唯一、無比

HF Excellence Unparalleled
Hear What You Couldn’t Hear
See What You Couldn’t See
Contesters and DXers are always looking for that competitive edge to magically pull out the weak signal that is either the rare country or multiplier they need to climb up the list. Larger antennas, higher gain pre-amps and other devices in line are great. However, what happens inside the radio with all those signals coming down your feedline can defeat all your efforts.

With the design of the IC-7851, Icom’s engineers focused on a new Local Oscillator (LO) that drastically reduces the phase noise. As a result of this design, the purity of the LO achieves a Reciprocal Mixing Dynamic Range (RMDR) of 110dB.

In addition to the incredibly clean LO allowing you to hear the weak signals, the new spectrum scope design enables you to see the weak ones! Faster processors, higher input gain, higher display resolution and a cleaner signal from the receiver’s LO will give you a new window into the RF world. Adding this performance and functionality for both receivers give you a dual scope portal.
Competitive Advantage: Reciprocal Mixing Dynamic Range

Design advances developed by the Icom HF engineers for the Local Oscillator (LO) enable the IC-7851 to set a new benchmark for amateur radio receivers. The goal was to dramatically reduce the phase noise that degrades the target signal due to the sum of the entire signal present. The result was a RMDR of 110dB. Below is a comparison of the improvement over the IC-7800.

RMDR: 110dB
Raising the Bar

Despite the trend to switch to a down conversion or a hybrid conversion receive design, Icom believes in the solid performance of the up-conversion design. In an up-conversion receiver, suppression of image interference and reduce distortion from electric components is easily overcome. A flat consistent performance is delivered over a wider frequency range. The IC-7851 introduces a new 1.2kHz Optimum Roofing Filter, greatly improving the in-band adjacent signal performance. This newly developed filter overcomes the gap of a narrower roofing filter in an up-conversion receiver.

RMDR (Reciprocal Mixing Dynamic Range) is the relative level of an undesired signal, offset "n" kHz from the RX passband, which will raise noise floor by 3 dB. The local oscillator phase noise will mix with strong unwanted signals and unavoidably generate noise which masks a wanted signal.

| RMDR Comparison |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | 1kHz            | 2kHz            | 10kHz           | 20kHz           |
| IC-7851        | 110             | 116             | 121             | 124             |
| IC-7800        | 78              | 87              | 106             | 112             |

Crystal Clear LO (Local Oscillator) Design

Breaking the boundaries of traditional designs, the IC-7851 employs a Direct Digital Synthesizer (DDS) along with a Phase Locked Oscillator for the LO. The C/N ratio excels beyond the IC-7800 and other similar class HF transceivers. This design significantly reduces noise components in both receive and transmit signals.

Improved Phase Noise Characteristics

Phase noise is coherent in radio circuit design and the new LO design introduced in the IC-7851 makes some major breakthroughs while utilizing the 64MHz up-conversion receiver design introduced in the IC-7800. An impressive 20dB improvement is seen with the IC-7851’s 10 kHz measurement and more than 30dB improvement at a 1 kHz measurement in comparison to the IC-7800.
Twice the Speed, Sensitivity, Resolution and More Control

Following the design lineage of the IC-7800, the IC-7851 uses a dedicated DSP unit for the Fast Fourier Transform (FFT) spectrum. The 2250 MFLOPS DSP processor enables a new dual scope function and significantly faster sweep speeds and better accuracy than in the IC-7800.

Improved Spectrum Scope

Following the design lineage of the IC-7800, the IC-7851 uses a dedicated DSP unit for the Fast Fourier Transform (FFT) spectrum. The 2250 MFLOPS DSP processor enables a new dual scope function and significantly faster sweep speeds and better accuracy than in the IC-7800.

Dual Scope Function

While you can watch both receivers on the scope of the IC-7800, within the limits of the scope bandwidth, the IC-7851 introduces the new dual scope – the ability of watching both receivers in separate spectrum scopes. The dual scope function is vital for watching for multipliers or band openings in contests, or working all bands/modes on a DXpedition.

High Resolution Spectrum Waterfall Display

The waterfall display captures signal strengths over time. This allows you to see signals that may not be apparent on a normal scope. Additionally, the combination of the scope attenuator and the wide screen mode gives you a better view of weaker signals as band conditions change. For the ultimate scope enhancement, the IC-7851 has a digital video interface (DVI-I) for a larger display.

