



The Icom IC-7700

A New Top-class HF/6m Transceiver

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[IC-7700 Information & Links](#)

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IC-7700 front panel



This is a *big* radio. 425(W) x 149 (H) x 437 (D) mm, 22.5 kg.

IC-7700 rear panel



IC-7700: Main Points



- **Single, no-compromise receiver: +40 dBm IP3 at 50 kHz offset**
 - ◆ Front end similar to IC-7800, with improved strong-signal handling
 - ◆ Large RF BPF inductors, “Digisel” tracking preselector, 2 linear low-noise preamps, DMOS 1st mixer
 - ◆ All front-end RF circuits *relay-switched* to eliminate switching-diode IMD
 - ◆ Dedicated high-performance 6m front end optimized for that band
- **Rugged 200W MOSFET transmitter**
 - ◆ PA stage utilizes a pair of MRF150 MOSFETs ($V_{DD} = 48V$)
 - ◆ Delivers 200W in all modes, at full duty cycle
 - ◆ Comprehensive VSWR and thermal protection
 - ◆ Full metering: P_O , V_{DD} , I_D , ALC, SWR, temperature
 - ◆ Up-converting architecture: 36 kHz DSP IF → 455 kHz → 64.455 MHz → TX freq.
- **Internal high-speed automatic antenna tuner**
 - ◆ Covers HF and 6m bands
- **Quiet, internal switch-mode mains PSU**
 - ◆ Adapts automatically to mains voltage 85 – 265V, 50/60 Hz
- **Selectable 15, 6 & 3 kHz roofing filters**
 - ◆ MCF’s optimized for low passive IMD, mounted on plug-in daughter-boards
- **Precision 10 MHz OCXO with 5 x 10⁻⁸ frequency stability**
 - ◆ The precision OCXO with 10 MHz REF I/O port allows the IC-7700 to clock other equipment, or to be clocked from a higher-level master clock source

IC-7700: Main Points (cont.)



■ Two independent DSP units

- ◆ One DSP (TI TMS320C6727) is dedicated to the transmitter and receiver, and the other (TI TMS320C6720) to the spectrum scope. These are of a later generation than the TMS320C6713 used in the IC-7800.

■ 7" color TFT LCD display (800 x 400 pixels)

- ◆ The display includes a simulated analogue multi-function meter
- ◆ Rear-panel VGA port for external video monitor

■ Multi-function spectrum scope with selectable RBW

- ◆ Selectable resolution bandwidth (min. RBW = 100 Hz) permits spectral analysis of received signals
- ◆ Displays span centered on RX frequency (CENT) or a defined frequency range (FIX)
- ◆ IMD products and spurs can be displayed
- ◆ Displays spectrum of transmitted signal

■ Built-in RTTY/PSK31 modem requiring only a USB keyboard

- ◆ The built-in RTTY/PSK31 modem allows use of the IC-7700 as a complete digimode terminal, requiring only a keyboard. This is great for semi-portable operation (e.g. Field Day) or when shack space is at a premium. FFT spectral, waterfall and vector tuning aids are provided.

■ Comprehensive IF-DSP selectivity filtering for all modes

- ◆ Continuously-adjustable bandwidth, selectable shape factors, optimized defaults for each mode
- ◆ Twin Passband Tuning allows independent adjustment of lower & upper passband flanks

■ IF-DSP dual-loop AGC

- ◆ AGC decay times selectable via menu or adjustable via front-panel control
- ◆ Excellent transient response, without clamping

