jc549 U.S. PTO
09/252874
02/18/99

ISSUE CLASSIFICATION	Subclass	Class
	226	704

PATENT NUMBER
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6363345

U.S. UTILITY PATENT APPLICATION

O.I.P.E.	PATENT DATE
SCANNED QT Q.A. RK	MAR 26 2002

SECTOR	CLASS	SUBCLASS	ART UNIT	EXAMINER
	704			

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PREPARED AND APPROVED FOR ISSUE

ISSUING CLASSIFICATION

ORIGINAL CLASS	ORIGINAL SUBCLASS	CROSS REFERENCE(S) CLASS	CROSS REFERENCE(S) SUBCLASS (ONE SUBCLASS PER BLOCK)
704	226	704	233 / 205

INTERNATIONAL CLASSIFICATION: G10L 21/02

☐ Continued on Issue Slip Inside File Jacket

☐ TERMINAL DISCLAIMER	DRAWINGS			CLAIMS ALLOWED	
	Sheets Drwg.	Figs. Drwg.	Print Fig.	Total Claims	Print Claim for O.G.
	10	10	2	46 47	1

☐ a) The term of this patent subsequent to _____ (date) has been disclaimed.

(Assistant Examiner) (Date)

☐ b) The term of this patent shall not extend beyond the expiration date of U.S Patent. No. _____

Richemond Dorvil
Primary Examiner

(Primary Examiner) 10-7-01 (Date)

☐ c) The terminal ____ months of this patent have been disclaimed.

MDJ 10.12.01
(Legal Instruments Examiner) (Date)

NOTICE OF ALLOWANCE MAILED

10-10-01

ISSUE FEE

Amount Due	Date Paid
$640.00	12-11-01

ISSUE BATCH NUMBER

1132

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Issue Fee

(LABEL AREA)

PATENT APPLICATION

09252874

jc549 U.S. PTO
09/252874
02/18/99

MAR INITIALS

CONTENTS

		Date received (Incl. C. of M.) or Date Mailed		Date received (Incl. C. of M.) or Date Mailed
1.	Application 11 pts papers.		42.	
2.	Lttr, Dec (unsigned) & Fee	3/12/99	43.	
3.		3-3-99	44.	
4.	Dec, Fee, Sm. Entity	4-12-99	45.	
5.	IDS	5-18-00	46.	
6.	Rejection (3 months)	11-16-00	47.	
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8.	Reconsideration + Ext. (1)	3-14-01	49.	
9.	Address change to Customer number	6-16-01	50.	
10.	Final Rejection (3 months)	5-29-01	51.	
11.	Change of Address	6/1/01	52.	
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15.	Notice of Allowance	10-10-01	56.	
16.	Issue Fee paid	2-4-02	57.	
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ISSUE SLIP STAPLE AREA (for additional cross references)

POSITION	INITIALS	ID NO.	DATE
FEE DETERMINATION	GW.	249	3/4/99
O.I.P.E. CLASSIFIER			
FORMALITY REVIEW	DMK DMK	69169 69169	3-9-99 3-31-99

INDEX OF CLAIMS

✔ ..... Rejected
= ..... Allowed
— (Through numeral)... Canceled
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N ..... Non-elected
I ..... Interference
A ..... Appeal
O ..... Objected

Claim Final	Claim Original	Date
1	1	✓ ✓ ✓ =
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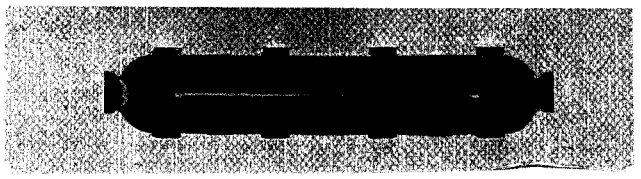
If more than 150 claims or 10 actions staple additional sheet here



SEARCHED

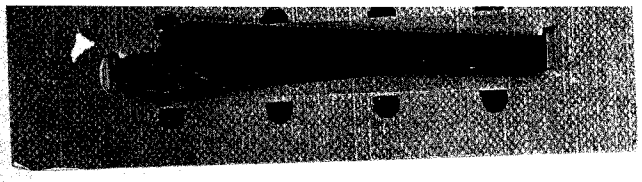
Class	Sub.	Date	Exmr.
704	270 500 233 200 201 205 226 227 228	11-1-00	RD
updated	ALL	5-24-01	MP
704	226 227 228 200 201 205 233 211 216 270 500		
379	22.08 392.01 3 406.01 406.12 406.13 406.14 406.05	10-06-01	RD

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.
704	226 233 205	10-06-01	RD

SEARCH NOTES
(INCLUDING SEARCH STRATEGY)

	Date	Exmr.
Clear	11-01-00	RD
updated	5-24-01	MP
updated	10-06-01	RD



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SERIAL NUMBER	FILING DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
09/252,874	02/18/99	381	2743	670025-2800

APPLICANT

JOSEPH MARASH, HAIFA, ISRAEL; BARUCH BERDUGO, KIRIAT-ATA 28000, ISRAEL.

CONTINUING DOMESTIC DATA********
VERIFIED

None, RN

371 (NAT'L STAGE) DATA********
VERIFIED

None, RN

FOREIGN APPLICATIONS********
VERIFIED

None, RN

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Foreign Priority claimed 35 USC 119 (a-d) conditions met	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐yes ☑no ☐yes ☐no ☐Met after Allowance Verified and Acknowledged RN Examiner's Initials _____ Initials	ILX	10	49	3

ADDRESS

THOMAS J KOWALSKI
FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE
NEW YORK NY 10151

TITLE

SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE

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RTL345-2_1020-0006

FROMMER LAWRENCE & HAUG LLP
745 Fifth Avenue
New York, New York 10151
Tel (212) 588-0800
Fax (212) 588-0500

PATENT APPLICATION TRANSMITTAL

Date: February 18, 1999
Re: 670025-2800

TO: THE COMMISSIONER OF PATENTS AND TRADEMARKS
Box PATENT APPLICATION
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Sir:

With reference to the filing in the United States Patent and Trademark Office of an application for patent in the name of:
JOSEPH MARASH and BARUCH BERDUGO

entitled: **SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**

The following are enclosed:

X Specification (22 pages) and One Page of Abstract (p. i)
X 49 Claims (including 3 independent claims; pp. 23-31)
X 10 Sheets of Drawings (Figs. 1, 2, 3, 4, 5, 5A, 6, 7, 8, 9)
X Unsigned Declaration and Power of Attorney (2 pages)
X The filing fee will be paid later, in response to a Notice to File Missing Parts. Kindly accord the application a February 18, 1998 filing date and address all communications to the undersigned at the address above.

Respectfully submitted,
Attorney for Applicant

By: [signature]
Thomas J. Kowalski, Reg. No. 32,147

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION FOR LETTERS PATENT

Title: **SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**

Inventors: Joseph Marash, Baruch Berdugo

22 pages specification and one page of Abstract (page i)

49 Claim (3 Independent; on pages 23-31)

10 sheets of Figs. (Figs. 1-5, 5A, 6-9)

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Abraham Muniz
(Signature of person mailing paper or fee)

Thomas J. Kowalski
Registration No. 32,147
I. Marc Asperas
Registration No. 37,274
FROMMER LAWRENCE & HAUG LLP
745 Fifth Avenue
New York, New York 10151
(212) 588-0800

MARCA\2800.APP (IMA:car)

RELATED APPLICATIONS INCORPORATED BY REFERENCE.

The following applications and patent(s) are cited and hereby herein incorporated by reference: U.S. Patent Serial No. 09/130,923 filed August 6, 1998, U.S. Patent Serial No. 09/055,709 filed April 7, 1998, U.S. Patent Serial No. 09/059,503 filed April 13, 1998, U.S. Patent Serial No. 08/840,159 filed April 14, 1997, U.S. Patent Serial No. 09/130,923 filed August 6, 1998, U.S. Patent Serial No. 08/672,899 now issued U.S. Patent No. 5,825,898 issued October 20, 1998. And, all documents cited herein are incorporated herein by reference, as are documents cited or referenced in documents cited herein.

FIELD OF THE INVENTION.

The present invention relates to noise cancellation and reduction and, more specifically, to noise cancellation and reduction using spectral subtraction.

BACKGROUND OF THE INVENTION.

Ambient noise added to speech degrades the performance of speech processing algorithms. Such processing algorithms may include dictation, voice activation, voice compression and other systems. In such systems, it is desired to reduce the noise and improve the signal to noise ratio (S/N ratio) without effecting the speech and its characteristics.

Near field noise canceling microphones provide a

satisfactory solution but require that the microphone in the proximity of the voice source (e.g., mouth). In many cases, this is achieved by mounting the microphone on a boom of a headset which situates the microphone at the end of a boom proximate the mouth of the wearer. However, the headset has proven to be either uncomfortable to wear or too restricting for operation in, for example, an automobile.

Microphone array technology in general, and adaptive beamforming arrays in particular, handle severe directional noises in the most efficient way. These systems map the noise field and create nulls towards the noise sources. The number of nulls is limited by the number of microphone elements and processing power. Such arrays have the benefit of hands-free operation without the necessity of a headset.

However, when the noise sources are diffused, the performance of the adaptive system will be reduced to the performance of a regular delay and sum microphone array, which is not always satisfactory. This is the case where the environment is quite reverberant, such as when the noises are strongly reflected from the walls of a room and reach the array from an infinite number of directions. Such is also the case in a car environment for some of the noises radiated from the car chassis.

OBJECTS AND SUMMARY OF THE INVENTION

The spectral subtraction technique provides a solution

to further reduce the noise by estimating the noise magnitude spectrum of the polluted signal. The technique estimates the magnitude spectral level of the noise by measuring it during non-speech time intervals detected by a voice switch, and then subtracting the noise magnitude spectrum from the signal. This method, described in detail in *Suppression of Acoustic Noise in Speech Using Spectral Subtraction, (Steven F Boll, IEEE ASSP-27 NO.2 April, 1979)*, achieves good results for stationary diffused noises that are not correlated with the speech signal. The spectral subtraction method, however, creates artifacts, sometimes described as musical noise, that may reduce the performance of the speech algorithm (such as vocoders or voice activation) if the spectral subtraction is uncontrolled. In addition, the spectral subtraction method assumes erroneously that the voice switch accurately detects the presence of speech and locates the non-speech time intervals. This assumption is reasonable for off-line systems but difficult to achieve or obtain in real time systems.

More particularly, the noise magnitude spectrum is estimated by performing an FFT of 256 points of the non-speech time intervals and computing the energy of each frequency bin. The FFT is performed after the time domain signal is multiplied by a shading window (Hanning or other) with an overlap of 50%. The energy of each frequency bin is averaged with neighboring FFT time frames. The number of frames is not determined but depends

on the stability of the noise. For a stationary noise, it is preferred that many frames are averaged to obtain better noise estimation. For a non-stationary noise, a long averaging may be harmful. Problematically, there is no means to know a-priori whether the noise is stationary or non-stationary.

Assuming the noise magnitude spectrum estimation is calculated, the input signal is multiplied by a shading window (Hanning or other), an FFT is performed (256 points or other) with an overlap of 50% and the magnitude of each bin is averaged over 2-3 FFT frames. The noise magnitude spectrum is then subtracted from the signal magnitude. If the result is negative, the value is replaced by a zero (Half Wave Rectification). It is recommended, however, to further reduce the residual noise present during non-speech intervals by replacing low values with a minimum value (or zero) or by attenuating the residual noise by 30dB. The resulting output is the noise free magnitude spectrum.

The spectral complex data is reconstructed by applying the phase information of the relevant bin of the signal's FFT with the noise free magnitude. An IFFT process is then performed on the complex data to obtain the noise free time domain data. The time domain results are overlapped and summed with the previous frame's results to compensate for the overlap process of the FFT.

There are several problems associated with the system described. First, the system assumes that there is a prior

knowledge of the speech and non-speech time intervals. A voice switch is not practical to detect those periods. Theoretically, a voice switch detects the presence of the speech by measuring the energy level and comparing it to a threshold. If the threshold is too high, there is a risk that some voice time intervals might be regarded as a non-speech time interval and the system will regard voice information as noise. The result is voice distortion, especially in poor signal to noise ratio cases. If, on the other hand, the threshold is too low, there is a risk that the non-speech intervals will be too short especially in poor signal to noise ratio cases and in cases where the voice is continuous with little intermission.

Another problem is that the magnitude calculation of the FFT result is quite complex. This involves square and square root calculations which are very expensive in terms of computation load. Yet another problem is the association of the phase information to the noise free magnitude spectrum in order to obtain the information for the IFFT. This process requires the calculation of the phase, the storage of the information, and applying the information to the magnitude data - all are expensive in terms of computation and memory requirements. Another problem is the estimation of the noise spectral magnitude. The FFT process is a poor and unstable estimator of energy. The averaging-over-time of frames contributes insufficiently to the stability. Shortening the length of the

FFT results in a wider bandwidth of each bin and better stability but reduces the performance of the system. Averaging-over-time, moreover, smears the data and, for this reason, cannot be extended to more than a few frames. This means that the noise estimation process proposed is not sufficiently stable.

It is therefore an object of this invention to provide a spectral subtraction system that has a simple, yet efficient mechanism, to estimate the noise magnitude spectrum even in poor signal-to-noise ratio situations and in continuous fast speech cases.

It is another object of this invention to provide an efficient mechanism that can perform the magnitude estimation with little cost, and will overcome the problem of phase association.

It is yet another object of this invention to provide a stable mechanism to estimate the noise spectral magnitude without the smearing of the data.

In accordance with the foregoing objectives, the present invention provides a system that correctly determines the non-speech segments of the audio signal thereby preventing erroneous processing of the noise canceling signal during the speech segments. In the preferred embodiment, the present invention obviates the need for a voice switch by precisely determining the non-speech segments using a separate threshold detector for each frequency bin. The threshold detector

precisely detects the positions of the noise elements, even within continuous speech segments, by determining whether frequency spectrum elements, or bins, of the input signal are within a threshold set according to a minimum value of the frequency spectrum elements over a preset period of time. More precisely, current and future minimum values of the frequency spectrum elements. Thus, for each syllable, the energy of the noise elements is determined by a separate threshold determination without examination of the overall signal energy thereby providing good and stable estimation of the noise. In addition, the system preferably sets the threshold continuously and resets the threshold within a predetermined period of time of, for example, five seconds.

In order to reduce complex calculations, it is preferred in the present invention to obtain an estimate of the magnitude of the input audio signal using a multiplying combination of the real and imaginary parts of the input in accordance with, for example, the higher and the lower values of the real and imaginary parts of the signal. In order to further reduce instability of the spectral estimation, a two-dimensional (2D) smoothing process is applied to the signal estimation. A two-step smoothing function using first neighboring frequency bins in each time frame then applying an exponential time average effecting an average over time for each frequency bin produces excellent results.

In order to reduce the complexity of determining the phase of the frequency bins during subtraction to thereby align the phases of the subtracting elements, the present invention applies a filter multiplication to effect the subtraction. The filter function, a Weiner filter function for example, or an approximation of the Weiner filter is multiplied by the complex data of the frequency domain audio signal. The filter function may effect a full-wave rectification, or a half-wave rectification for otherwise negative results of the subtraction process or simple subtraction. It will be appreciated that, since the noise elements are determined within continuous speech segments, the noise estimation is accurate and it may be canceled from the audio signal continuously providing excellent noise cancellation characteristics.

The present invention also provides a residual noise reduction process for reducing the residual noise remaining after noise cancellation. The residual noise is reduced by zeroing the non-speech segments, e.g., within the continuous speech, or decaying the non-speech segments. A voice switch may be used or another threshold detector which detects the non-speech segments in the time-domain.

The present invention is applicable with various noise canceling systems including, but not limited to, those systems described in the U.S. patent applications incorporated herein by reference. The present invention, for example, is applicable

with the adaptive beamforming array. In addition, the present invention may be embodied as a computer program for driving a computer processor either installed as application software or as hardware.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages according to the present invention will become apparent from the following detailed description of the illustrated embodiments when read in conjunction with the accompanying drawings in which corresponding components are identified by the same reference numerals.

Fig. 1 illustrates the present invention;

Fig. 2 illustrates the noise processing of the present invention;

Fig. 3 illustrates the noise estimation processing of the present invention;

Fig. 4 illustrates the subtraction processing of the present invention;

Fig. 5 illustrates the residual noise processing of the present invention;

Fig. 5A illustrates a variant of the residual noise processing of the present invention;

Fig. 6 illustrates a flow diagram of the present invention;

Fig. 7 illustrates a flow diagram of the present

invention;

Fig. 8 illustrates a flow diagram of the present invention; and

Fig. 9 illustrates a flow diagram of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 illustrates an embodiment of the present invention 100. The system receives a digital audio signal at input 102 sampled at a frequency which is at least twice the bandwidth of the audio signal. In one embodiment, the signal is derived from a microphone signal that has been processed through an analog front end, A/D converter and a decimation filter to obtain the required sampling frequency. In another embodiment, the input is taken from the output of a beamformer or even an adaptive beamformer. In that case the signal has been processed to eliminate noises arriving from directions other than the desired one leaving mainly noises originated from the same direction of the desired one. In yet another embodiment, the input signal can be obtained from a sound board when the processing is implemented on a PC processor or similar computer processor.

The input samples are stored in a temporary buffer 104 of 256 points. When the buffer is full, the new 256 points are combined in a combiner 106 with the previous 256 points to

provide 512 input points. The 512 input points are multiplied by multiplier 108 with a shading window with the length of 512 points. The shading window contains coefficients that are multiplied with the input data accordingly. The shading window can be Hanning or other and it serves two goals: the first is to smooth the transients between two processed blocks (together with the overlap process); the second is to reduce the side lobes in the frequency domain and hence prevent the masking of low energy tonals by high energy side lobes. The shaded results are converted to the frequency domain through an FFT (Fast Fourier Transform) processor 110. Other lengths of the FFT samples (and accordingly input buffers) are possible including 256 points or 1024 points.

The FFT output is a complex vector of 256 significant points (the other 256 points are an anti-symmetric replica of the first 256 points). The points are processed in the noise processing block 112(200) which includes the noise magnitude estimation for each frequency bin - the subtraction process that estimates the noise-free complex value for each frequency bin and the residual noise reduction process. An IFFT (Inverse Fast Fourier Transform) processor 114 performs the Inverse Fourier Transform on the complex noise free data to provide 512 time domain points. The first 256 time domain points are summed by the summer 116 with the previous last 256 data points to compensate for the input overlap and shading process and output

at output terminal 118. The remaining 256 points are saved for the next iteration.

It will be appreciated that, while specific transforms are utilized in the preferred embodiments, it is of course understood that other transforms may be applied to the present invention to obtain the spectral noise signal.

Figure 2 is a detailed description of the noise processing block 200(112). First, each frequency bin (n) 202 magnitude is estimated. The straight forward approach is to estimate the magnitude by calculating:

$$Y(n) = ((Real(n))^2 + (Imag(n))^2)^{-2}$$

In order to save processing time and complexity the signal magnitude (Y) is estimated by an estimator 204 using an approximation formula instead:

$$Y(n) = Max[|Real(n), Imag(n)|] + 0.4 * Min[|Real(n), Imag(n)|]$$

In order to reduce the instability of the spectral estimation, which typically plagues the FFT *Process (ref[2] Digital Signal Processing, Oppenheim Schafer, Prentice Hall P. 542545)*, the present invention implements a 2D smoothing process. Each bin is replaced with the average of its value and the two neighboring bins' value (of the same time frame) by a first

averager 206. In addition, the smoothed value of each smoothed bin is further smoothed by a second averager 208 using a time exponential average with a time constant of 0.7 (which is the equivalent of averaging over 3 time frames). The 2D-smoothed value is then used by two processes - the noise estimation process by noise estimation processor 212(300) and the subtraction process by subtractor 210. The noise estimation process estimates the noise at each frequency bin and the result is used by the noise subtraction process. The output of the noise subtraction is fed into a residual noise reduction processor 216 to further reduce the noise. In one embodiment, the time domain signal is also used by the residual noise process 216 to determine the speech free segments. The noise free signal is moved to the IFFT process to obtain the time domain output 218.

Figure 3 is a detailed description of the noise estimation processor 300(212). Theoretically, the noise should be estimated by taking a long time average of the signal magnitude (Y) of non-speech time intervals. This requires that a voice switch be used to detect the speech/non-speech intervals. However, a too-sensitive a switch may result in the use of a speech signal for the noise estimation which will defect the voice signal. A less sensitive switch, on the other hand, may dramatically reduce the length of the noise time intervals (especially in continuous speech cases) and defect the validity

of the noise estimation.

In the present invention, a separate adaptive threshold is implemented for each frequency bin 302. This allows the location of noise elements for each bin separately without the examination of the overall signal energy. The logic behind this method is that, for each syllable, the energy may appear at different frequency bands. At the same time, other frequency bands may contain noise elements. It is therefore possible to apply a non-sensitive threshold for the noise and yet locate many non-speech data points for each bin, even within a continuous speech case. The advantage of this method is that it allows the collection of many noise segments for a good and stable estimation of the noise, even within continuous speech segments.

In the threshold determination process, for each frequency bin, two minimum values are calculated. A future minimum value is initiated every 5 seconds at 304 with the value of the current magnitude (Y(n)) and replaced with a smaller minimal value over the next 5 seconds through the following process. The future minimum value of each bin is compared with the current magnitude value of the signal. If the current magnitude is smaller than the future minimum, the future minimum is replaced with the magnitude which becomes the new future minimum.

At the same time, a current minimum value is calculated at 306. The current minimum is initiated every 5 seconds with

the value of the future minimum that was determined over the previous 5 seconds and follows the minimum value of the signal for the next 5 seconds by comparing its value with the current magnitude value. The current minimum value is used by the subtraction process, while the future minimum is used for the initiation and refreshing of the current minimum.

The noise estimation mechanism of the present invention ensures a tight and quick estimation of the noise value, with limited memory of the process (5 seconds), while preventing a too high an estimation of the noise.

Each bin's magnitude (Y(n)) is compared with four times the current minimum value of that bin by comparator 308 - which serves as the adaptive threshold for that bin. If the magnitude is within the range (hence below the threshold), it is allowed as noise and used by an exponential averaging unit 310 that determines the level of the noise 312 of that frequency. If the magnitude is above the threshold it is rejected for the noise estimation. The time constant for the exponential averaging is typically 0.95 which may be interpreted as taking the average of the last 20 frames. The threshold of 4*minimum value may be changed for some applications.

Figure 4 is a detailed description of the subtraction processor 400(210). In a straight forward approach, the value of the estimated bin noise magnitude is subtracted from the current bin magnitude. The phase of the current bin is calculated and

used in conjunction with the result of the subtraction to obtain the Real and Imaginary parts of the result. This approach is very expensive in terms of processing and memory because it requires the calculation of the Sine and Cosine arguments of the complex vector with consideration of the 4 quarters where the complex vector may be positioned. An alternative approach used in this present invention is to use a Filter approach. The subtraction is interpreted as a filter multiplication performed by filter 402 where H (the filter coefficient) is:

$$H(n) = \frac{||Y(n)| - |N(n)||}{|Y(n)|}$$

Where Y(n) is the magnitude of the current bin and N(n) is the noise estimation of that bin. The value H of the filter coefficient (of each bin separately) is multiplied by the Real and Imaginary parts of the current bin at 404:

$$E(Real)=Y(Real)*H \quad ; \quad E(Imag)=Y(Imag)*H$$

Where E is the noise free complex value. In the straight forward approach the subtraction may result in a negative value of magnitude. This value can be either replaced with zero (half-wave rectification) or replaced with a positive value equal to the negative one (full-wave rectification). The filter approach, as expressed here, results in the full-wave

rectification directly. The full wave rectification provides a little less noise reduction but introduces much less artifacts to the signal. It will be appreciated that this filter can be modified to effect a half-wave rectification by taking the non-absolute value of the numerator and replacing negative values with zeros.

Note also that the values of Y in the figures are the smoothed values of Y after averaging over neighboring spectral bins and over time frames (2D smoothing). Another approach is to use the smoothed Y only for the noise estimation (N), and to use the unsmoothed Y for the calculation of H.

Figure 5 illustrates the residual noise reduction processor 500(216). The residual noise is defined as the remaining noise during non-speech intervals. The noise in these intervals is first reduced by the subtraction process which does not differentiate between speech and non-speech time intervals. The remaining residual noise can be reduced further by using a voice switch 502 and either multiplying the residual noise by a decaying factor or replacing it with zeros. Another alternative to the zeroing is replacing the residual noise with a minimum value of noise at 504.

Yet another approach, which avoids the voice switch, is illustrated in Figure 5A. The residual noise reduction processor 506 applies a similar threshold used by the noise estimator at 508 on the noise free output bin and replaces or decays the

result when it is lower than the threshold at 510.

The result of the residual noise processing of the present invention is a quieter sound in the non-speech intervals. However, the appearance of artifacts such as a pumping noise when the noise level is switched between the speech interval and the non-speech interval may occur in some applications.

The spectral subtraction technique of the present invention can be utilized in conjunction with the array techniques, close talk microphone technique or as a stand alone system. The spectral subtraction of the present invention can be implemented on an embedded hardware (DSP) as a stand alone system, as part of other embedded algorithms such as adaptive beamforming, or as a software application running on a PC using data obtained from a sound port.

