BDR IDR IP3 Seeking to Achieve the Ultimate...

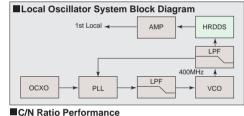
Our high-tech Local Oscillator system is the foundation providing weak signal detection without noise degradation in a close-in, strong signal environment.

World s First 400 MHz HRDDS Dramatically Improves Weak Signal Reception in Strong Signal Environments

In order to make a dramatic improvement in multisignal, close-in strong signal handling performance, new thinking was required in the crafting of the first local oscillator (LO), critical to the process because it feeds the important first mixer of the receiver. A noisy first LO can cause irreparable degradation to the received signal, as the noise cannot be removed in succeeding stages of the receiver. Traditional PLL systems, in seeking to achieve a rapid lock time, suffer a rapid rise in LO noise around the carrier signal. The HRDDS (High Resolution Direct Digital Synthesizer) system being introduced in the FT DX 9000 Series utilizes a direct locking technique using a 400 MHz reference signal, resulting in a lock time that approaches zero; because the lock time is zero, the inversely-related C/N ratio has no degradation close-in, resulting in unprecedented maintenance of the signal-to-noise ratio close to your operating

frequency and the BDR performance follows suit

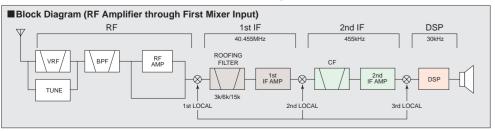
HRDDS Modu



7.5 dla BJ W. New Bark Bullack Raw 7.51 dla 54,45500 HBz SW4 20,00 HBz SW4 20,00 HBz

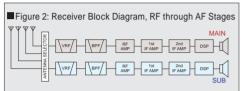
Triple Conversion Receiver using Gain Distribution Optimization

In the FT DX 9000, a gain-optimized triple-conversion super-heterodyne receiver architecture is employed, utilizing IFs of 40 MHz, 455 kHz, and 30 kHz



HF operation.

(FM 3rd IF: 24 kHz). Each stage is carefully filtered, and its gain balanced against the other IF stages' gains, to optimize net system performance. The system architecture does not require extraneous circuits for image rejection, resulting in an efficient design without unnecessary stages that can provide opportunities for performance degradation. And the Dual Receive circuit architecture, from the RF stage through the AF stage and to the speaker, provides identical circuitry on both Main and Sub sides, so system performance is unchanged when listening to either receiver (Dual Receive is an available option for the "Contest" version).



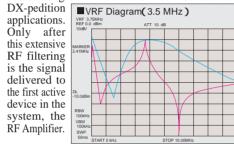
Ultra-Strong RF Front End

Yaesu's renowned VRF (Variable RF Filter), working in conjunction with a carefully-engineered bank of fixed bandpass filters, provides the first line of defense against strong out-of-band signals that could compromise RF Amplifier and 1st Mixer performance. By reducing the ingress of energy from very strong sources like Shortwave Broadcast, local AM/FM/TV stations, and other signal sources, the overall purity of the spectrum delivered to the RF Amplifier and subsequent stages is maintained, and the system BDR is also enhanced.

The RF Amplifier stage consists of a pair of SST310 Junction FETs in a parallel push-pull configuration to provide low noise figure and excellent immunity to blocking and Intermodulation. Following the RF Amplifier is the 1st Mixer, crafted using four SST310s in a doubly-balanced configuration ideal for optimizing IMD rejection in a multi-signal environment. Gain distribution in the front end is carefully balanced, as are stage gains throughout the receiver. The power supply in the front end runs at 22 Volts, further enhancing strong-signal performance. And the 1st Mixer, being an active type, does not contribute loss to the signal path, so frequently there is no need to use the RF amplifier stage at all (IPO - Intercept Point Optimization mode), but rather you may directly feed the 1st mixer. With IPO engaged, a 3rd-order Intercept Point of at least +40 dBm is easily realized. For operation on the 50 MHz band, a lower Noise Figure is sometimes important, especially for owners in very quiet locations operating EME (Moonbounce) or other very-weak-signal modes. So for 50 MHz operation, Yaesu's engineers have designed a special doubly-balanced RF Amplifier using four 2SK520 Junction FETs to push the Noise Figure well below what is required during

Powerful VRF (Variable RF Filter)