IC-7700: Additional Features



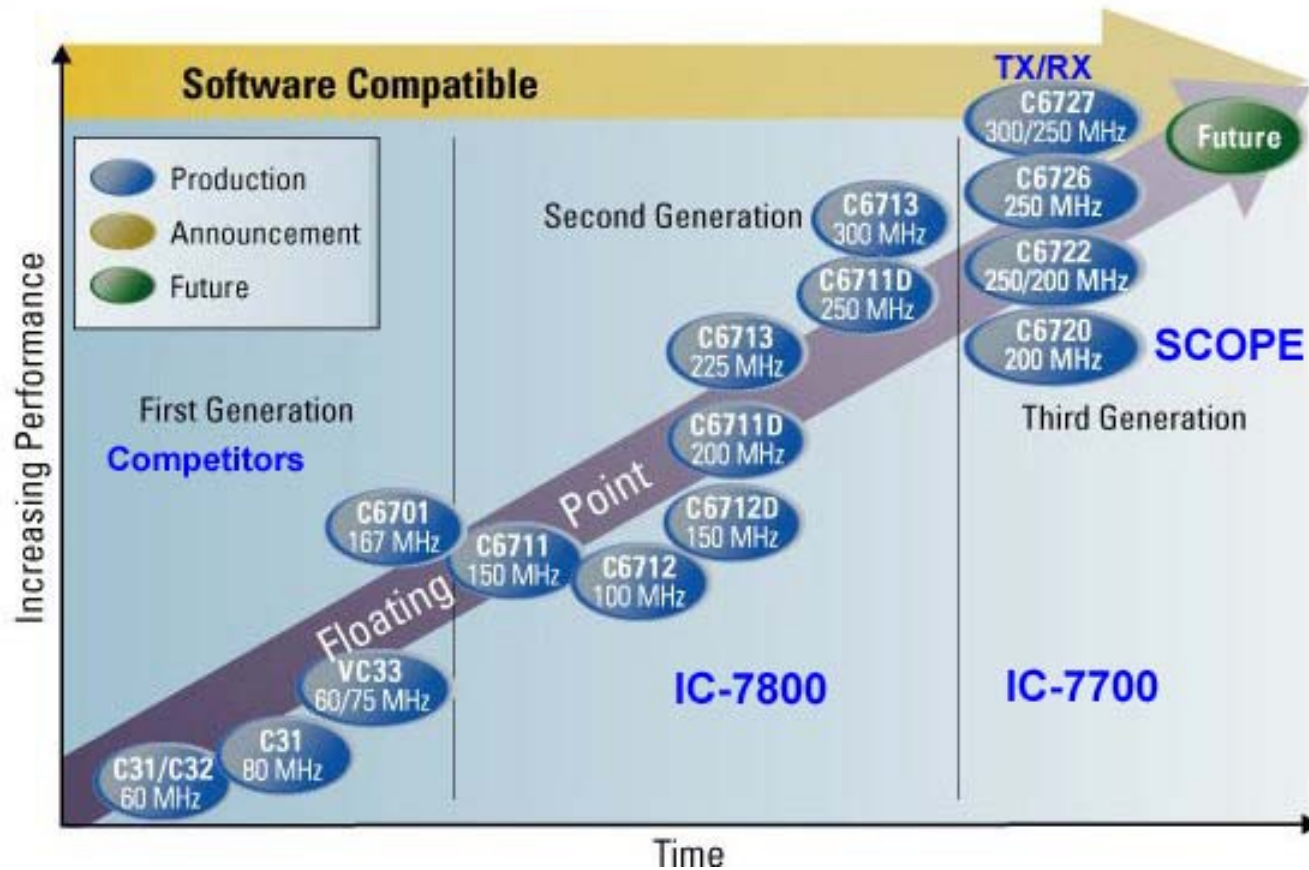
- **IF-DSP manual notch filter with adjustable parameters**
 - ◆ The manual notch filter shape factor is selectable in 3 steps, and its maximum stopband attenuation is 70 dB. The manual notch is within the AGC loop.
- **IF-DSP auto-notch filter**
 - ◆ Auto-notch is post-AGC, and suppresses single or multiple tones
- **High-performance IF-DSP noise blanker (NB)**
 - ◆ NB is DSP process ahead of AGC derivation point
 - ◆ NB suppresses single or periodic impulsive RF events before they can cause AGC activity
 - ◆ Adjustable threshold (front-panel control), blank depth & width (menu)
- **IF-DSP noise reduction (NR)**
 - ◆ Does correlation discrimination on noise vs. signal; computes out noise
 - ◆ 16 levels, adjustable via front-panel control
 - ◆ Post-AGC; heuristic (“learns” prevailing noise condition)
- **IF-DSP CW Audio Peak Filter (APF) and RTTY Twin Peak Filter (TPF)**
 - ◆ CW APF is tunable; 3 bandwidth settings available
 - ◆ TPF passes RTTY mark & space tones
- **High-quality digital voice recorder**
 - ◆ Record off-air or from microphone; play mic recordings on-air
 - ◆ Load/save .WAV files

IC-7700: Additional Features (cont.)



- **Front-panel USB ports for USB memory drive & keyboard**
 - ◆ Load/save Digital Recorder .WAV files, configuration settings, RTTY/PSK31 text
 - ◆ Upload new system firmware (alternately via rear-panel Ethernet port)
- **DSP-derived transmit monitor**
 - ◆ Samples transmit IF signal
 - ◆ Accurately reproduces transmitted SSB, AM and FM signal
- **Dual VFO's with one-button Split**
 - ◆ Allows rapid switch-over to Split mode
- **One-button XFC (TX frequency check)**
 - ◆ Permits monitoring of transmit frequency in Split mode
- **Voice-activated squelch control (VSC)**
 - ◆ Responds to speech signals only
 - ◆ Usable in SSB, AM and FM modes
- **S/P-DIF optical digital baseband interface**
 - ◆ Optical digital interface for baseband input/output in digital domain
 - ◆ Connect external audio devices with integral codec for highest audio quality

