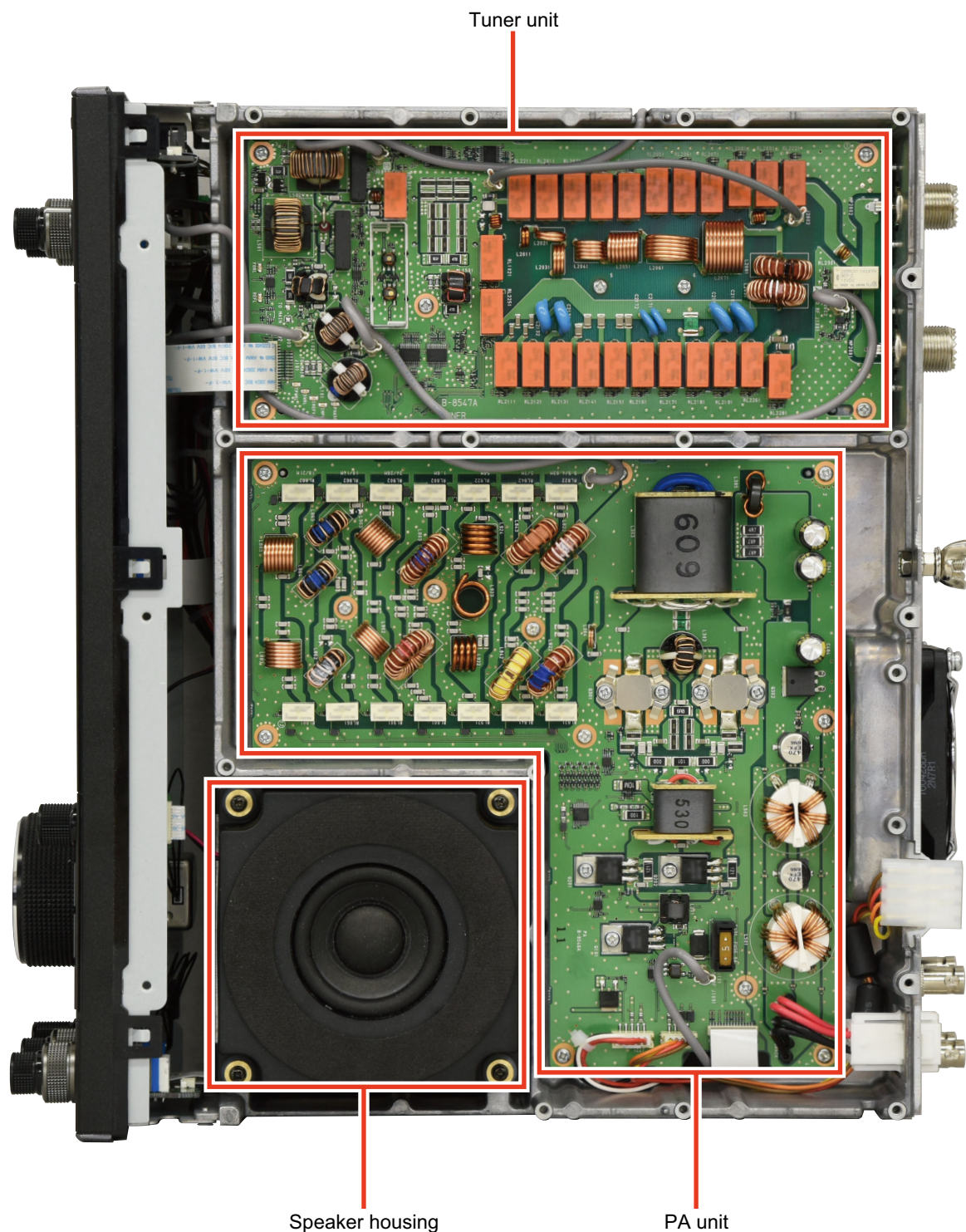
### Two independent external speaker jacks

The IC-7610 has the DUALWATCH function that was introduced in only the top class transceivers up until now. You can receive two independent signals simultaneously, in different modes as well as on different bands with the DUALWATCH function. Those two different signals are independently output from the external speaker jacks.



