

# FT-991

HF/VHF/UHF  
ALL MODE TRANSCEIVER

Super-Advanced Receiver Circuitry Combined With Intuitive Operation  
Further Raises the Bar for Compact All Mode Transceivers



# New generation FT-991 all-band transceiver offers full-fledged support for all modes

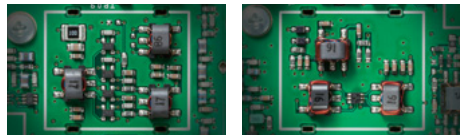
## Uncompromising Receiver Circuit Design Ensures Excellent Basic Performance from HF to VHF/UHF

Sophisticated receiver front end on a par with FTDX Series Transceivers

- Triple conversion with 1st IF frequency of 69.450 MHz for all bands
  - 1st IF stage implements a narrow bandwidth 3 kHz roofing filter as standard equipment  
Designed for outstanding adjacent multi signal characteristics, not only in HF but also in VHF and UHF bands.
  - Features the highly acclaimed quad mixer of the FTDX series transceivers, along with a dedicated VHF/UHF mixer
- The 1st IF mixer for HF/50 MHz features a quad mixer with four 3SK294 dual-gate MOS-FET devices that assures extremely low noise, excellent intermodulation characteristics, and high dynamic range. A dedicated VHF/UHF mixer, separate from the HF bands, allows design optimization for targeted frequencies, resulting in superior performance characteristics.



3 kHz and 15 kHz Roofing Filter

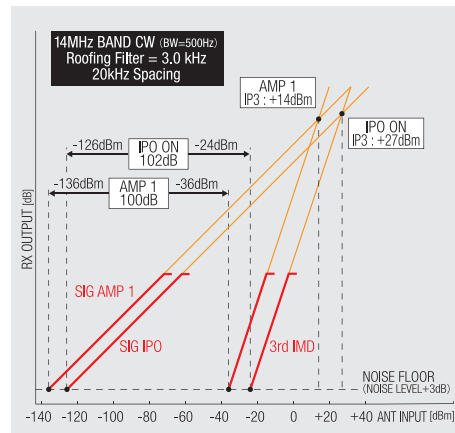


HF/50 MHz Quad Mixer

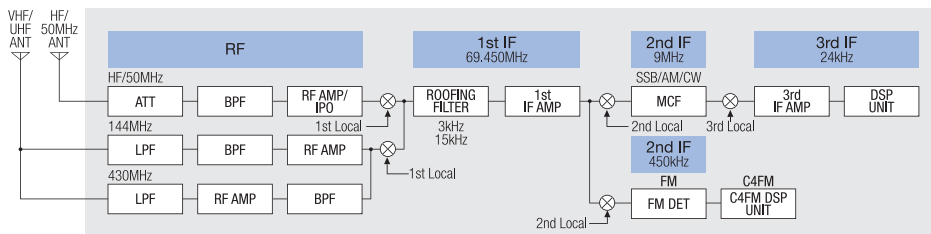
VHF/UHF Mixer

RF amplifier design is optimized for each band

- Selectable IPO/AMP1/AMP2 (HF/50 MHz) settings for optimized operation with any received signal
  - Separate RF amplifiers provide best characteristics for each band
- The IPO, AMP1 and AMP2 selections for the HF/50 MHz bands allows matching the settings to the current band and conditions, in order to ensure optimal RF amplifier operation. The RF amplifier for the 430 MHz band uses high-electron-mobility transistor (HEMT) NE3509 devices which maintain good performance also in the GHz range, combining high gain with a low NF (Noise Figure).



I DR (IMD Dynamic range) / IP3 (3rd-Order Intercept Point) characteristics



Receiver Block Diagram

## IF DSP from YAESU is Famous for Superb Interference Rejection

Same high-speed floating point DSP as used in FTDX Series

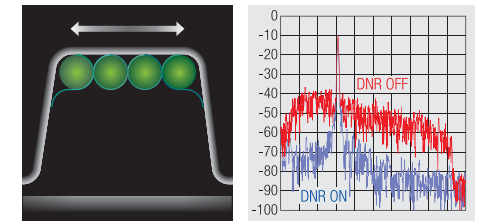
The high speed floating point DSP chip TMS320C6746 (3000 MIPS / 2250 MFLOPS) from Texas Instruments makes possible excellent interference rejection with actual signals under real-world conditions, not only in the HF but also in the VHF and UHF bands.