Evolution of TI DSP family as used in the IC-7700



IC-7700 Screen Display

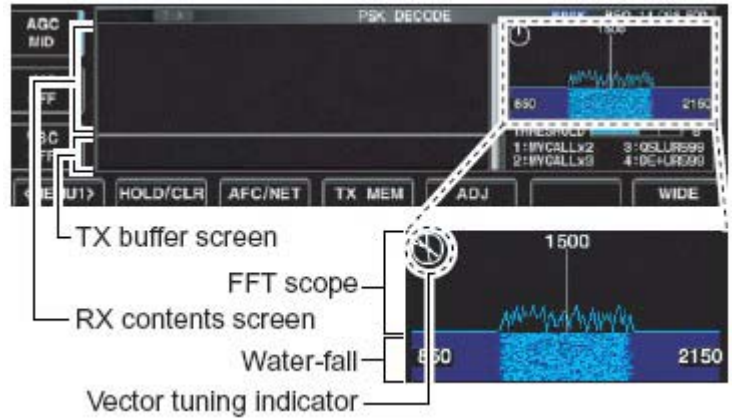
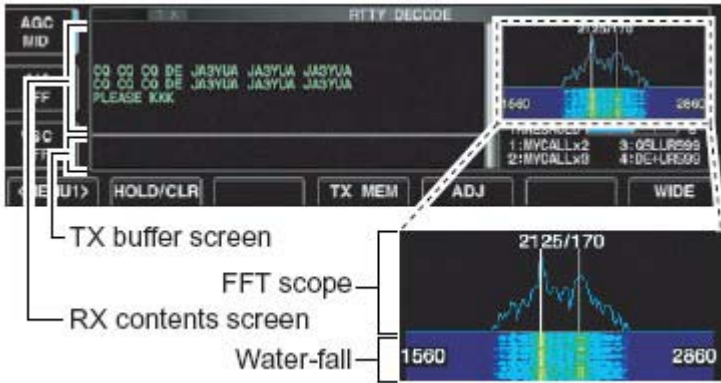
Spectrum Scope: ± 2.5 kHz span, 100 Hz RBW



BW: IF Bandwidth
SFT: Passband Shift
BPF: Tight Shape Factor
F-BKIN: QSK

IC-7700 RTTY & PSK31 Displays

RTTY & PSK31 TX/RX text fields & tuning aids



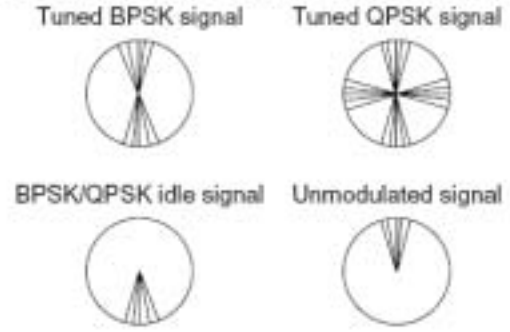
RTTY

PSK31

RTTY DECODE SET	
AGC MID	RTTY FFT Scope Averaging OFF
	RTTY FFT Scope Waveform Color [Blue] [Red] [Green] [Yellow] [Magenta] [Cyan] [White]
1/4	RTTY Decode USOS ON
OFF	RTTY Decode New Line Code CR,LF,CR+LF
	RTTY Diddle BLANK
	RTTY TX USOS ON
VSC	RTTY Auto CR+LF by TX ON
OFF	RTTY Time Stamp ON