Click Control

By connecting a human interface device (such as a USB mouse, trackball or touchpad) to the USB port on the rear panel, you gain control over the spectrum display pointer for “Click-and-Listen” receiver control. Fix/Center mode, sweep speed and other settings are controllable.

Audio Scope Function

The audio scope simultaneously shows an oscilloscope and FFT for receive and transmit audio. Adjust your transmit audio by watching your compressor level, equalization and mic gain settings to give you the audio you want for SSB. The oscilloscope shows the CW waveform. On receive, you can see the power of your filtering by watching filtering adjustments take out interfering signals including filter width and notch filter placement. The processing power in the IC-7851 allows for dual mini band scopes as well as the audio scope.

Specifications for the audio scope
- Span: 5kHz – 1000kHz
- Resolution: 1 pixel minimum
- Sweep Speed: 29.3 frames/Sec
- Display Dynamic Range: 100dB
- Noise Floor Level: –30dB

Specifications for the oscilloscope
- Span: 5kHz – 1000kHz
- Resolution: 1 pixel minimum
- Sweep Speed: 4 frames/Sec
- Display Dynamic Range: 80dB
- Noise Floor Level: –19dB

Scope Comparison

<table>
<thead>
<tr>
<th>IC-7851</th>
<th>IC-7800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span Width</td>
<td>5kHz–1000kHz</td>
</tr>
<tr>
<td>Resolution</td>
<td>1 pixel minimum</td>
</tr>
<tr>
<td>Sweep Speed</td>
<td>4 frames/Sec</td>
</tr>
<tr>
<td>Display Dynamic Range</td>
<td>100dB</td>
</tr>
<tr>
<td>Noise Floor Level</td>
<td>–30dB</td>
</tr>
</tbody>
</table>

*1 Number of dots shown at the 60 dB level, when receiving a signal.  
*2 SPAN = More than 20 kHz, SPEED = Slow  
*3 SPAN = Less than 20 kHz, SPEED = Fast  
*4 SPAN = 500 kHz, SPEED = Slow
Basic Functions

Premium components yield premium performance

+40dBm IP3
(3rd Order Intercept Point)

The IC-7851 continues the +40dBm, 3rd order intercept point and 110dB receiver dynamic range benchmark set by the IC-7800. To achieve this superb receiver performance, the entire analog circuitry and components have been re-engineered to match the DSP units. A newly designed LO amplifier generates high output while keeping flat frequency characteristics over a 60MHz wide range.

BPF Switching: Mechanical Relays

The IC-7851 incorporates high-grade, long-term reliable mechanical relays rather than PIN diodes for switching the Band Pass Filters (BPF). This deployment of relays removes secondary distortion products from the primary stage of signal processing.

Four 1st IF “Roofing” Filters

Three high-spec 1st IF “Roofing” filters plus the new 1.2kHz Optimum Roofing Filter allow only signals within the filter passband to the 1st IF amplifier stage. You can select the filter width from 15kHz, 6kHz, 3kHz and 1.2kHz, depending on your operating mode. (FM mode is fixed at 15kHz)

Digi-Sel Preselector

The preselector works between 1.5MHz and 30MHz and rejects distortion components derived from out of band interference such as multi-multi operation or strong broadcast stations. It automatically tracks the intended signal keeping the preselector’s bandwidth centered on the operating frequency. The center frequency of the preselector is manually adjustable from the Digi-SEL tuning knob on the front panel.

D/C/AGC Loop line

Image Rejection Mixer

Simple receiver system configuration is the best way to eliminate sources of the spurious signals and distortion from transceivers. The IC-7851 uses a double conversion system composed of a D-MOS FET 1st mixer and image rejection mixer for the 2nd stage. The 1st mixer stage is driven with a signal from the high-drive Local Oscillator with excellent C/N. The image rejection mixer for the 2nd stage reduces signal distortion through IF processing and provides a high-fidelity signal to the DSP unit. This system provides wide dynamic range, reducing the distortion from strong signals and lower intermodulation.

