

# Timewave DSP-599zx

DSP Noise & QRM Filter  
and RTTY Modem



*Timewave Digital Signal Processing (DSP) technology provides superior performance in reducing QRM and QRN. No other technology can do what DSP can!*

The Timewave DSP-599zx is the latest generation DSP filter incorporating the newest high speed CPU. The extra power gives the user unparalleled features and field upgradeable for the future. The new LCD display, push buttons, and Visible Memory™ let you see the exact settings of the filter. The optical encoders give the operator continuous tuning of filters.

## NOISE REDUCTION

The noise reduction functions of the DSP-599zx operate by examining a characteristic of signals and noise called correlation, and dynamically filtering out the undesired noise. The degree of correlation is relative. Random noise such as white noise or static is uncorrelated. Speech is moderately correlated. Pure tones such as heterodynes are highly correlated. The DSP-599zx measures correlation and automatically filters out noise that is outside its correlation threshold-holds.

## DATA and BANDPASS FILTERS

Narrow band signals like CW and RTTY require bandpass filters with steep skirts and linear phase response. Linear phase response maximizes the unusable signaling rate for a given bandwidth and minimizes ringing often heard on other types of extremely sharp filters. Filter skirts are so steep that a signal literally falls off the edge of the passband as you tune through a signal. Bandwidths range from 10 Hz to 600 Hz, and center frequencies from 200 to 2150 Hz. Narrow filters are useful for trying to dig out ex-

# Noise Killer!

- **Hyperspeed DSP Processor 36.8 MIPS with 80 KB Ram**
- **Field upgradeable design keeps you up to date**
- **LCD display for Visible Memory™ and Calibrated Filters™**
- **Wideband filter for AM and FM (VHF & UHF)**
- **Continuous filter tuning up to 5 kHz using optical encoders**
- **Voice Lowpass, Highpass from 100 - 5.0 kHz**
- **CW and Data 10 Hz to 600 Hz wide**
- **Audio Test Instrument Generator, Millivoltmeter, & Tone Decoder**
- **Manual notch Heterodyne Eliminator™**

tremely weak signals from noise and QRM. The wider filters allow easy tuning and listening to multiple CW signals simultaneously. Data filters supported in this filter are **RTTY, AMTOR, PacTOR, G-TOR™, HF Packet, SSTV, WeFAX, SITOR** and **CLOVER**. RTTY has two methods of being used in addition to regular filtering. You have a complete data modem designed for RTTY. You can use the remodulator mode that detects and regenerates the mark and space to the modem.

## TEST INSTRUMENTS

An added benefit of the powerful DSP processor and LCD display in the DSP-599zx is a **Test Instrument** mode. This mode is designed to provide the audio test instruments necessary for normal maintenance and setup of audio circuits in radio equipment installations. A low distortion **audio sine wave generator** and an **audio millivoltmeter** cover the frequency range from 20 Hz to 10 kHz. The millivoltmeter measures true rms and peak, as low as 1 mV, and the sine wave generator output is calibrated in the same units. The sine wave generator and the millivoltmeter operate simultaneously for gain and frequency response measurements. Another feature enhanced by the millivoltmeter is the **CTCSS or "PL" tone encoder/decoder** with the tone frequency autodetect. Millivoltmeter measurements allow relative frequency deviation measurements of a received signal's CTCSS tone. A CTCSS squelch output can switch a tape recorder or other device. A **Two-Tone audio generator** is provided for SSB linearity testing.

**FIRST to simultaneously reduce noise, kill heterodynes and QRM!**



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# DSP-599zx Specifications

## AUDIO INPUT

Impedance input	20 K ohms or 22 ohms, jumper selectable
signal range for full output	10 mV to 1.0 volt, front panel programmable

## AUDIO OUTPUT

Speaker output power	1 watt into 8 ohms at 13.8 VDC, both channels A&B operating 3 watts into 4 ohms at 13.8 VDC, output channels A&B bridged
Line output	0 dB, referenced to input level, into 10K ohms. Not controlled by gain control
Headphone jack	1/4" two circuit jack, use stereo headphones to use all functions, mono headphones for most functions.