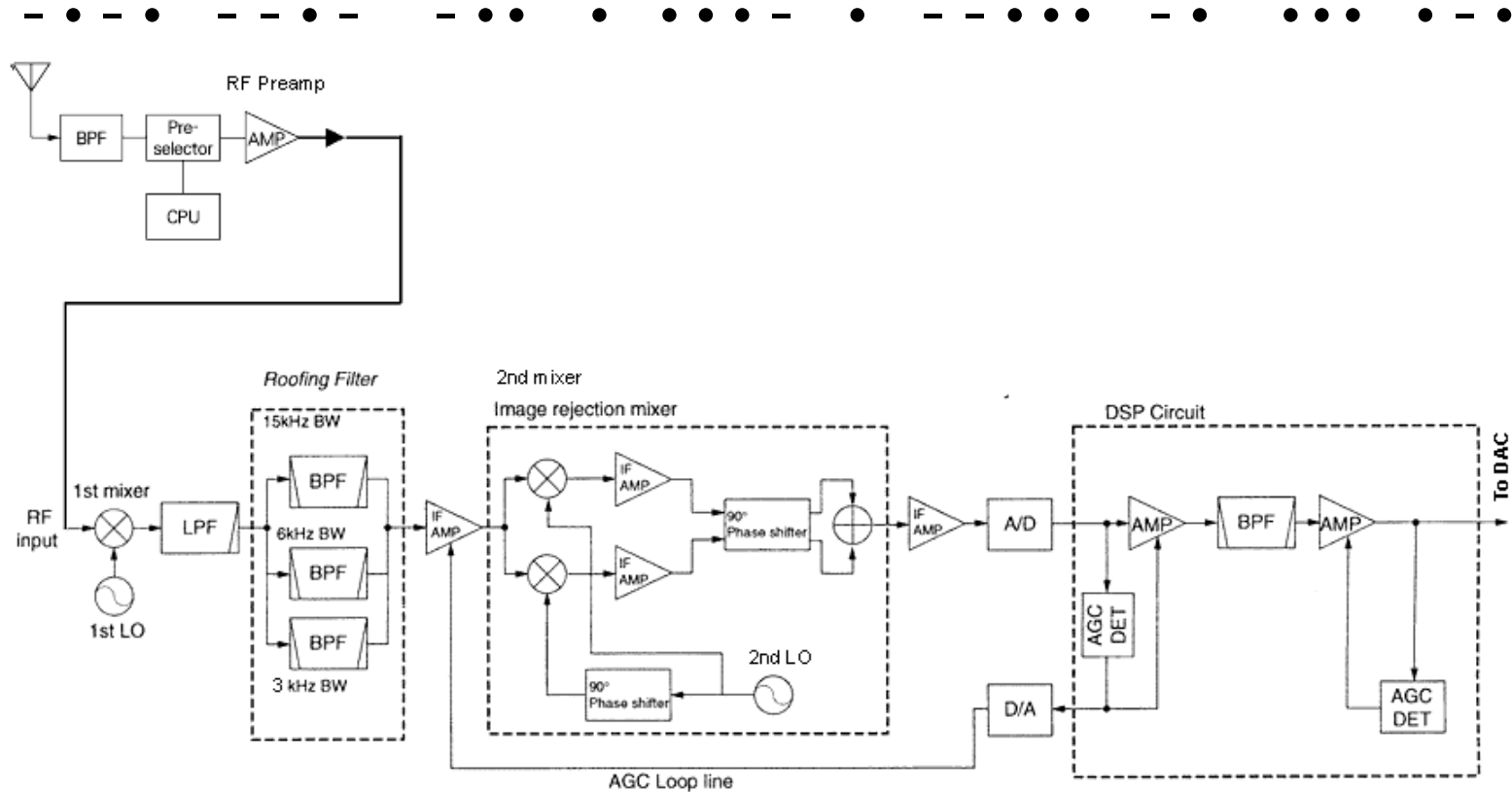
RTTY Decoder Setup Menu

Vector tuning indicator indication example



IC-7700 Receiver

Simplified Block Diagram



