505DSP

Computer-Controlled HF Transceiver

A New Approach to Amateur Radio

Fed up with the rows of miniature knobs and buttons found on today's rigs? So were we. After 20 years of building commercial HF radios in Arizona, we decided the time was right for a new approach to amateur radio.

Why Use Knobs If You Have Windows?

Most hams already have the ultimate radio controller in their shack — the personal computer. From our experience building commercial HF transceivers, Kachina felt that the old-fashioned front panel had become too cluttered to be useful. By providing 100% computer control, we have not only simplified radio operation, we have been able to incorporate many features simply unavailable on conventional radios. Features such as on-screen logging software, a built-in spectrum analyzer with "point and click" frequency tuning, an antenna Smith Chart that plots your antenna impedance, and keyboard CW, to name a few. The 505DSP is also the first transceiver ever to let you control your CW keying waveform.

Imagine combining the processing power and graphics capabilities of your PC with a state-of-the-art DSP transceiver, and you'll see why QST magazine called the 505DSP "a major leap in user-interface design."
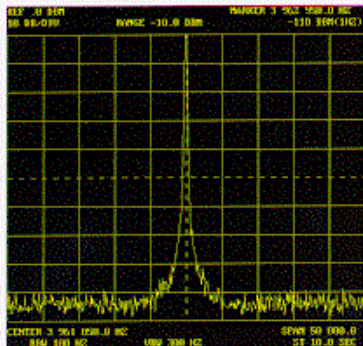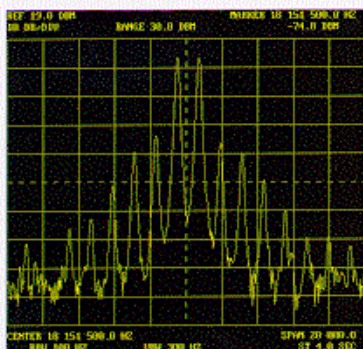

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- 100% PC Controlled Under Windows 3.1™, Windows 95™ or NT™
- All Amateur HF Bands with General Coverage Receiver
- Commercial Quality and Specifications; Plug-in Modular Construction
- IF Stage 16/24 Bit DSP Processing
- 1 Hz DDS Tuning
- Digitally Compensated Reference Oscillator
- Built-in Test and Frequency Calibration Functions
- Built-in Band Sweep Display with "Point and Click" Transceiver Tuning
- Includes On-screen Antenna "Smith" Chart and Logging Software

The 505DSP may be positioned vertically, horizontally, or remotely mounted up to seventy-five feet away from the P.C.
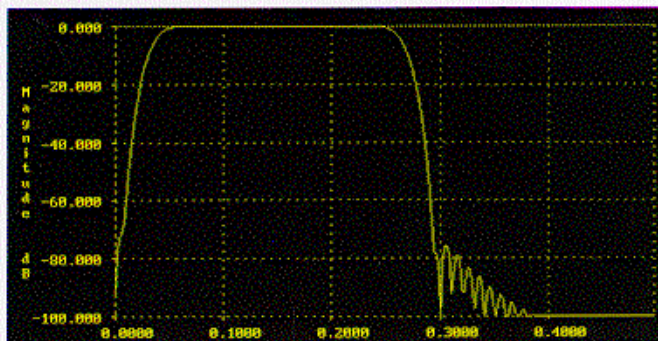
Low phase-noise DDS synthesizer avoids reciprocal mixing and needless QRM

Transmitter linearity designed to meet tough commercial specifications

High-speed DSP hardware achieves filter shape factors approaching unity

The Sky's the Limit

Kachina's 505DSP transceiver connects to your computer's serial port. The radio's control software runs under Windows 3.1™ Windows 95™ or NT™. A separate control head (for microphone, speaker, headphone and CW key connections) is provided and is designed to mount into one of your PC's unused drive bays. An inexpensive desktop cabinet is available for the control head in the event all of your bays are already in use.