As illustrated in Figures 6-9, for example, the present invention may be implemented as a software application. In step 600, the input samples are read. At step 602, the read samples are stored in a buffer. If 256 new points are accumulated in step 604, program control advances to step 606 - otherwise control returns to step 600 where additional samples are read. Once 256 new samples are read, the last 512 points are moved to the processing buffer in step 606. The 256 new samples stored are combined with the previous 256 points in step 608 to obtain the 512 points. In step 610, a Fourier Transform is performed on the 512 points. Of course, another transform may be employed to

obtain the spectral noise signal. In step 612, the 256 significant complex points resulting from the transformation are stored in the buffer. The second 256 points are a conjugate replica of the first 256 points and are redundant for real inputs. The stored data in step 614 includes the 256 real points and the 256 imaginary points. Next, control advances to Figure 7 as indicated by the circumscribed letter A.

In Figure 7, the noise processing is performed wherein the magnitude of the signal is estimated in step 700. Of course, the straight forward approach may be employed but, as discussed with reference to Figure 2, the straight forward approach requires extraneous processing time and complexity. In step 702, the stored complex points are read from the buffer and calculated using the estimation equation shown in step 700. The result is stored in step 704. A 2-dimensional (2D) smoothing process is effected in steps 706 and 708 wherein, in step 706, the estimate at each point is averaged with the estimates of adjacent points and, in step 708, the estimate is averaged using an exponential average having the effect of averaging the estimate at each point over, for example, 3 time samples of each bin. In steps 710 and 712, the smoothed estimate is employed to determine the future minimum value and the current minimum value. If the smoothed estimate is less than the calculated future minimum value as determined in step 710, the future minimum value is replaced with the smoothed estimate and stored in step 714.

Meanwhile, if it is determined at step 712 that the smoothed estimate is less than the current minimum value, then the current minimum is replaced with the smoothed estimate value and stored in step 720. The future and current minimum values are calculated continuously and initiated periodically, for example, every 5 seconds as determined in step 724 and control is advanced to steps 722 and 726 wherein the new future and current minimum are calculated. Afterwards, control advances to Figure 8 as indicated by the circumscribed letter B where the subtraction and residual noise reduction are effected.

In Figure 8, it is determined whether the samples are less than a threshold amount in step 800. In step 804, where the samples are within the threshold, the samples undergo an exponential averaging and stored in the buffer at step 802. Otherwise, control advances directly to step 808. At step 808, the filter coefficients are determined from the signal samples retrieved in step 806 the samples retrieved from step 810 is determined from the signal samples retrieved in step 806 and the estimated samples retrieved from step 810. Although the straight forward approach may be used by which phase is estimated and applied, the alternative Weiner Filter is preferred since this saves processing time and complexity. In step 814, the filter transform is multiplied by the samples retrieved from steps 816 and stored in step 812.

In steps 818 and 820, the residual noise reduction

process is performed wherein, in step 818, if the processed noise signal is within a threshold, control advances to step 820 wherein the processed noise is subjected to replacement, for example, a decay. However, the residual noise reduction process may not be suitable in some applications where the application is negatively effected.

It will be appreciated that, while specific values are used as in the several equations and calculations employed in the present invention, these values may be different than those shown.

In Figure 9, the Inverse Fourier Transform is generated in step 902 on the basis of the recovered noise processed audio signal recovered in step 904 and stored in step 900. In step 906, the time-domain signals are overlayed in order to regenerate the audio signal substantially without noise.

It will be appreciated that the present invention may be practiced as a software application, preferably written using C or any other programming language, which may be embedded on, for example, a programmable memory chip or stored on a computer-readable medium such as, for example, an optical disk, and retrieved therefrom to drive a computer processor. Sample code representative of the present invention is illustrated in Appendix A which, as will be appreciated by those skilled in the art, may be modified to accommodate various operating systems and compilers or to include various bells and whistles without

departing from the spirit and scope of the present invention.

With the present invention, a spectral subtraction system is provided that has a simple, yet efficient mechanism, to estimate the noise magnitude spectrum even in poor signal to noise ratio situations and in continuous fast speech cases. An efficient mechanism is provided that can perform the magnitude estimation with little cost, and will overcome the problem of phase association. A stable mechanism is provided to estimate the noise spectral magnitude without the smearing of the data.

Although preferred embodiments of the present invention and modifications thereof have been described in detail herein, it is to be understood that this invention is not limited to those precise embodiments and modifications, and that other modifications and variations may be affected by one skilled in the art without departing from the spirit and scope of the invention as defined by the appended claims.

WHAT IS CLAIMED IS:

1. An apparatus for canceling noise, comprising:

an input for inputting an audio signal which includes a noise signal;

a frequency spectrum generator for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal; and

a threshold detector for detecting for each frequency bin whether a respective frequency bin is within said threshold thereby detecting the position of noise elements for each frequency bin.

2. The apparatus according to claim 1, wherein said threshold detector detects the position of a plurality of non-speech data points for said frequency bins.

3. The apparatus according to claim 2, wherein said threshold detector detects the position of said plurality of non-speech data points for said frequency bins within a continuous speech segment of said audio signal.

4. The apparatus according to claim 1, wherein said threshold detector detects the positions of said noise elements by setting said threshold in accordance with a current minimum value of a magnitude of said frequency bins derived in accordance with a future minimum value.

5. The apparatus according to claim 4, wherein said

future minimum value is determined as that minimum value within a predetermined period of time.

6. The apparatus according to claim 4, wherein said current minimum value is determined as that minimum value within a predetermined period of time.

7. The apparatus according to claim 5, wherein said current minimum value is set to said future minimum value periodically.

8. The apparatus according to claim 5, wherein said future minimum value is set to said current-magnitude value periodically.

9. The apparatus according to claim 7, wherein said future minimum value is replaced with the current magnitude value when said future minimum value is greater than said current magnitude value.

10. The apparatus according to claim 7, wherein said current minimum value is replaced with the current magnitude value when said current minimum value is greater than said current magnitude value.

11. The apparatus according to claim 4, wherein said threshold is set by multiplying said current minimum value by a coefficient.

12. The apparatus according to claim 1, further comprising an averaging unit for determining a level of said noise within said respective frequency bin, wherein said

threshold detector detects the position of said noise elements where said level of said noise determined by said averaging unit is within said threshold.

13. The apparatus according to claim 1, further comprising a subtractor for subtracting said noise elements estimated at said positions determined by said threshold detector from said audio signal to derive said audio signal substantially without said noise.

14. The apparatus according to claim 13, wherein said subtractor performs subtraction using a filter multiplication which multiplies said audio signal by a filter function.

15. The apparatus according to claim 14, wherein said filter function is a Wiener filter function which is a function of said frequency bins of said noise elements and magnitude.

16. The apparatus according to claim 15, wherein said filter multiplication multiplies the complex elements of said frequency bins by said Weiner filter function.

17. The apparatus according to claim 1, further comprising an estimator for estimating a magnitude of each frequency bin.

18. The apparatus according to claim 17, wherein said estimator estimates said magnitude of each frequency bin as a function of the maximum and the minimum values of the complex element of said frequency bins for a number n of frequency bins.

19. The apparatus according to claim 17, further

comprising a smoothing unit which smoothes the estimate of each frequency bin.

20. The apparatus according to claim 19, wherein said smoothing unit comprises a two-dimensional process which averages each frequency bin in accordance with neighboring frequency bins and averages each frequency bin using an exponential timen average which effects an average over a plurality of frequency bins over time.

21. The apparatus according to claim 13, further comprising a residual noise processor for reducing residual noise remaining after said subtractor subtracts said noise elements at said positions determined by said threshold detector from said audio signal.

22. The apparatus according to claim 21, wherein said residual noise processor replaces said frequency bins corresponding to non-speech segments of said audio signal with a minimum value.

23. The apparatus according to claim 22, wherein said residual noise processor includes a voice switch for detecting said non-speech segments.

24. The apparatus according to claim 22, wherein said residual noise processor includes another threshold detector for detecting said non-speech segments by detecting said audio signal is below a predetermined threshold.

25. The apparatus according to claim 1, further

comprising an adaptive array comprising a plurality of microphones for receiving said audio signal.

26. An apparatus for canceling noise, comprising:

input means for inputting an audio signal which includes a noise signal;

frequency spectrum generating means for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal; and

threshold detecting means for detecting for each frequency bin whether a respective frequency bin is within said threshold thereby detecting the position of noise elements for each frequency bin.

27. The apparatus according to claim 26, wherein said threshold detecting means detects the positions of said noise elements by setting said threshold in accordance with a current minimum value of a magnitude of said frequency bins derived in accordance with a future minimum value.

28. The apparatus according to claim 26, wherein said threshold detecting means detects the positions of said noise elements by setting said threshold in accordance with a future minimum value of a magnitude of said frequency bins derived in accordance with a current minimum value.

29. The apparatus according to claim 27, wherein said future minimum value is determined as that minimum value within a predetermined period of time.

30. The apparatus according to claim 27, wherein said current minimum value is determined as that minimum value within a predetermined period of time.

31. The apparatus according to claim 26, further comprising averaging means for determining a level of said noise within said respective frequency bin, wherein said threshold detecting means detects the position of said noise elements where said level of said noise determined by said averaging means is within said threshold.

31 32. The apparatus according to claim 26, further comprising subtracting means for subtracting said noise elements at said positions determined by said threshold detecting means from said audio signal to derive said audio signal substantially without said noise.

32 33. The apparatus according to claim 31, wherein said subtracting performs subtraction using a filter multiplication which multiplies said audio signal by a filter function.

34 34. The apparatus according to claim 26, further comprising estimating means for estimating a magnitude of each frequency bin.

35. The apparatus according to claim 34, wherein said estimating means estimates said magnitude of each frequency bin as a function of a maximum and a minimum of said frequency bins for a number n of frequency bins.

36. The apparatus according to claim 34, further

comprising smoothing means for smoothing the estimate of each frequency bin.

~~37~~ 32. The apparatus according to claim 31, further comprising residual noise processing means for reducing residual noise remaining after said subtracting means subtracts said noise elements at said positions determined by said threshold detecting means from said audio signal.

~~38~~ 37. The apparatus according to claim 26, further comprising adaptive array means comprising a plurality of microphones for receiving said audio signal.

39. A method for driving a computer processor for generating a noise canceling signal for canceling noise from an audio signal representing audible sound including a noise signal representing audible noise, said method comprising the steps of:

inputting said audio signal which includes said noise signal;

generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal;

detecting for each frequency bin whether a respective frequency bin is within said threshold thereby detecting the position of noise elements for each frequency bin; and

subtracting said noise elements detected in said step of detecting from said audio signal to produce an audio signal representing said audible sound substantially without said audible noise.

40. The method according to claim 39, wherein said step of detecting detects the positions of said noise elements by setting said threshold in accordance with a current minimum value of a magnitude of said frequency bins derived in accordance with a future minimum value.

41. The method according to claim 40, wherein said step of detecting detects the positions of said noise elements by setting said threshold in accordance with a current minimum value of a magnitude of said frequency bins derived in accordance with a future minimum value.

42. The method according to claim 41, wherein said step of detecting further comprises the step of determining said future minimum value as that minimum value within a predetermined period of time.

43. The method according to claim 42, wherein said step of detecting further comprises the step of determining said future minimum value as that minimum value within a predetermined period of time.

44. The method according to claim 42, further comprising the step of averaging a level of said noise of said respective frequency bin, wherein said step of detecting detects the position of said noise elements where said level of said noise determined by said step of averaging is within said threshold.

45. The method according to claim 42, wherein said

step of subtracting performs subtraction using a filter multiplication which multiplies said audio signal by a filter function.

44 40
~~48~~. The method according to claim ~~42~~, further comprising the step of estimating a magnitude of each frequency bin as a function of a maximum and a minimum of said frequency bins for a number n of frequency bins.

45 ~~47~~ 44
~~47~~. The method according to claim ~~46~~, further comprising the step of smoothing the estimate of each frequency bin.

47 38 34
~~48~~. The method according to claim ~~34~~, further comprising the step of reducing the residual noise remaining after said step of subtracting subtracts said noise elements at said positions determined by said step of detecting from said audio signal.

46 39
~~49~~. The method according to claim ~~41~~, further comprising the step of receiving said audio signal from an adaptive array of a plurality of microphones.

ABSTRACT OF THE DISCLOSURE

A threshold detector precisely detects the positions of the noise elements, even within continuous speech segments, by determining whether frequency spectrum elements, or bins, of the input signal are within a threshold set according to current and future minimum values of the frequency spectrum elements. In addition, the threshold is continuously set and initiated within a predetermined period of time. The estimate magnitude of the input audio signal is obtained using a multiplying combination of the real and imaginary part of the input in accordance with the higher and lower values between the real and imaginary part of the signal. In order to further reduce instability of the spectral estimation, a two-dimensional smoothing is applied to the signal estimate using neighboring frequency bins and an exponential average over time. A filter multiplication effects the subtraction thereby avoiding phase calculation difficulties and effecting full-wave rectification which further reduces artifacts. Since the noise elements are determined within continuous speech segments, the noise is canceled from the audio signal nearly continuously thereby providing excellent noise cancellation characteristics. Residual noise reduction reduces the residual noise remaining after noise cancellation. Implementation may be effected in various noise canceling schemes including adaptive beamforming and noise cancellation using computer program applications installed as software or hardware.

DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(Includes reference to PCT International Applications)

FROMMER LAWRENCE & HAUG, LLP
File No.: 670025-2800

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor (if plural, names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention ENTITLED: **SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**

the specification of which:

- ☐ is attached hereto
- x was filed on FEBRUARY 18, 1999 as:
- x United States Application Serial No. _____
- ☐ PCT Application No. _____
- x with amendments through DATE EVEN HEREWITH (if applicable, give details).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code § 119 (a) - (d) or § 365 (b) of any foreign application(s) for patent or inventor's certificate, or § 365 (a) of any PCT International application(s) designating at least one country other than the United State of America listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT International applications designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign/PCT Application(s) [list additional applications on separate page]:

Country (or PCT)	Application Number:	Filed (Day/Month/Year)	Priority Claimed: Yes	No

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

_____ (Application Number) (Filing Date)

I hereby claim the benefit under Title 35, United States Code § 120 of any United States application(s) or § 365 (c) of any PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior United States or PCT International application(s) in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S. (or U.S.-designating PCT) Application(s) [list additional applications on separate page]:

U.S. Serial No.:	Filed (Day/Month/Year)	PCT Application No.	Status (patented, pending, abandoned)

DECLARATION FOR PATENT APPLICATION
AND POWER OF ATTORNEY

FLH Docket No. 670025-2800

I hereby appoint Thomas J. Kowalski, Registration No. 32,147, and I. Marc Asperas, Registration No. 37,274, and FROMMER LAWRENCE & HAUG, LLP or their duly appointed associates, my attorneys or agents, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to file continuation and divisional applications thereof, to receive the Patent, and to transact all business in the Patent and Trademark Office and in the Courts in connection therewith, and to insert the Serial Number of the application in the space provided above, and specify that all communications about the application are to be directed to the following correspondence address:

Thomas J. Kowalski, Esq.
c/o FROMMER LAWRENCE & HAUG, LLP
745 Fifth Avenue
New York, NY 10151
FAX (212) 588-0500

Direct all telephone calls to: (212) 588-0800
to the attention of:
Thomas J. Kowalski

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

INVENTOR(S):

Signature: _____ Date: _____

Full name of first inventor: Joseph Marash
Residence: Haifa, Isreal; P.O. Box 7752, Haifa, Isreal 31077
Citizenship: Isreali

Signature: _____ Date: _____

Full name of second joint inventor (if any): Baruch Berdugo
Residence: Kiriat-Ata 28000, Isreal
Citizenship: Isreali

Post Office Address(es) of inventors [if different from residence]:

NOTE: In order to qualify for reduced fees available to Small Entities, each inventor and any other individual or entity having rights to the invention must also sign an appropriate separate "Verified Statement (Declaration) Claiming [or Supporting a Claim by Another for] Small Entity Status" form [e.g. for Independent Inventor, Small Business Concern, Nonprofit Organization, Individual Non-Inventor].

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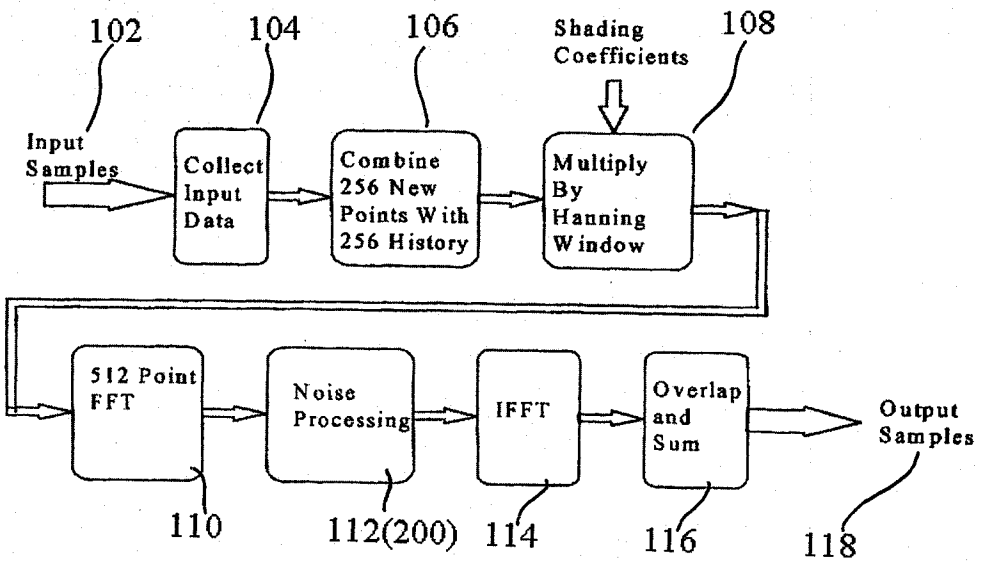

Figure 1- Spectral Subtraction System

100

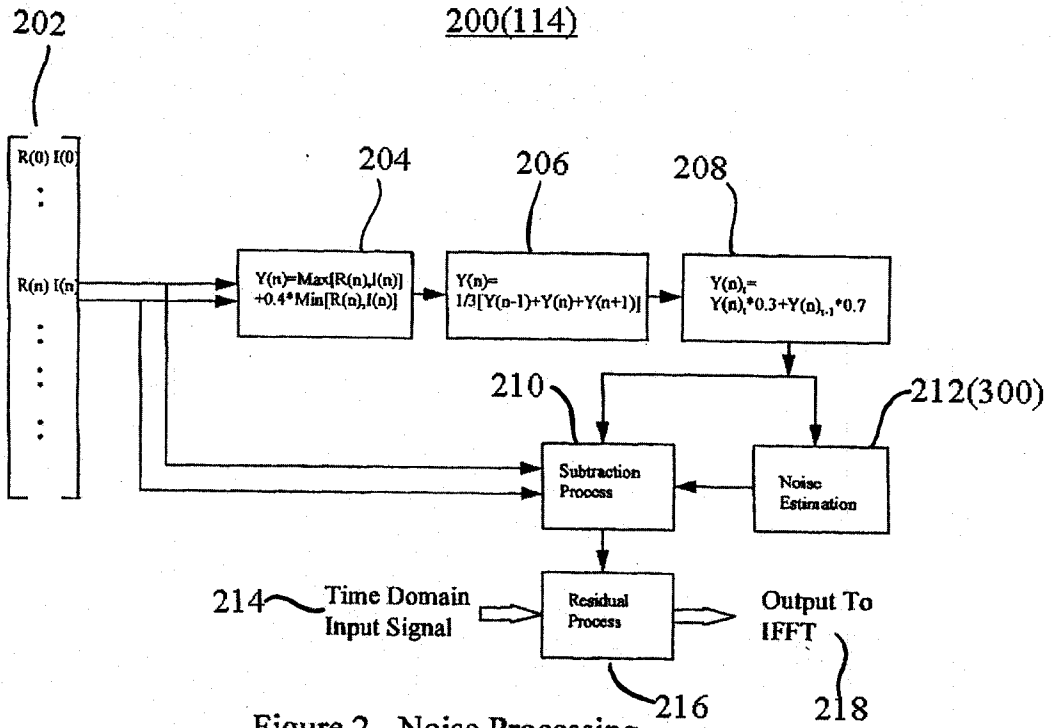

Figure 2 - Noise Processing

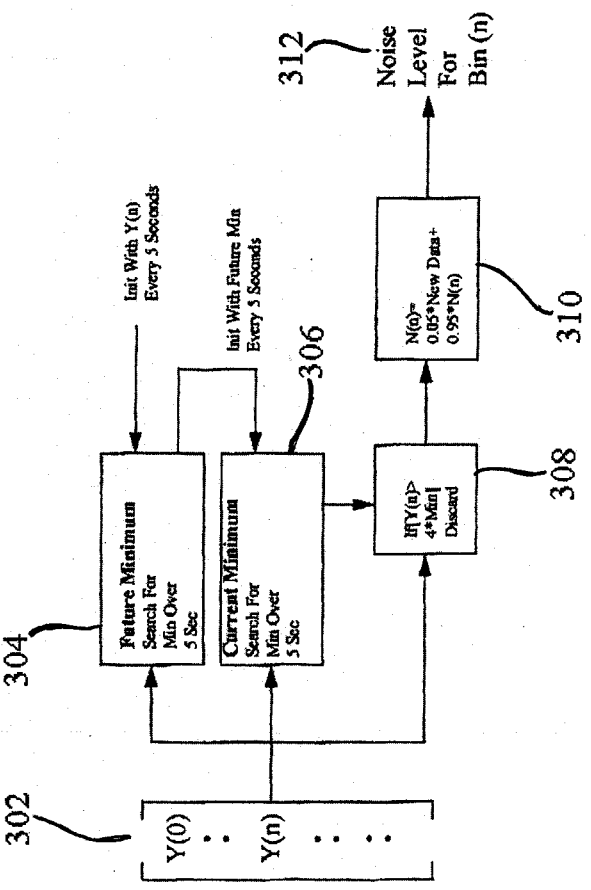

Figure 3 - Noise Estimation Process

400(210)

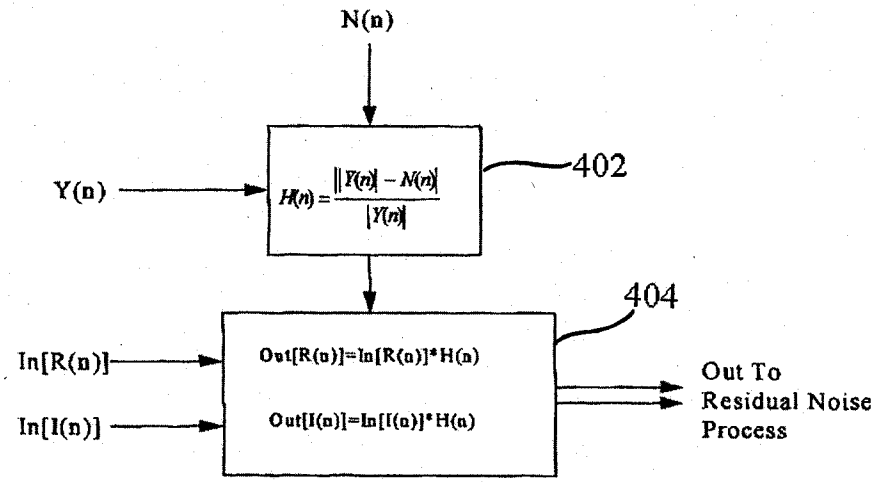

Figure 4 - Subtraction Process

500(216)