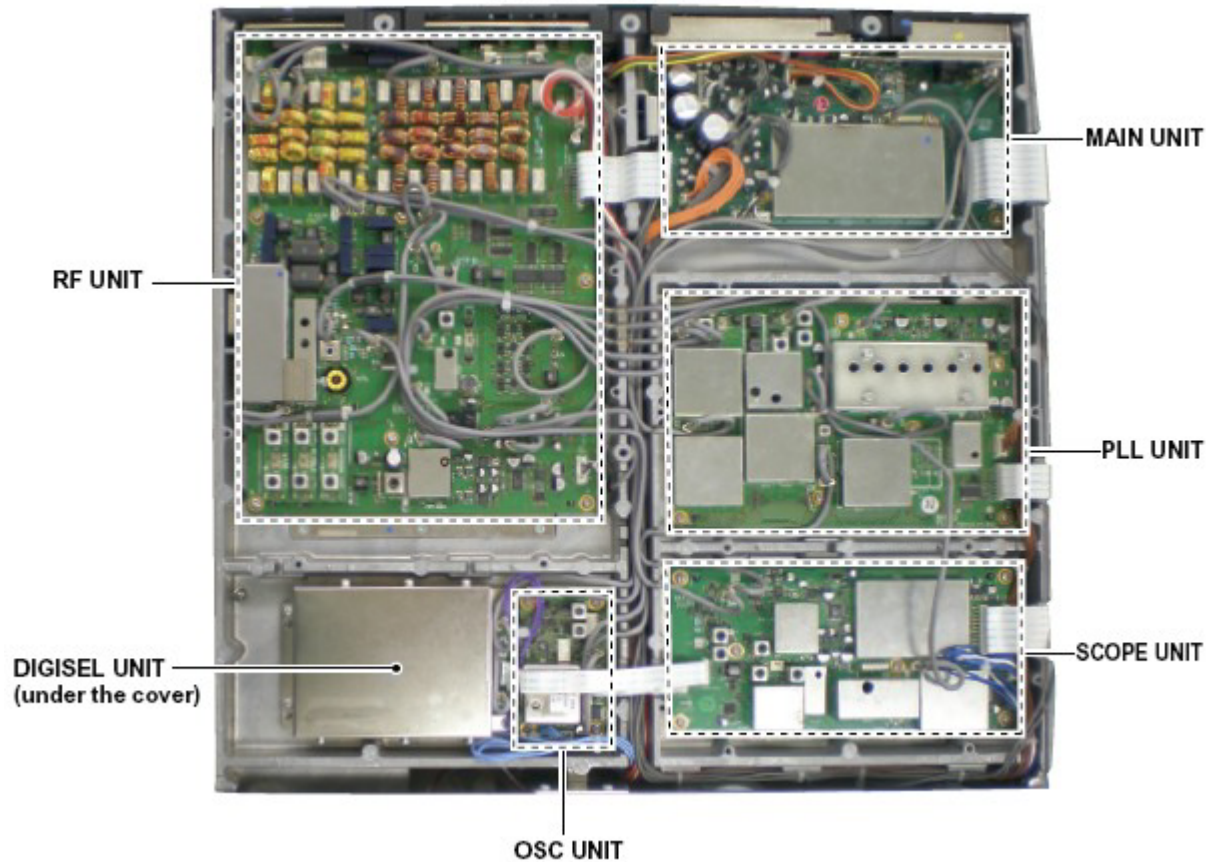
Receiver block diagram

IC-7700 Interior View

Chassis underside

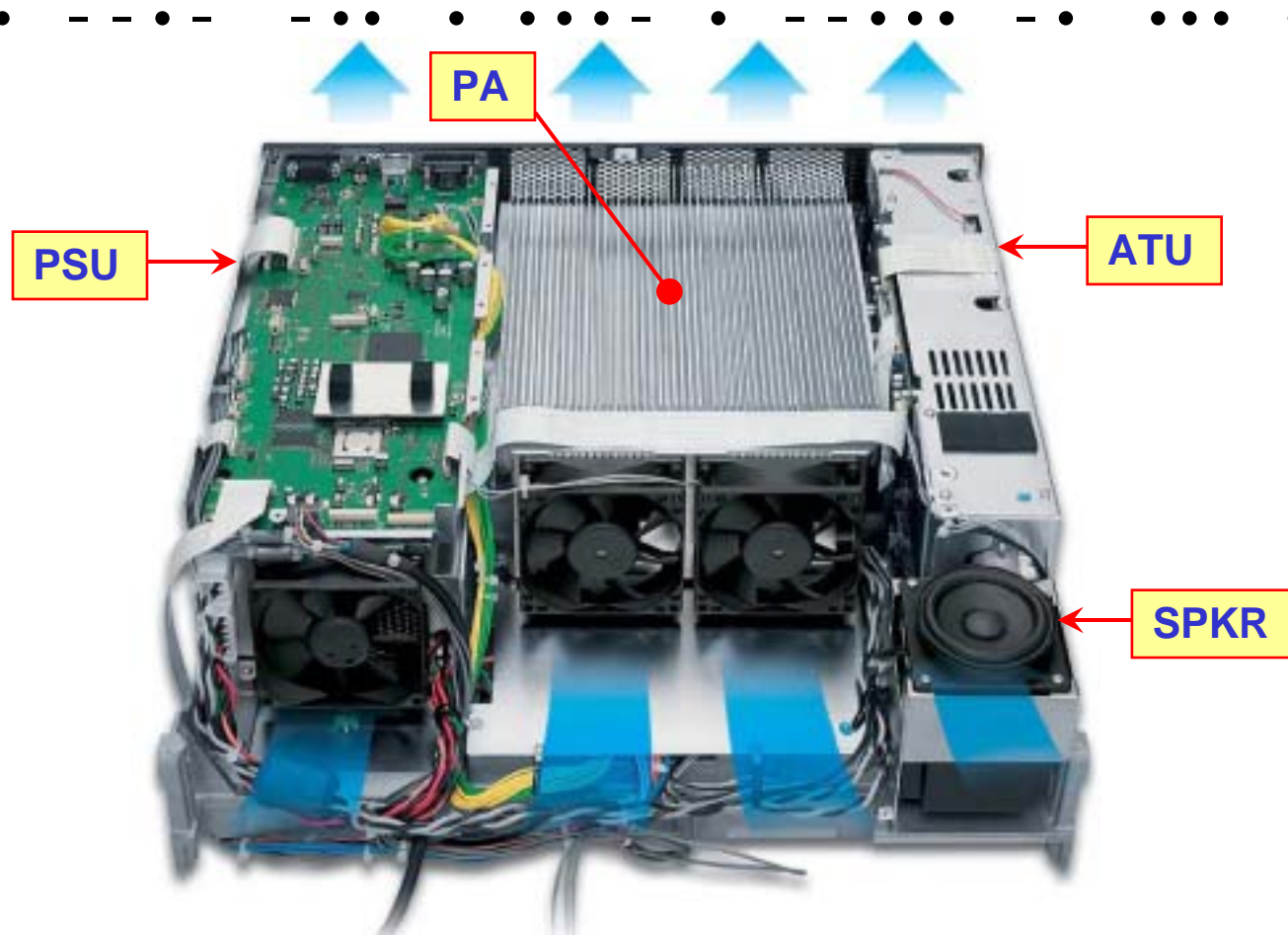


(viewing from the bottom)