32-bit High Speed Floating Point DSP

Highly effective interference rejection

The IF WIDTH and IF SHIFT functions that form the basis of removing interfering signals are of course implemented to best effect. The efficacy of interference rejection is further enhanced by sophisticated functions inherited from the FTDX series such as 16-stage digital noise reduction and the DNF (AUTO NOTCH) filter that rapidly tracks even multiple beats. The CONTOUR function that brings the desired signal easily into focus with a natural sound; the NOTCH function with selectable bandwidth, and other functions are provided for comfortable and convenient DX and Contest QSO operation.



CONTOUR Filter Conceptual Diagram

Digital Noise Reduction Performance

## Final Stage with Ample Power Reserves: 100 W for HF/50 MHz Band and 50 W for VHF/UHF Band

High quality push-pull amplifier with 100 watts for HF/50 MHz

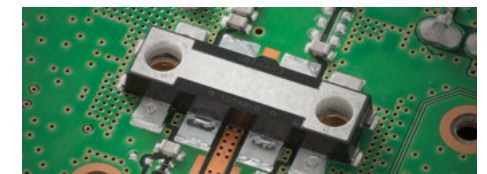
Using a push-pull arrangement of RD100HHF1 MOS-FET devices renowned for excellent performance in the HF/50 MHz range, the amplifier delivers 100 watts of low-distortion, high-quality power.

50 W amplifier for VHF/UHF assures plenty of power for high frequency bands

The final amplifier for the VHF and UHF bands uses the high-output MOS-FET RD70HUF2 device which incorporates two MOS-FETs in a single package, providing ample output power of 50 watts.

High speed 1.8 to 54 MHz antenna tuner included as standard equipment

The high speed digital tuner employs relay switching and features a large 100-channel tuning data memory. This allows the user to instantly call up optimum matching conditions for previously used frequencies.



V/UHF Final MOS FET RD70HUF2 Device



# including HF/50/144/430 MHz in a single compact unit

HF/VHF/UHF ALL MODE TRANSCEIVER **FT-991**

## Latest Touch Panel Operation Combined With Traditional Layout Realizes Optimal Ease of Use

3.5 inch full color touch panel display for convenient comfortable operating

- Full color TFT LCD display provides useful information about function status and settings at a glance
- Highly responsive panel with functional design and intuitive layout makes touch operation a pleasure
- Four user-customizable function keys offer quick access to mode-dependent assignments
- Traditional layout of Main Dial knob and related controls makes experienced users feel right at home



Function Key Display



Group Monitor Display

## Advanced Spectrum Scope Function With Waterfall Display Capability

- High resolution spectrum scope that is not usually found in this class of transceiver, permits instant evaluation of band conditions
- ASC function automatically switches between the Scope sweep and the receive audio in conjunction with the tuning operation



Spectrum Scope Display (Waterfall Mode)

## Support for Advanced C4FM Digital Functions

- V/D mode for simultaneous transmission of voice and data with powerful error correction optimal for mobile use, and Voice FR (Full Rate) mode for high quality audio transmission
- AMS function instantly recognizes digital mode or FM mode and enables mutual communication
- GM (Group Monitor) function allows easy on-screen checking for group members within range
- 126 types of DSQ (Digital Squelch) enable pinpoint selection of communication stations

\* Transmission and reception of image data by C4FM digital is not possible.

## Basic function

[ Versatile Array of Functions for CW Operation ] [ Convenient Function for FM Mode ]

- Advanced electronic keying (4 to 60 wpm) with FULL BK-IN support
- Electronic Keyer Weight control (2.5 - 4.5)
- CW side tone pitch frequency adjustable (300 - 1050 Hz)
- Message Memory function (5 ch x 50 characters)
- APF function with 3-stage bandwidth selection improves S/N ratio for enhanced intelligibility
- Auto Zero-in function facilitates subtle tuning operations for CW
- Automatic "Beacon" keyer mode
- CW SPOT Feature
- CW Mode reversal (USB or LSB injection)
- 104 types of DCS (Digital Code Squelch)
- ARS function provides easy repeater access
- 50-tone CTCSS Encoder/Decoder for FM operation



HF/VHF/UHF 100 W All Mode Transceiver **FT-991**  
 (144 MHz/ 430 MHz 50 W)