Since the 505DSP's control software runs under Windows™, it becomes easy to incorporate standard computer accessory/software packages to enhance the operation of your radio. For example, you could purchase an inexpensive computer sound card at your local computer outlet and use it to record and playback digital messages over the air. No need to buy an expensive factory option with limited recording time as other manufacturers require. Perhaps you want to use voice recognition software to control your 505DSP with voice commands. Needless to say, with Windows™ the possibilities are endless!

Remote Possibilities

You can control the 505DSP up to 75 feet away from your computer, so the transceiver can be in another room or hidden in a closet if you wish (8 foot cable supplied standard). We also offer a telephone remote option that allows you to control the radio over regular telephone lines. This means that you can operate your rig from your office, vacation home, even across the country…anywhere you have a computer connected to a phone line! Your boss might not appreciate this, but your local ham club sure will, since it allows you to share one radio among several users. Now, if you live in an area with antenna restrictions, it's possible to locate the radio and antenna elsewhere. You still need only one computer, since the radio connects directly to a modem at the remote end.

Additionally, our optional 505AR Antenna Rotator Interface will allow you to remotely control most of the popular antenna rotors directly from the computer.

16/24 Bit DSP/DDS Performance

The 505DSP is built to commercial standards and offers exceptional 16/24 bit DSP/DDS performance. It covers all 9 HF bands with 1 Hz tuning, plus 30 kHz to 30 MHz receive, and provides a full 100 watts P.E.P. or CW. IF stage DSP, "brick-wall" digital filtering, adaptive notch filters and noise reduction ensure state-of-the-art receiver performance.

Up conversion to the 1st I.F. of 75 MHz ensures maximum freedom from spurious responses. The 2nd I.F. of 40 kHz allows utilization of the most advanced DSP hardware available. Signals are converted directly from 75 MHz to 40 kHz, greatly simplifying the transceiver; only the minimum number of local oscillators must be generated, reducing spurious products.

Data Ready

The 505DSP's 100 watt transmitter is designed to withstand the rigors of continuous duty data service. A thermostatically controlled cooling fan cools the transmitter heatsink allowing a 100% Tx duty cycle. Two 500 Hz DSP bandpass filters, having center frequencies of 1700 and 2210 Hz respectively, are available for data service. A socket is provided on the rear panel of the transceiver for interfacing to outboard TNC's or other external modems, and Windows™ allows you to operate your modem's software on the same computer as the 505DSP's control program.

Digitally Compensated Accuracy

The 1st local oscillator is a state-of-the-art DDS/PLL hybrid; its low phase-noise and fast lock times maximize enjoyment of operation. Frequency tuning is performed in 1 Hz steps under microprocessor control. The small tuning steps give the impression of continuous tuning, even over small frequency ranges. The 2nd L.O. is a VCXO, also locked to the master frequency reference.

The reference itself is a precision MPCXO; it's a variable crystal oscillator digitally temperature-compensated by the microprocessor. A thermometer mounted near the crystal allows the system to accurately track the crystal's frequency vs. temperature curve. Absolute accuracy is achieved using a built-in test equipment (BITE) facility; the microprocessor calibrates itself against WWV, or any other external frequency standard, on command. You won't have to worry whether you're on frequency ever again!

