DSP-599zx Version 5.0 Manual Supplement

New Features

Timewave Technology Inc. has extended the leading edge technology that has made the DSP-599zx the #1 signal processor in HF communications. Today, you can find the DSP-599zx and its technological derivatives in commercial, government, aviation and military HF communication systems worldwide! But we didn't build a flash-in-the-pan - when the DSP-599zx was designed in 1995-96, we looked forward and created a hardware and software architecture to carry us into the next millenium. The following new features are founded on that powerful architecture.

• Binaural CW

Binaural CW enables the CW operator to use the powerful combination of his brain and both his ears to separate CW signals in a panorama with lower pitch signals to the left and higher pitch signals to the right. This exclusive feature makes CW listening easier and takes the pile out of pileups!

• CW Spotlight

The CW spotlight highlights a weak signal to pull it out of surrounding QRM, and allows a proficient CW operator to monitor nearby CW signals while staying focused on a particular signal. This unique feature is great for DX pileups and contests.

• PC-Radio Interface and Filter for PSK-31

PSK-31 and SSTV require connection and matching of a radio's audio input/output and transmit/receive control line to a computer sound card and serial port. The DSP-599zx with Version 5.0 firmware performs these tasks while maintaining the ability to perform its other signal processing tasks. You can now operate RTTY, PSK31 and SSTV with just the DSP-599zx, a transceiver, and a computer with appropriate software. No other interface boxes or multi-mode controllers are required!

This new feature includes an internal reconfiguration of the signal routing, filters, and audio level adjustments in the DSP-599zx that permits the DSP-599zx to be connected directly to a sound card in a computer.

• Noise Reduction Algorithm Modification

We've tweaked the DSP-599zx's noise reduction algorithm for a better low end response for SWLers and improved noise reduction over the entire range.

• Morse Code Practice Oscillator

This one wasn't much of a technical stretch for our engineers, but our customers wanted it. Even 5 words per minute takes some practice. It's also a great way to test your keyer project and work on your fist until you're ready to put it on the air. Just plug in your key and start sending!

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Sound Card Interface for PSK31 and SSTV

PSK-31 and SSTV require connection of a radio's audio input and output and transmit/receive control line to a computer. The DSP-599zx with Version 5.0 firmware allows these connections while maintaining the ability to perform its other signal processing tasks. You can now operate RTTY, PSK31 and SSTV with just the DSP-599zx, a transceiver, and a computer with appropriate software. No other interface boxes or multi-mode controllers are required!

This new feature is an internal reconfiguration of the signal routing and audio level adjustments in the DSP-599zx that permits the DSP-599zx to be connected directly to a sound card in a computer.

See Figure 1 for an overview of the necessary connections for the DSP-599zx PC-Radio configuration.

To set the DSP-599zx to the PC-Radio configuration, the control sequence is:

Press Shift - mode - shift -mode (Display = Setup - Select? Install)
Press the left knob (Display = Install Setup - Reset Memory USA)
Turrn the left knob (Display = Install Setup Routing SpM LnM)
Press the left knob (Display = Routing ■ SpM LnM)
Turn the left knob (Display = Install Setup - Routing ■PC-Radio)
Press the left knob (Display = Install Setup - Routing PC-Radio)

Computer to DSP-599zx Connections

Sound Card OUT to Audio B IN

Connect the sound card line out or speaker out to Audio Input B of the DSP-599zx. (The B channel inputs of the DSP-599zx are on the bottom row of gold phono connectors.) You may wish to use a "Y" connector to keep your external computer speakers connected at the same time as the DSP-599zx. Using the Setup mode, check the Channel B input level sensitivity of the DSP-599zx. Set it to -3 dbV (factory default). When the System is in the transmit, the yellow "Normal" LED should be lighted, but the red "Overload" LED should not be lighted. Adjust the DSP-599zx input level sensitivity if the input level is too high or too low.