## Other Useful and Convenient Functions

- Speech Processor ■ Parametric MIC EQ ■ Five-channel digital voice message memory function for repetitive voice messages ■ MULTI dial design facilitates setting operations ■ Key button Illumination by White LEDs
- Independent AF GAIN and RF GAIN, and CLAR/VFO-B knob ■ FH-2 Remote Control (Optional) ■ VOX ■ MOX ■ 99 channel memory (supports memory group view, 12 alphanumeric characters) ■ RTTY/DATA Jack
- TUN/LIN connector allows connection of optional VL-1000 or FC-40 ■ Wide Band Receive Capability (30kHz-56MHz, 118-164MHz, 420-470MHz) ■ CS key brings up a preselected menu with a single touch
- USB port allows connection to a PC with a single cable (CAT control, Audio In/Out interface, PTT/RTTY(FSK) SHIFT control) ■ High Stability 0.5 ppm TCXO ■ Carrying Handle ■ Tilt Stand

## Specifications

General	
RX Frequency Range	0.03 - 56 MHz, 118 - 164 MHz, 420 - 470 MHz (operating), 1.8 - 54 MHz, 144 - 148MHz, 430 - 450 MHz (specified performance, Amateur bands only)
TX Frequency Ranges	1.8 - 54 MHz, 144 - 148MHz, 430 - 450 MHz (Amateur bands only)
Frequency Stability	±0.5 ppm (after 1 minute @14°F - +122°F/-10°C - +50°C)
Operating Temperature Range	+14°F - +122°F (-10°C - +50°C)
Emission Modes	A1A (CW), A3E (AM), J3E (LSB, USB), F2D, F3E (FM), F7W (C4FM)
Frequency Steps	5 / 10 Hz (SSB, CW, AM), 100 Hz (FM, C4FM)
Antenna Impedance	50 Ohms, unbalanced 16.7 - 150 Ohms, unbalanced (Tuner ON, 1.8 - 30 MHz Amateur bands) 25 - 100 Ohms, unbalanced (Tuner ON, 50 MHz Amateur band)
Power Consumption (Approx.)	RX (no signal) 1.8 A RX (signal present) 2.2 A TX 23 A (HF/50MHz 100 W), 15 A (144/430MHz 50 W)
Supply Voltage	DC 13.8 V ±15 % (Negative Ground)
Dimensions (W x H x D)	9.0" x 3.2" x 10" (229 x 80 x 253 mm)
Weight (Approx.)	9.5 lbs (4.3 kg)
Transmitter	
Power Output	HF/50MHz: 5 - 100 watts (2 - 25 watts AM carrier) 144/430MHz: 5 - 50 watts (2 - 12.5 watts AM carrier)
Modulation Types	J3E (SSB): Balanced / A3E (AM): Low-Level (Early Stage) F3E (FM): Variable Reactance / F7W (C4FM): 4-level FSK
Maximum FM Deviation	±5.0 kHz / ±2.5 kHz
Harmonic Radiation	Better than -50 dB (1.8 - 30 MHz Amateur bands) Better than -63 dB (1.8 - 30 MHz Amateur bands, above 30MHz)*1 Better than -63 dB (50 MHz Amateur band) Better than -60 dB (144 MHz, 430 MHz Amateur bands)
SSB Carrier Suppression	At least 50 dB below peak output
Undesired Sideband Suppression	At least 50 dB below peak output
Bandwidth	3 kHz (LSB/USB), 500 Hz (CW), 6 kHz (AM), 16 kHz (FM/C4FM)
Audio Response (SSB)	Not more than -6 dB from 300 to 2700 Hz
Microphone Impedance	600 Ohms (200 to 10kOhms)

