

## ProSound a10

# Broadband Harmonics

## Introduction of New Image Improvement Technology

Broadband transmission as used in ultrasound systems offers excellent distance resolution and native frequency compound effects due to the inclusion of many frequency components. Broadband transmission provides uniform images with speckle patterns of fine particles.

Broadband transmission generally uses drive signals of needle-like impulse waveforms with very small pulse widths. Short pulses with a short drive time generate only a small amount of energy unless they are at extreme amplitude, and so do not offer sufficient sensitivity for examination. This is the reason broadband transmission is not generally used in ultrasound systems.

Includes all frequency components



When bandwidth is 100%



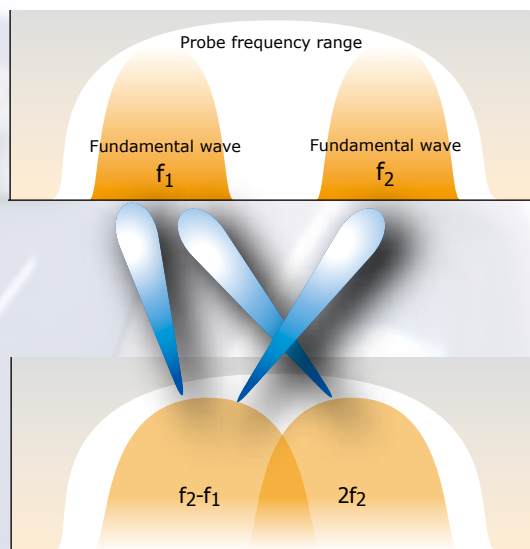
When bandwidth is 30%



No bandwidth (a single frequency)



Recently, a system with a broadband harmonics feature that successfully offers both high resolution and sensitivity has been developed. This system uses two mixed frequencies for transmission and generates broadband harmonics using low frequency components which are equivalent to the difference between the two frequencies. The fundamental wave components are removed by the phase modulation method (see the figure below).

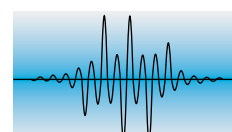
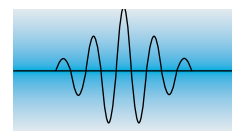
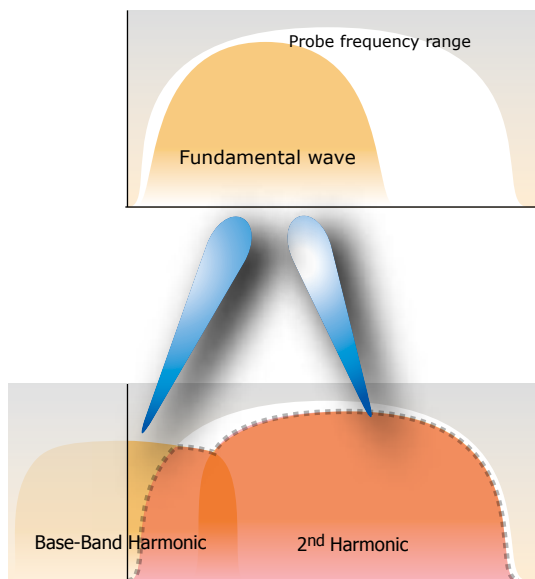


The ProSound a10 features a compound pulse wave generator (CPWG) for transmission of programmed waveforms. To obtain broadband pulse waveforms of high amplitude, the CPWG uses drive signal data of very narrow pulse waveforms for synthesis and transmission. By aggressively using the DC and other base-band nonlinear echoes (or base-band harmonics) in addition to broadband second harmonics for broadband transmission and reception, the ProSound a10 realizes ultra-broadband harmonic imaging with beam characteristics that are enhanced by highly penetrating harmonic transmission

and reception technology. Compared with the phase-modulated harmonics based on the difference tone between two frequencies, broadband transmission assures a high and wide frequency distribution and generates images with straightforward sounds.

Broadband transmission, enabled by CPWG, uses the broadband short pulse drive waveforms that are optimized for individual probes for effective generation of second harmonic components and base-band nonlinear echo (or base-band harmonic) components which centers DC.

Aloka, which is committed to continually improving the quality of transmission sound, has attained new image performance by adding to its core technology the base-band tissue harmonic technique that fully utilizes the frequency range of a probe using CPWG for transmitting programmed waveforms. This technological innovation will shift ultrasound imaging to a new phase of development.



Compound Impulse waveform (patent pending)



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We operate with regard for the environment.

We care, Ultrasound@Aloka.

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