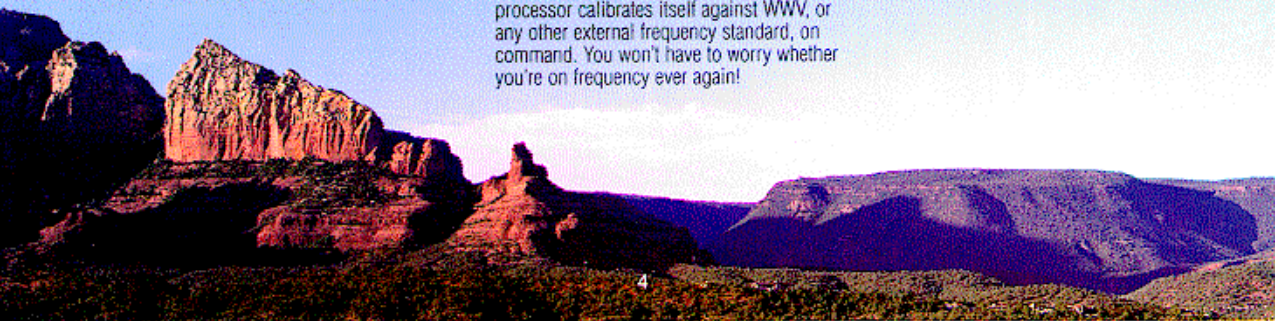## High Dynamic Range DSP Receiver

The high-dynamic range receiver boasts low in-band IMD. This, combined with a very high available signal-to-noise ratio, makes for the cleanest-sounding receiver around. Sophisticated DSP technology makes it easy to achieve performance levels unimaginable in the analog world. The most advanced "sigma-delta" analog-to-digital (A/D) converter is used; the DSP system has a dynamic range of 96 dB, even before the AGC is applied! The 11 available filters offer "brick-wall" performance. Imagine shape factors approaching unity, and all those bandwidths at no extra cost!

Full TX Control

The transmitter also benefits from precise 16/24-bit processing horsepower. Excellent carrier and opposite-sideband suppression is obtained using superior phasing-method algorithms. The RF compressor, operating on the actual signal envelope, will add *lots* of punch to your signal without adding lots of bandwidth. The 505DSP will spoil many an operator into thinking it's commonplace to blast through the pile-ups on the first call! A built-in equalizer lets you tailor your transmitted audio for more highs or lows. People will not believe you have all that control in such an inexpensive package.
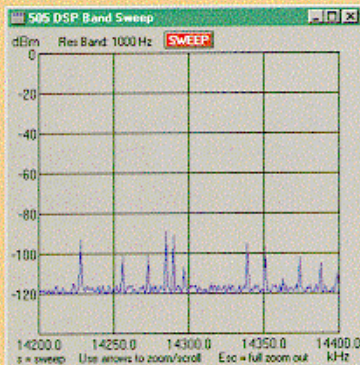
Special CW Features

Whether you use a key, paddle or keyboard to send CW, you'll find the 505DSP to be one of the best rigs around. You can exactly regulate the rise and fall times of your CW signal in 256 increments. Weighting and speed are also continuously adjustable over wide ranges for the sound and feel you want. Besides having excellent CW tone quality, your paddle can be set up for right or left-handed keyers, and machine CW is supplied standard with every 505DSP, allowing you to send directly from the keyboard of your PC. The 100-Hz CW filter digs 'em out when the others can't even tell they're in there. Additionally, up to nine 60-character CW messages can be stored and transmitted on command.

Band Sweep Display

When you purchase a 505DSP you get more than an excellent radio. You get features that even very expensive radios, and many test benches don't have! The Band Sweep Display provides a spectral display of any selected frequency range. Simply enter your center sweep frequency, the resolution and bandwidth, and a graph of band activity is displayed. Look for the peaks or valleys, depending upon whether you want a pileup or a clear frequency, and use your mouse to move the crosshairs in the display. When you click the mouse, the radio automatically switches to the selected frequency. You can actually drag your mouse across the graph to sweep the band!

KCLOG Logging Software

Another reason many think of the 505DSP as the ham's ultimate "work station" is the built-in logging program supplied standard with every 505DSP. When you make a QSO, enter the call sign, signal strength and QTH of your contact. The frequency, date, time, power output and mode will be automatically added to the logbook. QRZ callsign data base support is now incorporated, so a click of your mouse also displays your contact's name and address.