High Performance OCXO Unit

The IC-7851 uses the OCXO (Oven Control Crystal Oscillator) unit which is stable to within ±0.05ppm at 0°C to 50°C. This specification means that even on the 50MHz band, frequency error is less than 2.5Hz! In addition, a 10MHz reference frequency can be input and output for accurate tuning.

200W Output Power at Full Duty Cycle

The push-pull power amplifiers using power MOS-FETs work on 48V DC. They provide a powerful 200W output power at full duty cycle and low transmit intermodulation. An effective cooling system maintains internal temperatures within a safe range and prevents thermal runaway.

Solid Aluminum Main Dial Knob

The main dial tuning knob is pure functional beauty. Machined from a solid aluminum block, the main dial tuning knob gives you a solid operational feel. The diamond engraved accents are cosmetic perfection – expected only from a radio of this caliber.

<table>
<thead>
<tr>
<th>Dynamic Range Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofing Filter Bandwidth</td>
</tr>
<tr>
<td>1kHz</td>
</tr>
<tr>
<td>IC-7851</td>
</tr>
<tr>
<td>1.2kHz</td>
</tr>
</tbody>
</table>

| Triple DSP Power |

Three separate 24-bit AD/DA converters and dedicated DSP processors are at the heart of the IC-7851. With one AD/DA and DSP dedicated to the spectrum scope and two 24-bit AD/DA and DSP chips for the receivers and transmit circuits, there is plenty of DSP power for the most demanding RF environment.

Transmit/Receiver DSP (left) and Receiver DSP (right)
ADSP-21489 by Analog Devices
32-bit floating point DSP
2400 MFLOPS
393MHz clock speed
**Basic Functions**

**Operational functionality for the most advanced operators**

**Dual Receivers**
The IC-7851 incorporates two completely independent receivers, from the antenna inputs all the way through to the stereo headphone and individual external speaker outputs. All the performance of the first receiver is duplicated for a perfectly matched set of “Twins.” When connected to external stereo headphone, main and sub receiver audio can be mixed or separated to the right and left.

**RTTY/PSK31 and PSK63**
RTTY, PSK31 as well as the new PSK63 modes are available at your fingertips without the use of a computer. The built-in Modulator/Demodulators are activated by via the radio’s functions buttons or an optional USB keyboard. TX memories make contacts a snap and communications logs or an optional USB keyboard. TX memories are activated via the radio’s functions buttons.

**Digital IF Filters**
“Build your own” IF filters by adjusting the IF filter width, 50 – 3600Hz, as well as soft or sharp filter characteristics for your perfect sound. Save these settings in three user-defined filter presets, Wide/Mid/Narrow, by mode to give you full customization of your filters.

**Digital Manual Notch**
HF operators marvel at how well DSP reduces interfering signals and noise. Signals such as heterodynes and AM Carriers can be eliminated with automatic notch filter technology. Making interference from RF sources such as beat signals and RTTY signals a thing of the past. Additionally, the filter shape of the manual notch can be adjusted in three steps – with more than 70dB of attenuation!

**Digital Twin PBT**
(Passband Tuning)
Once the IF filters have been “tweaked,” the operator has additional control with the digital twin passband tuning (PBT). The digital twin PBT allows flexibility of both the IF shift and narrowing of the digital IF passband by moving the IF passband. With the digital IF filters, PBT performance allows you to cut away all the interference and noise to hear the actual signal.

**Variable Level Noise Reduction**
The digital noise reduction separates a target signal from noise components and noise suppression level is variable in 16-steps, depending on the noise level. The low latency digital noise reduction is achieved by applying an adaptive filter using the high speed DSP computing power.

**New Auto Digital Noise Blanker**
While most noise blanker reduces pulse type noise, the IC-7851 introduces a new automatic digital noise blanker circuit. While using the 15/9kHz, SG filter, the digital noise blanker gives you full control. When the 12kHz Optimum Roofing Filter is activated, the best blanking level is automatically selected. Additional adjustments allow you to tweak the threshold level, blank time and attenuation level parameters.

**Digital Transmit Bandwidth (TBW) and Audio Equalizer**
With the flexibility of DSP-based waveform shaping, transmit and receive audio quality is adjustable to suit your preference. Three user-adjustable transmit filters, Wide/Mid/Narrow, allow you to set both the low and high cut-off frequency limits.