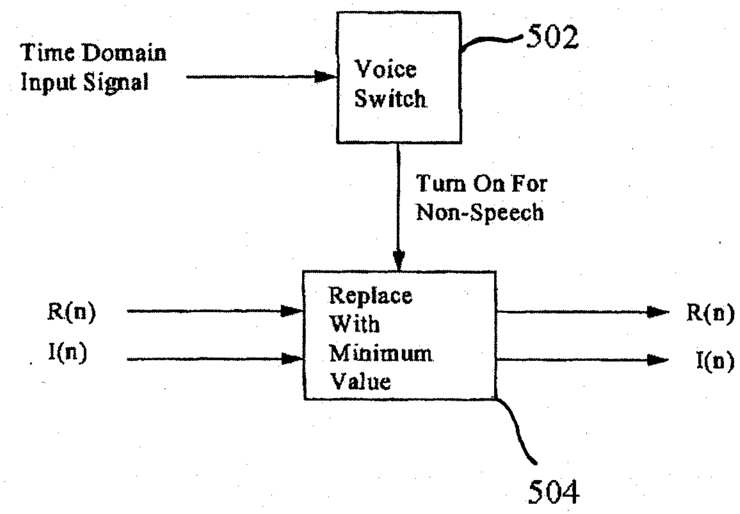

Figure 5 - Residual Noise Process

506

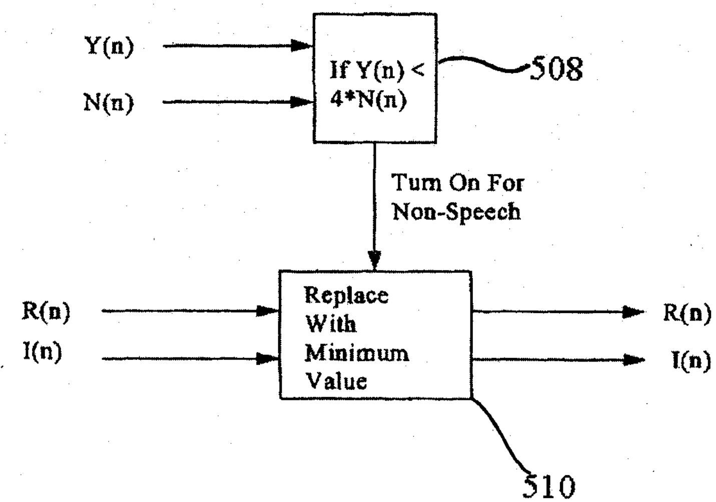

Figure 5A - Residual Noise Process Alternative

Fig. 6

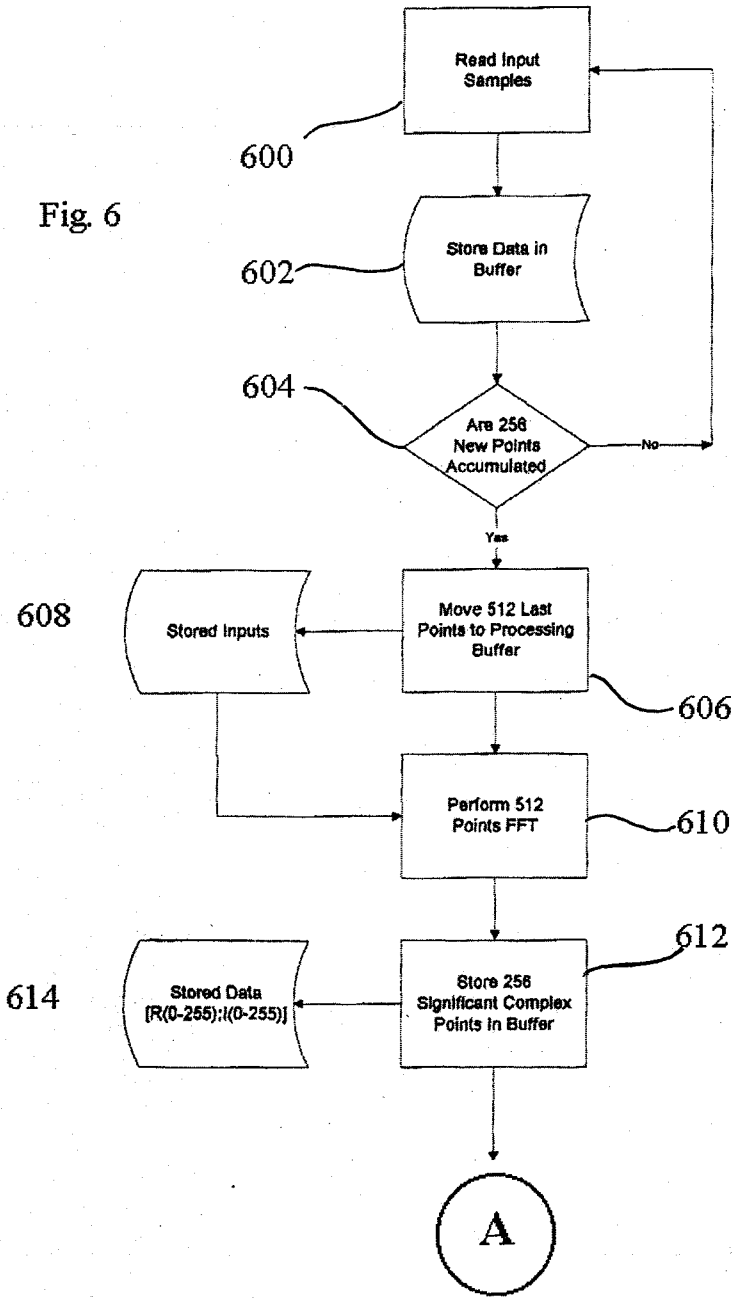
Read Input Samples
600
Store Data in Buffer
602
604
Are 256 New Points Accumulated
No
Yes
608
Stored Inputs
Move 512 Last Points to Processing Buffer
606
Perform 512 Points FFT
610
612
614
Stored Data [R(0-255);I(0-255)]
Store 256 Significant Complex Points in Buffer
A

Fig. 7

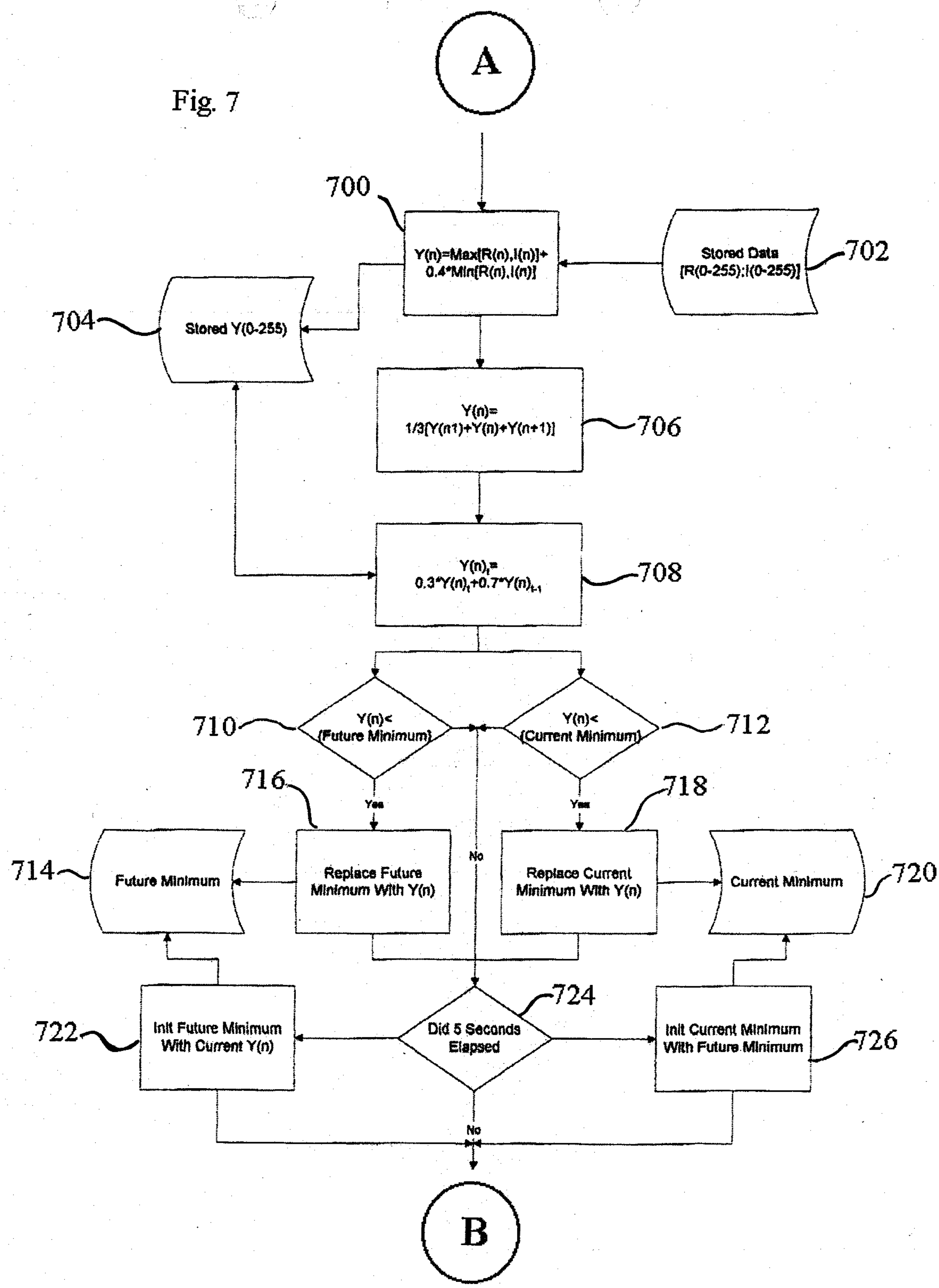

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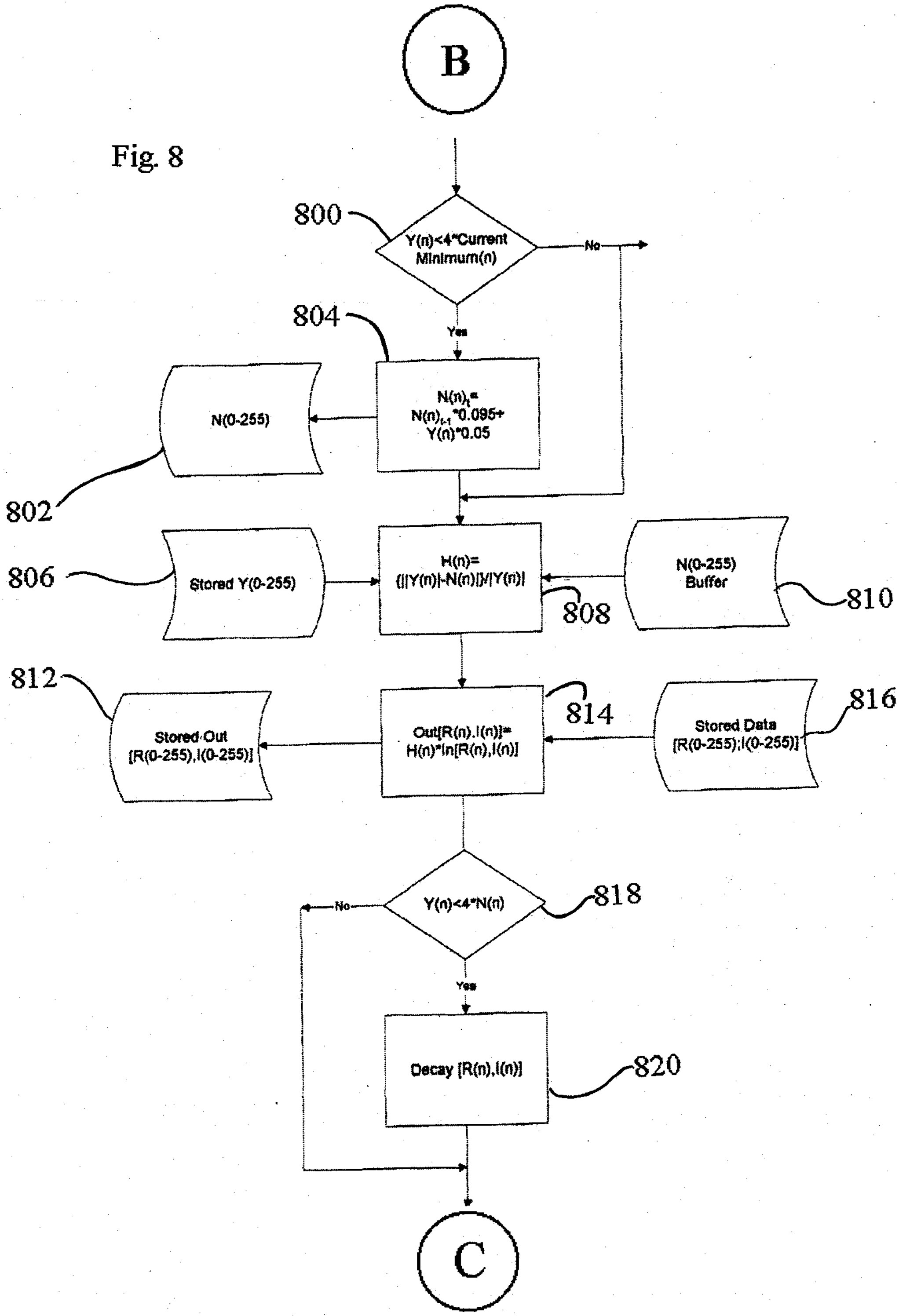
Fig. 8


B
800
Y(n)<4*Current Minimum(n)
No
Yes
804
N(0-255)
802
806
Stored Y(0-255)
808
N(0-255) Buffer
810
812
Stored Out [R(0-255),I(0-255)]
814
816
Stored Data [R(0-255);I(0-255)]
No
Y(n)<4*N(n)
818
Yes
Decay [R(n),I(n)]
820
C

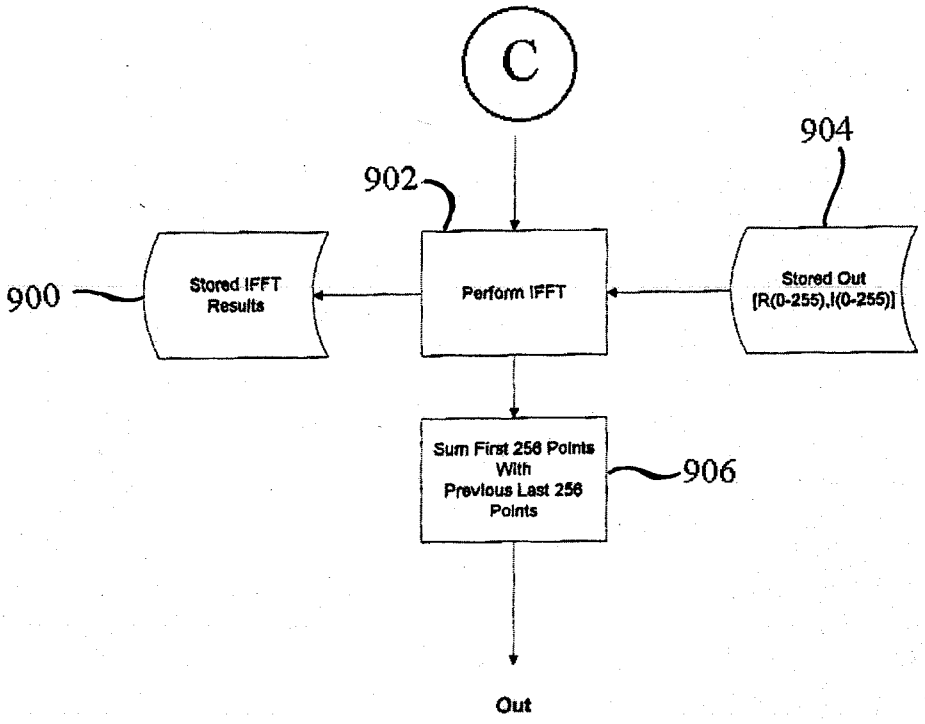

C
902
904
900
Stored IFFT Results
Perform IFFT
Stored Out [R(0-255),I(0-255)]
Sum First 256 Points With Previous Last 256 Points
906
Out