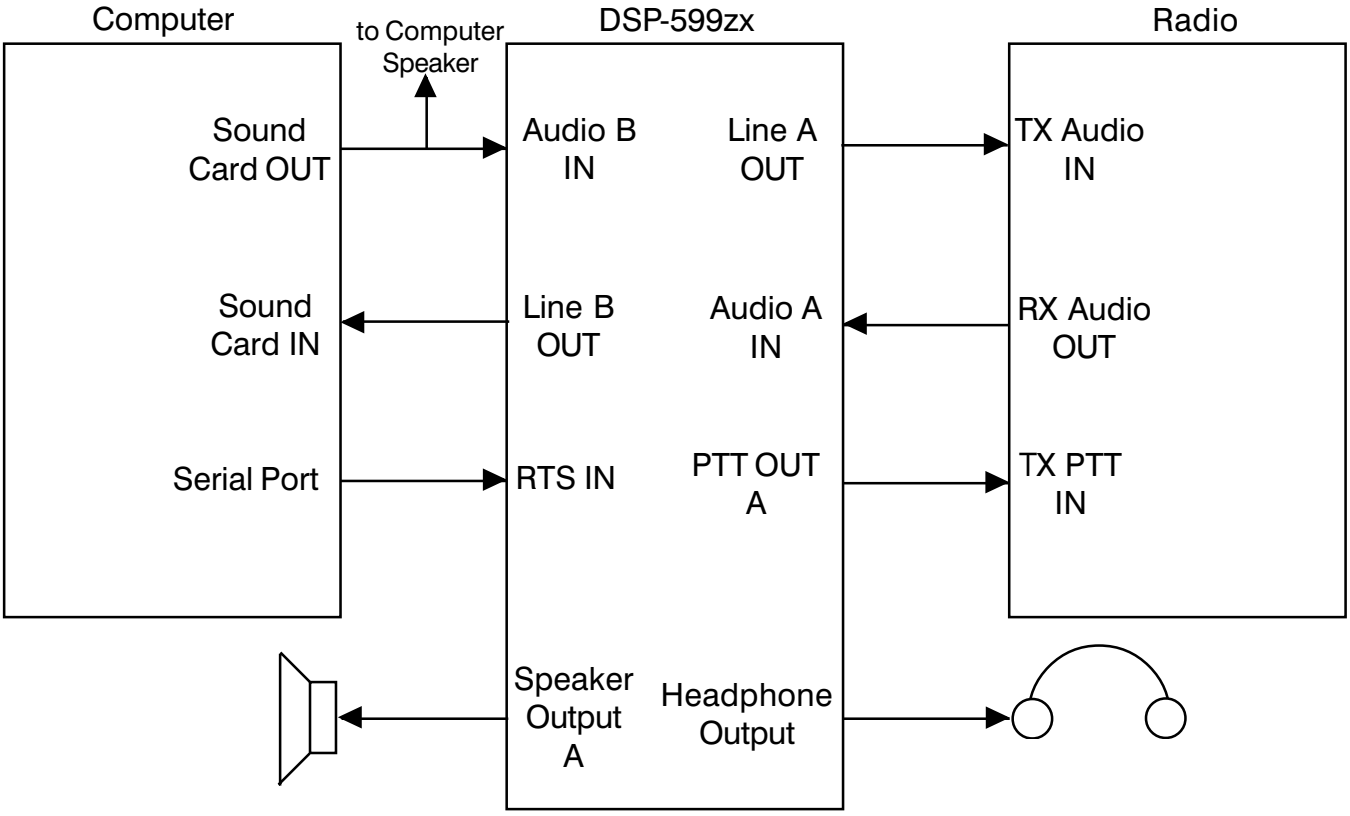
Line B OUT to Sound Card IN

Connect Line Output B of the DSP-599zx to the sound card mic in. (The B channel inputs of the DSP-599zx are on the bottom row of gold phono connectors.) Using the Setup mode, check the Channel B Ouput level sensitivity of the DSP-599zx. Set it to -39 dbV. This level may have to be adjusted when you are running a PSK31 or SSTV program. The programs usually have input level indicators or analyzers that willl help you set the correct level. Use the computer Mic gain control to further control the received audio signal level. If the Mic input to the sound card has a fixed gain stage that can be controlled, turn it off.