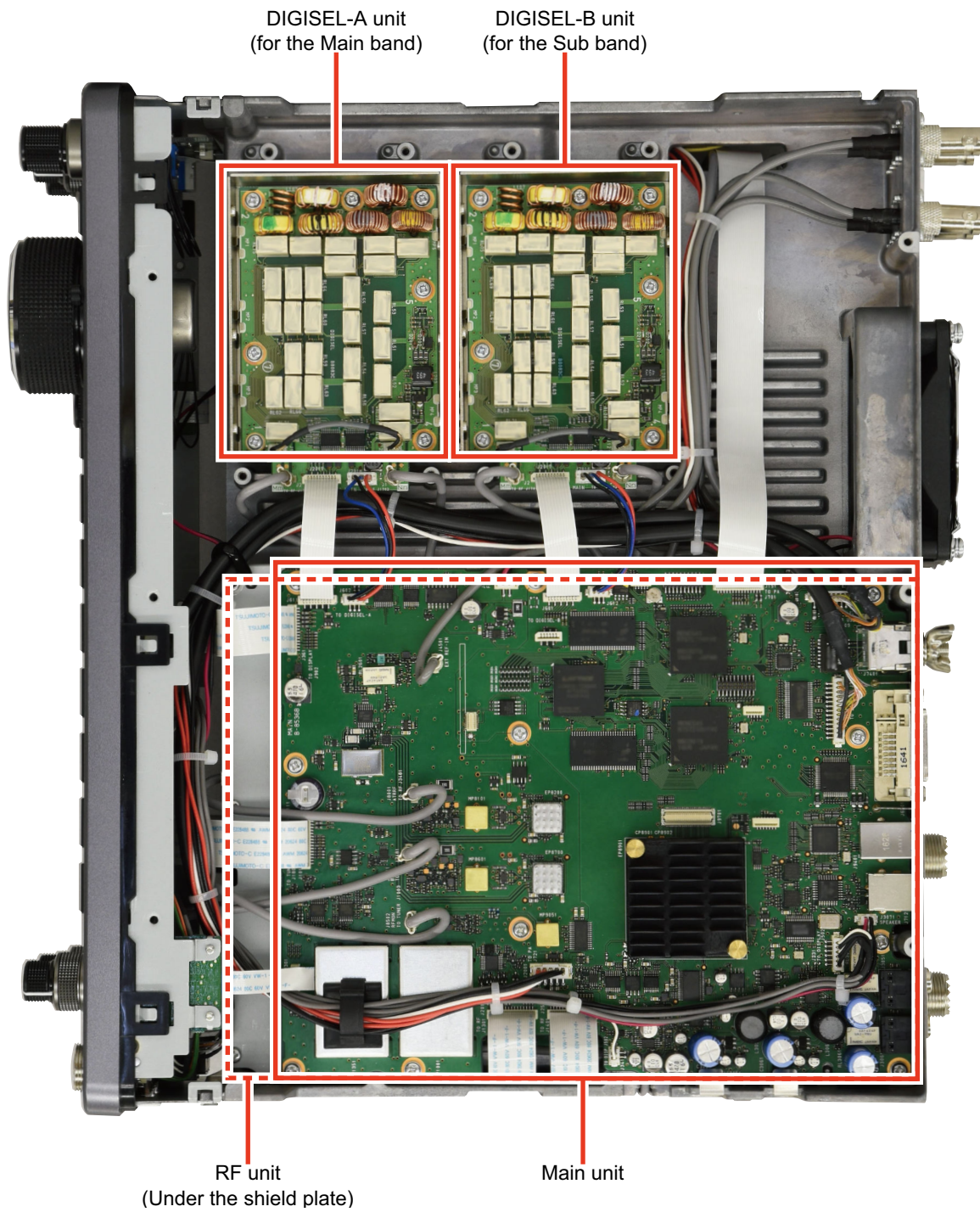
When you place two external speakers on the right and left sides of the transceiver, you can listen to only the Main or the Sub band audio through the jacks.