Antenna Smith Chart

One of the more exciting features of the 505DSP is our built-in antenna Smith chart function. The 505DSP's built-in antenna tuner stores antenna inductance and impedance data, "learning" antenna length and frequency combinations to increase antenna efficiency and decrease tuning times. This data can be displayed on-screen as data is accrued, providing a detailed graph of antenna performance at various frequencies. (The ARRL Handbook provides an excellent description of Smith chart readings.) Note that you do not have to buy the optional antenna tuner to take advantage of the Smith chart display.

Though 505DSP operation is largely intuitive, the user guide and help menus are just a click away to guide you through every function. You can also output this information to your printer.

505DSP

Features

- Designed and Manufactured in USA to Commercial Standards
- Plugs Into Computer Serial Port
- Runs Under Windows 3.1™, Windows 95™ or NT™
- Mouse or Keyboard Operation
- Covers All 9 HF bands Plus General Coverage Receiver
- Built-in Automatic Antenna Tuner (optional) Using Fuzzy Reasoning Algorithms
- Plug-in Modular Construction
- PCMCIA Card Slot for Future Firmware Options
- MARS/CAP General Coverage Tx Version Available

DSP Features:

- I.F. Stage 16/24 Bit DSP
- Adaptive, Variable Width Auto-Notch Filter
- Variable DSP Bandpass Filters
- Digitally Compensated Reference Oscillator
- Selectable Tuning Steps w/1 Hz Resolution

On-Screen Charts and Menus:

- Logging Software
- Band-Sweep Window with "Point and Click" Frequency Tuning
- Antenna Impedance (Smith) Chart
- Time Display (shows UTC or local time)
- Call Sign Display
- Help Menu and User Guide
- "Shortcut" Key Assignment Menu

Antenna Control:

- Two Software-selectable Antenna Ports
- Optional Antenna Tuner
- Optional Rotor Control Package

Rear Panel:

- 3 sub-D accessory ports are provided for interfacing with amplifiers, data modems, external antenna tuners and other equipment
- Large cooling fan allows 100% Tx duty cycle
- Two software-selectable antenna ports are provided

TX Functions:

- 100 Watts P.E.P. and CW, 100% duty cycle
- Adjustable Tx Power (in 1 watt increments)
- RF Speech Processor
- Speech Monitor
- SWR Alarm
- Heat Sink High-Temp Warning (with automatic power cutback)
- Adjustable Tx Equalization
- VOX/Anti-VOX

RX Functions:

- Exceptional Receiver Performance
- DSP Noise Reduction
- "Ring-free" Digital Bandpass Filters
- Automatic Notch Filter
- .18 uV Sensitivity (Preamp on)
- DSB AM Reception
- -20 dB Attenuator
- Continuously Adjustable AGC Speed
- Selectable Syllabic or Level Sensitive Squelch
- Variable-Rate Channel or Band Scanning

CW Functions:

- Full Break-in CW
- Built-in CW Keyer
- Nine 60-Character CW Memory
- Continuously Adjustable CW Waveforms
- Adjustable Sidetone Frequency
- Selectable Filter Widths

Meters:

- RX S-meter Displays in Volts, dB or S-units
- ALC
- Forward Power
- Reflected Power
- SWR

Memory/Function Keys:

- 100 Memory Channels
- 5 Group Memories
- 16 "SnapShot" Keys for Quick Store/Recall of Current Setup
- 47 "Hot" Keys for Quick Access to Commonly Used Functions
- Undo Key for Instant Recall of Last Settings
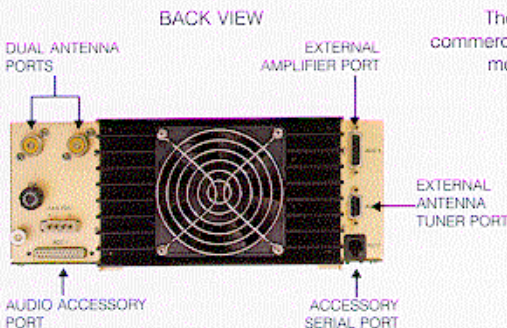
Built-in Test Equipment (BITE):