Computer Serial Port to DSP-599zx RTS IN

Connect the DSP-599zx RTS IN to the Computer Serial Port with a standard DB-9M to dB-25F or DB-9F computer cable.

PC-RADIO Configuration Diagram (Fig. 1)



Device	Description	Connector
COMPUTER		
Sound Card OUT	Speaker/Line Output on computer sound card	3.5 mm Stero phone jack
Sound Card IN	Mic Input on computer sound card	3.5 mm Stero phone jack
Serial Port	RS-232 Serial COM port on Computer	DB-9 or DB-25 male
DSP-599zx		
Audio B IN	Audio input B	RCA phono jack
Audio A IN	Audio input A	RCA phono jack
Line A OUT	Line A output	RCA phono jack
Line B OUT	Line B output	RCA phono jack
RTS IN	Ready-to Send input on RS-232 port	DB-9 female pin #6
PTT OUT A	Output pulled to ground on Xmit	8 pin DIN jack pin #3
RADIO		
TX Audio IN	Mic in or Xmit audio pin on Radio	Radio dependent
RX Audio OUT	Speaker or line out on Radio	Radio dependent
TX PTT IN	PTT, T-R or Xmit input on Radio	Radio dependent

Radio to DSP-599zx Connections

PTT OUT A to TX PTT IN

This line controls the transmit - receive switching of your transceiver. It is controlled by the RTS IN line from the Computer serial port. It has a transistor open collector that pulls to ground during transmit. On the DSP-599zx, it is pin #3 on the Radio A 8-pin Din jack. Ground is pin 2 on the Radio A 8-pin DIN jack

RADIO RX Audio OUT to DSP-599zx Audio A IN

The radio speaker output is usually connected to the DSP-599zx Audio Input A. Set the DSP-599zx Audio Input A level sensitivity at its factory default sensitivity of -3 dBV.

DSP-599zx Line A OUT to TX Audio IN

The transceiver audio input may be either the microphone input or the data audio input on the back panel of the transceiver. Use the DSP-599zx setup mode to set the Line A output level to an initial level of -39 dbV. Further adjustment may be necessary to prevent overdriving or underdriving the transmitter. If you drive the transmitter too hard, you will cause a distorted, wide signal and make reception and demodulation of your signal difficult. Underdriving the transmitter will may result in a noisy and/or weak signal.

Note that the microphone input is not muted or disconnected during data transmission on many transceivers. To prevent room noise from accidentally modulating the transmitter during data transmission, it is necessary to disconnect or switch off the microphone during PSK operation.

Operation

To operate PSK31, select the Data mode with the Mode switch. Turn the left knob until “PSK” or “PSK31” is displayed. Both PSK and PSK31 default to 1000 Hz center frequency. PSK defaults to 600 Hz bandwidth and PSK31 defaults to 100 Hz. bandwidth. Then press the left knob. Now the bandwidth and the center frequency of the selected PSK filter can be adjusted. Start with the wider bandwidth and use the narrow filter bandwidth to eliminate strong QRM. Use the DSP-599zx AGC to help overcome receiver “pumping” by nearby strong signals in the receiver bandpass.

Binaural CW

Binaural CW enables the CW operator to use the powerful combination of both ears and his brain to separate CW signals in a spatial panorama with low frequency signals to the left and high frequency signals to the right.

The DSP-599zx spreads all the signals in the selected CW bandwidth from left to right, with lower pitch signals toward the left and higher pitch signals toward the right. The center pitch is selectable - 500 Hz, 750 Hz, or 1500 Hz. All signals lower than the center frequency are spread to the left of center and all frequencies higher than the center frequency are spread to the right of center. The maximum CW filter bandwidth is 600 Hz. The recommended starting point is 750 Hz center frequency and 600 Hz bandwidth.