Fig. 9

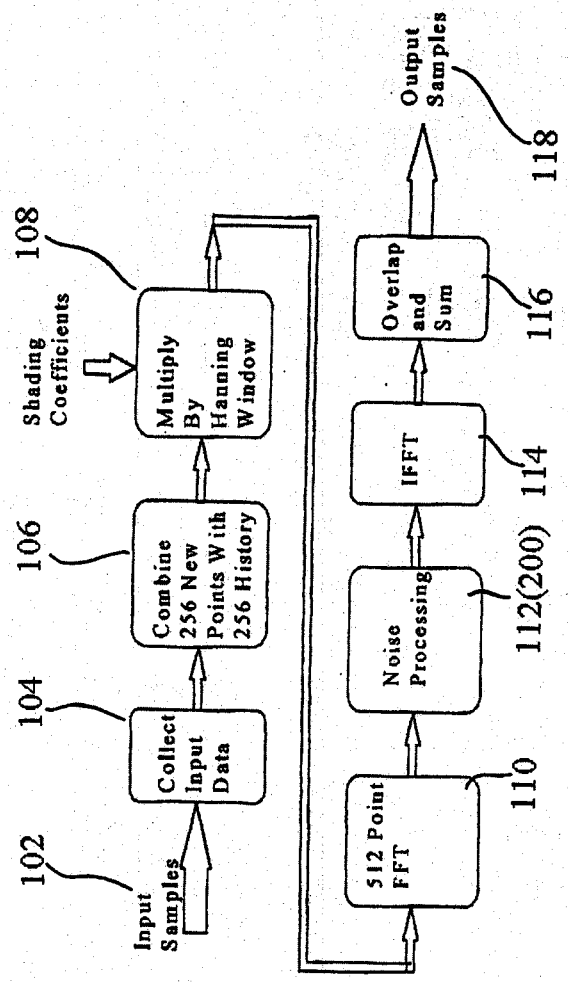


Figure 1- Spectral Subtraction System

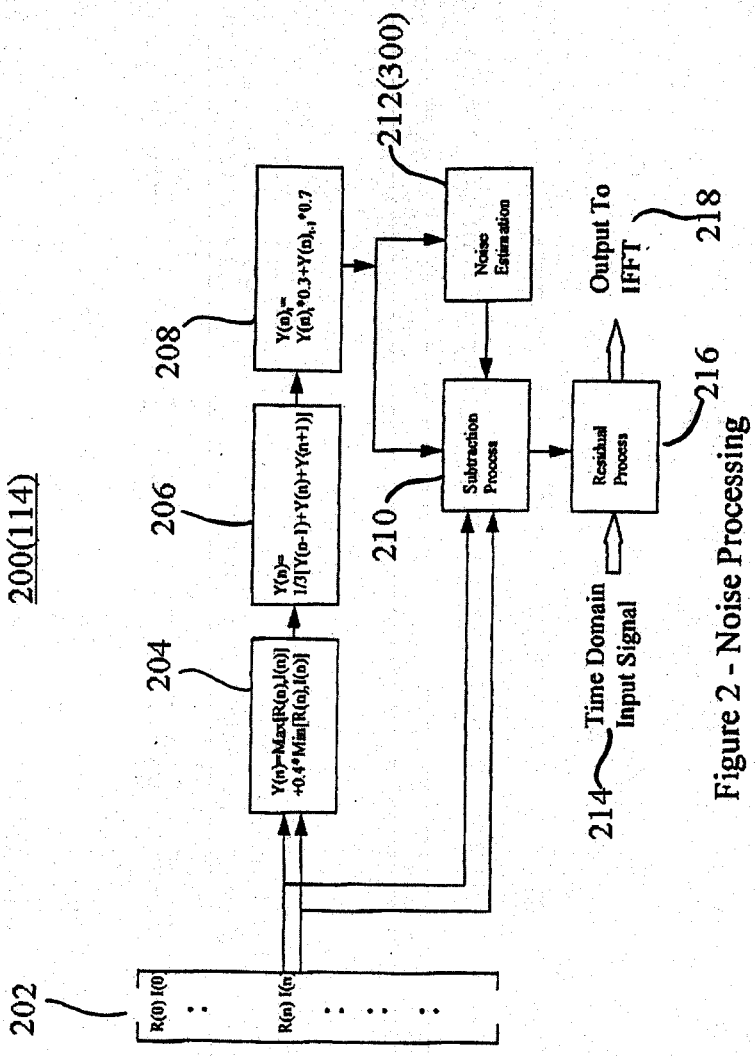


Figure 2 - Noise Processing

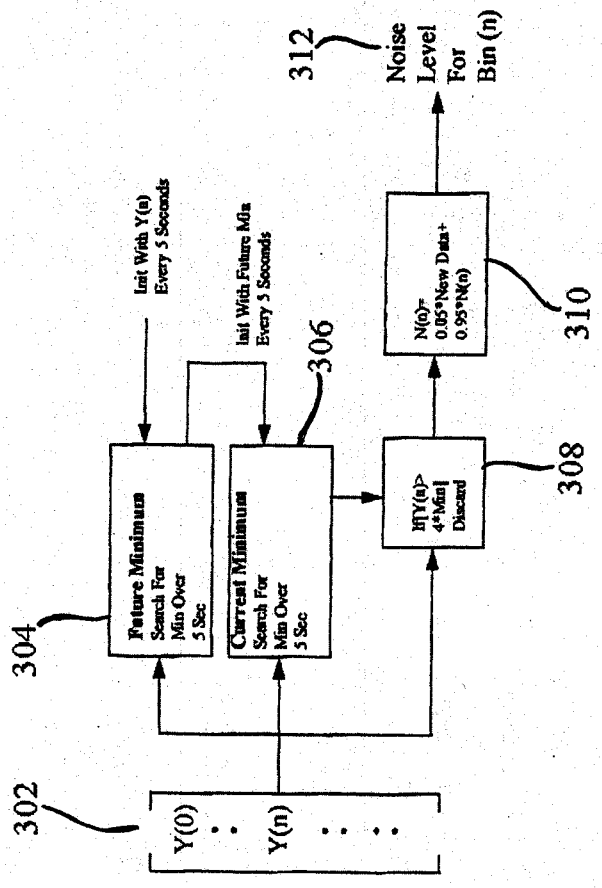


Figure 3 - Noise Estimation Process

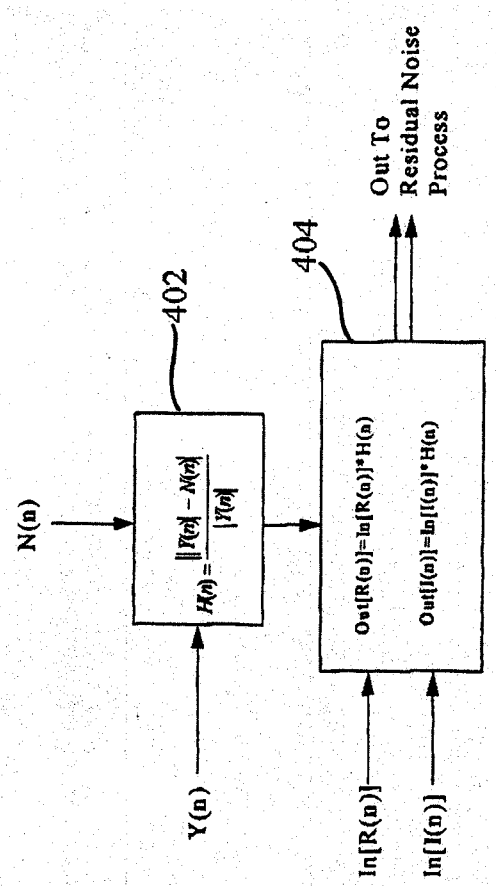


Figure 4 - Subtraction Process

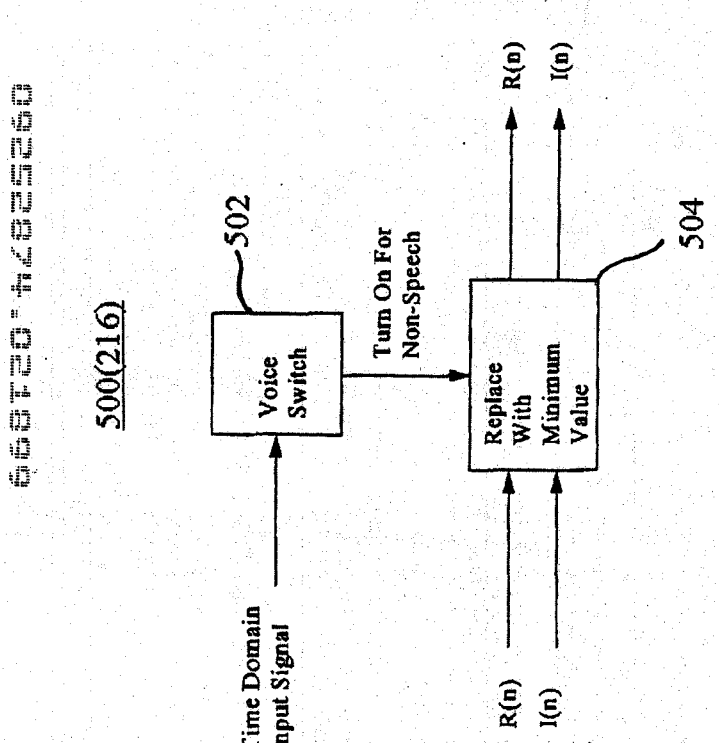


Figure 5 - Residual Noise Process

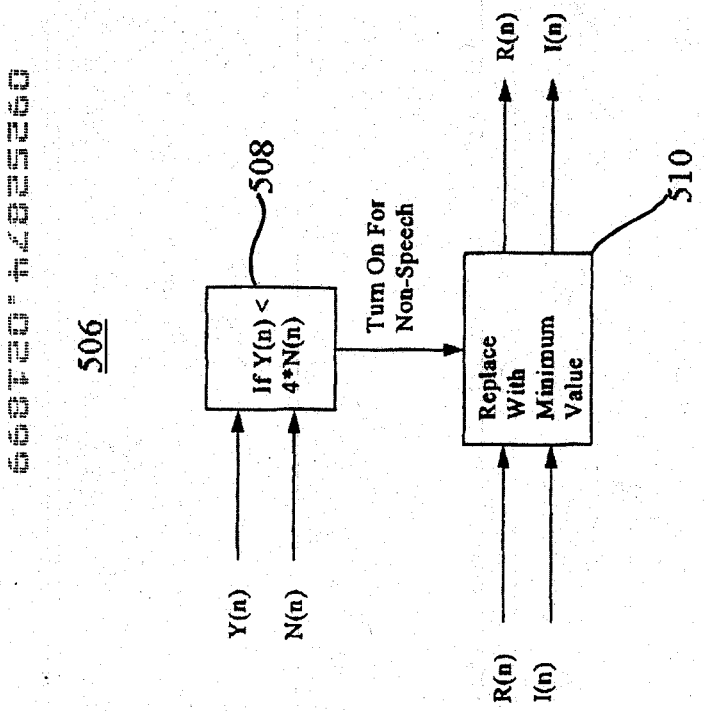


Figure 5A - Residual Noise Process Alternative

Fig. 6

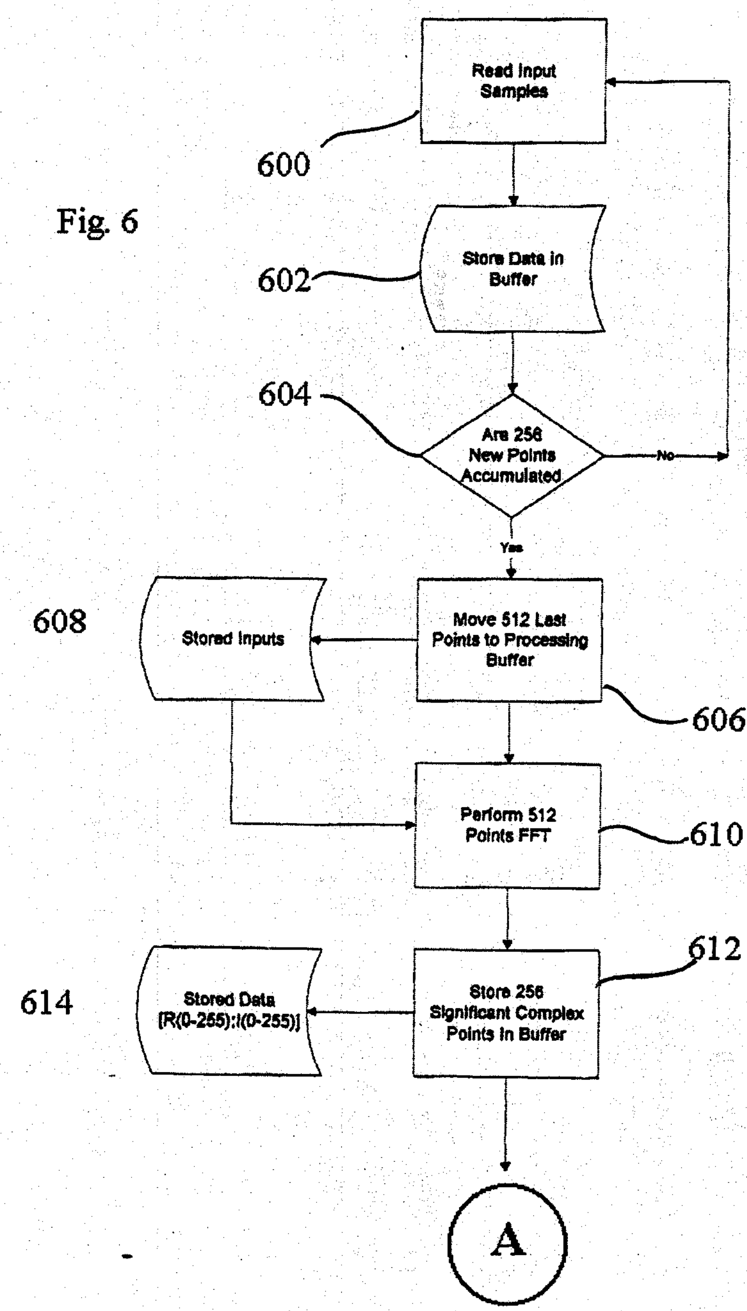


Fig. 7

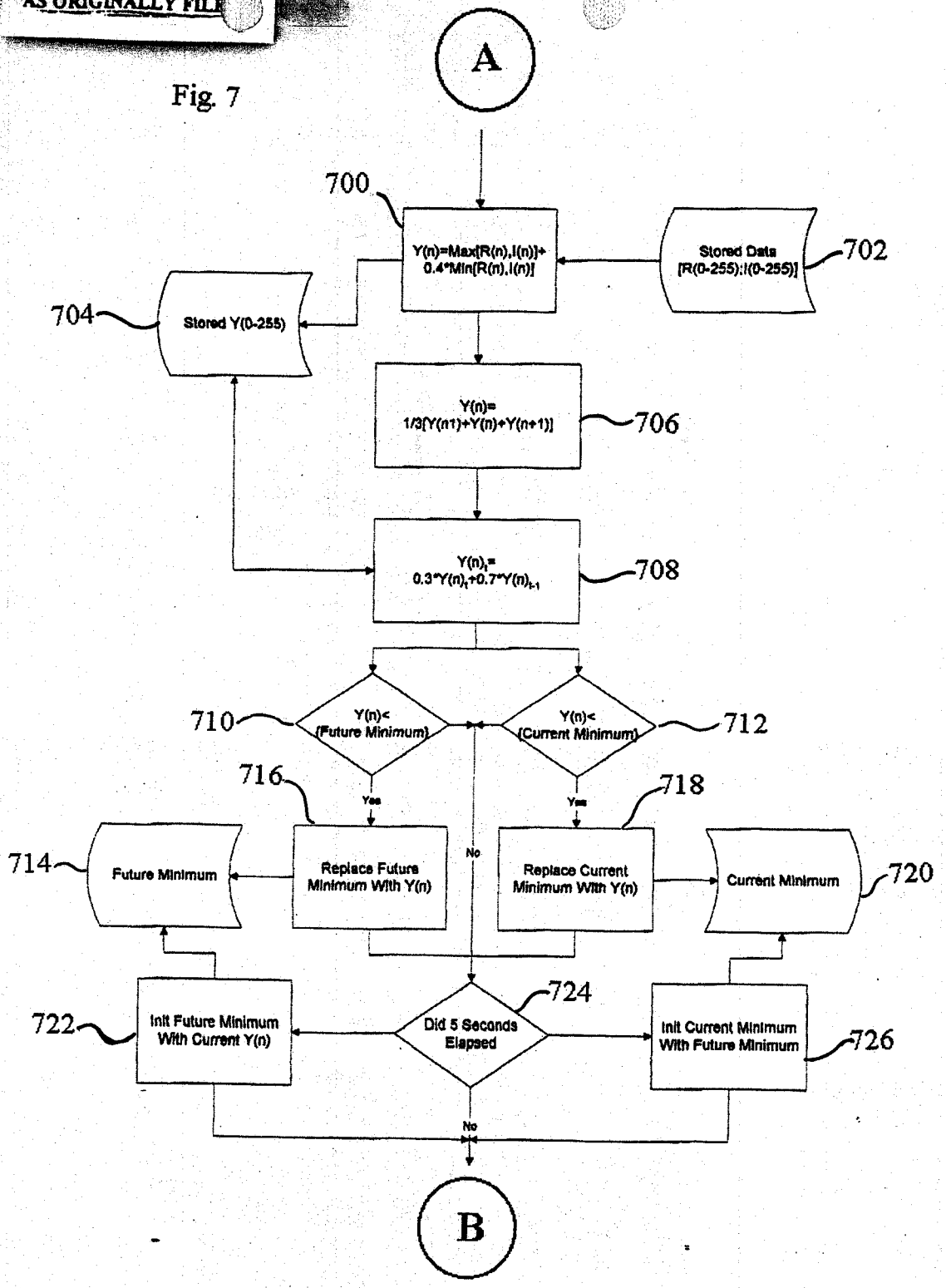
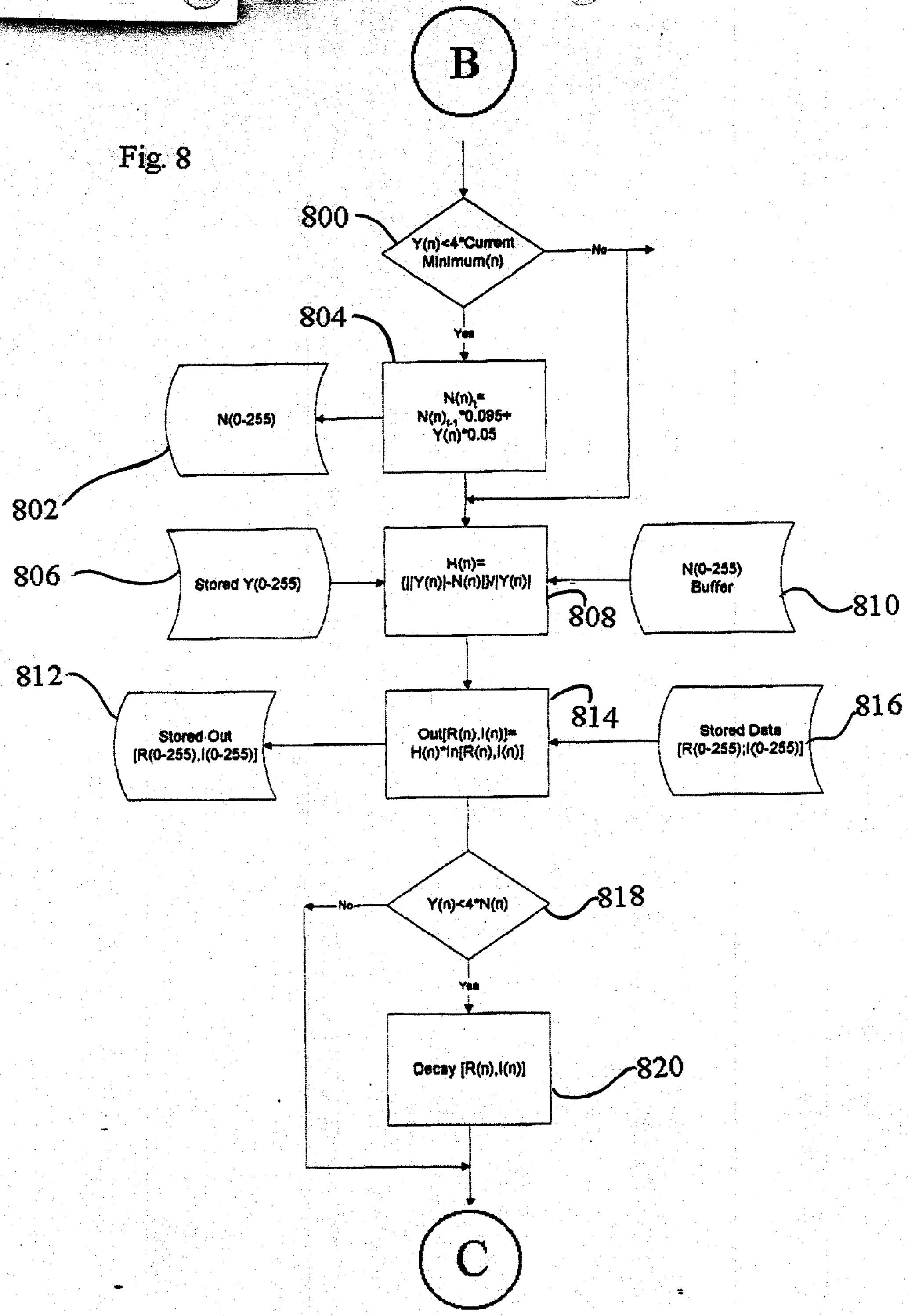


Fig. 8



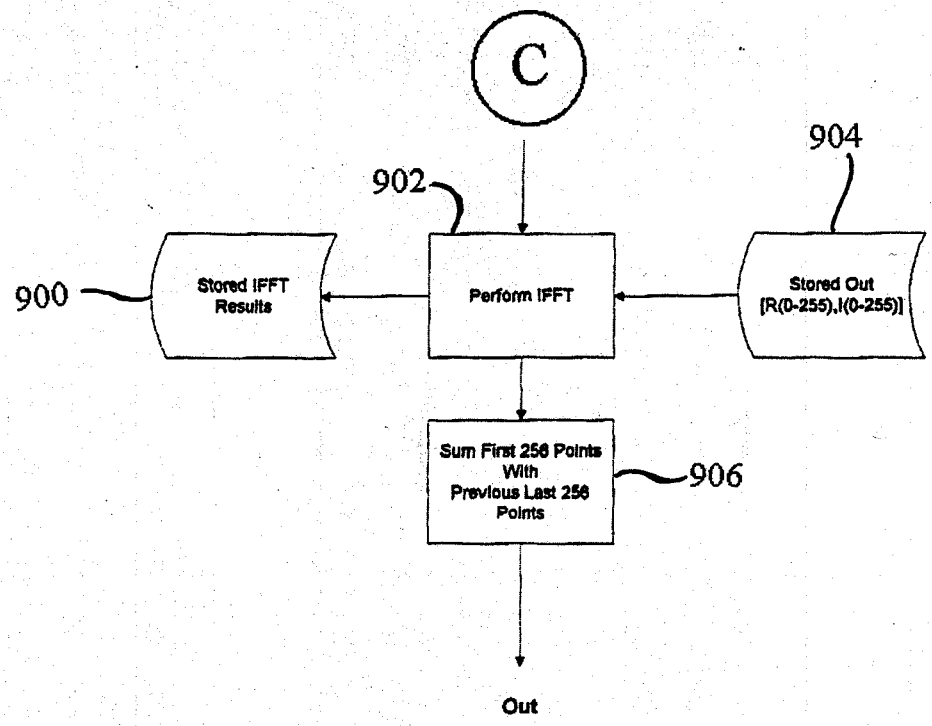


Fig. 9

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO./TITLE
09/252,874	02/18/99	MARASH J	670025-2800

0242/0312

THOMAS J KOWALSKI
FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE
NEW YORK NY 10151

NOT ASSIGNED

2743

DATE MAILED: 03/12/99

NOTICE TO FILE MISSING PARTS OF APPLICATION
Filing Date Granted

An Application Number and Filing Date have been assigned to this application. The items indicated below, however, are missing. Applicant is given TWO MONTHS FROM THE DATE OF THIS NOTICE within which to file all required items and pay fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a). **If any of items 1 or 3 through 5 are indicated as missing, the SURCHARGE set forth in 37 CFR 1.16(e) of ☐ $65.00 for a small entity in compliance with 37 CFR 1.27, or ☒ $130.00 for a non-small entity, must also be timely submitted in reply to this NOTICE to avoid abandonment.**

If all required items on this form are filed within the period set above, the total amount owed by applicant as a ☐ small entity (statement filed) ☒ non-small entity is $ 1412.00 .

☒ 1. The statutory basic filing fee is:
- ☒ missing.
- ☐ insufficient.

Applicant must submit $ 760.00 to complete the basic filing fee and/or file a small entity statement claiming such status (37 CFR 1.27).

☐ 2. Additional claim fees of $ 522.00, including any multiple dependent claim fees, are required.

$ _____ for _____ independent claims over 3.

$ 522.00 for 18 dependent claims over 20.

$ _____ for multiple dependent claim surcharge.

Applicant must either submit the additional claim fees or cancel additional claims for which fees are due.

☒ 3. The oath or declaration:
- ☒ is missing or unexecuted.
- ☐ does not cover the newly submitted items.
- ☐ does not identify the application to which it applies.
- ☐ does not include the city and state or foreign country of applicant's residence.

An oath or declaration in compliance with 37 CFR 1. 63, including residence information and identifying the application by the above Application Number and Filing Date is required.

☐ 4. The signature(s) to the oath or declaration is/are by a person other than inventor or person qualified under 37 CFR 1.42, 1.43 or 1.47.
A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.

☐ 5. The signature of the following joint inventor(s) is missing from the oath or declaration:

_____

An oath or declaration in compliance with 37 CFR 1.63 listing the names of all inventors and signed by the omitted inventor(s), identifying this application by the above Application Number and Filing Date, is required.

☐ 6. A $50.00 processing fee is required since your check was returned without payment (37 CFR 1.21(m)).

☐ 7. Your filing receipt was mailed in error because your check was returned without payment.

☑ 8. The application does not comply with the Sequence Rules.
See attached "Notice to Comply with Sequence Rules 37 CFR 1.821-1.825."

☐ 9. OTHER: _____

Direct the reply and any questions about this notice to "Attention: Box Missing Parts."

A copy of this notice MUST be returned with the reply.

Dikin

Customer Service Center
Initial Patent Examination Division (703) 308-1202

PART 3 - OFFICE COPY

FORM PTO-1533 (REV.9-97)

RTL345-2_1020-0063

PATENT
670025-2800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	JOSEPH MARASH and BARUCH BERDUGO
Serial No.	:	09/252,874
Filed	:	FEBRUARY 18, 1999
For	:	**SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**

745 Fifth Avenue
New York, New York 10151

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231, on November 30, 1998.

THOMAS J. KOWALSKI, Reg. No. 32,147
Name of Applicant, Assignee or Registered Representative

Signature

March 3, 1999
Date of Signature

COMMUNICATION

Hon. Commissioner of Patent and Trademarks
Washington, D.C. 20231

Sir:

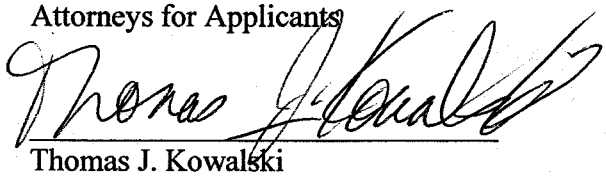
Attached is the original executed Declaration and Verified Statement (Declaration) Claiming Small Entity Status and Declaration For Patent Application And Power of Attorney, and a check for $65.00 to cover the small entity fee. This Communication is being filed without a copy of the Notice to Filing Missing Parts because that document has not yet been received by Applicant's Counsel. If such a Notice is mailed by the PTO before this Communication is processed, it is requested that this Communication be considered as responsive to the Notice to Filing Missing Parts.

SJL1090

Please charge any additional fees required to Deposit Account No. 50-0320.

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants



Thomas J. Kowalski
Reg. No. 32,147
(212) 588-0800

SJL1090

#3

DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

(Includes reference to PCT International Applications)

FROMMER LAWRENCE & HAUG, LLP
File No.: 670025-2800

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor (if plural, names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention ENTITLED: **SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**

the specification of which:

- ☐ is attached hereto
- x was filed on FEBRUARY 18, 1999 as:
- x United States Application Serial No. 09/252,874
- ☐ PCT Application No. _____
- x with amendments through DATE EVEN HEREWITH (if applicable, give details).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code § 119 (a) - (d) or § 365 (b) of any foreign application(s) for patent or inventor's certificate, or § 365 (a) of any PCT International application(s) designating at least one country other than the United State of America listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT International applications designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign/PCT Application(s) [list additional applications on separate page]:

Country (or PCT)	Application Number:	Filed (Day/Month/Year)	Priority Claimed: Yes	No

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

_____ _____
(Application Number) (Filing Date)

I hereby claim the benefit under Title 35, United States Code § 120 of any United States application(s) or § 365 (c) of any PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior United States or PCT International application(s) in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S. (or U.S.-designating PCT) Application(s) [list additional applications on separate page]:

U.S. Serial No.:	Filed (Day/Month/Year)	PCT Application No.	Status (patented, pending, abandoned)

DECLARATION FOR PATENT APPLICATION
AND POWER OF ATTORNEY

FLH Docket No. 670025-2800

I hereby appoint Thomas J. Kowalski, Registration No. 32,147, and I. Marc Asperas, Registration No. 37,274, and FROMMER LAWRENCE & HAUG, LLP or their duly appointed associates, my attorneys or agents, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to file continuation and divisional applications thereof, to receive the Patent, and to transact all business in the Patent and Trademark Office and in the Courts in connection therewith, and to insert the Serial Number of the application in the space provided above, and specify that all communications about the application are to be directed to the following correspondence address:

Thomas J. Kowalski, Esq.
c/o FROMMER LAWRENCE & HAUG, LLP
745 Fifth Avenue
New York, NY 10151
FAX (212) 588-0500

Direct all telephone calls to: (212) 588-0800
to the attention of:
Thomas J. Kowalski

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

INVENTOR(S):

Signature: Joseph Marash Date: _____

Full name of first inventor: Joseph Marash
Residence: Haifa, Isreal; P.O. Box 7752, Haifa, Isreal 31077
Citizenship: Isreali

Signature: B. Berdugo Date: _____

Full name of second joint inventor (if any): Baruch Berdugo
Residence: Kiriat-Ata 28000, Isreal
Citizenship: Isreali

Post Office Address(es) of inventors [if different from residence]:

NOTE: In order to qualify for reduced fees available to Small Entities, each inventor and any other individual or entity having rights to the invention must also sign an appropriate separate "Verified Statement (Declaration) Claiming [or Supporting a Claim by Another for] Small Entity Status" form [e.g. for Independent Inventor, Small Business Concern, Nonprofit Organization, Individual Non-Inventor].

sjl1078

#3

Applicant or Patentee: MARASH, Joseph — FROMMER LAWRENCE & HAUG LLP

Serial or Patent No. — File No.: 670025-2800

Filed or Issued: FEBRUARY 18, 1999 — Page 1 of 3

For: SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN

I hereby declare that I am

__ the owner of the small business concern identified below:

_x_ an officer of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: LAMAR SIGNAL PROCESSSING LTD., a wholly owned subsidiary of ANDREA ELECTRONICS CORPORATION

ADDRESS OF CONCERN: KOHAV YOKNEAM BUILDING, 5TH FLOOR
P.O. BOX 273
YOKNEAM 20692
ISRAEL

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled **SYSTEM METHOD AND APPARATUS FOR CANCELLING NOISE** by inventor(s) **MARASH, Joseph and BERDUGO, Baruch** described in

__ the specification filed herewith.

X application serial no. 09/252,874, filed February 18, 1999.

__ patent no. __, issued __.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

03/09/1999 [illegible] 00000021 09252874

02 FC:205 65.00 OP

ANDREA.2\25005M.INT

22.Feb. 1999 15:16 Lamar Signal Processing Ltd. No.1891 P. 4

Applicant or Patentee: MARASH, Joseph — FROMMER LAWRENCE & HAUG LLP

Serial or Patent No. — File No.: 670025-2800

Filed or Issued: FEBRUARY 18, 1999 — Page 2 of 3

For: SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27).

FULL NAME LAMAR SIGNAL LTD.

ADDRESS KOHAV YOKNEAM BUILDING, 5TH FLOOR
P.O. BOX 273
YOKNEAM 20692
ISRAEL

__ INDIVIDUAL _X_ SMALL BUSINESS CONCERN __ NONPROFIT ORGANIZATION

FULL NAME _____

ADDRESS _____

__ INDIVIDUAL __ SMALL BUSINESS CONCERN __ NONPROFIT ORGANIZATION

FULL NAME _____

ADDRESS _____

__ INDIVIDUAL __ SMALL BUSINESS CONCERN __ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this provisional application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of

ANDREA.2\2800SM.ENT

the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: MARASH, Joseph

TITLE OF PERSON (if other than owner): President & CEO

ADDRESS OF PERSON SIGNING: KOHAV YOKNEAM BUILDING, 5TH FLOOR
P.O. BOX 273
YOKNEAM 20692
ISRAEL

SIGNATURE: Joseph Marash DATE:

ANDREA.2\2800SN.ENT

#3

Applicant or Patentee: MARASH, Joseph — FROMMER LAWRENCE & HAUG LLP

Serial or Patent No. — File No.: 670025-2800

Filed or Issued: FEBRUARY 18, 1999 — Page 1 of 3

For: SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN

I hereby declare that I am

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_x_ an officer of the small business concern empowered to act on behalf of the concern identified below:

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ADDRESS OF CONCERN: KOHAV YOKNEAM BUILDING, 5TH FLOOR
P.O. BOX 273
YOKNEAM 20692
ISRAEL

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled SYSTEM METHOD AND APPARATUS FOR CANCELLING NOISE by inventor(s) MARASH, Joseph and BERDUGO, Baruch described in

__ the specification filed herewith.

X application serial no. 09/252,874, filed February 18, 1999.

__ patent no. __, issued __.

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ANDREA.2\2800SM.ENT

RTL345-2_1020-0071

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27).

FULL NAME LAMAR SIGNAL LTD.
ADDRESS KOHAV YOKNEAM BUILDING, 5TH FLOOR
P.O. BOX 273
YOKNEAM 20692
ISRAEL

__ INDIVIDUAL X SMALL BUSINESS CONCERN __ NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____

__ INDIVIDUAL __ SMALL BUSINESS CONCERN __ NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____

__ INDIVIDUAL __ SMALL BUSINESS CONCERN __ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this provisional application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of

the application, any patent issuing thereon, or any patent to which this verified statement is directed.

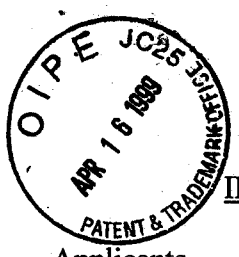
NAME OF PERSON SIGNING: MARASH, Joseph

TITLE OF PERSON (if other than owner): President & CEO

ADDRESS OF PERSON SIGNING: KOHAV YOKNEAM BUILDING, 5TH FLOOR
P.O. BOX 273
YOKNEAM 20692
ISRAEL

SIGNATURE: Joseph Marash DATE:

ANDREA.2\28006N.ENT



SEÑOR $

#4

PATENT
670025-2800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	JOSEPH MARASH and BARUCH BERDUGO
Serial No.	:	09/252,874
Filed	:	FEBRUARY 18, 1999
For	:	**SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**

745 Fifth Avenue
New York, New York 10151

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231, on April 12, 1999.

THOMAS J. KOWALSKI, Reg. No. 32,147

Name of Applicant, Assignee or Registered Representative

Signature

April 12, 1999

Date of Signature

RESPONSE TO NOTICE TO FILE MISSING PARTS

Hon. Commissioner of Patent and Trademarks
Washington, D.C. 20231

Sir:

In response to the March 12, 1999 Notice to File Missing Parts, enclosed is a copy of the Communication, executed Declaration, executed Small Entity Declaration and executed Assignment, Recordation Form Cover Sheet, Check No. 4763 in the amount of $40.00 to cover the required recordal fee and, Check No. 4762 in the amount of $65.00 to cover the required surcharge fee, which were first class mailed to the PTO on March 3, 1999 and filed on March 8, 1999 (see enclosed copy

SJL1297

of the return receipt postcard showing that the PTO received these documents on March 8).

Since the required surcharge fee for $65.00 has been paid on March 3, 1999, attached is Check No. 65166 for $641.00 to cover the required Small Entity basic filing fee of $380.00 and, Small Entity additional claim fee of $261.00 in response to the NOTICE TO FILE MISSING PARTS, mailed March 12, 1999.

Please charge any additional fees required or credit any overpayment to Deposit Account No. 50-0320.

Respectfully submitted,
FROMMER LAWRENCE & HAUG LLP

By: Thomas J. Kowalski

THOMAS J. KOWALSKI, ESQ.
Reg. No. 32,147
(212) 588-0800

SJL1297

PATENT
670025-2800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : JOSEPH MARASH and BARUCH BERDUGO

Serial No. 09/252,874

Filed FEBRUARY 18, 1999

For **SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**

745 Fifth Avenue
New York, New York 10151

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231, on November 30, 1998.