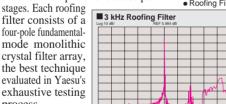
Building on the experience and performance realized in the Mark-V FT-1000MP Series, Yaesu's engineers have incorporated an enhanced Variable RF Filter (VRF) system in the FT DX 9000 Series. Acting as a high-Q "preselector" in the front end, the VRF provides an RF passband of about 100 kHz. with ultimate rejection outside the passband in excess of 40 dB, in cascade with the 17 fixed bandpass filters (10 for Amateur bands, 7 for General Coverage reception), for unmatched rejection of out-of-band energy. And because the center frequency of the VRF may be adjusted, it is possible to enhance the rejection of a particular interference source by a simple rotation of a front panel knoboutstanding for multi-transmitter Contest and



First IF 3 kHz Roofing Filter

In the 40 MHz 1st IF, three selectable roofing filters are provided, in bandwidths of 3 kHz, 6 kHz, and 15 kHz, to protect the following 15 kHz, to protect the following stages from strong signals that could degrade dynamic range in the first IF amplifier and subsequent

filter consists of a four-pole fundamentalmode monolithic crystal filter array, the best technique evaluated in Yaesu's exhaustive testing process.



Enjoy the New World of YAESU 32-bit Floating-Point DSP, Crafted for Real Improvement in HF Receiver Performance

The new IF DSP system, utilizing a TI TMS320C6711 device, is a high-speed 32-bit floating point circuit designed with a unique objective: to do away with the "digital" sound of many DSP filtering systems, and emulate the "Analog Sound" so familiar and comfortable to HF DX and Contest operators. Special attention has been paid to AGC design within the DSP, so as to retain the "feel" of analog receiver performance. The result, after thousands of hours of testing, revision, and final evaluation, is a leading-edge receiver that has the "feel" of a traditional analog receiver, but with the flexibility and superb filtering capability of a modern digital filtering system.

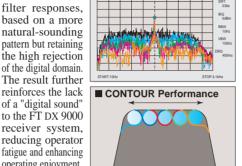
The IF DSP system brings the operator razor-sharp, precise adjustment capability of the dual filtering concept known traditionally as IF Shift and IF Width controls. These filter systems allow both the width of the IF passband, and the center frequency of the filter response, to be continuously adjusted;

the result is the perfect passband response, without a complicated adjustment procedure. Precise adjustment is facilitated by the largediameter adjustment knobs on the front panel.

With high-performance DSP filters, the steep shoulders and unrelenting rejection of interference can create an unfamiliar sound on incoming signals. In the Mark-V FT-1000MP Series, where analog filters were slaved with a DSP filter according to analysis of the analog filter characteristics, the resulting response was completely natural-sounding. Building on this experience, Yaesu's engineers

entirely new set of CONTOUR filter responses. based on a more natural-sounding pattern but retaining the high rejection of the digital domain. The result further of a "digital sound" to the FT DX 9000 receiver system, reducing operator fatigue and enhancing operating enjoyment.

have created an NOISE REDUCTION advaided and values a \bigcirc



Another high-performance aspect of the IF DSP system is the NOTCH filter capability. Both manually-adjustable Notch and automatic beatelimination filters are provided; combined with the DSP Noise Reduction filters, the IF DSP system

provides an **NOTCH Filter Performance** incredible array of tools for interference rejection and -30 enhancement of intelligence recovery.

New Mu (µ) Narrow-bandwidth High-Q RF Filter Using Large-Diameter (28 mm) Coils

Operation on the low bands, especially 1.8 MHz frequently involves very strong signals from close-by broadcast stations, with signal voltages much greater than on the high bands due to NVIS propagation and large antenna size. Heretofore no RF filtering system in an Amateur Transceiver was fully equipped to cope with this challenge, but Yaesu's new "µ" filter breaks new ground, thanks to the high Q (300 or more) afforded by the large 28 mm (1.1") diameter coils used in filter construction. As the ferrite tuning slug is passed through the coil structure, the center frequency is adjusted, and the 3 dB bandwidth is approximately ±12 kHz on 1.8 MHz (-30 dB bandwidth ±450 kHz). A high-accuracy, lownoise stepper motor provides precise adjustment of the μ filter, and the signal peaking is provided via a front panel control. And with a distortion obtainable with the FT DX 9000's total area of approximately 55 mm (2.2"), the μ filter is capable of operation from 1.8 MHz you have front-panel control over the bias level

through 14 MHz (three modules required). The μ filter builds on the action of the VRF and fixed bandpass filters to provide the steepest RF selectivity ever provided in an Amateur transceiver. The μ system is capable of operation on any band between 160 meters and

20 meters, and it consists of three structures: one is for 1.8 MHz, another for 3.5/7 MHz, and a third for 10/14 MHz. In the "D version of the FT DX 9000.

all three modules are built in. On Filter Performance other versions, these modules are options and may be added. one by one, to customize the transceiver to your operating needs.