The DSP-599zx Binaural CW function is a two channel system designed to work with stereo headphones. Using two speakers instead of stereo headphones will generally reduce the binaural effect and may not work at all in some circumstances. Mono headphones or a single speaker will not work. Switch the speakers off when you are using binaural CW to prevent acoustic leakage past your headphones.

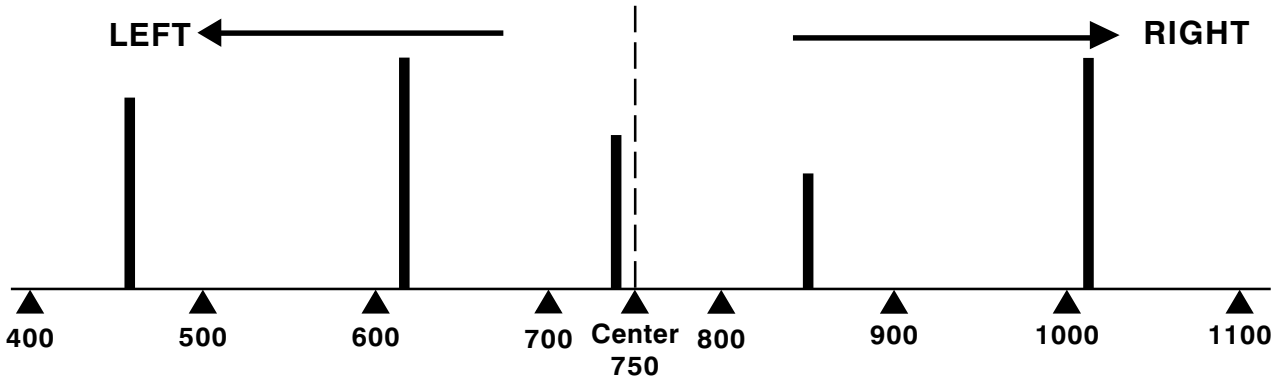
Binaural CW Operation

Preset the Binaural CW center frequency in the mode "Setup – CW – Binaural CF - 750"

Turn on the CW mode. Set the CW bandwidth to 600 Hz and the center frequency to 750 Hz. Store this setting in memory 1.

Turn on the Binaural CW in the mode "CW - shift - function - binaural? - on"
Binaural CW is now active. Store this setting in memory 2.

Tune in some noise with no signal present. You should hear more hiss or noise in your right ear and less hiss or noise in you left ear. Now very slowly tune in a CW signal from low pitch to high pitch. Note the signal appears first in your left ear and moves across the center of your head to your left ear as the pitch increases. Now find two or three signals operating with 600 Hz of each other. Switch from binaural to monaural by pressing RCL-1. Now switch from monaural to binaural by pressing RCL - 2. You will hear the binaural signals spread out, especially if you have a low pitch and a high pitch signal. The monaural signals will sound



Approximate frequency vs. perceived position of a typical 600 Hz. wide spectrum of CW signals

Binaural CW

like they are all stacked on top of each other in the center of your head. Switch back and forth rapidly just by pressing RCL twice. A little practice will soon have you wondering what's wrong when you don't have Binaural CW turned on.

CW Spotlight

The CW spotlight highlights a weak signal to pull it out of surrounding QRM, and allows a proficient CW operator to monitor nearby CW signals while staying focused on a particular signal.

Note that normal CW operation doesn't change.

CW Spotlight Operation

The CW Spotlight amplifies the signal in a narrow bandwidth in the center of the 600 Hz. CW filter passband.

Preset the CW Spotlight amplification in the mode "Setup – CW – level". You may vary the amplification of the CW Spotlight from -3 to –18 dB with respect to the rest of the 600 Hz CW bandwidth. The default level is –12 dB.

While in CW mode, push the FUNCTION key. The green light next to the key will be ON. This indicates you are in the CW spotlight mode. The AGC light should be OFF

Set the CW Spotlight bandwidth with the bandwidth control knob while in the CW Spotlight function.