**Digital RF Speech Compressor**
The DSP controlled RF speech compressor provides additional punch while maintaining the original tone quality of the operator. The IC-7851 utilizes the 32-bit DSP for the RF speech compressor, providing the maximum punch without the fuzzy sound. It’s great for breaking through the noise and hash to complete the QSO.

**SD Memory Card Slot**
Save operator profiles, digital voice keyer, CW memory keyer, RTTY/PSK logs, IC-7851 “Screen Shots” and various other operational settings to your SD Memory card.

**Digital Voice Recorder**
The digital voice recorder captures both receive and transmit audio to your SD or USB storage devices. Up to 9 hours of continuous audio recording is possible with 2 GB of storage. Record your QSO with a rare entity or record your operating time in a contest. Operating frequency, mode, S-meter and output power are automatically captured.

**Memory Keyer**
Whether operating phone, CW, RTTY or PSK31/63, the IC-7851 has a convenient memory keyer to ease operations. Record your CQ, station information or other items in one of 8 keyer memories for the CW and digital modes; 4 memories for phone operation. For CW, the memory keyer has timesaving functions like auto repeat, contest serial number counter and short Morse number functions. For phone operation, you have a voice-saving auto repeat function.

**Improved Automatic Antenna Tuner**
The automatic antenna tuner utilizes setting memories to record the best tuner configuration for the lowest SWR. This allows a faster response time when jumping bands or moving around in the same band.

**Internal Antenna Switch**
With six antenna ports – two receive-only and four receive/transmit – the IC-7851 enables the operator to have fingertip control over a vast array of antenna configurations. Switch to 80/160m and you want to use your beverage antenna for receive, but transmit on your vertical. Not a problem: the antenna switch memory will automatically switch antennas when you select the band you want to operate. This is very convenient when using the RS-BA1 for remote base operation.

**Enhanced PC Connectivity**
The IC-7851 has various computer interfaces, giving you maximum connectivity between your computer and radio. Digital modes become a snap when controlling with the USB port. USB audio and some CI-V commands including USB send (DTR/RTS) and USB keying (CW and RTTY) are selectable. You can also interface your computer with the S/P DIF optical digital interface provides audio I/O. The Ethernet jack allows you to connect the IC-7851 directly to your router and control your radio over your wireless Internet, or travel the globe and operate your station remotely over the Internet.

**Firmware Update Capability**
The IC-7851 can grow as feature and function enhancements become available via the USB or your SD Card.
Other Outstanding Features

**[Antenna]**
- BNC type RX input/output connectors for receiver antennas or external attenuators
- General coverage receiver covers from 30Hz to 60MHz* (* Some frequency ranges are not guaranteed.)
- Two types of preamplifiers:
  - Preamp 1: improves intermodulation characteristics
  - Preamp 2: High gain preamp for high bands
- A seven step attenuator (3, 6, 9, 12, 18, 21dB and OFF)
- A dedicated 50MHz band mixer using a Quad FET
- Twin peak filters for better RTTY signal reception

**[Receiver]**
- Electronic keyer speed popup
- CW/AM auto tuning function helps to zero in on intended signals within ±500Hz range
- Soft and sharp audio filter shapes for the Audio Peak Filter (APF)

**[Transmitter]**
- Speech compressor increases average talk power (SSB mode)
- TX monitor functions
- Fifty sub-audible tones (CTCSS) for repeater access
- VOX (Voice operated transmission) capability
- All mode power control

**[CW]**
- DSP controlled CW keying waveform shaping
- Multi-function electronic keyer with adjustable keying speed, dot/dash ratio, keyer type, rise time and paddle polarity
- Electronic keyer speed popup
- CW reverse mode operation for receiving USB side signal
- Double key jacks for front and rear panels
- Full break-in and semi break-in functions
- CW/AM auto tuning function helps to zero in on intended signals within ±500Hz range
- Soft and sharp audio filter shapes for the Audio Peak Filter (APF)

**[Operation]**
- Set mode functions for flexible and speedy settings
- Memo pads stores up to 10 operating frequencies and modes
- Quick split function and split lock functions
- Programmable scan, memory scan, select memory scan, VSC scan and Δf scan
- Auto tuning step function
- Dial lock function
- Main dial tension control
- Programmable band edge beeps
- S/P DIF input/output connectors
- BNC type transverter connector
- External speaker connectors for Main/Sub receivers
- FFT scope waveform averaging function for PSK and RTTY decoder
- Screen saver function

**Simplified Remote Control (Optional RS-BA1)**
Remote base operation is made easy as the IC-7851 operating system incorporates the remote base server software. A computer is not required in the shack for audio or rig control. Up to three, unique user log-in/password configurations are part of the internal server. As the rig control has a priority of service, the controls will feel like you are right in front of your rig.