IC-7700 Interior View

Chassis top side, showing airflow

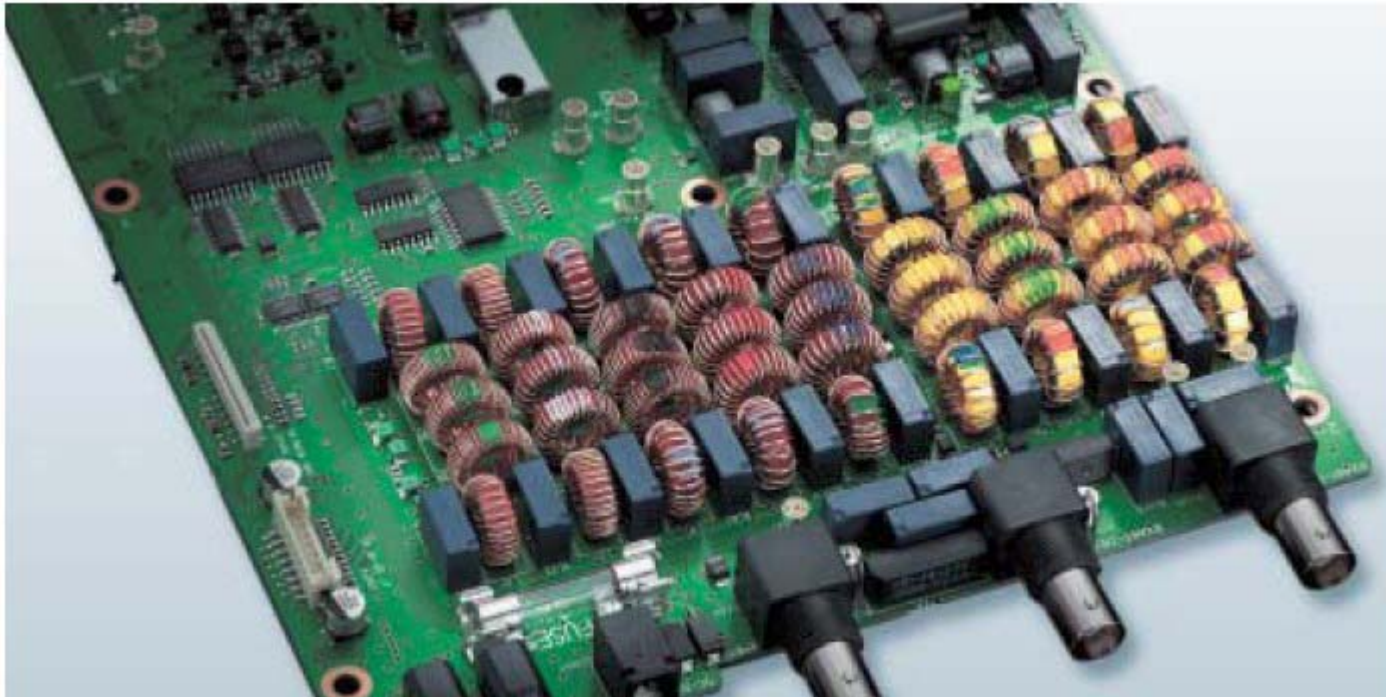


IC-7700 Automatic ATU

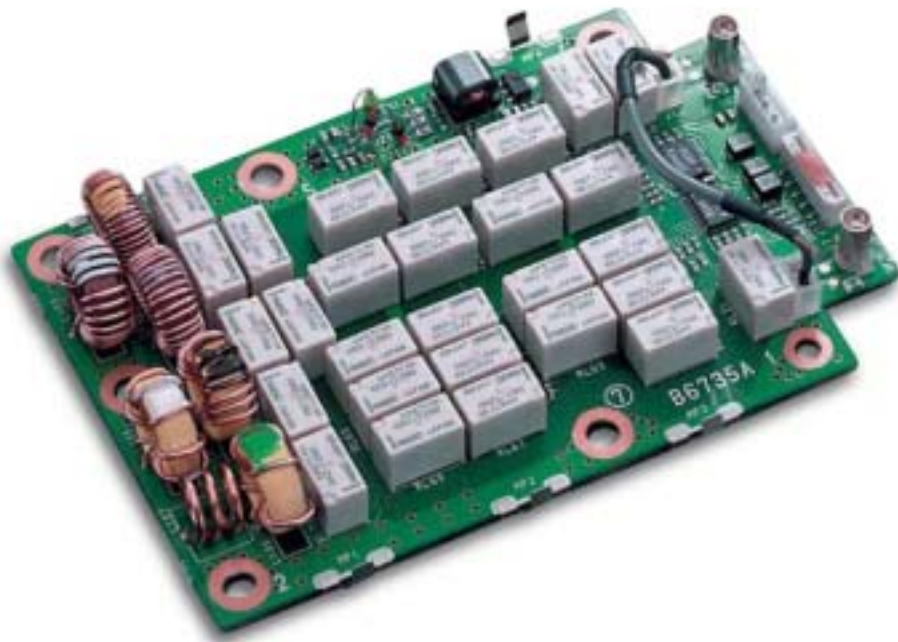


IC-7700 RX BPF Unit

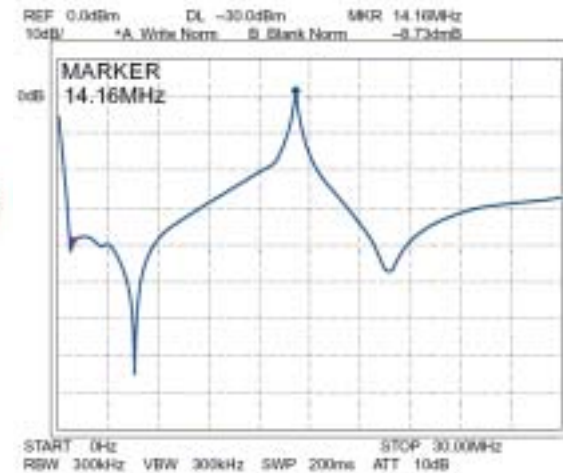
Note filter selection relays & large toroid cores



IC-7700 *Digisel* Preselector and characteristics at 14 MHz