Top view





Bottom view



\*The above picture was taken without the case of the DIGISEL-A and DIGISEL-B units.

Some options may not be available in some countries. Ask your dealer for details.

## IC-PW1/IC-PW1EURO

### HF+50MHz 1 kW LINEAR AMPLIFIER



#### General specifications

Frequency coverage	Amateur radio bands*1
Power supply requirement	90~132 V AC, 180~264 V AC (Single-phase 50/60 Hz)
Grounding system	Negative ground
Input power	100 W (maximum)
Output power	1 kW (200 V AC) 500 W (100 V AC)
Dimensions*2	
Linear amplifier	350(W)×265(H)×375(D) mm 13.8(W)×10.4(H)×14.8(D) inches
Remote controller	205(W)×71(H)×68.3(D) mm 8.1(W)×2.8(H)×2.7(D) inches
Weight*3	28 kg (62 lbs) (including remote controller)

#### Antenna tuner specifications

Impedance matching range	HF bands	16.7~150 Ω unbalanced (VSWR less than 3:1 when first tuned)
	50 MHz band	20~125 Ω unbalanced (VSWR less than 2.5:1 when first tuned)
Tuning time		Within 3 seconds
Tuning accuracy		VSWR 1.5:1 or less
Insertion loss		Less than 1 dB (after tuning)

## SM-30

### DESKTOP MICROPHONE



#### Specifications

Microphone type	Unidirectional electret condenser microphone (preamp built in)
Cable length*3	1 m (3 ft)
Weight*3	350 g (12.3 oz)

## SM-50

### DESKTOP DYNAMIC MICROPHONE

(With UP/DOWN switches)



#### Specifications

Microphone type	Unidirectional dynamic microphone (preamp built in)
Cable length*3	1 m (3 ft)
Weight*3	730 g (1.6 lbs)

## HM-219

### HAND MICROPHONE

(With UP/DOWN switches)



#### Specifications

Dimensions (except curl cord)	53.6(W)×110.5(H)×29.6(D) mm 2.1(W)×4.4(H)×1.2(D) inches
Curl cord length*3	30 cm (1 ft)
Weight*3	170 g (6 oz)

\*1The U.S.A. version can only be tuned between 1.80 to 1.95 MHz of the 1.8 MHz band.

\*2Projections not included

\*3Approximate



**SP-23**

**EXTERNAL SPEAKER**

(With four audio filters)



Specifications	
Rated input power	2 W
Maximum input power	4 W
Input impedance	8 Ω
Dimensions* <sup>2</sup>	145(W)×111(H)×282.5(D) mm 5.7(W)×4.4(H)×11.1(D) inches
Weight* <sup>3</sup>	1.7 kg (3.7 lbs)
Filter cut-off frequency* <sup>3</sup>	
HPF 1	500 Hz
HPF 2	250 Hz
LPF 1	3 kHz
LPF 2	1 kHz

**SP-34**

**EXTERNAL SPEAKER**

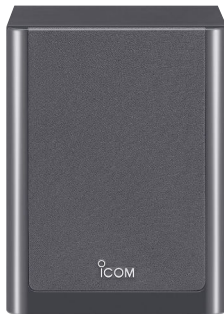
(With four audio filters)



Specifications	
Rated input power	3 W
Maximum input power	5 W
Input impedance	8 Ω
Dimensions* <sup>2</sup>	200(W)×150(H)×343(D) mm 7.9(W)×5.9(H)×13.5(D) inches
Weight* <sup>3</sup>	3 kg (6.6 lbs)
Filter cut-off frequency* <sup>3</sup>	
HPF 1	300 Hz
HPF 2	600 Hz
LPF 1	2.4 kHz
LPF 2	800 Hz

**SP-33**

**EXTERNAL SPEAKER**



Specifications	
Rated input power	3 W
Maximum input power	5 W
Input impedance	8 Ω
Dimensions* <sup>2</sup>	125.5(W)×163(H)×140(D) mm 4.9(W)×6.4(H)×5.5(D) inches
Weight* <sup>3</sup>	1.1 kg (2.4 lbs)

**PS-126**

**DC POWER SUPPLY**



Specifications	
Power supply requirement	100 V AC ±10% (50/60 Hz)
Power consumption	750 VA (Apparent power) 450 W (Active power)
Output voltage	13.8 V DC ±5%
Maximum output current capacity	25 A
Dimensions* <sup>2</sup>	94(W)×111(H)×287(D) mm 3.7(W)×4.4(H)×11.3(D) inches
Weight* <sup>3</sup>	3 kg (6.6 lbs)

\*<sup>2</sup>Projections not included

\*<sup>3</sup>Approximately.