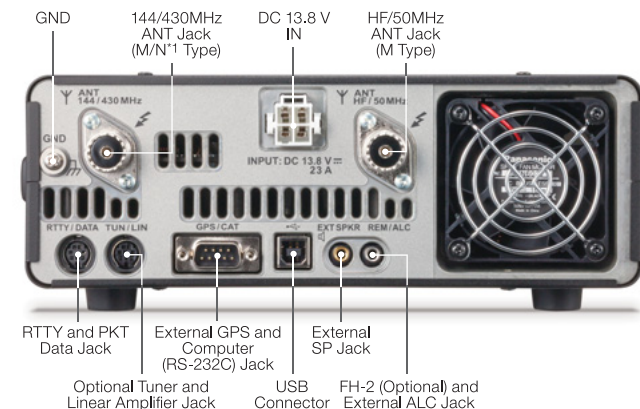
Receiver			
Circuit Type	SSB/CW/AM: Triple-conversion Super heterodyne FM/C4FM: Double-conversion Super heterodyne		
Intermediate Frequencies	SSB/CW/AM: 69.450 MHz / 9.000 MHz / 24 kHz FM/C4FM: 69.450 MHz / 450 kHz		
Sensitivity	SSB/CW (BW: 2.4 kHz, 10 dB S+N/N) 0.158 µV (1.8 - 30 MHz) (AMP 2), 0.125 µV (50 - 54 MHz) (AMP 2) 0.11 µV (144 - 148 MHz), 0.11 µV (430 - 450 MHz) AM (BW: 6 kHz, 10 dB S+N/N, 30 % modulation @400 Hz) 5 µV (0.5 - 1.8 MHz) (AMP2), 1.6 µV (1.8 - 30 MHz) (AMP 2) 1.25 µV (50 - 54 MHz) (AMP 2) FM (BW: 15 kHz, 12 dB SINAD) 0.35 µV (28 - 30 MHz) (AMP 2), 0.35 µV (50 - 54 MHz) (AMP 2) 0.18 µV (144 - 148 MHz), 0.18 µV (430 - 440 MHz) There is no specification for frequency ranges not listed.		
Squelch Sensitivity (TYP.)	SSB/CW/AM 1.0 µV (1.8 - 30 MHz, 50 - 54 MHz, AMP 2) 1.0 µV (144 - 148 MHz, 430 - 450 MHz) FM 0.35 µV (28 - 30 MHz, 50 - 54 MHz, AMP 2) 0.125 µV (144 - 148 MHz, 430 - 450 MHz) There is no specification for frequency ranges not listed.		
Selectivity	Mode	-6 dB	-60 dB
	CW SSB AM FM	0.5 kHz or better 2.4 kHz or better 6 kHz or better 12 kHz or better	0.75 kHz or less 3.6 kHz or less 15 kHz or less 30 kHz or less (-50dB)
Image Rejection	70 dB or better (160 - 6m Amateur bands) 60 dB or better (2m, 70cm Amateur band)		
Maximum Audio Output	2.5 W into 4 Ohms with 10% THD		
Audio Output Impedance	4 to 8 Ohms (4 Ohms: nominal)		
Conducted Radiation	Less than 4 nW		

Specifications are subject to change, in the interest of technical improvement, without notice or obligation, and are guaranteed only within the amateur bands.  
Supplied Accessories: MH-31A8J Hand Microphone, T9025225 DC Cable

## Option

QUADRA SYSTEM				
<b>VL-1000</b> HF - 50 MHz 1 kW Linear Amplifier *2 *3 *4 (50 MHz: 500 W/USA Version) Automatic Antenna Tuner Built In				
<b>VP-1000</b> VL-1000 Power Supply *2 *3 *4				
 <b>MH-31A8J</b> Hand Microphone	 <b>MH-36E8J</b> DTMF Hand Microphone	 <b>MD-200A8X</b> Ultra High fidelity Desktop Microphone	 <b>MD-100A8X</b> Desktop Microphone	 <b>YH-77STA</b> Stereo Headphones Microphone
 <b>FH-2</b> Remote Control Keypad *3	 <b>FC-40</b> Automatic Antenna Tuner *4 (for Long wire antenna)	 <b>CT-58</b> Band Data Cable for VL-1000*2 *3 *4	 <b>CT-39A</b> Packet Interface Cable	 <b>ATAS-120A</b> Active Tuning Antenna *4 (Automatic Type)
 <b>FP-1023A</b> (USA Only) External Power Supply (13.8 VDC 23 A)	 <b>FP-1030A</b> External Power Supply (13.8 VDC 25 A)	 <b>ATBK-100</b> Antenna Base Kit *4 (for BASE operation on 6 m, 2 m and 70 cm Bands)	 <b>MMB-90</b> Mobile Bracket	 <b>ATAS-25</b> Active Tuning Antenna (Manual Type)

## Rear Panel



About this brochure: We have made this brochure as comprehensive and factual as possible. We reserve the right, however, to make changes at any time in equipment, optional accessories, specifications, model numbers, and availability. Precise frequency range may be different in some countries. Some accessories shown herein may not be available in some countries. Some information may have been updated since the time of printing; please check with your Authorized Yaesu Dealer for complete details.

\*1 European version only \*2 USA and Asian version only \*3 VL-1000 and FH-2 cannot be used simultaneously \*4 VL-1000, FC-40, and ATAS-120A cannot be used simultaneously

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