- Antenna Impedance Data
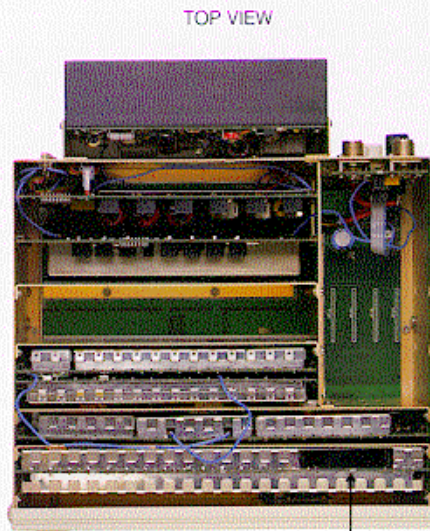- Frequency Calibration

Remote Operation:

- Transceiver May be Mounted Up to 75 Feet from Computer
- "Dial-up" Operation Over Telephone Lines with 505RC Remote Control Interface

Warranty:

- 2 Years Parts and Labor Limited Warranty
- 48 Hour Turnaround Time on Repairs
- Free Return Freight (U.S.A. only)

TOP VIEW

BACK VIEW

The 505DSP is built to commercial standards using modular construction.

DUAL ANTENNA PORTS

EXTERNAL AMPLIFIER PORT

EXTERNAL ANTENNA TUNER PORT

AUDIO ACCESSORY PORT

ACCESSORY SERIAL PORT

TWO PCMCIA PORTS FOR FUTURE ROM UPGRADES

Technical Specifications

General

Frequency Coverage: Tx: 1.8-2.0, 3.5-4.0, 7.0-7.3, 10.1-10.15, 14.0-14.35, 18.068-18.168, 21.0-21.45, 24.895-24.995, 28.0-29.7 MHz. Note: MARS frequency coverage available.

Rx: 30 kHz-30 MHz

Frequency Stability: $< \pm 10$ ppm (-10° to 50°C). Can be automatically calibrated to within +/-10 Hz of WWV or other external standard.

Modes: USB, LSB, AM, CW

Power Requirements: +13.8 VDC nominal, 2 A max. RX, 25 A max. Tx

Operating Temperature Range: -10 to +50 degrees Celsius

Transceiver Dimensions/Weight: Length: 32 cm, Height: 29.5 cm, Width: 11.5 cm, Weight: 5.27 kg (11.6 lbs.)

Control Head Dimensions/Weight: Length: 17.5 cm, Height: 4.5 cm, Width: 15.0 cm, Weight: 0.58 kg (1.28 lbs.)

Receiver

SSB Sensitivity: 0.18 uV (2.4 kHz filter, 10 dB SINAD, pre-amp on). 0.35 uV typical (2.4 kHz filter, 10 dB SINAD, pre-amp off).

AM Sensitivity: 0.6 uV (pre-amp on), 1.0 uV typical (pre-amp off).

Audio Power (5 uV input): >2 Watts into 8 Ohms, >4 Watts into 4 Ohms

Spurious Rejection: >80 dB

Image Rejection: >80 dB

IF Rejection: >80 dB

3rd-order Intercept Point: +18 dBm typical @ 20 kHz (pre-amp off).

3rd-order IMD Dynamic Range: 96 dB typical (pre-amp off).

2nd-order Intercept Point: +49 dBm typical.

Blocking Dynamic Range: 115 dB typical @ 20 kHz (pre-amp off). 118 dB typical @ 50 kHz.