**AH-4**

**HF+50 MHz AUTOMATIC ANTENNA TUNER**



Specifications	
Frequency coverage	3.5 MHz~54 MHz (with 7 m:23 ft or longer wire antenna)
Power supply requirement	7 MHz~54 MHz (with AH-2b) 13.8V DC ±15% (supplied from the transceiver)
Current drain	Less than 1 A
Maximum input power	120 W (100 W rated)
Tuning power	10 W (5~10 W)
Matching time	2~3 seconds (15 seconds maximum)
Tuning accuracy	VSWR 2.0:1 or better (Except antennas a one half wave or multiple of a one half wave in length)
Dimensions*2	172(W)×69.5(H)×230(D) mm 6.8(W)×2.7(H)×9.1(D) inches
Weight*3	1.2 kg (2.6 lbs)

**AH-2b**

**ANTENNA ELEMENT/BASE**

(For AH-4)

Use with the AH-4.

Specifications	
Frequency coverage	7~54 MHz
Element length*3	2.5 m (8.2 ft)



**OPC-420**

**SHIELDED CONTROL CABLE**

(For AH-4)

Specifications	
Cable length*3	10 m (33 ft)

**AH-740**

**TUNING ANTENNA**

Specifications	
Frequency coverage	2.2~30 MHz (with AH-5NV) 2.5~30 MHz (with supplied antenna element)
Power supply requirement	13.8 V DC ±15% (supplied from the transceiver)
Current drain	0.6 A maximum
Maximum input power	125 W (PEP)
Matching time	2~3 seconds
Tuning accuracy	VSWR 1.5:1 or better (Except antennas a one half wave or multiple of a one half wave in length)
Dimensions*2	145(W)×238(H)×160(D) mm 5.7(W)×9.4(H)×6.3(D) inches
Weight*3	3.5 kg (7.7 lbs)



**AH-5NV**

**NVIS ANTENNA KIT**

(For AH-740)



Specifications	
Frequency coverage	2.2~30 MHz
Element length*3	4.5 m (14.8 ft)

\*2Projections not included

\*3Approximately

**OPC-2321**

**CONTROL CABLE**

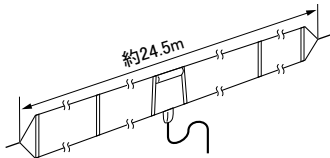
(For AH-740)



Specifications	
Cable length*3	6 m (20 ft)

**AH-710**

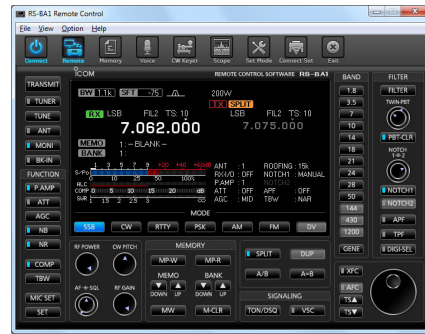
**FOLDED DIPOLE ANTENNA**



Specifications	
Frequency coverage	1.9~30 MHz
Maximum input power	150 W
Impedance	50 Ω
VSWR	VSWR 2.0:1 or better (1.9~18 MHz)
	VSWR 2.5:1 or better (18~30 MHz)
Element length*3	24.5 m (80 ft)
Supplied coaxial cable length*3	30 m (98 ft) (with a PL-259 connector)

**RS-BA1**

**IP REMOTE CONTROL SOFTWARE**



When you remotely control your transceiver from a remote location, be sure to follow any local regulations.