DIGI-SEL Characteristics in 14MHz band



IC-7700 200W PA Unit

showing heatsink and MRF150 PA devices



IC-7700 10 MHz OCXO

Stability: 5×10^{-8}



OCXO unit

IC-7700 Component Details



BPF coil detail



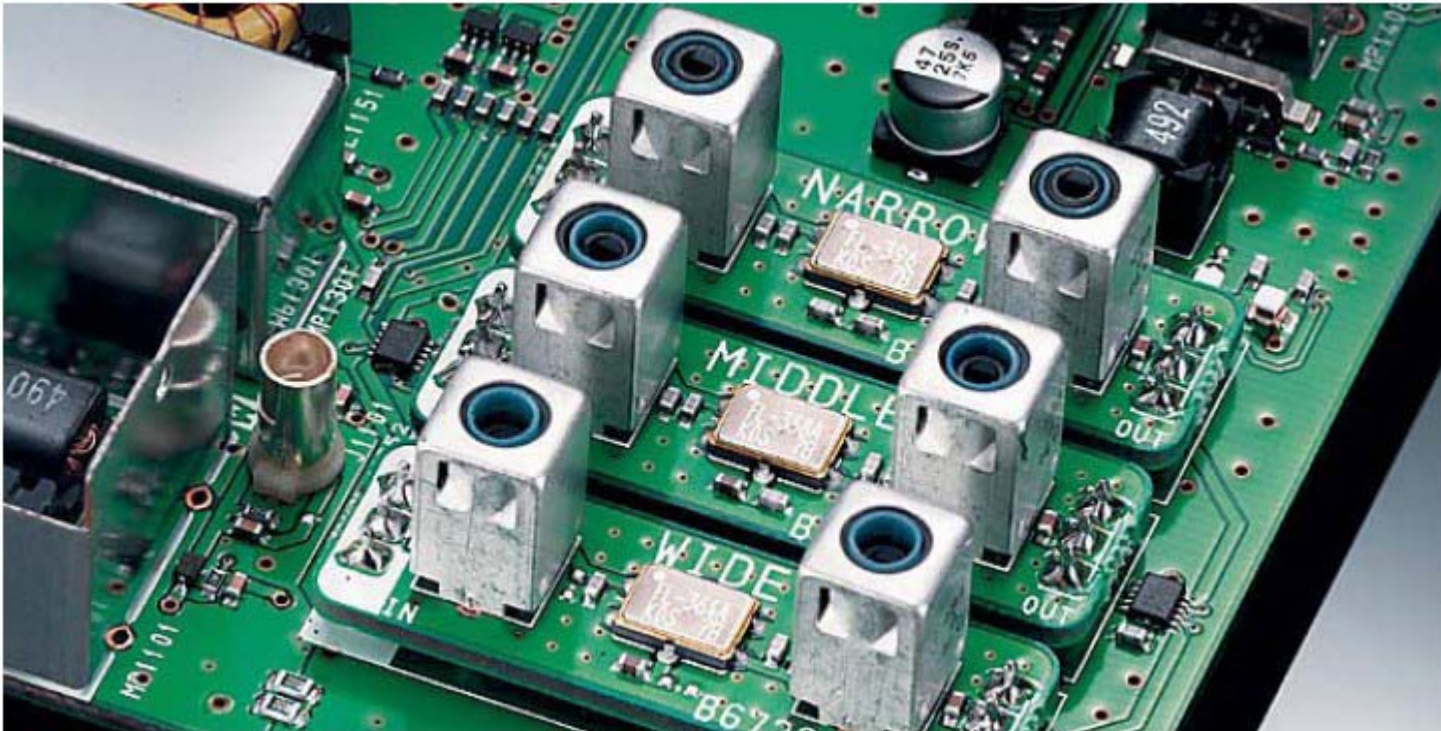
RF relay with bifurcated noble-metal contacts