**Optional RS-BA1 main features**
- Most functions of your transceiver, including interference rejection functions and IF filter settings, can be controlled. Also, received signal strength and SWR can be observed on the computer display.
- Received voice recording function.
- Optional RC-28 USB remote encoder provides a hardware dial/transmit functions for a realistic dial operation.
- The IC-7851 can wake-up from the standby mode through the RS-BA1 software.
THE TRANSCEIVER

SPECIFICATIONS

GENERAL

Frequency coverage: 0.1–1.799 MHz, 18.068–18.168 MHz, 21.000–21.450 MHz
Receiver: 0.030–60.000 MHz
Transmit: 1.800–1.999 MHz, 3.500–3.999 MHz, 5.255–5.405 MHz
Receive: 10.100–10.150 MHz, 14.000–14.350 MHz, 18.068–18.168 MHz
Operating temp. range: 0°C to +50°C, +32°F to +122°F
Frequency stability: Less than ±0.05ppm (0°C to +50°C @ 54MHz, after warm up)
Frequency resolution: 50Hz (minimum)
Power supply requirement: 85–265V AC
Current drain: Less than 5W

TRANSMITTER

Transmitter connector (CW): More than –20dBm
Modulation system: SSB: Digital PSN modulation, AM: Digital power modulation, FM: Digital phase modulation
Spurious emissions: HF bands: More than 60dB, 50MHz band: More than 70dB
Carrier suppression: More than 83dB
Unwanted sideband suppression: More than 70dB
TX variable range: ±9.999kHz

RECEIVER

Receive system: Double conversion super-heterodyne system
Intermediate frequencies: Main receiver: 64.455MHz/36kHz (1st/2nd)
Sub receiver: 64.555MHz/36kHz (1st/2nd)
Sensitivity (typical): (HF: Pre-amp 1 ON, 50MHz: Pre-amp 2 ON)
SSB, CW, RTTY, PSK (BW=2.4kHz, at 10dB S/N): 0.5μV, 0.16μV, 0.13μV
AM (BW=6kHz, at 10dB S/N): 6.3μV, 3μV, 1μV
FM (BW=15kHz, at 12dB SINAD): –0.5μV (28–29.9kHz), 0.32μV
Squelch sensitivity: SSB, CW, RTTY, PSK: Less than 5.6μV (Pre-amp: OFF)
FM: Less than 1μV (Pre-amp: OFF)
Selectivity: More than 70dB
Audio output power: More than 2W (10% distortion, 8Ω load)
RX variable range: ±9.999kHz

ANTENNA TUNER

Matching impedance range: HF bands: 16.7 to 1502 unbalanced (VSWR better than 3:1)
50MHz: 202 to 1252 unbalanced (VSWR better than 2.5:1)
Minimum operating power: HF bands: 8W, 50MHz band: 15W
Tuning accuracy: VSWR 1.5 or less
Insertion loss: Less than 1.0 dB (after tuning)

SUPPLIED ACCESSORIES:
- Rack mount handles
- 5D card
- AC power cable
- Spare fuses
- Plugs

OPTIONS

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

IC-PW1/IC-PW1EURO
HF+50MHz 1kW LINEAR AMPLIFIER
IC-PW1/IC-PW1EURO
4 antenna connectors are available.
Automatic antenna tuner and compact detachable console are standard. 4 audio filters and headphone jack can connect to 2 transceivers. Input impedance: 8Ω Max. input: 5W

IC-7851

Hand microphone
SP-33 EXTERNAL SPEAKER
5W Hand microphone
SM-50 DESKTOP MICROPHONE
Dynamic microphone with UP/DOWN switches

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