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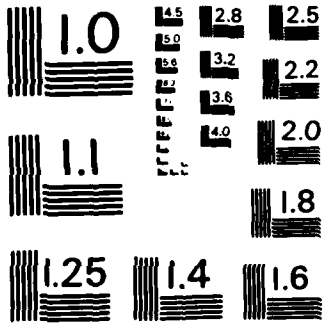

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AN ULTRASONIC DEVICE FOR SIGNAL PROCESSING

by

S.V. Kulakov, A.G. Leks, et al.

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EDITED TRANSLATION

FTD-ID(RS)T-1567-84 15 Nov 85

MICROFICHE NR: FTD-85-C-001100

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English pages: 4

Source: USSR Patent Nr. 319986, 2 November 1971, pp. 1-2

Country of origin: USSR
Translated by: FLS, INC.
F33657-85-D-2079
Requester: FTD/TQFE
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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

AN ULTRASONIC DEVICE FOR SIGNAL PROCESSING

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Leningrad Institute of Aviation Instrument Design

The invention concerns the field of radioengineering and can be used in analog processors of the signals of phased antenna arrays.

There are familiar devices for processing the signals of phased antenna arrays. However these are large in size, structurally complicated, and contain expensive parts.

In the proposed device, for the purpose of simplification and cheapening the design and reducing the dimensions, the counting system is in the form of a receiving acoustical array, the elements of which are hooked up to a television-type indicator.

The drawing shows a block diagram of the device.

The device contains a multichannel intermediate amplifier 1, a transmitting acoustical array 2, an ultrasonic polygon 3, a

receiving acoustical array 4 (counting system), a cathode ray tube 5, an electronic amplifier 6, and an indicator 7.

The ultrasonic processor of the signals of phased antenna arrays employs a reconstruction of the wavefront. The outputs of the multichannel intermediate amplifier are hooked up to the respective elements of the transmitting acoustical array, secured to one of the faces of the ultrasonic polygon. The number of elements of the transmitting acoustical array is equal to the number of elements of the antenna array, while their arrangement on the face of the ultrasonic polygon models the arrangement in space of the elements of the antenna array. For example, if the distance between adjacent elements of the antenna array is equal to half the length of the electromagnetic oscillations, then the distance between adjacent elements of the transmitting acoustical array is equal to half the wavelength of the ultrasonic oscillations.

At the other end of the ultrasonic polygon is secured the receiving acoustical array. The distance between the transmitting and the receiving acoustical array should be chosen so that the receiving array is situated in the far zone of the transmitting array. The receiving array is secured to the face of the cathode ray tube. The elements of the receiving acoustical array may also be connected to the inputs of an electronic commutating circuit. The collector of the cathode ray tube is connected across a compensation electronic amplifier to the television type indicator. The motion of the electron beam of the cathode ray tube and the sweep of the indicator are synchronized by the synchronizer 8. The transmitting and receiving acoustical array are represented by piezoceramic (or piezoquartz) plates, one surface of which is metallized, while on the other are deposited metal electrodes (elements of the acoustical array).

The signals taken from the elements from the antenna array after amplification and frequency manipulation are sent to the respective inputs of the multichannel amplifier. The signals from the outputs of the amplifier are sent to the elements of the transmitting acoustical array. The initial phases of the signals being emitted by the elements of the acoustical array to the ultrasonic polygon coincide in phase with the signals being received by the elements of the antenna array and depend on the angular coordinates of the target. If the distances between adjacent elements of the transmitting acoustical array expressed in wavelengths of the ultrasonic oscillations are equal to the distances between elements of the antenna array expressed in electromagnetic wavelengths, the shape of the cumulative wavefront in the ultrasonic polygon repeats the shape of the wavefront received by the antenna array. Thus, the wavefront is "reconstructed."

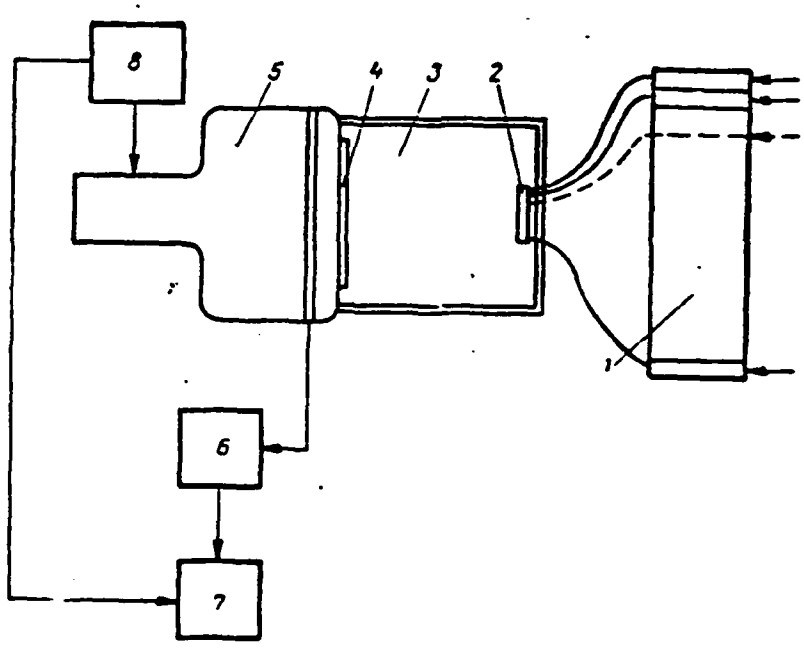
Different relationships may be used between the periods of the transmitting acoustical array and the antenna array. The distribution of the sonic field in the far zone of the transmitting acoustical array is counted by the receiving acoustical array. The potentials formed at its elements are removed by the electron beam of the cathode ray tube, from the collector of which the signal is amplified by the electronic amplifier and sent to the indicator. The indicator sweep is synchronized with the motion of the counting electron beam.

An image of the observed target is formed on the indicator screen. The coordinates of this image on the indicator screen determine the angular coordinates of the observed object.

Patent Claims

An ultrasonic processor of signals of phased antenna arrays, employing a reconstruction of the wavefront, containing a trans-

mitting acoustical array, an ultrasonic polygon, a multichannel electronic amplifier, an indicator and a system for counting the distribution of the acoustical field, distinguished by the fact that, to simplify and cheapen the design and reduce the dimensions, the counting system is in the form of a receiving acoustical array, the elements of which are connected to a television type indicator.



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