\*If the RS-BA1 program is already installed, download the update program from our web site.

**Minimum system requirements**

Operating System (32/64 bit)	Microsoft® Windows® 10 Microsoft® Windows® 8.1 (Except for Microsoft® Windows® RT) Microsoft® Windows® 7
HDD	At least 70 MB of free disk space
Network data speed	For the Base station
	Upload 500 kbps, or faster Download 350 kbps, or faster
For the Remote station	Upload 350 kbps, or faster Download 500 kbps or faster
	*With the default audio quality (RX: 16 kHz, 16-bit, 1 ch LPCM, TX: 8 kHz, 16-bit, 1 ch LPCM)
Display resolution	At least 1024×600 pixels

**RC-28**

**REMOTE ENCODER**



Functions as a Sub band dial during DUALWATCH operation when connected to the IC-7610. Connect the RC-28 to a PC to remotely operate the Main dial, PTT, and desired functions using the RS-BA1 IP remote control software.

**Specifications**

Power supply requirement	5 V DC ±5% (supplied from the PC's, or transceiver's USB port)
Dimensions*2	64(W)×64(H)×116(D) mm 2.5(W)×2.5(H)×4.6(D) inches
Weight*3	440 g (15.5 oz)
Supplied USB cable (USB (A)-USB (mini-B)) length*3	1.5 m (5 ft)

\*2Projections not included

\*3Approximately

## General

<ul style="list-style-type: none"> <li> <b>Frequency range</b>            Receive      Operable range                              Guaranteed range             Transmit            (The transmit frequency range will differ, depending on the transceiver version.)         </li> </ul>	30 kHz ~ 60.000000 MHz 500 kHz ~ 29.999999 MHz 50.000000 MHz ~ 54.000000 MHz 1.800000 MHz ~ 1.999999 MHz 3.500000 MHz ~ 3.999999 MHz 5.332000 MHz, 5.348000 MHz, 5.358500 MHz, 5.373000 MHz, 5.405000 MHz 7.000000 MHz ~ 7.300000 MHz 10.100000 MHz ~ 10.150000 MHz 14.000000 MHz ~ 14.350000 MHz 18.068000 MHz ~ 18.168000 MHz 21.000000 MHz ~ 21.450000 MHz 24.890000 MHz ~ 24.990000 MHz 28.000000 MHz ~ 29.700000 MHz 50.000000 MHz ~ 54.000000 MHz
<ul style="list-style-type: none"> <li><b>Operating mode</b></li> </ul>	SSB (LSB/USB), CW, RTTY, PSK, AM, FM
<ul style="list-style-type: none"> <li><b>Number of memory channels</b></li> </ul>	101 (99 regular + 2 scan edges)
<ul style="list-style-type: none"> <li><b>Antenna impedance</b></li> </ul>	50 Ω (nominal)
<ul style="list-style-type: none"> <li><b>Power supply voltage</b></li> </ul>	13.8 V DC ±15%
<ul style="list-style-type: none"> <li><b>Polarity</b></li> </ul>	Negative ground
<ul style="list-style-type: none"> <li><b>Power consumption</b>                Stand-by                Maximum audio                Transmit (at 100 W)         </li> </ul>	3.0 A 3.5 A 23.0 A
<ul style="list-style-type: none"> <li><b>Usable temperature range</b></li> </ul>	0°C~+50°C (+32°F~+122°F)
<ul style="list-style-type: none"> <li><b>Frequency stability</b></li> </ul>	±0.5 ppm (0°C~+50°C)
<ul style="list-style-type: none"> <li><b>Frequency resolution</b></li> </ul>	Minimum 1 Hz
<ul style="list-style-type: none"> <li><b>Display</b></li> </ul>	7-inch wide TFT LCD (800×480 dot) + Pressure-sensitive touch panel
<ul style="list-style-type: none"> <li><b>Dimensions</b> (projections not included)</li> </ul>	340(W) × 118(H) × 277(D) mm (13.4(W) × 4.6(H) × 10.9(D) inches)
<ul style="list-style-type: none"> <li><b>Weight</b></li> </ul>	Approximately 8.5 kg (18.7 lbs)