Crystal Oscillator (OCXO)

Serving as the master reference oscillator for the transceiver, the 10 MHz OCXO is a large-area (50 x 50 mm/2" x 2") oscillator operating at high temperature, for ultra-high thermal stability for the oscillator components. The resulting frequency stability precision is truly amazing: it's rated at 0.03 ppm over the temperature range -10° to $+60^{\circ}$ C $(-14^{\circ}$ to $+140^{\circ}$ F)!

New-Design High-Power Final Amplifier section

The 400-Watt version of the FT DX 9000 features an all-new parallel, push-pull design utilizing SD2931 MOS FET amplifier transistors, operating at 50 Volts, for highly stable, low-distortion power output from the transmitter. The careful biasing and robust heat sink construction permit longduration operation at 400 Watts out, more power than available on any other Amateur transceiver. The 200-Watt version also uses push-pull SD2931 devices. The high-capacity 2750 cc heat sink (400 W type) uses a large aluminum structure with a high coefficient of thermal conductivity, significantly reducing the temperature rise during long periods of continuous operation. The thermostatically-controlled 120 mm (4.7") brushless axial fan cools the heat sink efficiently, and the efficiency of the system holds down fan noise, important for nighttime use. The heat sink temperature may be monitored on the TFT or analog meters on the right side (depending on model), providing reassurance of safe operation even during long late-night rag-chews. MOS FET SD293

Low-distortion Class-A Operation

YAESU VERTEX STANDARD CO., LTD. YAESU EUROPE B.V. 4-8-8 Nakameguro, Meguro-ku, Tokyo 153-8644, Japan P.O. Box 75525, 1118 ZN Schi

For the latest Yaesu news, visit us on the Internet: http://www.vxstd.com

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US Headquarters	Phone 714/827-7600; Fax 714/827-8100
10900 Walker Street, Cypress, CA 90630, U.S.A.	
bout this brochure: we have made this brochure as comprehensive and factual as possible. becifications, model numbers, and availability. Precise frequency range may be different in	

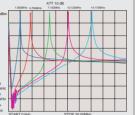
not be sold or leased, or offered for sale or lease, until FCC approval has been obtained

Technical Overview





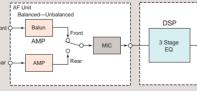
• µ Sv



New Ultra-High-Stability Oven-Controlled



Referring to the next column, note the very low Class A operating capability. In the FT DX 9000,



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Unit 12, Sun Valley Business Park, Winnall Close Winchester, Hampshire, SO23 0LB, U.K.

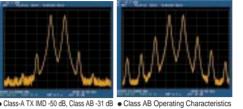
VERTEX STANDARD HK LTD. http://www.vxstd.com.hk

Unit 5, 20/F., Seaview Centre, 139-141 Hoi Bun Road, Kwun Tona, Kowloon, Hona Kona

. We reserve the right, however, to make changes at any time in equipment, optional accessories, 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. This device has not been approved by the ECC. This device may 2004.0905NA(U/E) B9200469 Printed in Japan

adjustment of the operating conditions, from Class A to Class AB! In the 400-Watt version. the power output becomes 100 Watts, and typical 3rd-order IMD drops to -50 dB, while 5th- and higher-order IMD drops below -70 dB! This means that, when exciting a linear amplifier, your linear is not amplifying all those distortion products along with the desired signal! On the 200-Watt versions, Class-A output is 75 Watts. The unique capability to set the desired bias operating point, from Class A to AB, allows you to optimize-on the fly-to optimize the operating conditions you utilize, whether you're in a local, high-fidelity rag-chew or in the heat of battle in a contest.

applied to the final amplifier, affording continuous



Professional-Grade Audio Facilities Including Cannon (XLR) Connector

For audio professionals, a Cannon-type (XLR) balanced connector is provided on the front panel of the transceiver, affording easy connection to Heil

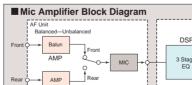
Sound or other high-end microphone systems and processors. And if our microphone has a traditional 8-pin connector, a matching jack s provided on the rear panel he transceiver.