## NOISE REDUCTION FILTERS

	Frequency range	Attenuation	Type	Delay
Random Noise Reduction	entire freq. range of selected bandpass filter	Up to 20 dB, varies with noise characteristics. Noise reduction aggressiveness front panel adjustable.	Adaptive	5 msec max
Heterodyne Reduction (multiple automatic notch) (manual notch)	entire freq. range of selected bandpass filter	Up to 50 dB, varies with noise characteristics	Adaptive	5 msec max

Note: The random noise reduction and bandpass filters can operate simultaneously.  
The random noise reduction, tone notch and highpass/lowpass filters can operate simultaneously.

## BANDPASS FILTERS

CW Filters	Bandwidth = 10 Hz to 600 Hz, Center freq. = 300 to 1600 Hz.,	10 Hz steps 5 Hz steps	FIR Linear phase	BW less than 20 Hz 64 msec max BW greater 20 Hz 40 msec max
CW Marker Tone	Sine wave at center freq. of selected CW filter.			

## DATA FILTERS

RTTY, AMTOR, PacTOR, G-TOR, HF Packet	Bandwidth = 100 Hz to 600 Hz, 12 steps. Center freq. = 2210 Hz. plus option of 1700(default), 1360, 1300, 1530 or 2125 Hz.	40 dB at 60 Hz outside the passband	FIR Linear phase	38 msec max
SSTV	1100-1300 Hz & 1500-2300 Hz	50 dB at 75 Hz outside the passband	Composite FIR Linear phase	21 msec max
WeFAX	1500-2300 Hz	55 dB at 75 Hz outside the passband	FIR Linear phase	21 msec max
CLOVER	2000-2500 Hz	55 dB at 75 Hz outside the passband	FIR Linear phase	21 msec max

## VOICE FILTERS

Highpass	Corner freq. = 20 to 1000 Hz., 10 Hz. steps.	60 dB at 180 Hz. outside the passband	FIR Linear phase	24 msec max for any combination of highpass & lowpass Filters
Lowpass	Corner Freq. = 1000 to 5000 Hz., 10 Hz. steps	60 dB. at 180 Hz. outside the passband	FIR Linear phase	

## SIGNAL PROCESSING

A-D/D-A Converter	16 bit linear, sigma-delta conversion, dual channel
Signal Processor	16 bit, 27 ns Analog Devices ADSP-2181 with 80 kb of memory on board

## TEST INSTRUMENT

Audio Generator	Single or two-tone, Sine wave tunable from 20 Hz to 15 kHz. Sine wave distortion less than 1%
Audio millivoltmeter	True RMS from 10 uV. to 2 V., 20-20 kHz calibrated in volts, dBm @ 600 ohms, relative dB
DTMF decoder	Decodes and displays up to 16 character string of DTMF digits (0-9, *, #, A-D)
CTCS decoder	Decodes and displays CTCSS "PL" tones from 67.0 Hz to 254.1 Hz
CTCSS squelch	Open collector output pulls low when selected CTCSS tone is present. (connection on back panel DIN connector)

## MEMORY

Six Memories	All configuration setups can be stored and recalled (except volume control setting)
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## DISPLAY

2x16 alphanumeric characters, dot-matrix, yellow-green backlit LCD.

## DIMENSIONS

Size	7.6 in. wide x 8.5 in. deep x 1.9 in. high (193 mm wide x 216 mm deep x 48 mm high)
Weight	2.0 lb. (0.9 Kg.)

**Note:** RTTY, AMTOR, PacTOR, G-TOR and HF Packet data filter bandwidths are specified at -3 dB points to comply with traditional data filter specification methods. All other filter bandwidths are specified to comply with conventional DSP FIR filter parametric descriptions.