TX/RX DSP IC (250 MHz clock)

IC-7700 Roofing Filter Group

WIDE 15 kHz, MIDDLE 6 kHz, NARROW 3 kHz

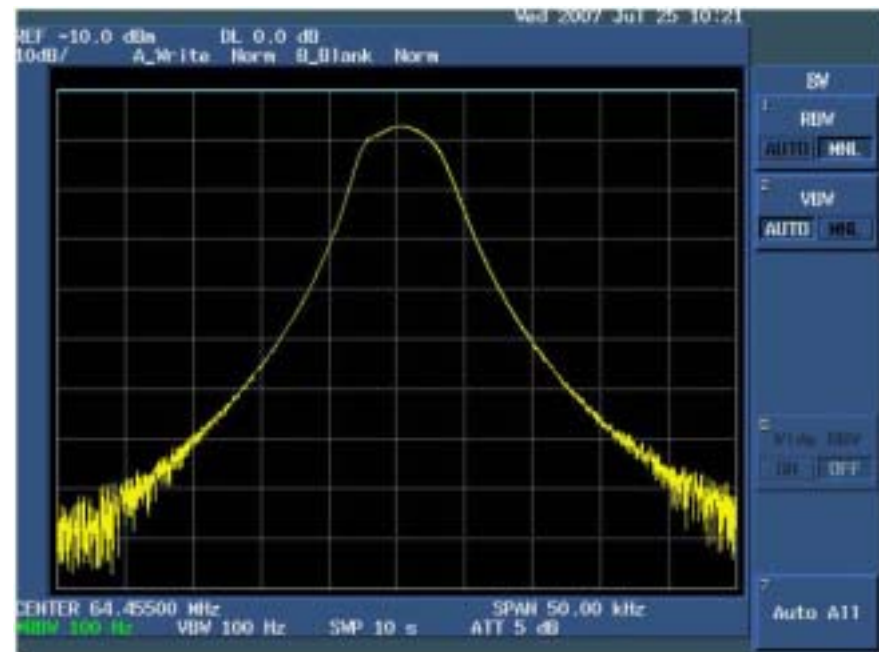


The MCF roofing filters are at the 64.455 MHz 1st IF output of the 1st mixer. They are optimized for minimum passive IMD, to ensure best strong-signal handling.

3 kHz Roofing Filter Passband

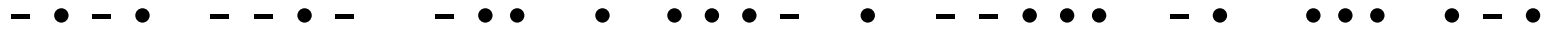


3 kHz roofing filter detail



3 kHz roofing filter passband (50 kHz span)

Links for further study



- <http://www.icom.co.jp/world/products/amateur/hf/ic-7700/>
- <http://www.icomamerica.com/en/products/amateur/hf/7700/default.aspx>
- <http://www.ab4oj.com/icom/ic7700/main.html>