## Transmitter

<ul style="list-style-type: none"> <li><b>Output power</b>                SSB/CW/RTTY/PSK/FM                AM         </li> </ul>	1 W~100 W 1 W~25 W
<ul style="list-style-type: none"> <li><b>Modulation method</b>                SSB                AM                FM         </li> </ul>	Digital PSN modulation Digital low power modulation Digital reactance modulation
<ul style="list-style-type: none"> <li><b>Spurious emissions</b>                Harmonics   1.8 MHz~28 MHz                              50 MHz band                Out-of-band 1.8 MHz~28 MHz                emission    50 MHz band         </li> </ul>	Less than -50 dB Less than -63 dB Less than -40 dB Less than -60 dB
<ul style="list-style-type: none"> <li><b>Carrier suppression</b></li> </ul>	50 dB
<ul style="list-style-type: none"> <li><b>Unwanted sideband suppression</b></li> </ul>	50 dB
<ul style="list-style-type: none"> <li><b>Microphone impedance</b></li> </ul>	600 Ω
<ul style="list-style-type: none"> <li><b>ΔTX variable range</b></li> </ul>	±9.999 kHz

## Receiver

• <b>Receive system</b>	Direct sampling superheterodyne system
• <b>Intermediate frequency</b>	12 kHz
• <b>Receive sensitivity</b>	
SSB/CW (BW=2.4 kHz) (10 dB S/N)	
1.8 MHz~29.995 MHz	-16 dB $\mu$ (0.15 $\mu$ V) typ. (Preamp1 ON)
50 MHz band	-18 dB $\mu$ (0.12 $\mu$ V) typ. (Preamp2 ON)
AM (BW=6 kHz) (10 dB S/N)	
0.5 MHz~1.8 MHz	-16 dB $\mu$ (6.3 $\mu$ V) typ. (Preamp1 ON)
1.8 MHz~29.999 MHz	-6 dB $\mu$ (2.0 $\mu$ V) typ. (Preamp1 ON)
50 MHz band	0 dB $\mu$ (1.0 $\mu$ V) typ. (Preamp2 ON)
FM (BW=15 kHz) (12 dB SINAD)	
28.0 MHz~29.7 MHz	-6 dB $\mu$ (0.5 $\mu$ V) typ. (Preamp1 ON)
50 MHz band	-10 dB $\mu$ (0.3 $\mu$ V) typ. (Preamp2 ON)
• <b>Squelch sensitivity</b>	
SSB	Less than +10 dB $\mu$ (3.2 $\mu$ V)
FM	Less than -10 dB $\mu$ (0.3 $\mu$ V)
• <b>Selectivity</b> (Filter shape=SHARP)	
SSB (BW=2.4 kHz)	More than 2.4 kHz/-6 dB, Less than 3.6 kHz/-60 dB
CW (BW=500 Hz)	More than 500 Hz/-6 dB, Less than 700 Hz/-60 dB
RTTY (BW=500 Hz)	More than 500 Hz/-6 dB, Less than 700 Hz/-60 dB
AM (BW=6 kHz)	More than 6.0 kHz/-6 dB, Less than 15 kHz/-60 dB
FM (BW=15 kHz)	More than 12.0 kHz/-6 dB, Less than 20 kHz/-60 dB
• <b>Spurious and image rejection ratio</b>	
HF bands	70 dB
50 MHz band	70 dB (Except for ADC aliasing)
• <b>Audio output power</b>	More than 2 W (at 10% distortion into an 8 $\Omega$ load)
• <b>Audio output impedance</b>	8 $\Omega$
• <b>RIT variable range</b>	$\pm$ 9.999 kHz

## Antenna tuner

• <b>Matching impedance range</b>	16.7 $\Omega$ ~150 $\Omega$ (unbalanced) (VSWR 3:1 or less)
• <b>Tuning time</b>	2~3 seconds (average/15 seconds maximum)
• <b>Tuning accuracy</b>	VSWR 1.5:1 or less



**Count on us!**