THOMAS J. KOWALSKI, Reg. No. 32,147
Name of Applicant, Assignee or Registered Representative

Signature

March 3, 1999
Date of Signature

COMMUNICATION

Hon. Commissioner of Patent and Trademarks
Washington, D.C. 20231

Sir:

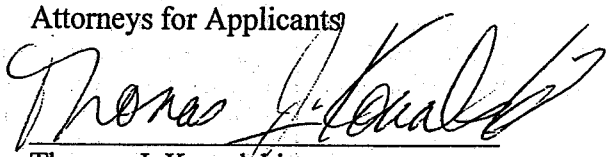
Attached is the original executed Declaration and Verified Statement (Declaration) Claiming Small Entity Status and Declaration For Patent Application And Power of Attorney, and a check for $65.00 to cover the small entity fee. This Communication is being filed without a copy of the Notice to Filing Missing Parts because that document has not yet been received by Applicant's Counsel. If such a Notice is mailed by the PTO before this Communication is processed, it is requested that this Communication be considered as responsive to the Notice to Filing Missing Parts.

SJL1090

Please charge any additional fees required to Deposit Account No. 50-0320.

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants



Thomas J. Kowalski
Reg. No. 32,147
(212) 588-0800

SJL1090

#4

DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

(Includes reference to PCT International Applications)

FROMMER LAWRENCE & HAUG, LLP
File No.: 670025-2800

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor (if plural, names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention ENTITLED: **SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**

the specification of which:

- ☐ is attached hereto
- x was filed on FEBRUARY 18, 1999 as:
- x United States Application Serial No. 09/252,874
- ☐ PCT Application No. _____
- x with amendments through DATE EVEN HEREWITH (if applicable, give details).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code § 119 (a) - (d) or § 365 (b) of any foreign application(s) for patent or inventor's certificate, or § 365 (a) of any PCT International application(s) designating at least one country other than the United State of America listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT International applications designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign/PCT Application(s) [list additional applications on separate page]:

Country (or PCT)	Application Number:	Filed (Day/Month/Year)	Priority Claimed: Yes	No

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

_____ (Application Number) (Filing Date)

I hereby claim the benefit under Title 35, United States Code § 120 of any United States application(s) or § 365 (c) of any PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior United States or PCT International application(s) in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S. (or U.S.-designating PCT) Application(s) [list additional applications on separate page]:

U.S. Serial No.:	Filed (Day/Month/Year)	PCT Application No.	Status (patented, pending, abandoned)

DECLARATION FOR PATENT APPLICATION
AND POWER OF ATTORNEY

FLH Docket No. 670025-2800

I hereby appoint Thomas J. Kowalski, Registration No. 32,147, and I. Marc Asperas, Registration No. 37,274, and FROMMER LAWRENCE & HAUG, LLP or their duly appointed associates, my attorneys or agents, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to file continuation and divisional applications thereof, to receive the Patent, and to transact all business in the Patent and Trademark Office and in the Courts in connection therewith, and to insert the Serial Number of the application in the space provided above, and specify that all communications about the application are to be directed to the following correspondence address:

Thomas J. Kowalski, Esq.
c/o FROMMER LAWRENCE & HAUG, LLP
745 Fifth Avenue
New York, NY 10151
FAX (212) 588-0500

Direct all telephone calls to: (212) 588-0800
to the attention of:
Thomas J. Kowalski

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

INVENTOR(S):

Signature: Joseph Marash Date: _____

Full name of first inventor: Joseph Marash
Residence: Haifa, Isreal; P.O. Box 7752, Haifa, Isreal 31077
Citizenship: Isreali

Signature: B. Berdugo Date: _____

Full name of second joint inventor (if any): Baruch Berdugo
Residence: Kiriat-Ata 28000, Isreal
Citizenship: Isreali

Post Office Address(es) of inventors [if different from residence]:

NOTE: In order to qualify for reduced fees available to Small Entities, each inventor and any other individual or entity having rights to the invention must also sign an appropriate separate "Verified Statement (Declaration) Claiming [or Supporting a Claim by Another for] Small Entity Status" form [e.g. for Independent Inventor, Small Business Concern, Nonprofit Organization, Individual Non-Inventor].

sjl1078

#4

Applicant or Patentee: MARASH, Joseph — FROMMER LAWRENCE & HAUG LLP

Serial or Patent No. — File No.: 670025-2800

Filed or Issued: FEBRUARY 18, 1999 — Page 1 of 3

For: SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN

I hereby declare that I am

__ the owner of the small business concern identified below:

__x__ an officer of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: LAMAR SIGNAL PROCESSSING LTD., a wholly owned subsidiary of ANDREA ELECTRONICS CORPORATION

ADDRESS OF CONCERN: KOHAV YOKNEAM BUILDING, 5TH FLOOR
P.O. BOX 273
YOKNEAM 20692
ISRAEL

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled SYSTEM METHOD AND APPARATUS FOR CANCELLING NOISE by inventor(s) MARASH, Joseph and BERDUGO, Baruch described in

__ the specification filed herewith.

X application serial no. 09/252,874, filed February 18, 1999.

__ patent no. __, issued __.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below' and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

ANDREA.2\28005M.ENT

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27).

FULL NAME LAMAR SIGNAL LTD.
ADDRESS KOHAV YOKNEAM BUILDING, 5TH FLOOR
P.O. BOX 273
YOKNEAM 20692
ISRAEL

__ INDIVIDUAL X SMALL BUSINESS CONCERN __ NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____

__ INDIVIDUAL __ SMALL BUSINESS CONCERN __ NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____

__ INDIVIDUAL __ SMALL BUSINESS CONCERN __ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this provisional application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of

For: SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE

the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: MARASH, Joseph

TITLE OF PERSON (if other than owner): President & CEO

ADDRESS OF PERSON SIGNING: KOHAV YOKNEAM BUILDING, 5TH FLOOR
P.O. BOX 273
YOKNEAM 20692
ISRAEL

SIGNATURE Joseph Marash DATE

ANDREA.2\2800SN.ENT

FROMMER LAWRENCE & H. .G LLP
745 FIFTH AVENUE
NEW YORK, NY 10151

04763

3/3 19 99

1-1-210 428

PAY TO THE ORDER OF COMMISSIONER OF PATENTS AND TRADEMARKS $ 40.00

THE SUM $40.00¢ DOLLARS

THE BANK OF NEW YORK
575 MADISON AVENUE
NEW YORK, NY 10022
CHARGE ANY ADD'L FEES TO DEPOSIT ACCT. #50-0320

FROMMER LAWRENCE & HAUG LLP

Thomas J. Kowalski

⑈0000047634⑈ ⑆021000018⑆ ⑈630114745 5⑈

FROMMER LAWRENCE & HAUG LLP

DETACH AND RETAIN THIS STATEMENT
THE ATTACHED CHECK IS IN PAYMENT OF ITEMS DESCRIBED BELOW.
IF NOT CORRECT PLEASE NOTIFY US PROMPTLY. NO RECEIPT DESIRED.

OIPE JC25
APR 16 1999
PATENT & TRADEMARK OFFICE

APPLICANT Joseph MARSH ET AL
SERIAL NO. 08/252,874 F L & H DOCKET NO. 670025-2800
TITLE System, Method and Apparatus for...

- ☐ FILING FEE
- ☐ FEE FOR ADDED CLAIMS
- ☐ BASE ISSUE FEE
- ☐ ADDITIONAL ISSUE FEE
- ☐ PETITION FEE
- ☐ APPEAL FEE
- ☐ CERTIFICATE OF CORRECTION
- ☐ DISCLAIMER
- ☒ RECORDING FEE
- ☐ DRAWING CORRECTION
- ☐ COMPARISON FEE
- ☐ SEC. 8 TM DECLARATION FEE
- ☐ NOTICE OF OPPOSITION
- ☐ PETITION FOR CANCELLATION
- ☐ TM RENEWAL
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

☒ PLEASE CHARGE ANY ADDITIONAL FEES OR CREDIT OVER PAYMENT TO DEPOSIT ACCOUNT NO. 50-0320.

CHARGE TO

NAME OF CLIENT OR ACCOUNT	FILE NO.	ATTORNEY	AMOUNT
Andrea Electronics	670025-2800	T. Kowalski	$40.00

ACCOUNTING COPY

RTL345-2_1020-0083

FROMMER LAWRENCE & HAUG LLP
745 FIFTH AVENUE
NEW YORK, NY 10151

04762

3/3 19 99

1-1-210 428

PAY TO THE ORDER OF **COMMISSIONER OF PATENTS AND TRADEMARKS** $ 65.00

THE SUM ▶65 00¢ DOLLARS

THE BANK OF NEW YORK
575 MADISON AVENUE
NEW YORK, NY 10022
CHARGE ANY ADD'L FEES TO DEPOSIT ACCT. #50-0320

FROMMER LAWRENCE & HAUG LLP

Thomas J. Kowalski

⑈0000047621⑈ ⑆021000018⑆ ⑈6301147455⑈

DETACH AND RETAIN THIS STATEMENT
THE ATTACHED CHECK IS IN PAYMENT OF ITEMS DESCRIBED BELOW.
IF NOT CORRECT PLEASE NOTIFY US PROMPTLY. NO RECEIPT DESIRED.

FROMMER LAWRENCE & HAUG LLP

APPLICANT Joseph MARASH ET al.
SERIAL NO. 09/252,891 F L & H DOCKET NO. 670025-2800
TITLE SYSTEM, METHOD AND APPARATUS FOR ...

- ☐ FILING FEE
- ☐ FEE FOR ADDED CLAIMS
- ☐ BASE ISSUE FEE
- ☐ ADDITIONAL ISSUE FEE
- ☐ PETITION FEE
- ☐ APPEAL FEE
- ☐ CERTIFICATE OF CORRECTION
- ☐ DISCLAIMER
- ☐ RECORDING FEE
- ☐ DRAWING CORRECTION
- ☐ COMPARISON FEE
- ☐ SEC. 8 TM DECLARATION FEE
- ☐ NOTICE OF OPPOSITION
- ☐ PETITION FOR CANCELLATION
- ☐ TM RENEWAL
- ☒ SMALL ENTITY FEE
- ☐ _____
- ☐ _____
- ☐ _____

☒ PLEASE CHARGE ANY ADDITIONAL FEES OR CREDIT OVER PAYMENT TO DEPOSIT ACCOUNT NO. 50-0320.

CHARGE TO

NAME OF CLIENT OR ACCOUNT	FILE NO.	ATTORNEY	AMOUNT
ANDREA ELECTRONICS.	670025-2800	T. Kowalski	$65.00

ACCOUNTING COPY

RTL345-2_1020-0084

Serial No. 09/252,874 File No. 67025-2800 By TKK

Title In the Matter of the Application of MARSH ET AL.

The following due ——— in the U.S. Patent Office, was received in the Patent Office

- ☐ Affidavit ☐ Declaration
- ☐ Amendment
- ☐ Preliminary Amendment
- ☐ Amendment After Final Rejection
- ☐ Request for Extension of Time
- ☐ Provisional Patent Application
- ☐ Application for Patent, including ___ Pages Specification ___ Claims
- ☒ Declaration ☐ Oath ☒ Power
- ☐ Request for Filing Continuation or Divisional Application ___ sheets, in duplicate
- ☐ File Wrapper Continuation Patent Application ___ sheets, in duplicate
- ☐ PCT Request ___ sheets, including
- ☐ Transmittal Letter to the US/RO
- ☒ Assignment ☒ Recordation Cover Sheet
- ☐ Express Mail Mailing Certificate 4762 65.00
- ☐ (separate sheet)
- ☒ Check No. 4763 for $ 40.00
- ☐ Deposit Account Order Form
- ☐ Drawing ___ Sheet(s)
- ☐ Information Disclosure Statement
- ☐ PTO Form 1449
- ☐ Issue Fee Transmittal
- ☐ Brief ☐ Letter
- ☐ Application for TM Registration Including ___ Specimens
- ☐ Status Request ☐ Notice of Appeal
- ☐ Petition ☐ Response
- ☐ Priority Document
- ☒ Small Entity Declaration
- ☒ COMMUNICATION

FIRST CLASS MAIL
MARCH 3, 1999

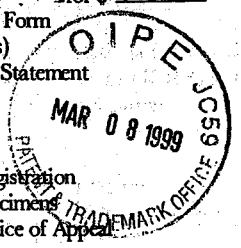
Serial No. 09/252,874 File No. 67025-2800 By TKK

Title In the Matter of the Application of MARSH ET AL.

The following due ——— in the U.S. Patent Office, was received in the Patent Office

- ☐ Affidavit ☐ Declaration
- ☐ Amendment
- ☐ Preliminary Amendment
- ☐ Amendment After Final Rejection
- ☐ Request for Extension of Time
- ☐ Provisional Patent Application
- ☐ Application for Patent, including ___ Pages Specification ___ Claims
- ☒ Declaration ☐ Oath ☒ Power
- ☐ Request for Filing Continuation or Divisional Application ___ sheets, in duplicate
- ☐ File Wrapper Continuation Patent Application ___ sheets, in duplicate
- ☐ PCT Request ___ sheets, including
- ☐ Transmittal Letter to the US/RO
- ☒ Assignment ☒ Recordation Cover Sheet
- ☐ Express Mail Mailing Certificate 4762 65.00
- ☐ (separate sheet)
- ☒ Check No. 4763 for $ 40.00
- ☐ Deposit Account Order Form
- ☐ Drawing ___ Sheet(s)
- ☐ Information Disclosure Statement
- ☐ PTO Form 1449
- ☐ Issue Fee Transmittal
- ☐ Brief ☐ Letter
- ☐ Application for TM Registration Including ___ Specimens
- ☐ Status Request ☐ Notice of Appeal
- ☐ Petition ☐ Response
- ☐ Priority Document
- ☒ Small Entity Declaration
- ☒ COMMUNICATION

FIRST CLASS MAIL
MARCH 3, 1999



OIPE JC25 APR 1 6 1999 PATENT & TRADEMARK OFFICE

#4

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO./TITLE
09/252,874	02/18/99	MARASH	J 670025-2800

0242/0312

THOMAS J KOWALSKI
FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE
NEW YORK NY 10151

NOT ASSIGNED

2743

DATE MAILED: 03/12/99

NOTICE TO FILE MISSING PARTS OF APPLICATION

Filing Date Granted

An Application Number and Filing Date have been assigned to this application. The items indicated below, however, are missing. Applicant is given TWO MONTHS FROM THE DATE OF THIS NOTICE within which to file all required items and pay fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a). **If any of items 1 or 3 through 5 are indicated as missing, the SURCHARGE set forth in 37 CFR 1.16(e) of ☐ $65.00 for a small entity in compliance with 37 CFR 1.27, or ☒ $130.00 for a non-small entity, must also be timely submitted in reply to this NOTICE to avoid abandonment.**

If all required items on this form are filed within the period set above, the total amount owed by applicant as a ☐ small entity (statement filed) ☒ non-small entity is $ 1412.00 .

☒ 1. The statutory basic filing fee is:
☒ missing.
☐ insufficient.
Applicant must submit $ 760.00 to complete the basic filing fee and/or file a small entity statement claiming such status (37 CFR 1.27).

☐ 2. Additional claim fees of $ 522.00, including any multiple dependent claim fees, are required.
$ — for ____ independent claims over 3.
$ 522.00 for 18 dependent claims over 20.
$ ____ for multiple dependent claim surcharge.
Applicant must either submit the additional claim fees or cancel additional claims for which fees are due.

☒ 3. The oath or declaration:
☒ is missing or unexecuted.
☐ does not cover the newly submitted items.
☐ does not identify the application to which it applies.
☐ does not include the city and state or foreign country of applicant's residence.
An oath or declaration in compliance with 37 CFR 1. 63, including residence information and identifying the application by the above Application Number and Filing Date is required.

☐ 4. The signature(s) to the oath or declaration is/are by a person other than inventor or person qualified under 37 CFR 1.42, 1.43 or 1.47.
A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.

☐ 5. The signature of the following joint inventor(s) is missing from the oath or declaration:
____
An oath or declaration in compliance with 37 CFR 1.63 listing the names of all inventors and signed by the omitted inventor(s), identifying this application by the above Application Number and Filing Date, is required.

☐ 6. A $50.00 processing fee is required since your check was returned without payment (37 CFR 1.21(m)).

☐ 7. Your filing receipt was mailed in error because your check was returned without payment.

☐ 8. The application does not comply with the Sequence Rules.
See attached "Notice to Comply with Sequence Rules 37 CFR 1.821-1.825."

☐ 9. OTHER: ____

Direct the reply and any questions about this notice to "Attention: Box Missing Parts."

A copy of this notice MUST be returned with the reply.

D King
Customer Service Center
Initial Patent Examination Division (703) 308-1202

PART 2 - COPY TO BE RETURNED WITH RESPONSE

RTL345-2_1020-0086

GAU 2743

PATENT
670025-2800

#5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	:	Joseph MARASH Baruch BERDUGO
U.S. Serial No.	:	09/252,874
Filing Date	:	February 18, 1999
For	:	SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE
Examiner	:	Unknown
Art Unit	:	2743

745 Fifth Avenue
New York, NY 10151

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231, on May 16, 2000

Bruno Polito, Reg. No. 38,580

Name of Applicant, Assignee or Registered Representative

Signature

May 16, 2000

Date of Signature

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

In compliance with the duty of disclosure set forth in 37 C.F.R. §1.56, applicants are filing this Information Disclosure Statement and the accompanying form PTO-1449. Copies of all of the documents cited herein have previously been submitted in pending applications 09/425,790; 09/059,503; 08/840,159; 09/055,709; and 09/089,710. Copies of documents cited herein that have not previously been submitted are enclosed.

ds0228

The Examiner is respectfully requested to consider, and make of record, the documents cited herein.

Since this Information Disclosure Statement is being filed before the first Office Action, no fee is believed necessary or due for considering and making of record the documents cited herein (37 C.F.R. §1.97(b)(3)). This Information Disclosure Statement is not a representation that any of the cited documents are considered pertinent, or that any of the cited documents are indeed prior art.

Please charge any fee required for consideration and making of record the documents cited herein, or credit any overpayment therein, to Deposit Account No. 50-0320.

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants

Date: May 16, 2000

By _____
BRUNO POLITO
Reg. No. 38,580
Tel. (212) 588-0800

BP:das
Enclosure

Based on Form PTO-1449
(3/90)

LIST OF REFERENCES CITED BY APPLICANT
(Use several sheets if necessary)

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT	
MARASH et al.	
FILING DATE	**GROUP**
February 18, 1999	2743

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
RD	AA	5,914,912	6/22/99	Yang			
	AB	5,909,495	6/1/99	Andrea			
	AC	5,874,918	3/23/99	Czarnecki et al.			
	AD	5,838,805	11/17/98	Warnaka et al.			
	AE	5,835,608	11/10/98	Warnaka et al.			
	AF	5,828,768	10/27/98	Eatwell et al.			
	AG	5,825,898	10/20/98	Marash			
	AH	5,825,897	10/20/98	Andrea et al.			
	AI	5,815,582	9/29/98	Claybaugh et al.			
	AJ	5,812,682	9/22/98	Ross et al.			
	AK	5,798,983	8/25/98	Kuhn et al.			
	AL	5,774,859	6/30/98	Houser et al.			
	AM	5,768,473	6/16/98	Eatwell et al.			
	AN	5,715,321	2/3/98	Andrea et al.			
	AO	5,748,749	5/5/98	Miller et al.			
	AP	5,745,581	4/28/98	Eatwell et al.			
	AQ	5,732,143	3/1998	Andrea et al.			
	AR	5,727,073	3/10/98	Ikeda			
	AS	5,724,270	3/3/98	Posch			
	AT	5,719,945	2/17/98	Fuller et al.			
	AU	5,715,319	2/3/98	Chu			
	AV	5,701,344	12/23/97	Wakui			
	AW	5,699,436	12/16/97	Claybaugh et al.			
	AX	5,692,054	11/25/97	Parrella et al.			
	AY	5,692,053	11/25/97	Fuller et al.			
	AZ	5,689,572	11/18/97	Ohki et al.			
	BA	5,676,353	10/14/97	Jones et al.			
RD	BB	5,673,325	9/30/97	Andrea et al.			

EXAMINER	DATE CONSIDERED
Richemond Dorvil	11-04-02

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ds0227

Based on Form PTO-1449 (3/90)

LIST OF REFERENCES CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874

APPLICANT	
MARASH et al.	

FILING DATE	GROUP
February 18, 1999	2743

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
RD	BC	5,668,747	9/16/97	Obashi			
	BD	5,664,021	9/2/97	Chu et al.			
	BE	5,657,393	8/12/97	Crow			
	BF	5,652,799	7/29/97	Ross et al.			
	BG	5,652,770	7/29/97	Eatwell			
	BH	5,649,018	7/15/97	Gifford et al.			
	BI	5,644,641	7/1/97	Ikeda			
	BJ	5,642,353	6/24/97	Roy, III et al.			
	BK	5,638,456	6/10/97	Conley et al.			
	BL	5,638,454	6/10/97	Jones et al.			
	BM	5,638,022	6/10/97	Eatwell			
	BN	5,627,799	5/6/97	Hoshuyama			
	BO	5,627,746	5/6/97	Ziegler, Jr. et al.			
	BP	5,625,880	4/29/97	Goldburg et al.			
	BQ	5,625,697	4/29/97	Bowen et al.			
	BR	5,621,656	4/15/97	Langley			
	BS	5,619,020	4/8/97	Jones et al.			
	BT	5,617,479	4/1/97	Hildebrand et al.			
	BU	5,615,175	3/25/97	Cater et al.			
	BV	5,604,813	2/18/97	Evans et al.			
	BW	5,600,106	2/4/97	Langley			
	BX	5,592,490	1/7/97	Barratt et al.			
	BY	5,592,181	1/7/97	Cai et al.			
	BZ	5,581,620	12/3/96	Brandstein et al.			
	CA	5,568,557	10/22/96	Ross et al.			
	CB	5,563,817	10/8/96	Ziegler, Jr. et al.			
	CC	5,553,153	9/3/96	Eatwell			
RD	CD	5,550,334	8/27/96	Langley			

EXAMINER	DATE CONSIDERED
Richmond Dorvil	11-04-00

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ds0227

Based on Form PTO-1449
(3/90)

LIST OF REFERENCES CITED BY APPLICANT
(Use several sheets if necessary)

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT	
MARASH et al.	
FILING DATE	**GROUP**
February 18, 1999	2743

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
RD	CE	5,546,467	8/13/96	Denenberg			
	CF	5,546,090	8/13/96	Roy, III et al.			
	CG	5,526,432	6/11/96	Denenberg			
	CH	5,524,057	6/4/96	Akiho et al.			
	CI	5,524,056	6/4/96	Killion et al.			
	CJ	5,515,378	5/7/96	Roy, III et al.			
	CK	5,511,128	4/23/96	Lindeman			
	CL	5,511,127	4/23/96	Warnaka			
	CM	5,502,869	4/2/96	Smith et al.			
	CN	5,493,615	2/20/96	Burke et al.			
	CO	5,485,515	1/16/96	Allen et al.			
	CP	5,481,615	1/2/96	Eatwell et al.			
	CQ	5,475,761	12/12/95	Eatwell			
	CR	5,473,702	12/5/95	Yoshida et al.			
	CS	5,473,701	12/5/95	Cezanee et al.			
	CT	5,473,214	12/5/95	Hildebrand			
	CU	5,471,538	11/1995	SASAKI et al.			
	CV	5,471,106	11/18/95	Curtis et al.			
	CW	5,469,087	11/21/95	Eatwell			
	CX	5,457,749	10/10/95	Cain et al.			
	CY	5,452,361	9/19/95	Jones			
	CZ	5,448,637	9/1995	YAMAGUCHI et al.			
	DA	5,440,642	8/8/95	DENENBERG et al.			
	DB	5,434,925	7/18/95	Nadim			
	DC	5,432,859	7/11/95	Yang et al.			
	DD	5,431,008	7/11/95	Ross et al.			
	DE	5,423,523	6/13/95	Gossman et al.			
RD	DF	5,418,857	5/23/95	Eatwell			

EXAMINER	DATE CONSIDERED
Richard David	1-04-01

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ds0227

Based on Form PTO-1449
(3/90)

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APPLICANT	
MARASH et al.	
FILING DATE	GROUP
February 18, 1999	2743

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
RM	DG	5,416,887	5/16/95	Shimada			
	DH	5,416,847	5/16/95	Boze			
	DI	5,416,845	5/16/95	Shen			
	DJ	5,414,775	5/9/95	Scribner et al.			
	DK	5,414,769	5/1995	GATTEY et al.			
	DL	5,412,735	5/2/95	Engebretson et al.			
	DM	5,402,497	3/1995	NISHIMOTO et al.			
	DN	5,384,843	1/24/95	Masuda et al.			
	DO	5,381,481	1/10/95	Gammie et al.			
	DP	5,381,473	1/1995	ANDREA et al.			
	DQ	5,375,174	12/20/94	Denenberg			
	DR	5,365,594	11/15/94	Ross et al.			
	DS	5,361,303	11/1/94	Eatwell			
	DT	5,353,376	10/4/94	Oh et al.			
	DU	5,353,347	10/4/94	Irissou et al.			
	DV	5,348,124	9/20/94	Harper			
	DW	5,335,011	8/2/94	Addeo et al.			
	DX	5,332,203	7/26/94	Gossman et al.			
	DY	5,327,506	7/1994	STITES, III			
	DZ	5,319,736	6/7/94	Hunt			
	EA	5,315,661	5/24/94	Gossman et al.			
	EB	5,313,945	5/24/94	Friedlander			
	EC	5,313,555	5/17/94	Kamiya			
	ED	5,311,453	5/10/94	Denenberg et al.			
	EE	5,311,446	5/10/94	Ross et al.			
	EF	5,276,740	1/1994	INANAGA et al.			
	EG	5,272,286	12/21/93	Cain et al.			
RM	EH	5,260,997	11/1993	GATTEY et al.			