The operator can hear non-spotlighted signals within +/-300 Hz of the center frequency. For example, set the CW filter bandwidth to 80 Hz, then tune in a signal until it is loudest. The signal will be in the CW Spotlight exactly in the center of the CW filter passband. Notice you can hear other signals within +/-300 Hz. of the CW passband, but they are not in the CW spotlight unless they are within +/- 40 Hz of the CW filter center frequency. You can tune your receiver or the DSP-599zx center frequency to move another signal into the CW spotlight. You can also adjust the CW Spotlight bandwidth at any time.

If the signal you wish to spotlight is very weak with respect to other signals in the 600 Hz CW passband, turn on the AGC after you have tuned in the weak signal with the CW Spotlight. The AGC acts on all the signals in the CW passband, but sets the level of the signal in the CW Spotlight at a higher level than the other signals. This effectively boosts the weak signal AND suppresses the very strong signals so you can copy a much weaker signal.

Voice Noise Reduction

The voice noise reduction algorithm has been changed to improve the noise reduction and to extend the low frequency response of the voise noise reduction mode to 100 Hz. The only difference in operation of the Noise Reduction function to use the High pass filter to set the desired low end frequency reponse. As a starting point, we recommend 300 Hz for Amateur Radio SSB, and 100 Hz for shortwave listening.

DSP-599zx CW Oscillator

The CW oscillator is a tool to practice morse code and help test CW keyers and multi-mode controllers in CW mode. The center frequency ranges from 200 Hz to 2000 Hz.

The CW oscillator is part of the Test Mode.

The control sequence to select the CW Oscillator is:

1) SHIFT + MODE (Test LED will light)
2) Select the CWOsc mode by depressing the left knob. The display shows either A or B CW Key Osc and the tone frequency is displayed. The tone can be changed using the left knob from 200 Hz to 2000 Hz.
3) Select the A or B inputs by pressing SHIFT+CHAN (Ch B is the default input)

Plug the Key or unit for test into the selected A or B PTT Input connector.