Audio THD: <5% @ 2 Watts into 4 Ohms

Manual Notch Depth: >-50 dB

Transmitter

Output Power: SSB: 100 Watts +/- 1 dB into 50 Ohms, AM: 25 Watts carrier nominal

Spurious, Harmonics: <60 dBc @ 100 Watts into 50 Ohms

Carrier, Opposite Sideband Suppression: SSB: <-55 dBc

CW Keyer Speed: 5-80 WPM adjustable

Hardware Requirements

IBM™ compatible computer with 80386 or higher processor running Windows 3.1™, Windows 95™ or NT™. External 4 ohm speaker with 1/8" phone jack required unless computer is equipped with sound card and speakers.

Above specifications are subject to change as Kachina's engineers are constantly striving to make technical improvements. Specifications of export models may differ slightly from above.

Options and Accessories

The Kachina 505DSP is made in the U.S.A. The Kachina dolls depicted in our logo are Hopi Indian symbols, used to communicate legends from one generation to the next.

The **505DSP** is supplied with a control head designed to mount in a spare PC drive bay. If you don't have a spare drive bay or are using a laptop computer, a low priced kit is available to allow use of the control head on a desktop. This kit includes a painted cover (left) for the control head and a cable for connecting to your computer's serial port.

505AR Antenna Rotator Interface

Kachina is continually adding new features to the 505DSP. Since most of the functions are software controlled, it is usually possible to update existing radios as new features are announced. One such new option is an antenna rotator interface, that allows you to control most of the popular rotators on the market directly from the 505's control panel. This is especially convenient when operating the 505DSP remotely. Antenna direction is displayed in a small control window. Simply click the mouse on the desired direction, or use the keyboard +/- keys to move the antenna in small increments. The 505AR Antenna Rotator Interface includes a microprocessor based card that plugs into your computer and the software to control the following rotators:

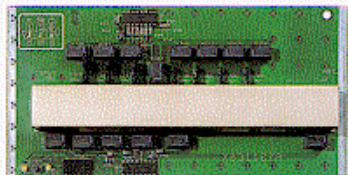|			
HAM II	Yaesu G-800S	HAM-M	Yaesu G-1000SDX
HAM III	Yaesu G-1000S	Tailtwister	Yaesu G-2700SDX
HAM IV	Yaesu G-800SDX	HDR-300A	Yaesu G-2800SDX

505TK Tuning Knob

For those who insist on the feel of a knob for frequency tuning, Kachina offers a high quality accessory tuning control. The 505TK has a heavy steel base and a machined aluminum knob. With rubber feet and a weight of 3.15 lbs., it stays in place on your bench. The tuning speed ramps up the longer the knob is turned and a damping lever is provided to add drag as needed. The 505TK requires an additional computer serial port.

Internal Antenna Tuner

An optional internal antenna tuner automatically matches your antenna system to 50 Ohms, within a 3:1 VSWR. This subsystem, using "fuzzy reasoning," is as fast and accurate as you'll see. 64 internal memories and impedance point interpolation (IPI) mean virtually transparent operation within a few tune cycles. You can display the antenna Z for the entire band on a "Smith" chart right on the PC screen.

505RC Remote Control Interface

The 505RC Remote Control Interface allows you to remotely control the 505DSP transceiver over standard telephone lines. Remote operation of the 505DSP is virtually identical to local use, except that CW is transmitted entirely from the keyboard, rather than using a key or paddle, and QSK is not supported. Two undedicated serial ports are provided to allow connection of outboard equipment, such as rotator controls or TNCs. The Remote Control option is designed to be used with external V.34 Hayes-compatible modems (available from Kachina), and includes a remote control interface unit, cables, and special dialer software. Note that a computer is required only at the control site, not at the remote site, since the 505DSP there connects directly to the modem and interface unit.

Also Available

505MD	Desk Microphone (VOX Capable)
970055	25 Ft. 15-Pin Control Head Cable
970056	75 Ft. 15-Pin Control Head Cable
970057	25 Ft. RJ12 Serial Cable (for Ext. C.H. use only)
970058	75 Ft. RJ12 Serial Cable (for Ext. C.H. use only)

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The Professional Name In Amateur Radio