EXAMINER	DATE CONSIDERED
Richard Durkin	1-04-01

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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(3/90)

LIST OF REFERENCES CITED BY APPLICANT
(Use several sheets if necessary)

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT	
MARASH et al.	
FILING DATE	GROUP
February 18, 1999	2743

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
RD	EI	5,251,863	10/12/93	Gossman et al.			
	EJ	5,251,263	10/5/93	Andrea et al.			
	EK	5,241,692	8/31/93	Harrison et al.			
	EL	5,226,087	7/1993	ONO			
	EM	5,226,077	7/6/93	Lynn et al.			
	EN	5,219,037	6/15/93	Smith et al.			
	EO	5,212,764	5/18/93	Ariyoshi			
	EP	5,209,326	5/11/93	Harper			
	EQ	5,208,864	5/4/93	Kaneda			
	ER	5,208,864	5/4/93	Kaneda			
	ES	5,192,918	3/9/93	Sugiyama			
	ET	5,142,585	8/25/92	Taylor			
	EU	5,138,664	8/1992	KIMURA et al.			
	EV	5,138,663	8/1992	MOSELEY			
	EW	5,134,659	7/1992	MOSELEY			
	EX	5,133,017	7/21/92	Cain et al.			
	EY	5,126,681	6/30/92	Ziegler, Jr. et al.			
	EZ	5,125,032	6/1992	MEISTER et al.			
	FA	5,121,426	6/1992	BAVMHAUER			
	FB	5,117,461	5/1992	MOSELEY			
	FC	5,117,461	5/26/92	Moseley			
	FD	5,105,377	4/14/92	Ziegler, Jr.			
	FE	5,097,923	3/24/92	Ziegler et al.			
	FF	5,091,954	2/1992	SASAKI et al.			
	FG	5,086,415	2/4/92	Takahashi et al.			
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	FI	5,075,694	12/24/91	Donnangelo et al.			
RD	FJ	5,070,527	12/3/91	Lynn			

EXAMINER	DATE CONSIDERED
Richard Deboer	11-04-00

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February 18, 1999	2743

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AM	FK	5,052,510	10/1/91	Gossman			
	FL	5,046,103	9/3/91	Warnaka et al.			
	FM	5,029,218	7/2/91	Nagayasu			
	FN	5,023,002	6/11/91	Schweizer et al.			
	FO	5,018,202	5/21/91	Takahashi et al.			
	FP	5,010,576	4/23/91	Hill			
	FQ	5,001,763	3/1991	MOSELEY			
	FR	4,991,433	2/12/91	Warnaka et al.			
	FS	4,985,925	1/1991	LANGBERG et al.			
	FT	4,977,600	12/11/90	Ziegler			
	FU	4,965,834	10/23/90	Miller			
	FV	4,963,071	10/16/90	Larwin et al.			
	FW	4,959,865	9/25/90	Stettiner et al.			
	FX	4,956,867	9/11/90	Zarek et al.			
	FY	4,955,055	9/4/90	Fujisaki et al.			
	FZ	4,951,954	8/28/90	MacNeill			
	GA	4,947,356	8/7/90	Elliott et al.			
	GB	4,937,871	6/26/90	Hattori			
	GC	4,932,063	6/5/90	Nakamura			
	GD	4,930,156	5/29/90	Norris			
	GE	4,928,307	5/22/90	Lynn			
	GF	4,910,719	3/20/90	Thubert			
	GG	4,910,718	3/20/90	Horn			
	GH	4,908,855	3/13/90	Ohga et al.			
	GI	4,878,188	10/31/89	Ziegler et al.			
	GJ	4,862,506	8/29/89	Landgarten et al.			
	GK	4,847,897	7/11/89	Means			
AM	GL	4,837,832	6/6/89	Fanshel			

EXAMINER	DATE CONSIDERED
Richard Dorvil	11-04-02

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APPLICANT: MARASH et al.

FILING DATE	GROUP
February 18, 1999	2700

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
RM	GM	4,833,719	5/1989	CARME et al.			
	GN	4,811,404	3/7/89	Vilmur et al.			
	GO	4,802,227	1/31/89	Elko et al.			
	GP	4,791,672	12/13/88	Nunley et al.			
	GQ	4,783,818	11/8/88	Graupe et al.			
	GR	4,783,817	11/1988	HAMADA et al.			
	GS	4,783,798	11/8/88	Leibholz et al.			
	GT	4,771,472	9/13/88	Williams, III, et al.			
	GU	4,769,847	9/6/88	Taguchi			
	GV	4,752,961	6/1988	KAHN			
	GW	4,750,207	6/7/88	Gebert et al.			
	GX	4,741,038	4/26/88	Elko et al.			
	GY	4,736,432	4/5/88	Cantrell			
	GZ	4,731,850	3/15/88	Levitt et al.			
	HA	4,718,096	1/5/88	Meisel			
	HB	4,696,043	9/22/87	Iwahara et al.			
	HC	4,683,010	7/28/87	Hartmann			
	HD	4,672,674	6/1987	CLOUGH et al.			
	HE	4,658,426	4/14/87	Chabries et al.			
	HF	4,654,871	3/31/87	Chaplin et al.			
	HG	4,653,606	3/31/87	Flanagan			
	HH	4,653,102	3/24/87	Hansen			
	HI	4,649,505	3/10/87	Zinser, Jr., et al.			
	HJ	4,636,586	1/13/87	Schiff			
	HK	4,630,304	12/16/86	Borth et al.			
	HL	4,630,302	12/16/86	Kryter			
	HM	4,628,529	12/9/86	Borth et al.			
RM	HN	4,622,692	11/11/86	Cole			

EXAMINER: Richard Dorsch

DATE CONSIDERED: 11-04-02

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APPLICANT: MARASH et al.

FILING DATE	GROUP
February 18, 1999	

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
RM	HO	4,600,863	7/15/86	Chaplin et al.			
	HP	4,589,137	5/1986	MILLER			
	HQ	4,589,136	5/13/86	Poldy et al.			
	HR	4,581,758	4/8/86	Coker et al.			
	HS	4,570,155	2/11/86	Skarman et al.			
	HT	4,566,118	1/21/86	Chaplin et al.			
	HU	4,562,589	12/31/85	Warnaka et al.			
	HV	4,559,642	12/17/85	Miyaji et al.			
	HW	4,539,708	9/3/85	Norris			
	HX	4,530,304	7/23/85	Gardos			
	HY	4,527,282	7/2/85	Chaplin et al.			
	HZ	4,517,415	5/14/85	Laurence			
	IA	4,495,643	1/22/85	Orban			
	IB	4,494,074	1/15/85	Bose			
	IC	4,490,841	12/25/84	Chaplin et al.			
	ID	4,489,441	12/18/84	Chaplin et al.			
	IE	4,477,505	10/16/84	Warnaka			
	IF	4,473,906	9/25/84	Warnaka et al.			
	IG	4,463,222	7/1984	PORADOWSKI			
	IH	4,461,025	7/17/84	Franklin			
	II	4,459,851	7/17/84	Crostack			
	IJ	4,455,675	6/19/84	Bose et al.			
	IK	4,453,600	6/12/84	Thigpen			
	IL	4,442,546	4/10/84	Ishigaki			
	IM	4,433,435	2/21/84	David			
	IN	4,417,098	11/22/83	Chaplin et al.			
	IO	4,409,435	10/11/83	Ono			
RM	IP	4,363,007	12/7/82	Haramoto et al.			

EXAMINER	DATE CONSIDERED
Richard Doris	11-04-02

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670025-2800	09/252,874

APPLICANT: MARASH et al.

FILING DATE	GROUP
February 18, 1999	

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
DM	IQ	4,339,018	7/13/82	Warnaka			
	IR	4,334,740	6/1982	WRAY			
	IS	4,321,970	3/30/82	Thigpen			
	IT	4,261,708	4/14/81	Gallagher			
	IU	4,243,117	1/6/81	Warnaka			
	IV	4,241,805	12/30/80	Chance, Jr.			
	IW	4,239,936	12/16/80	Sakoe			
	IX	4,169,257	9/25/79	Smith			
	IY	4,153,815	5/8/79	Chaplin et al.			
	IZ	4,122,303	10/24/78	Chaplin et al.			
	JA	4,068,092	1/10/78	Ikoma et al.			
	JB	3,890,474	6/1975	GLICKSBERG			
	JC	3,889,059	6/1975	THOMPSON et al.			
	JD	3,830,988	8/1974	MOL et al.			
	JE	3,702,644	11/14/72	Fowler et al.			
	JF	3,562,089	2/9/71	Warnaka et al.			
	JG	3,422,921	1/21/69	Warnaka			
	JH	3,416,782	12/17/68	Warnaka			
	JI	3,394,226	7/1968	ANDREWS, JR.			
	JJ	3,330,376	7/11/67	Warnaka			
	JK	3,298,457	1/17/67	Warnaka			
	JL	3,262,521	7/26/66	Warnaka			
	JM	3,247,925	4/26/66	Warnaka			
	JN	3,170,046	2/1965	LEALE			
	JO	3,101,744	8/27/63	Warnaka			
	JP	3,098,121	7/1963	WADSWORTH			
	JQ	2,972,018	2/1961	HAWLEY et al.			
DM	JR	2,379,514	7/1945	FISHER			

EXAMINER	DATE CONSIDERED
Richard Dorvil	11-06-02

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(3/90)

LIST OF REFERENCES CITED BY APPLICANT
(Use several sheets if necessary)

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT: MARASH et al.	
FILING DATE: February 18, 1999	GROUP: 2700

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	JS	RE 34,236	4/27/93	Taylor			
	JT	D344,730	3/1/94	Gattey et al.			

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	JU	0 059 745 B1	9/15/82	EPO				
	JV	0 380 290 A2	8/1/90	EPO				
	JW	0 390 386	10/90	EPO				
	JX	0 411 360 B1	2/6/91	EPO				
	JY	0 483 845	1/13/93	EPO				
	JZ	0 509 742 A2	10/21/92	EPO				
	KA	0 583 900 A1	2/23/94	EPO				
	KB	0 595 457 A1	5/4/94	EPO				
	KC	0 721 251	7/10/96	EPO				
	KD	0 724 415	11/20/96	EPO				
	KE	2305909	10/76	FRANCE				
	KF	2640324	3/9/78	GERMANY				
	KG	3719963	3/88	GERMANY				
	KH	4008595	9/91	GERMANY				
	KI	1-149695	6/12/89	JAPAN				
	KJ	1-314098	12/89	JAPAN				
	KK	2-070152	3/90	JAPAN				
	KL	3-169199	7/91	JAPAN				
	KM	3-231599	10/91	JAPAN				
	KN	4-16900	1/21/92	JAPAN				
	KO	56-89194	7/81	JAPAN				
	KP	59-64994	4/84	JAPAN				
	KQ	62-189898	8/87	JAPAN				

EXAMINER: Richard Bruce

DATE CONSIDERED: 10-24-01

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LIST OF REFERENCES CITED BY APPLICANT

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ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT	
MARASH et al.	
FILING DATE	**GROUP**
February 18, 1999	2743

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	KR	1 160 431	8/69	UNITED KINGDOM				
	KS	1 289 993	9/72	UNITED KINGDOM				
	KT	1 378 294	12/74	UNITED KINGDOM				
	KU	2 172 769 A	9/24/86	UNITED KINGDOM				
	KV	2 239 971 B	7/17/91	UNITED KINGDOM				
	KW	2 289 593 A	11/22/95	UNITED KINGDOM				
	KX	WO 88/09512	12/1/88	WIPO				
	KY	WO 92/05538	4/92	WIPO				
	KZ	WO 92/17019	10/92	WIPO				
	LA	WO 94/16517	7/21/94	WIPO				
	LB	WO 95/08906	3/30/95	WIPO				
	LC	WO 96/15541	5/23/96	WIPO				
	LD	WO 97/23068	6/26/97	WIPO				

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

	LE	B.D. Van Veen and K.M. Buckley, "Beamforming: A Versatile Approach to Spatial Filtering," IEEE ASSN Magazine, Vol. 5, No. 2, April 1988, pp. 4-24.
	LF	Beranek, Acoustics (American Institute of Physics, 1986) pp. 116-135.
	LG	Boll, IEEE Trans. on Acous., Vol. ASSP-27, No. 2, April 1979, pp. 113-120.
	LH	Daniel Sweeney, "Sound Conditioning Through DSP", The Equipment Authority, 1994.
	LI	Edward J. Foster, "Switched on Silence", Popular Science, 1994, p. 33.
	LJ	Kuo, Automatic Control of Systems, pp. 504-585.
	LK	Luenberger, Optimization by Vector Space Method, pp. 134-138.
	LL	Ogata, Modern Control Engineering, pp. 474-508.
	LM	Oppenheim-Schafer, Digital Signal Processing (Prentice Hall) pp. 542-45.
	LN	P.P. Vaidyanathan, "Multirate Digital Filters, Filter Banks, Polyphase Networks, and Applications; A Tutorial," IEEE Proc., Vol. 78, No. 1, January 1990.
	LO	P.P. Vaidyanathan, "Quadrature Mirror Filter Banks, M-band Extensions and Perfect-Reconstruction Techniques," IEEE ASSP Magazine, July 1987, pp. 4-20.
	LP	Rabiner et al., IEEE Trans. on Acous., Vol. ASSP-24, No. 5, October 1976, pp. 399-418.

EXAMINER	DATE CONSIDERED
Richard Dorvil	11-8-02

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/252,874	02/18/99	MARASH J	670025-2800

WM02/1116

THOMAS J KOWALSKI
FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE
NEW YORK NY 10151

EXAMINER	
DORVIL,R	
ART UNIT	**PAPER NUMBER**
2641	6

DATE MAILED: 11/16/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

PTO-90C (Rev. 2/95)
*U.S. GPO: 2000-473-000/44602

1- File Copy

RTL345-2_1020-0100

Office Action Summary

Application No.	Applicant(s)
09/252,874	Marash et al.
Examiner	**Group Art Unit**
Richemond Dorvil	2641

☐ Responsive to communication(s) filed on _____

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) *1-49* is/are pending in the applicat

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-49* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 5

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

RTL345-2_1020-0101

Information Disclosure Statement

1. The information disclosure statement filed May 18, 2000 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321© may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1-49 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1-49 of copending Application No. 09/385,996. Although the conflicting claims are not identical, they are not patentably distinct

from each other because removing inherent and/or unnecessary would be within the level of one of ordinary skill in the art. It is well settled that the omission of an element, e.g. "USB", and its function is an obvious expedient if the remaining elements perform the same function as before. *In re Karlson, 136 USPQ 184 (CCPA 1963)*. Also note Ex parte Rainu, *168 USPQ 375 (Bd. App. 1969)*. Omission of a reference element or step whose function is not needed would be obvious to one of ordinary skill in the art..

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892.

5. **Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 308-6306, (for formal communications intended for entry)

Or:

(703) 308-6296 (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richemond Dorvil whose telephone number is (703)-305-9645. The examiner can normally be reached on Monday-Friday from 09:30 a.m.-6:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth, can be reached on (703)-308-4825.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

RD
November 1, 2000

Richemond Dorvil
Primary Examiner
Art unit 2641

FORM PTO-892	U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	SERIAL NO.	GROUP ART UNIT	ATTACHMENT TO PAPER NO.	
NOTICE OF REFERENCES CITED		09252874	2741		6
		APPLICANT(S) Marash et al.			

U.S. PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	NAME	CLASS	SUB-CLASS	FILING DATE
	A	5,479,562	12/1995	Fielder et al.	704	229	
	B	5,914,877	6/1999	Gulick	364	400.01	
	C	5,995,150	11/1999	Hsieh et al.	348	409	
	D	5,668,927	9/1997	Chan et al.	704	240	
	E	5,706,394	1/1998	Wynn	704	219	
	F	5,818,948	10/1998	Gulick	381	77	
	G	5,787,259	7/1998	Haroun et al	709	253	
	H						
	I						
	J						
	K						

FOREIGN PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUB-CLASS
	L						
	M						
	N						
	O						
	P						
	Q						

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)

	R	
	S	
	T	
	U	

EXAMINER	DATE	
Richemond Dorvil	November 4, 2000	Form892ccs2106b

* A copy of this reference is not being furnished with this office action.
(See Manual of Patent Examining Procedure, section 707.05(a).)

FORM PTO 948 (REV. 11-97) U.S. DEPARTMENT OF COMMERCE-Patent and Trademark Office Application No. 252874

NOTICE OF DRAFTPERSON'S PATENT DRAWING REVIEW

The drawing filied (insert date) 2/18/99 are:

A. _____ not objected to by the Draftperson under 37 CFR 1.84 or 1.152.

B. X objected to by the Draftperson under 37 CFR 1.84 or 1.152 as indicated below. The Examiner will require submission of new, corrected drawings whe necessary. Corrected drawings must be submitted according to the instructions on the back of this notice.

1. DRAWINGS. 37 CFR 1.84(a): Acceptable categories of drawings: Black ink. Color.
   - _____ Color drawing are not acceptable until petition is granted. Fig.(s) _____
   - _____ Pencil and non black ink is not permitted. Fig(s) _____
2. PHOTOGRAPHS. 37 CFR 1.84(b)
   - _____ Photographs are not acceptable until petition is granted,
   - _____ 3 full-tone sets are required. Fig(s) _____
   - _____ Photographs not properly mounted (must brystol board or photographic double-weight paper). Fig(s) _____
   - _____ Poor quailty (half-tone). Fig(s) _____
3. TYPE OF PAPER. 37 CFR 1.84(e)
   - _____ Paper not flexible, strong, white and durable. Fig.(s) _____
   - _____ Erasures, alterations, overwritings, interlineations, folds, copy machine marks not acceptable. (too thin)
   - _____ Mylar, vellum paper is not acceptable (too thin). Fig(s) _____
4. SIZE OF PAPER. 37 CFR 1.84(F): Acceptable sizes:
   - _____ 21.0 cm by 29.7 cm (DIN size A4)
   - _____ 21.6 cm by 27.9 cm (8 1/2 x 11 inches)
   - _____ All drawings sheets not the same size. Sheet(s) _____
5. MARGINS. 37 CFR 18.4(g): Acceptable margins:
   - Top 2.5 cm Left 2.5 cm Right 1.5 cm Bottom 1.0 cm SIZE: A4 Size
   - Top 2.5 cm Left 2.5 cm Right 1.5 cm Bottom 1.0 cm SIZE: 8 1/2 x 11
   - _____ Margins not acceptable. Fig(s) _____
   - _____ Top (T) _____ Left (L)
   - _____ Right (R) _____ Bottom (B)
6. VIEWS. CFR 1.84(h)
   REMINDER: Specification may require revision to correspond to drawing changes.
   - _____ Views connected by projection lines or lead lines. Fig.(s) _____

   Partial views. 37 CFR 1.84(h)(2)
   - _____ Brackets needed to show figure as one entity. Fig.(s) _____
   - _____ Views not labeled separately or properly. Fig.(s) _____
   - _____ Enlarged view not labeled separately or properly. Fig.(s) _____
7. SECTIONAL VIEWS. 37 CFR 1.84(h)(3)
   - _____ Hatching not indicated for sectional portions of an object. Fig.(s) _____
   - _____ Sectional designation should be noted with Arabic or Roman numbers. Fig.(s) _____
8. ARRANGEMENT OF VIEWS. 37 CFR 1.84(i)
   - _____ Words do not appear on a horizontal, left-to-right fashion when page is either upright or turned, so that the top becomes the right side, except for graphs. Fig.(s) _____
   - _____ Views not on the same plane on drawing sheet. Fig.(s) _____
9. SCALE. 37 CFR 1.84(k)
   - _____ Scale not large enough to show mechansim without crowding when drawing is reduced in size to two-thirds in reproduction. Fig.(s) _____
10. CHARACTER OF LINES, NUMBERS, & LETTERS. 37 CFR 1.84(l)
   - X Lines, numbers & letters not uniformly thick and well defined, clean, durable and black (poor line quality). Fig.(s) 1-9
11. SHADING. 37 CFR 1.84(m)
   - _____ Solid black areas pale. Fig.(s) _____
   - _____ Solid black shading not permitted. Fig.(s) _____
   - _____ Shade lines, pale, rough and blurred. Fig.(s)
12. NUMBERS, LETTERS, & REFERENCE CHARACTERS. 37 CFR 1.48(p)
   - _____ Numbers and reference characters not plain and legible. Fig.(s) _____
   - _____ Figure legends are poor. Fig.(s) _____
   - _____ Numbers and reference characters not oriented in the same direction as the view. 37 CFR 1.84(p)(3) Fig.(s) _____
   - _____ Engligh alphabet not used. 37 CFR 1.84(p)(3) Fig.(s) _____
   - _____ Numbers, letters and reference characters must be at least .32 cm (1/8 inch) in height. 37 CFR 1.84(p)(3) Fig.(s) _____
13. LEAD LINES. 37 CFR 1.84(q)
   - _____ Lead lines cross each other. Fig.(s) _____
   - _____ Lead lines missing. Fig.(s) _____
14. NUMBERING OF SHEETS OF DRAWINGS. 37 CFR 1.48(t)
   - _____ Sheets not numbered consecutively, and in Ababic numerals beginning with number 1. Fig.(s) _____
15. NUMBERING OF VIEWS. 37 CFR 1.84(u)
   - _____ Views not numbered consecutively, and in Abrabic numerals, beginning with number 1. Fig.(s) _____
16. CORRECTIONS. 37 CFR 1.84(w)
   - _____ Corrections not made from PTO-948 dated _____
17. DESIGN DRAWINGS. 37 CFR 1.152
   - _____ Surface shading shown not appropriate. Fig.(s) _____
   - _____ Solid black shading not used for color contrast. Fig.(s) _____

COMMENTS

REVIEWER _____ DATE 5/17/99 TELEPHONE NO. 703 305 0858

ATTACHMENT TO PAPER NO. 6

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starting with: DETECT$(DETECTORS-REFLECTOMETERS).P27-P83.

Search Results -

Terms	Documents
l3 and (threshold near3 detect$)	2

Database: US Patents Full-Text Database; JPO Abstracts Database; EPO Abstracts Database; Derwent World Patents Index; IBM Technical Disclosure Bulletins

Refine Search: `l3 and (threshold near3 detect$)` Clear

Search History

Today's Date: 11/5/2000

DB Name	Query	Hit Count	Set Name
USPT	l3 and (threshold near3 detect$)	2	L8
USPT	l3 and bus	4	L7
USPT	l5 and bus	1	L6
USPT	l3 and speech	5	L5
USPT	l3 and non-speech	0	L4
USPT	l2 and (position with noise)	13	L3
USPT	l1 and audio	171	L2
USPT	frequency bin	562	L1

11/04/2000 9:57 PM

PATENT
670025-2800

#7
MDJ
3/23/01

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	:	Joseph MARASH Baruch BERDUGO
U.S. Serial No.	:	09/252,874
Filing Date	:	February 18, 1999
For	:	SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE
Examiner	:	Unknown
Art Unit	:	2743

OIPE JC171 MAR 14 2001 PATENT & TRADEMARK OFFICE

745 Fifth Avenue
New York, NY 10151

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231, on May 16, 2000

Bruno Polito, Reg. No. 38,580
Name of Applicant, Assignee or Registered Representative

Signature

May 16, 2000
Date of Signature

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

In compliance with the duty of disclosure set forth in 37 C.F.R. §1.56, applicants are filing this Information Disclosure Statement and the accompanying form PTO-1449. Copies of all of the documents cited herein have previously been submitted in pending applications 09/425,790; 09/059,503; 08/840,159; 09/055,709; and 09/089,710. Copies of documents cited herein that have not previously been submitted are enclosed.

ds0228

The Examiner is respectfully requested to consider, and make of record, the documents cited herein.

Since this Information Disclosure Statement is being filed before the first Office Action, no fee is believed necessary or due for considering and making of record the documents cited herein (37 C.F.R. §1.97(b)(3)). This Information Disclosure Statement is not a representation that any of the cited documents are considered pertinent, or that any of the cited documents are indeed prior art.

Please charge any fee required for consideration and making of record the documents cited herein, or credit any overpayment therein, to Deposit Account No. 50-0320.

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants

Date: May 16, 2000

By _____
BRUNO POLITO
Reg. No. 38,580
Tel. (212) 588-0800

BP:das
Enclosure

Based on Form PTO-1449
3/90)

LIST OF REFERENCES CITED BY APPLICANT
(Use several sheets if necessary)

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT: MARASH et al.	
FILING DATE: February 18, 1999	GROUP: 2743

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA	5,914,912	6/22/99	Yang			
	AB	5,909,495	6/1/99	Andrea			
	AC	5,874,918	3/23/99	Czarnecki et al.			
	AD	5,838,805	11/17/98	Warnaka et al.			
	AE	5,835,608	11/10/98	Warnaka et al.			
	AF	5,828,768	10/27/98	Eatwell et al.			
	AG	5,825,898	10/20/98	Marash			
	AH	5,825,897	10/20/98	Andrea et al.			
	AI	5,815,582	9/29/98	Claybaugh et al.			
	AJ	5,812,682	9/22/98	Rose et al.			
	AK	5,798,983	8/25/98	Kuhn et al.			
	AL	5,774,859	6/30/98	Houser et al.			
	AM	5,768,473	6/16/98	Eatwell et al.			
	AN	5,715,321	2/3/98	Andrea et al.			
	AO	5,748,749	5/5/98	Miller et al.			
	AP	5,745,581	4/28/98	Eatwell et al.			
	AQ	5,732,143	3/1998	Andrea et al.			
	AR	5,727,073	3/10/98	Ikeda			
	AS	5,724,270	3/3/98	Posch			
	AT	5,719,945	2/17/98	Fuller et al.			
	AU	5,715,319	2/3/98	Chu			
	AV	5,701,344	12/23/97	Wakui			
	AW	5,699,436	12/16/97	Claybaugh et al.			
	AX	5,692,054	11/25/97	Parrella et al.			
	AY	5,692,053	11/25/97	Fuller et al.			
	AZ	5,689,572	11/18/97	Ohki et al.			
	BA	5,676,353	10/14/97	Jones et al.			
	BB	5,673,325	9/30/97	Andrea et al.			