Selection of Modes, Functions and Parameters

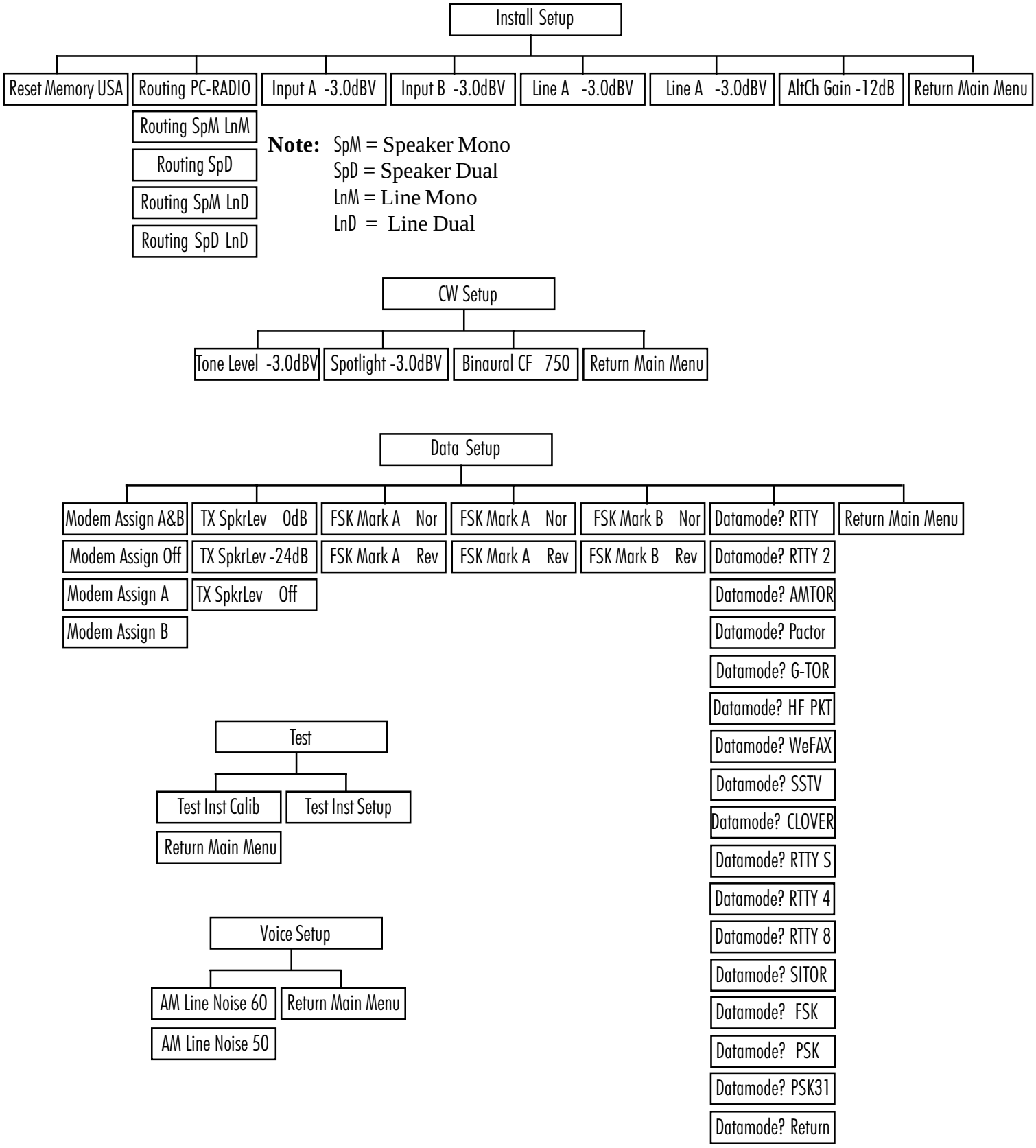
Most of the selection of the DSP-599zx various modes, functions, parameters and settings remain the same under the version 5.0 upgrade as they were under previous firmwave versions. The new modes and functions are generally added at the same level as other similar modes and functions. The main exception is the change in the selection of Channel A and B audio input, line output and speaker output configuration. These are now found under the Install - Setup - Routing mode. The following pages show several of the new and modified selection trees. The selection trees do not necessarily show every character and line in each display, but they do show the significant ones. Please refer to your DSP-599zx Operator's Manual for detailed instructions on keystoke operations common to different modes and functions.

Deleted Features

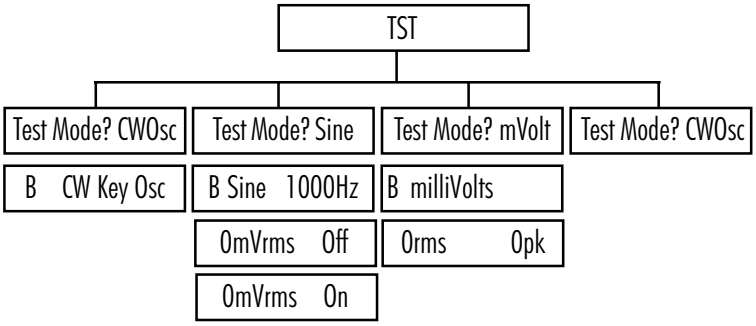
The following DSP-599zx firmware version 4.0 Test Mode features are deleted in version 5.0:

CTCSS encoder/decoder
Two-tone test oscillator

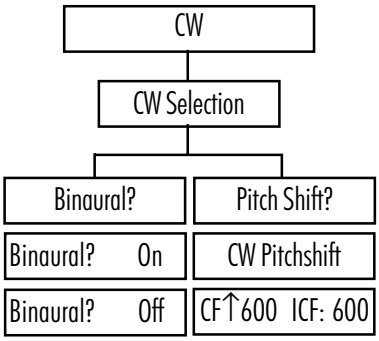
Setup Mode Selection Tree



Test Mode Selection Tree



CW Mode Selection Tree



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