Yaesu Exclusive: Parametric Equalizer Microphone Amplifier

Another design breakthrough on the FT DX 9000 Series is the incorporation of the industry's first three-band Parametric Equalizer Microphone Amplifier. The Parametric Equalizer, compared to simpler designs, allows very precise enhancements of three different ranges of audio frequency response, providing unmatched ability for you to match your radio's response to your voice and microphone. As a result, the sparkling fidelity from your FT DX 9000 will make you the envy of everyone else on the band!

Especially important for operation in Contests and DX pile-ups, the Digital Speech Processor provides a significant increase in average transmitter power output. Utilizing the power of the IF DSP, and leveraging the capabilities of the Parametric Microphone Amplifier, the Digital Speech Processor provides that unique 'Yaesu Punch" on those Sunday afternoon pileups-where DX stations will stop and say "Wow, OM, your audio sounds great!"

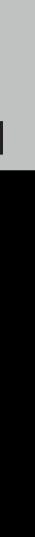


HF Cutting-Edge Transceiver FT DX 9000

Performance







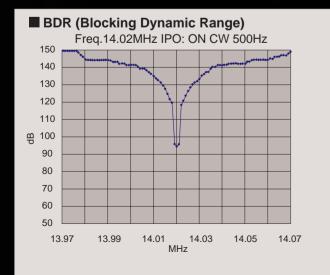
The Eternal Design Priority: Enhance Strong-Signal-Handling Performance in a Crowded, Multi-signal Environment

In elite-class Contest and DX-pedition environments, a large number of high-power stations are calling simultaneously inside a window of only a few kHz. At the very moment one is trying to decipher a signal near the galactic/atmospheric noise floor, this tiny but important signal (at an amplitude of a fraction of a microvolt) may reside alongside multiple signals at RF levels of several volts. At some point, the ability of a receiver's RF, IF, and audio filtering systems to survive this hostile RF environment may well be exceeded; local oscillator noise may rise dramatically inside the receiver, reducing effective sensitivity, and Intermodulation Distortion (IMD) products may obscure weak signals inside the receiving passband.

Recent observations of other high-end products prove the difficulty in optimizing sensitivity, IP3, 3rd-order IMD Dynamic Range, Blocking Dynamic Range (BDR), and Carrier-to-Noise (CN) ratio simultaneously. Indeed, there have been some notable failures. Without striking STDX 9000D the proper balance among all these parameters, the net intelligence recovery from the receiver will be compromised.

Moreover, care must be exercised when evaluating the claimed specifications of high-end receivers, as the precise measurement techniques associated with those specifications may be misleading. For example, a receiver with an outstanding Blocking Dynamic Range, measured with a test signal 100 kHz away, may, nonetheless, have inferior front-end characteristics when signals much closer than 100 kHz are encountered (as they typically are in a Contest or DX-pedition environment). Noise may be generated inside the receiver, to the extent that the desired signal is obscured by the noise or AGC action suppressing the sensitivity. Ultimately, the desired signal is lost.

In the design effort associated with the FT DX 9000 project, the team leaders set, as a top priority, the optimization of all the above-mentioned parameters, in the interest of providing the best net system performance ever achieved in an Amateur Radio transceiver product.



IP3 and Dynamic Range Freq. 14.02MHz IPO: ON Spacing: 100kHz CW 500Hz - 3dB Dynamic Range 110 dB +40dBm

1st IF 3 kHz Roofing Filter Implementation

USB

CW

FM

RTTY

NAR

SPLIT

TXW

Variable RF filter (VRF) and New-Technology "µ" Narrow RF Filter (installed in "D" version)

IF DSP Loaded with Advanced Circuitry, including IF WIDTH, IF SHIFT, IF NOTCH, Filter Shaping Contour Control, Super Multi-function 30 kHz/32-bit Floating Point DSP

Completely Independent Dual Receive system (option on "Contest" version)

High-Level 400 MHz HRDDS Local Oscillator System

Triple Conversion Receiver Architecture

FT DX 9000 Series



Future Production Model: FT DX 9000MP 400 W Version HF/50 MHz Dual Analog Meter Sets, LCD Display, Memory Card Installed, Main and Sub Receiver VRF, Full Dual RX, Switching External Power Supply/Twin Speaker Enclosure.



FT DX 9000D 200 W Version HF/50 MHz Large TFT Display, Built-in Memory Board, Main and Sub Receiver VRF, Full Dual RX. "µ" Tuning (3 modules) Installed, Internal Switching Power Supply



FT DX 9000 Contest 200 W Version HF/50 MHz Dual Meters + LCD, VRF Installed in Main Receiver, Extra Key and Headphone Jacks, Internal Switching Power Supply