EXAMINER | DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	BC	5,668,747	9/16/97	Obashi			
	BD	5,664,021	9/2/97	Chu et al.			
	BE	5,657,393	8/12/97	Crow			
	BF	5,652,799	7/29/97	Ross et al.			
	BG	5,652,770	7/29/97	Eatwell			
	BH	5,649,018	7/15/97	Gifford et al.			
	BI	5,644,641	7/1/97	Ikeda			
	BJ	5,642,353	6/24/97	Roy, III et al.			
	BK	5,638,456	6/10/97	Conley et al.			
	BL	5,638,454	6/10/97	Jones et al.			
	BM	5,638,022	6/10/97	Eatwell			
	BN	5,627,799	5/6/97	Hoshuyama			
	BO	5,627,746	5/6/97	Ziegler, Jr. et al.			
	BP	5,625,880	4/29/97	Goldburg et al.			
	BQ	5,625,697	4/29/97	Bowen et al.			
	BR	5,621,656	4/15/97	Langley			
	BS	5,619,020	4/8/97	Jones et al.			
	BT	5,617,479	4/1/97	Hildebrand et al.			
	BU	5,615,175	3/25/97	Cater et al.			
	BV	5,604,813	2/18/97	Evans et al.			
	BW	5,600,106	2/4/97	Langley			
	BX	5,592,490	1/7/97	Barratt et al.			
	BY	5,592,181	1/7/97	Cai et al.			
	BZ	5,581,620	12/3/96	Brandstein et al.			
	CA	5,568,557	10/22/96	Ross et al.			
	CB	5,563,817	10/8/96	Ziegler, Jr. et al.			
	CC	5,553,153	9/3/96	Eatwell			
	CD	5,550,334	8/27/96	Langley			

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APPLICANT	
MARASH et al.	
FILING DATE	GROUP
February 18, 1999	2743

U.S. PATENT DOCUMENTS

AMINER ITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	CE	5,546,467	8/13/96	Denenberg			
	CF	5,546,090	8/13/96	Roy, III et al.			
	CG	5,526,432	6/11/96	Denenberg			
	CH	5,524,057	6/4/96	Akiho et al.			
	CI	5,524,056	6/4/96	Killion et al.			
	CJ	5,515,378	5/7/96	Roy, III et al.			
	CK	5,511,128	4/23/96	Lindeman			
	CL	5,511,127	4/23/96	Warnaka			
	CM	5,502,869	4/2/96	Smith et al.			
	CN	5,493,615	2/20/96	Burke et al.			
	CO	5,485,515	1/16/96	Allen et al.			
	CP	5,481,615	1/2/96	Eatwell et al.			
	CQ	5,475,761	12/12/95	Eatwell			
	CR	5,473,702	12/5/95	Yoshida et al.			
	CS	5,473,701	12/5/95	Cezanec et al.			
	CT	5,473,214	12/5/95	Hildebrand			
	CU	5,471,538	11/1995	SASAKI et al.			
	CV	5,471,106	11/18/95	Curtis et al.			
	CW	5,469,087	11/21/95	Eatwell			
	CX	5,457,749	10/10/95	Cain et al.			
	CY	5,452,361	9/19/95	Jones			
	CZ	5,448,637	9/1995	YAMAGUCHI et al.			
	DA	5,440,642	8/8/95	DENENBERG et al.			
	DB	5,434,925	7/18/95	Nadim			
	DC	5,432,859	7/11/95	Yang et al.			
	DD	5,431,008	7/11/95	Ross et al.			
	DE	5,423,523	6/13/95	Gossman et al.			
	DF	5,418,857	5/23/95	Eatwell			

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INER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through if not in conformance and not considered. Include copy of this form with next communication to applicant.

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ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT: MARASH et al.	
FILING DATE: February 18, 1999	GROUP: 2743

U.S. PATENT DOCUMENTS

AMINER NITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	DG	5,416,887	5/16/95	Shimada			
	DH	5,416,847	5/16/95	Boze			
	DI	5,416,845	5/16/95	Shen			
	DJ	5,414,775	5/9/95	Scribner et al.			
	DK	5,414,769	5/1995	GATTEY et al.			
	DL	5,412,735	5/2/95	Engebretson et al.			
	DM	5,402,497	3/1995	NISHIMOTO et al.			
	DN	5,384,843	1/24/95	Masuda et al.			
	DO	5,381,481	1/10/95	Gammie et al.			
	DP	5,381,473	1/1995	ANDREA et al.			
	DQ	5,375,174	12/20/94	Denenberg			
	DR	5,365,594	11/15/94	Ross et al.			
	DS	5,361,303	11/1/94	Eatwell			
	DT	5,353,376	10/4/94	Oh et al.			
	DU	5,353,347	10/4/94	Irissou et al.			
	DV	5,348,124	9/20/94	Harper			
	DW	5,335,011	8/2/94	Addeo et al.			
	DX	5,332,203	7/26/94	Gossman et al.			
	DY	5,327,506	7/1994	STITES, III			
	DZ	5,319,736	6/7/94	Hunt			
	EA	5,315,661	5/24/94	Gossman et al.			
	EB	5,313,945	5/24/94	Friedlander			
	EC	5,313,555	5/17/94	Kamiya			
	ED	5,311,453	5/10/94	Denenberg et al.			
	EE	5,311,446	5/10/94	Ross et al.			
	EF	5,276,740	1/1994	INANAGA et al.			
	EG	5,272,286	12/21/93	Cain et al.			
	EH	5,260,997	11/1993	GATTEY et al.			

NER	DATE CONSIDERED

MINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through
if not in conformance and not considered. Include copy of this form with next communication to applicant.

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670025-2800	09/252,874

APPLICANT	
MARASH et al.	
FILING DATE	GROUP
February 18, 1999	2743

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	EI	5,251,863	10/12/93	Gossman et al.			
	EJ	5,251,263	10/5/93	Andrea et al.			
	EK	5,241,692	8/31/93	Harrison et al.			
	EL	5,226,087	7/1993	ONO			
	EM	5,226,077	7/6/93	Lynn et al.			
	EN	5,219,037	6/15/93	Smith et al.			
	EO	5,212,764	5/18/93	Ariyoshi			
	EP	5,209,326	5/11/93	Harper			
	EQ	5,208,864	5/4/93	Kaneda			
	ER	5,208,864	5/4/93	Kaneda			
	ES	5,192,918	3/9/93	Sugiyama			
	ET	5,142,585	8/25/92	Taylor			
	EU	5,138,664	8/1992	KIMURA et al.			
	EV	5,138,663	8/1992	MOSELEY			
	EW	5,134,659	7/1992	MOSELEY			
	EX	5,133,017	7/21/92	Cain et al.			
	EY	5,126,681	6/30/92	Ziegler, Jr. et al.			
	EZ	5,125,032	6/1992	MEISTER et al.			
	FA	5,121,426	6/1992	BAVMHAUER			
	FB	5,117,461	5/1992	MOSELEY			
	FC	5,117,461	5/26/92	Moseley			
	FD	5,105,377	4/14/92	Ziegler, Jr.			
	FE	5,097,923	3/24/92	Ziegler et al.			
	FF	5,091,954	2/1992	SASAKI et al.			
	FG	5,086,415	2/4/92	Takahashi et al.			
	FH	5,086,385	2/4/92	Launey et al.			
	FI	5,075,694	12/24/91	Donnangelo et al.			
	FJ	5,070,527	12/3/91	Lynn			

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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LIST OF REFERENCES CITED BY APPLICANT

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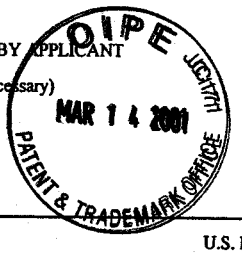

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT	
MARASH et al.	
FILING DATE	GROUP
February 18, 1999	2743

U.S. PATENT DOCUMENTS

AMINER NITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	FK	5,052,510	10/1/91	Gossman			
	FL	5,046,103	9/3/91	Warnaka et al.			
	FM	5,029,218	7/2/91	Nagayasu			
	FN	5,023,002	6/11/91	Schweizer et al.			
	FO	5,018,202	5/21/91	Takahashi et al.			
	FP	5,010,576	4/23/91	Hill			
	FQ	5,001,763	3/1991	MOSELEY			
	FR	4,991,433	2/12/91	Warnaka et al.			
	FS	4,985,925	1/1991	LANGBERG et al.			
	FT	4,977,600	12/11/90	Ziegler			
	FU	4,965,834	10/23/90	Miller			
	FV	4,963,071	10/16/90	Larwin et al.			
	FW	4,959,865	9/25/90	Stettiner et al.			
	FX	4,956,867	9/11/90	Zarek et al.			
	FY	4,955,055	9/4/90	Fujisaki et al.			
	FZ	4,951,954	8/28/90	MacNeill			
	GA	4,947,356	8/7/90	Elliott et al.			
	GB	4,937,871	6/26/90	Hattori			
	GC	4,932,063	6/5/90	Nakamura			
	GD	4,930,156	5/29/90	Norris			
	GE	4,928,307	5/22/90	Lynn			
	GF	4,910,719	3/20/90	Thubert			
	GG	4,910,718	3/20/90	Horn			
	GH	4,908,855	3/13/90	Ohga et al.			
	GI	4,878,188	10/31/89	Ziegler et al.			
	GJ	4,862,506	8/29/89	Landgarten et al.			
	GK	4,847,897	7/11/89	Means			
	GL	4,837,832	6/6/89	Fanshel			

INER	DATE CONSIDERED

MINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through
n if not in conformance and not considered. Include copy of this form with next communication to applicant.

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LIST OF REFERENCES CITED BY APPLICANT
(Use several sheets if necessary)

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874

APPLICANT	
MARASH et al.	
FILING DATE	GROUP
February 18, 1999	2743

U.S. PATENT DOCUMENTS

AMINER NITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	GM	4,833,719	5/1989	CARME et al.			
	GN	4,811,404	3/7/89	Vilmur et al.			
	GO	4,802,227	1/31/89	Elko et al.			
	GP	4,791,672	12/13/88	Nunley et al.			
	GQ	4,783,818	11/8/88	Graupe et al.			
	GR	4,783,817	11/1988	HAMADA et al.			
	GS	4,783,798	11/8/88	Leibholz et al.			
	GT	4,771,472	9/13/88	Williams, III, et al.			
	GU	4,769,847	9/6/88	Taguchi			
	GV	4,752,961	6/1988	KAHN			
	GW	4,750,207	6/7/88	Gebert et al.			
	GX	4,741,038	4/26/88	Elko et al.			
	GY	4,736,432	4/5/88	Cantrell			
	GZ	4,731,850	3/15/88	Levitt et al.			
	HA	4,718,096	1/5/88	Meisel			
	HB	4,696,043	9/22/87	Iwahara et al.			
	HC	4,683,010	7/28/87	Hartmann			
	HD	4,672,674	6/1987	CLOUGH et al.			
	HE	4,658,426	4/14/87	Chabries et al.			
	HF	4,654,871	3/31/87	Chaplin et al.			
	HG	4,653,606	3/31/87	Flanagan			
	HH	4,653,102	3/24/87	Hansen			
	HI	4,649,505	3/10/87	Zinser, Jr., et al.			
	HJ	4,636,586	1/13/87	Schiff			
	HK	4,630,304	12/16/86	Borth et al.			
	HL	4,630,302	12/16/86	Kryter			
	HM	4,628,529	12/9/86	Borth et al.			
	HN	4,622,692	11/11/86	Cole			

INER	DATE CONSIDERED

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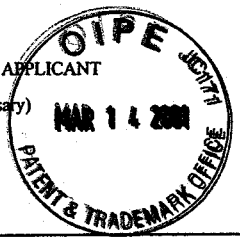

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT: MARASH et al.	
FILING DATE: February 18, 1999	GROUP: 2743

U.S. PATENT DOCUMENTS

AMINER ITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	HO	4,600,863	7/15/86	Chaplin et al.			
	HP	4,589,137	5/1986	MILLER			
	HQ	4,589,136	5/13/86	Poldy et al.			
	HR	4,581,758	4/8/86	Coker et al.			
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	HT	4,566,118	1/21/86	Chaplin et al.			
	HU	4,562,589	12/31/85	Warnaka et al.			
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	HX	4,530,304	7/23/85	Gardos			
	HY	4,527,282	7/2/85	Chaplin et al.			
	HZ	4,517,415	5/14/85	Laurence			
	IA	4,495,643	1/22/85	Orban			
	IB	4,494,074	1/15/85	Bose			
	IC	4,490,841	12/25/84	Chaplin et al.			
	ID	4,489,441	12/18/84	Chaplin et al.			
	IE	4,477,505	10/16/84	Warnaka			
	IF	4,473,906	9/25/84	Warnaka et al.			
	IG	4,463,222	7/1984	PORADOWSKI			
	IH	4,461,025	7/17/84	Franklin			
	II	4,459,851	7/17/84	Crostack			
	IJ	4,455,675	6/19/84	Bose et al.			
	IK	4,453,600	6/12/84	Thigpen			
	IL	4,442,546	4/10/84	Ishigaki			
	IM	4,433,435	2/21/84	David			
	IN	4,417,098	11/22/83	Chaplin et al.			
	IO	4,409,435	10/11/83	Ono			
	IP	4,363,007	12/7/82	Haramoto et al.			

MINER	DATE CONSIDERED

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FILING DATE: February 18, 1999	GROUP: 2743

U.S. PATENT DOCUMENTS

MINER ITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	IQ	4,339,018	7/13/82	Warnaka			
	IR	4,334,740	6/1982	WRAY			
	IS	4,321,970	3/30/82	Thigpen			
	IT	4,261,708	4/14/81	Gallagher			
	IU	4,243,117	1/6/81	Warnaka			
	IV	4,241,805	12/30/80	Chance, Jr.			
	IW	4,239,936	12/16/80	Sakoe			
	IX	4,169,257	9/25/79	Smith			
	IY	4,153,815	5/8/79	Chaplin et al.			
	IZ	4,122,303	10/24/78	Chaplin et al.			
	JA	4,068,092	1/10/78	Ikoma et al.			
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	JD	3,830,988	8/1974	MOL et al.			
	JE	3,702,644	11/14/72	Fowler et al.			
	JF	3,562,089	2/9/71	Warnaka et al.			
	JG	3,422,921	1/21/69	Warnaka			
	JH	3,416,782	12/17/68	Warnaka			
	JI	3,394,226	7/1968	ANDREWS, JR.			
	JJ	3,330,376	7/11/67	Warnaka			
	JK	3,298,457	1/17/67	Warnaka			
	JL	3,262,521	7/26/66	Warnaka			
	JM	3,247,925	4/26/66	Warnaka			
	JN	3,170,046	2/1965	LEALE			
	JO	3,101,744	8/27/63	Warnaka			
	JP	3,098,121	7/1963	WADSWORTH			
	JQ	2,972,018	2/1961	HAWLEY et al.			
	JR	2,379,514	7/1945	FISHER			

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(Use several sheets if necessary)

APPLICANT	
MARASH et al.	
FILING DATE	GROUP
February 18, 1999	2743

U.S. PATENT DOCUMENTS

MINER TIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	JS	~~RE 34,236~~	4/27/93	Taylor			
	JT	~~D344,730~~	~~3/1/94~~	Gattey et al.			

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	JU	0 059 745 B1	9/15/82	EPO				
	JV	0 380 290 A2	8/1/90	EPO				
	JW	0 390 386	10/90	EPO				
	JX	0 411 360 B1	2/6/91	EPO				
	JY	0 483 845	1/13/93	EPO				
	JZ	0 509 742 A2	10/21/92	EPO				
	KA	0 583 900 A1	2/23/94	EPO				
	KB	0 595 457 A1	5/4/94	EPO				
	KC	0 721 251	7/10/96	EPO				
	KD	0 724 415	11/20/96	EPO				
	KE	2305909	10/76	FRANCE				
	KF	2640324	3/9/78	GERMANY				
	KG	3719963	3/88	GERMANY				
	KH	4008595	9/91	GERMANY				
	KI	1-149695	6/12/89	JAPAN				
	KJ	1-314098	12/89	JAPAN				
	KK	2-070152	3/90	JAPAN				
	KL	3-169199	7/91	JAPAN				
	KM	3-231599	10/91	JAPAN				
	KN	4-16900	1/21/92	JAPAN				
	KO	56-89194	7/81	JAPAN				
	KP	59-64994	4/84	JAPAN				
	KQ	62-189898	8/87	JAPAN				

INER	DATE CONSIDERED
Richmond Dorvil	5-24-01

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LIST OF REFERENCES CITED BY APPLICANT
(Use several sheets if necessary)

ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874
APPLICANT: MARASH et al.	
FILING DATE: February 18, 1999	GROUP: 2743

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

	LQ		Rubiner et al., Digital Processing of Speech Signals (Prentice Hall, 1978) pp. 130-135.
	LR		Sapontis, Probability, Lambda Variables and Structural Processes, pp. 467-474.
	LS		Scott C. Douglas, "A Family of Normalized LMS Algorithms," IEEE-Signal Proc. Letters, Vol. 1, No. 3, March 1994.
	LT		Sewald et al., "Application of . . . Beamforming to Reject Turbulence Noise in Airducts," IEEE ICASSP Vol. 5, No. CONF-21, May 7, 1996, pp. 2734-37.
	LU		White, Moving-Coil Earphone Design, 1963, pp. 188-194.
	LV		Widrow et al., "Adaptive Noise Canceling: Principles and Applications," Proc. IEEE, Vol. 63, No. 12, December 1975, pp. 1692-1716.
	LW		Youla et al., IEEE Trans. on Acous., Vol. MI-1, No. 2, October 1982, pp. 81-101.

MINER	DATE CONSIDERED
Richmond Dorvil	5-26-01

AMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through on if not in conformance and not considered. Include copy of this form with next communication to applicant.

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ATTY. DOCKET NO.	SERIAL NO.
670025-2800	09/252,874

LIST OF REFERENCES CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT	
MARASH et al.	
FILING DATE	GROUP
February 18, 1999	2743

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
(N)	KR	1 160 431	8/69	UNITED KINGDOM				
	KS	1 289 993	9/72	UNITED KINGDOM				
	KT	1 378 294	12/74	UNITED KINGDOM				
	KU	2 172 769 A	9/24/86	UNITED KINGDOM				
	KV	2 239 971 B	7/17/91	UNITED KINGDOM				
	KW	2 289 593 A	11/22/95	UNITED KINGDOM				
	KX	WO 88/09512	12/1/88	WIPO				
	KY	WO 92/05538	4/92	WIPO				
	KZ	WO 92/17019	10/92	WIPO				
	LA	WO 94/16517	7/21/94	WIPO				
	LB	WO 95/08906	3/30/95	WIPO				
	LC	WO 96/15541	5/23/96	WIPO				
)	LD	WO 97/23068	6/26/97	WIPO				

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

1	LE		B.D. Van Veen and K.M. Buckley, "Beamforming: A Versatile Approach to Spatial Filtering," IEEE ASSN Magazine, Vol. 5, No. 2, April 1988, pp. 4-24.
	LF		Beranek, Acoustics (American Institute of Physics, 1986) pp. 116-135.
	LG		Boll, IEEE Trans. on Acous., Vol. ASSP-27, No. 2, April 1979, pp. 113-120.
	LH		Daniel Sweeney, "Sound Conditioning Through DSP", The Equipment Authority, 1994.
	LI		Edward J. Foster, "Switched on Silence", Popular Science, 1994, p. 33.
	LJ		Kuo, Automatic Control of Systems, pp. 504-585.
	LK		Luenberger, Optimization by Vector Space Method, pp. 134-138.
	LL		Ogata, Modern Control Engineering, pp. 474-508.
	LM		Oppenheim Schafer, Digital Signal Processing (Prentice Hall) pp. 542-45.
	LN		P.P. Vaidyanathan, "Multirate Digital Filters, Filter Banks, Polyphase Networks, and Applications; A Tutorial," IEEE Proc., Vol. 78, No. 1, January 1990.
	LO		P.P. Vaidyanathan, "Quadrature Mirror Filter Banks, M-band Extensions and Perfect-Reconstruction Techniques," IEEE ASSP Magazine, July 1987, pp. 4-20.
)	LP		Rabiner et al., IEEE Trans. on Acous., Vol. ASSP-24, No. 5, October 1976, pp. 399-418.

MINER	DATE CONSIDERED
Richard Dorvil	5-24-01

AMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through tion if not in conformance and not considered. Include copy of this form with next communication to applicant.

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3-15-01

GAU 2641
PATENT
670025-2800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	:	Joseph MARASH Baruch BERDUGO
Serial No.	:	09/252,874
Filed	:	February 18, 1999
For	:	SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE
Examiner	:	R. Dorvil
Art Unit	:	2641

RECEIVED
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Technology Center 2600

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MAR 14 2001
PATENT & TRADEMARK OFFICE

745 Fifth Avenue
New York, New York 10151
Tel. (212) 588-0800

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Transmitted herewith is an amendment in the above-identified application.

_____ No additional fee is required.

__X__ The fee has been calculated as shown below.

_____ This is an application of a small entity under 37 CFR 1.9(f), and the amounts shown in parentheses apply.

Claims as Amended

(1)	(2) Claims remaining after amendment	(3)	(4) Highest number previously paid for	(5) Present extra	(6) Rate	(7) Additional fee
Total claims	* 49	Minus	** = 49	0	$18 (9)	= $ 0
Independent claims	* 3	Minus	*** = 3	0	$78(39)	= $ 0
			Total additional fee for this amendment			$ 0

If the entry in Column 2 is less than the entry in Column 4, write "0" in Column 5.
If the highest number of total claims previously paid for is less than 20, write "20" in this space.
If the highest number of independent claims previously paid for is less than 3, write "3" in this space.

_____ This application contains a multiple dependent claim. The required fee of $250(125) has been previously paid __, or is paid herewith _.

__X__ This response is being filed within the first month following the expiration of the term originally set therefor. This is a petition to request a one-month extension of time. A check covering the cost of the petition is enclosed.

__X__ A check in the amount of $110.00 is attached, which covers the cost of _____ additional independent claims __X__ petition for extension of time.

_____ Charge $_ to Deposit Account No. 50-0320.

__X__ Please charge any additional fees incurred by reason of this response or credit any overpayment to Deposit Account No. 50-0320.

EXPRESS MAIL

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Date of Deposit: March 14, 2001

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Edward Nay
(Typed or printed name of person mailing paper or fee)

(Signature of person mailing paper or fee)

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants

By: Darren M. Simon
Darren M. Simon
Reg. No. P47,946
Tel. (212) 588-0800

CAR0914

RTL345-2_1020-0122

#8

PATENT
670025-2800

3/20/01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	:	Joseph MARASH Baruch BERDUGO
Serial No.	:	09/252,874
For	:	**SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**
Filed	:	February 18, 1999
Examiner	:	R. Dorvil
Group Art Unit	:	2641

745 Fifth Avenue
New York, NY 10151
Tel. (212) 588-0800

March 14, 2001

EXPRESS MAIL

Mailing Label Number: EL 742698114US

Date of Deposit: March 14, 2001

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Edward Vas
(Typed or printed name of person mailing paper or fee)

(Signature of person mailing paper or fee)

AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

In response to the non-final Office Action which issued November 16, 2000, please consider the following remarks.

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RTL345-2_1020-0123

REMARKS

The Office Action in the above-identified application has been carefully considered and this amendment has been presented to place this application in condition for allowance. Accordingly, reconsideration of this application is respectfully requested.

Claims 1–49 are pending in the present application.

Information Disclosure Statement

The Examiner asserts that the information disclosure statement filed on May 18, 2000, fails to comply with 37 C.F.R. § 1.98(a)(2) which requires a legible copy of each patent and publication listed. Because the references were omitted inadvertently, copies of the foreign patents listed as JU–KM, KO-KP, and KR-LD on the PTO-1449 form and the publications listed as LE–LW on the PTO-1449 form are enclosed herewith for consideration in accordance with 37 C.F.R. § 1.97(f). Note that with respect to reference KD, corresponding published PCT application WO 94/24970 has been provided in place of EPO 0 724 415. Please ignore reference KN which mistakenly refers to nonexistent Japanese patent 4-16900. Also note that some foreign patents (i.e., JU, KE, KF, KH, and KI) are not in English and need only be considered to the extent that English translations have been provided. As indicated on the PTO-1449 form that was signed by the Examiner (also enclosed), the cited U.S. patents have already been considered. Therefore, Applicants respectfully request that the enclosed foreign patents and publications now also be considered.

Obviousness Double Patenting

Claims 1–49 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1–49 of copending U.S. Patent application 09/385,996. As noted by the Examiner, a timely filed terminal disclaimer may be used to overcome the provisional double patenting rejections provided the conflicting application for patent is shown to be commonly owned with the present application.

The conflicting application is commonly owned with the present application. However, it is not clear whether, at time of issuance, the allowable claims from the present application will be obvious in view of the allowable claims in copending U.S. Patent application 09/385,996. Hence, Applicants will file a terminal disclaimer if the allowable claims in the present application are obvious in view of the allowable claims in U.S. Patent application 09/385,996.

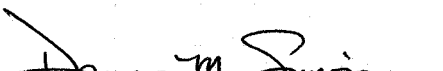
In view of the foregoing amendment and remarks, it is respectfully submitted that the application as now presented is in condition for allowance. Early and favorable reconsideration of the application are respectfully requested.

Statements appearing above in respect to the disclosures in the cited reference represent the present opinions of the Applicants' undersigned attorney and, in the event that the Examiner disagrees with any of such opinions, it is respectfully requested that the Examiner indicate specifically those portions of the reference providing a basis for a contrary view.

No additional fees are deemed to be required for the filing of this amendment, but if such are, the Examiner is hereby authorized to charge any insufficient fees or credit any overpayment associated with the above-identified application to Deposit Account No. 50-0320.

If any issues remain, or if the Examiner has any further suggestions, he/she is invited to call the undersigned at the telephone number provided below. The Examiner's consideration of this matter is gratefully acknowledged.

Respectfully submitted,
FROMMER LAWRENCE & HAUG LLP

By: 
Darren M. Simon
Reg. No. P47,946
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THE PRACTITIONERS OF RECORD HAVE BEEN CHANGED TO CUSTOMER # 20999

ON 03/19/01 THE ADDRESS OF RECORD FOR CUSTOMER NUMBER 20999 IS:

FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE
NEW YORK NY 10151

AND THE PRACTITIONERS OF RECORD FOR CUSTOMER NUMBER 20999 ARE:

2	25456	25506	27413	28029	29309	30800	31086	31223	32147
3	34930	35582	37274	37514	37870	37937	38511	38580	39440
2	41205	41531	43228	44071					

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THIS FILE IS ASSIGNED TO GAU 2641.

O-FMD
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/252,874	02/18/99	MARASH	

WM01/0529

020999
FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE
NEW YORK NY 10151

EXAMINER	
DORVIL,R	

ART UNIT	PAPER NUMBER
2641	10

DATE MAILED: 05/29/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

RTL345-2_1020-0128

Office Action Summary	Application No.	Applicant(s)	
	09/252,874	MARASH ET AL.	
	Examiner	Art Unit	
	Richemond Dorvil	2641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

eriod for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

atus

1)☒ Responsive to communication(s) filed on *14 March 2001* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

sposition of Claims

4)☒ Claim(s) *1-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

plication Papers

9)☐ The specification is objected to by the Examiner.

0)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

1)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

2)☐ The oath or declaration is objected to by the Examiner.

ority under 35 U.S.C. § 119

3)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

achment(s)

☐ Notice of References Cited (PTO-892)
☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7 .
18)☐ Interview Summary (PTO-413) Paper No(s). _____ .
19)☐ Notice of Informal Patent Application (PTO-152)
20)☐ Other: .

RTL345-2_1020-0129

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321© may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1-49 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1-49 of copending Application No. 09/385,996. Although the conflicting claims are not identical, they are not patentably distinct from each other because removing inherent and/or unnecessary would be within the level of one of ordinary skill in the art. It is well settled that the omission of an element, e.g. "USB", and its function is an obvious expedient if the remaining elements perform the same function as before. *In re Karlson, 136 USPQ 184 (CCPA 1963)*. Also note Ex parte

Rainu, *168 USPQ 375 (Bd. App. 1969)*. Omission of a reference element or step whose function is not needed would be obvious to one of ordinary skill in the art..

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

Applicant's arguments filed 3-14-01 have been fully considered but they are not persuasive. A timely filed terminal disclaimer in compliance with 37 CFR 1.321© must be used to overcome the provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richemond Dorvil whose telephone number is (703) 305-9645. The examiner can normally be reached on T-F 9:30 to 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on 703 308-4825. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-9508 for regular communications and (703) 308-9051 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Richemond Dorvil
Primary Examiner
Art Unit 2641

RD
May 25, 2001

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

RECEIVED
MAY 0 [illegible]
Technology Center

#21 Fd 6/6/01

CHANGE OF ADDRESS/POWER OF ATTORNEY

E LOCATION 26X1 SERIAL NUMBER 09252874 PATENT NUMBER

THE CORRESPONDENCE ADDRESS HAS BEEN CHANGED TO CUSTOMER # 20999

THE PRACTITIONERS OF RECORD HAVE BEEN CHANGED TO CUSTOMER # 20999

ON 03/28/01 THE ADDRESS OF RECORD FOR CUSTOMER NUMBER 20999 IS:

FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE
NEW YORK NY 10151

RECEIVED
MAY 0 2 2001
Technology Center 2600

AND THE PRACTITIONERS OF RECORD FOR CUSTOMER NUMBER 20999 ARE:

02	25456	25506	27413	28029	29309	30800	31086	31223	32147
43	34930	35582	37274	37514	37870	37937	38511	38580	39440
52	41205	41531	43228	44071					

PTO INSTRUCTIONS: PLEASE TAKE THE FOLLOWING ACTION WHEN THE CORRESPONDENCE ADDRESS HAS BEEN CHANGED TO CUSTOMER NUMBER: RECORD, ON THE NEXT AVAILABLE CONTENTS LINE OF THE FILE JACKET, 'ADDRESS CHANGE TO CUSTOMER NUMBER'. LINE THROUGH THE OLD ADDRESS ON THE FILE JACKET LABEL AND ENTER ONLY THE 'CUSTOMER NUMBER' AS THE NEW ADDRESS. FILE THIS LETTER IN THE FILE JACKET. WHEN ABOVE CHANGES ARE ONLY TO FEE ADDRESS AND/OR PRACTITIONERS OF RECORD, FILE LETTER IN THE FILE JACKET.
THIS FILE IS ASSIGNED TO GAU 2641.

TO-FMD
ALBOT-1/97

6-6-01 AO

AY/2641 PATENT 670025-2800 270

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Joseph MARASH
Baruch BERDUGO

Serial No. 09/252,874

Filed February 18, 1999

For : SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE

Examiner R. Dorvil

Art Unit : 2641

745 Fifth Avenue
New York, New York 10151
Tel. (212) 588-0800

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Transmitted herewith is an amendment in the above-identified application.

__X__ No additional fee is required.

_____ The fee has been calculated as shown below.

_____ This is an application of a small entity under 37 CFR 1.9(f), and the amounts shown in parentheses apply.

Claims as Amended

(1)	(2) Claims remaining after amendment	(3)	(4) Highest number previously paid for	(5) Present extra	(6) Rate	(7) Additional fee
Total claims	* 49	Minus	** = 49	0	$18 (9)	= $ 0
Independent claims	* 3	Minus	*** = 3	0	$78(39)	= $ 0
			Total additional fee for this amendment			$ 0

If the entry in Column 2 is less than the entry in Column 4, write "0" in Column 5.
If the highest number of total claims previously paid for is less than 20, write "20" in this space.
If the highest number of independent claims previously paid for is less than 3, write "3" in this space.

_____ This application contains a multiple dependent claim. The required fee of $250(125) has been previously paid __, or is paid herewith _.

_____ This response is being filed within the month following the expiration of the term originally set therefor. This is a petition to request a -month extension of time. A check covering the cost of the petition is enclosed.

_____ A check in the amount of $ is attached, which covers the cost of _____ additional independent claims __ petition for extension of time.

_____ Charge $_ to Deposit Account No. 50-0320.

__X__ Please charge any additional fees incurred by reason of this response or credit any overpayment to Deposit Account No. 50-0320.

EXPRESS MAIL

Mailing Label Number: EL742692315US

Date of Deposit: June 5, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" Service under 37 CFR 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, DC 20231.

Edward Nay
(Typed or printed name of person mailing paper or fee)

(Signature of person mailing paper or fee)

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants

By: Darren M. Simon
Darren M. Simon
Reg. No. 47,946
Tel. (212) 588-0800

00014833

PATENT
670025-2800

#12
06/15/01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	:	Joseph MARASH Baruch BERDUGO
Serial No.	:	09/252,874
For	:	**SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**
Filed	:	February 18, 1999
Examiner	:	R. Dorvil
Group Art Unit	:	2641

745 Fifth Avenue
New York, NY 10151
Tel. (212) 588-0800

June 5, 2001

EXPRESS MAIL

Mailing Label Number: EL 742692315 US

Date of Deposit: June 5, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" Service under 37 CFR 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, DC 20231.

Edward Nay
(Typed or printed name of person mailing paper or fee)

(Signature of person mailing paper or fee)

AMENDMENT UNDER RULE 116

Assistant Commissioner for Patents
Washington, D.C. 20231
Box: AF

Dear Sir:

In response to the Final Office Action which issued May 29, 2001, please consider the following remarks.

00014516

REMARKS

The Office Action in the above-identified application has been carefully considered and this amendment has been presented to place this application in condition for allowance. Accordingly, reconsideration of this application is respectfully requested.

Claims 1–49 are pending in the present application.

Obviousness Double Patenting

Claims 1–49 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1–49 of copending U.S. Patent application 09/385,996—which is commonly owned with the present application. However, as of May 16, 2001, U.S. Patent application 09/385,996 stands abandoned by virtue of Applicants' decision not to respond within 6 months to the Office Action issued November 16, 2000. Therefore, Applicants respectfully request this rejection be withdrawn.

In view of the foregoing amendment and remarks, it is respectfully submitted that the application as now presented is in condition for allowance. Early and favorable reconsideration of the application are respectfully requested.

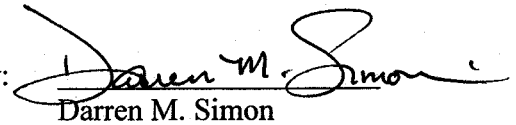
Statements appearing above in respect to the disclosures in the cited reference represent the present opinions of the Applicants' undersigned attorney and, in the event that the Examiner

disagrees with any of such opinions, it is respectfully requested that the Examiner indicate specifically those portions of the reference providing a basis for a contrary view.

No additional fees are deemed to be required for the filing of this amendment, but if such are, the Examiner is hereby authorized to charge any insufficient fees or credit any overpayment associated with the above-identified application to Deposit Account No. 50-0320.

If any issues remain, or if the Examiner has any further suggestions, he/she is invited to call the undersigned at the telephone number provided below. The Examiner's consideration of this matter is gratefully acknowledged.

Respectfully submitted,
FROMMER LAWRENCE & HAUG LLP

By: 
Darren M. Simon
Reg. No. 47,946
(212) 588-0800

6

UNITED STATES PARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

6

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/252,874	02/18/99	MARASH J	670025-2800

020999
FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE
NEW YORK NY 10151

TM02/0628

EXAMINER	
DORVIL,R	
ART UNIT	**PAPER NUMBER**
2641	13

DATE MAILED: 06/28/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

TO-90C (Rev.11/00)

CK
1- File Copy

RTL345-2_1020-0138

Office Action Summary	Application No.	Applicant(s)	
	09/252,874	MARASH ET AL.	
	Examiner	Art Unit	
	Richemond Dorvil	2641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 June 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited (PTO-892)
☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7 .
18)☐ Interview Summary (PTO-413) Paper No(s). _____ .
19)☐ Notice of Informal Patent Application (PTO-152)
20)☐ Other: .

RTL345-2_1020-0139

DETAILED ACTION

Response to Amendment

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 39-49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 39 recites the limitation " said threshold" in line 10. There is insufficient antecedent basis for this limitation in the claim.

Claims 40-49 incorporate the problem of claim 39 by dependency.

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-49 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The step or means for setting a predetermined threshold critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Claims 1 line 8 and

claim 26 lines 8-9, recite a "threshold detector for detecting whether a respective frequency bin is within said threshold" however the step of setting said threshold is not positively recited prior to said lines.

6. Claims 1-38 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, line 8, the phrase "whether said frequency bin is within said threshold" is indefinite. The step/means for setting a predetermined threshold must be set forth.

Claim 26 contains same error as claim 1.

Claim 2-25 and 27-38 incorporate the problems of claims 1 or 26 by dependency.

Response to Arguments

7. Applicant's arguments with respect to claims 1-49 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richemond Dorvil whose telephone number is (703) 305-9645. The examiner can normally be reached on T-F 9:30 to 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on 703 308-4825. The fax phone numbers for the

organization where this application or proceeding is assigned are (703) 305-9508 for regular communications and (703) 308-9051 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Richemond Dorvil
Primary Examiner
Art Unit 2641

RD
June 27, 2001

10-01-01

PATENT 2641
670025-2800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	:	Joseph MARASH Baruch BERDUGO
Serial No.	:	09/252,874
Filed	:	February 18, 1999
For	:	SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE
Examiner	:	R. Dorvil
Art Unit	:	2641

745 Fifth Avenue
New York, New York 10151
Tel. (212) 588-0800

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Transmitted herewith is an amendment in the above-identified application.

__X__ No additional fee is required.

_____ The fee has been calculated as shown below.

_____ This is an application of a small entity under 37 CFR 1.9(f), and the amounts shown in parentheses apply.

Claims as Amended

(1)	(2) Claims remaining after amendment	(3)	(4) Highest number previously paid for	(5) Present extra	(6) Rate	(7) Additional fee
Total claims	* 47	Minus	** = 49	0	$18 (9)	= $ 0
Independent claims	* 3	Minus	*** = 3	0	$78(39)	= $ 0
			Total additional fee for this amendment			$ 0

If the entry in Column 2 is less than the entry in Column 4, write "0" in Column 5.
If the highest number of total claims previously paid for is less than 20, write "20" in this space.
If the highest number of independent claims previously paid for is less than 3, write "3" in this space.

_____ This application contains a multiple dependent claim. The required fee of $250(125) has been previously paid __, or is paid herewith _.

_____ This response is being filed within the month following the expiration of the term originally set therefor. This is a petition to request a -month extension of time. A check covering the cost of the petition is enclosed.

_____ A check in the amount of $ is attached, which covers the cost of _____ additional independent claims __ petition for extension of time.

_____ Charge $_ to Deposit Account No. 50-0320.

__X__ Please charge any additional fees incurred by reason of this response or credit any overpayment to Deposit Account No. 50-0320.

EXPRESS MAIL

Mailing Label Number: EL742692505US

Date of Deposit: September 28, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" Service under 37 CFR 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, DC 20231.

Edward Nay
(Typed or printed name of person mailing paper or fee)

(Signature of person mailing paper or fee)

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants

By: Darren M. Simon
Darren M. Simon
Reg. No. 47,946
Tel. (212) 588-0800

00030182

A

PATENT
670025-2800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	:	Joseph MARASH Baruch BERDUGO
Serial No.		09/252,874
For		**SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE**
Filed		February 18, 1999
Examiner	:	R. Dorvil
Group Art Unit	:	2641

14/a mdj 10-5-01

745 Fifth Avenue
New York, NY 10151
Tel. (212) 588-0800

September 28, 2001

EXPRESS MAIL

Mailing Label Number: EL 742692505 US

Date of Deposit: September 28, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" Service under 37 CFR 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, DC 20231.

Edward Nay
(Typed or printed name of person mailing paper or fee)

(Signature of person mailing paper or fee)

AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

In response to the non-final Office Action which issued June 28, 2001, please amend the above-identified patent application as follows.

00029945

RTL345-2_1020-0144

IN THE CLAIMS

Cancel claims 28 and 40.

Please amend claim 1 to read as follows:

1. (amended) An apparatus for canceling noise, comprising:

an input for inputting an audio signal which includes a noise signal;

a frequency spectrum generator for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal; and

a threshold detector for setting a threshold for each frequency bin using a noise estimation process and for detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold, thereby detecting the position of noise elements for each frequency bin.

Please amend claim 4 to read as follows:

4. (amended) The apparatus according to claim 1, wherein said threshold detector sets the threshold for each frequency bin in accordance with a current minimum value of the magnitude of the corresponding frequency bin; said current minimum value being derived in accordance with a future minimum value of the magnitude of the corresponding frequency bin.

Please amend claim 5 to read as follows:

5. (amended) The apparatus according to claim 4, wherein said future minimum value is determined as the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.

Please amend claim 6 to read as follows:

10 ~~6~~. (amended) The apparatus according to claim 4, wherein said current minimum value is determined as the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.

Please amend claim 8 to read as follows:

9 ~~8~~. (amended) The apparatus according to claim 5, wherein said future minimum value is set to a current magnitude value periodically; said current-magnitude value being the value of the magnitude of the corresponding frequency bin.

Please amend claim 12 to read as follows:

12. (amended) The apparatus according to claim 1, further comprising an averaging unit for determining a level of said noise within said respective frequency bin, wherein said threshold detector detects the position of said noise elements where said level of said noise determined by said averaging unit is less than the corresponding threshold.

Please amend claim 20 to read as follows:

24 ~~20~~. (amended) The apparatus according to claim ~~19~~ 23, wherein said smoothing unit comprises a two-dimensional process which averages each frequency bin in accordance with neighboring frequency bins and averages each frequency bin using an exponential time average which effects an average over a plurality of frequency bins over time.

Please amend claim 26 to read as follows:

26. (amended) An apparatus for canceling noise, comprising:

input means for inputting an audio signal which includes a noise signal;

34

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frequency spectrum generating means for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal; and

threshold detecting means for setting a threshold for each frequency bin using a noise estimation process and for detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold, thereby detecting the position of noise elements for each frequency bin.

Please amend claim 27 to read as follows:

27. (amended) The apparatus according to claim 26, wherein said threshold detecting means sets the threshold for each frequency bin in accordance with a current minimum value of the magnitude of the corresponding frequency bin; said current minimum value being derived in accordance with a future minimum value of the magnitude of the corresponding frequency bin.

Please amend claim 29 to read as follows:

28 ~~29~~. (amended) The apparatus according to claim 27, wherein said future minimum value is determined as the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.

Please amend claim 30 to read as follows:

29 ~~30~~. (amended) The apparatus according to claim 27, wherein said current minimum value is determined as the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.

Please amend claim 31 to read as follows:

30 ~~31~~. (amended) The apparatus according to claim 26, further comprising averaging means for determining a level of said noise within said respective frequency bin, wherein said threshold detecting means detects the position of said noise elements where said level of said noise determined by said averaging means is less than the corresponding threshold.

Please amend claim 39 to read as follows:

~~38~~ 30 ~~39~~. (amended) A method for driving a computer processor for generating a noise canceling signal for canceling noise from an audio signal representing audible sound including a noise signal representing audible noise, said method comprising the steps of:

inputting said audio signal which includes said noise signal;

generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal;

setting a threshold for each frequency bin using a noise estimation process;

detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold, thereby detecting the position of noise elements for each frequency bin; and

subtracting said noise elements detected in said step of detecting from said audio signal to produce an audio signal representing said audible sound substantially without said audible noise.

Please amend claim 41 to read as follows:

39 ~~41~~. (amended) The method according to claim ~~39~~ 38, wherein said setting step sets the threshold for each frequency bin in accordance with a current minimum value of the magnitude

A

of the corresponding frequency bin; said current minimum value being derived in accordance with a future minimum value of the magnitude of the corresponding frequency bin.

Please amend claim 42 to read as follows:

40 42. (amended) The method according to claim 37, wherein said setting step further comprises the step of determining said future minimum value as the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.

Please amend claim 43 to read as follows:

41 43. (amended) The method according to claim 40, wherein said setting step further comprises the step of determining said future minimum value as the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.

Please amend claim 44 to read as follows:

42 44. (amended) The method according to claim 40, further comprising the step of averaging a level of said noise of said respective frequency bin, wherein said step of detecting detects the position of said noise elements where said level of said noise determined by said step of averaging is less than the corresponding threshold.

A

REMARKS

The Office Action in the above-identified application has been carefully considered and this amendment has been presented to place this application in condition for allowance. Accordingly, reconsideration of this application is respectfully requested.

Claims 1–27, 29–39, and 41–49 are in the present application. It is submitted that these claims, as originally presented, were patentably distinct over the prior art cited by the Examiner, and that these claims were in full compliance with the requirements of 35 U.S.C. § 112. Changes to the claims, as presented herein, are not submitted for the purpose of patentability within the meaning of 35 U.S.C. sections 101, 102, 103 or 112. Rather, these changes are made simply for clarification and to round out the scope of protection to which Applicants are entitled. Claims 28 and 40 are cancelled.

Attached hereto as an Appendix entitled "Version with Markings Showing Changes Made," is a marked-up version of the changes made to the claims by this Amendment.

§ 112 Rejections

Claims 39–49 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In accordance with the Examiner's comments, claim 39 has been amended to provide sufficient antecedent basis for all limitations in the claim. Dependent claims 41–49 inherit the limitations from amended independent claim 39. Applicants believe the

rejected claims now comply with the requirements of § 112 and this rejection should be withdrawn.

Claims 1–49 were rejected under 35 U.S.C. § 112, first paragraph, as based on a disclosure which is not enabling. The Examiner asserts "the step or means for setting a predetermined threshold critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure." (Office Action page 2) Independent claims 1, 26, and 39 have been amended to recite a step or means of "setting a threshold for each frequency bin using a noise estimation process." (Claims 1, 26, 39) In addition, each independent claim has numerous dependent claims which further recite limitations directed towards the threshold setting process. (e.g. claims 4–10) The noise estimation process used by the present invention in setting the threshold values is shown in Figure 3 and explained in detail on page 3, line 16 through page 5, line 21. A further description of the threshold setting process is provided on page 6, line 23 to page 7, line 13. Applicants believe this disclosure is sufficient to enable one skilled in the art to make and use the present invention. Therefore, Applicants respectfully request the rejected claims now be allowed.

Claims 1–38 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In accordance with the Examiner's comments the phrase "within said threshold" has been amended to "less than the corresponding threshold" in claims 1 and 26. In addition, as discussed above, the step/means for setting the threshold is now explicitly recited in

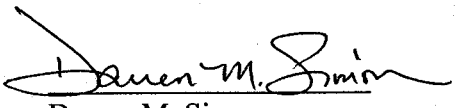
claims 1 and 26. Therefore, Applicants believe the rejected claims now comply with the requirements of § 112 and should be allowed.

In view of the foregoing amendment and remarks, it is respectfully submitted that the application as now presented is in condition for allowance. Early and favorable reconsideration of the application are respectfully requested.

No additional fees are deemed to be required for the filing of this amendment, but if such are, the Examiner is hereby authorized to charge any insufficient fees or credit any overpayment associated with the above-identified application to Deposit Account No. 50-0320.

If any issues remain, or if the Examiner has any further suggestions, he/she is invited to call the undersigned at the telephone number provided below. The Examiner's consideration of this matter is gratefully acknowledged.

Respectfully submitted,
FROMMER LAWRENCE & HAUG LLP

By: 
Darren M. Simon
Reg. No. 47,946
(212) 588-0800

APPENDIX
Version with Markings Showing Changes Made

IN THE CLAIMS

Cancel claims 28 and 40.

Please amend claim 1 as follows:

—1. (amended) An apparatus for canceling noise, comprising:

an input for inputting an audio signal which includes a noise signal;

a frequency spectrum generator for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal; and

a threshold detector for setting a threshold for each frequency bin using a noise estimation process and for detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding [a respective frequency bin is within said] threshold, thereby detecting the position of noise elements for each frequency bin.—

Please amend claim 4 as follows:

—4. (amended) The apparatus according to claim 1, wherein said threshold detector [detects the positions of said noise elements by setting said] sets the threshold for each frequency bin in accordance with a current minimum value of [a magnitude of said frequency bins] the magnitude of the corresponding frequency bin; said current minimum value being derived in accordance with a future minimum value of the magnitude of the corresponding frequency bin.—

Please amend claim 5 as follows:

—5. (amended) The apparatus according to claim 4, wherein said future minimum value is determined as [that] the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.—

A

Please amend claim 6 as follows:

—6. (amended) The apparatus according to claim 4, wherein said current minimum value is determined as [that] the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.—

Please amend claim 8 as follows:

—8. (amended) The apparatus according to claim 5, wherein said future minimum value is set to [said] a current[-] magnitude value periodically; said current-magnitude value being the value of the magnitude of the corresponding frequency bin.—

Please amend claim 12 as follows:

—12. (amended) The apparatus according to claim 1, further comprising an averaging unit for determining a level of said noise within said respective frequency bin, wherein said threshold detector detects the position of said noise elements where said level of said noise determined by said averaging unit is [within said] less than the corresponding threshold.—

Please amend claim 20 as follows:

—20. (amended) The apparatus according to claim 19, wherein said smoothing unit comprises a two-dimensional process which averages each frequency bin in accordance with neighboring frequency bins and averages each frequency bin using an exponential time[n] average which effects an average over a plurality of frequency bins over time.—

Please amend claim 26 as follows:

—26. (amended) An apparatus for canceling noise, comprising:

input means for inputting an audio signal which includes a noise signal;

frequency spectrum generating means for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal; and

threshold detecting means for setting a threshold for each frequency bin using a noise estimation process and for detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding [a respective frequency bin is within said] threshold, thereby detecting the position of noise elements for each frequency bin.—

Please amend claim 27 as follows:

—27. (amended) The apparatus according to claim 26, wherein said threshold detecting means [detects the positions of said noise elements by setting said] sets the threshold for each frequency bin in accordance with a current minimum value of [a magnitude of said frequency bins] the magnitude of the corresponding frequency bin; said current minimum value being derived in accordance with a future minimum value of the magnitude of the corresponding frequency bin.—

Please amend claim 29 as follows:

—29. (amended) The apparatus according to claim 27, wherein said future minimum value is determined as [that] the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.—

Please amend claim 30 as follows:

—30. (amended) The apparatus according to claim 27, wherein said current minimum value is determined as [that] the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.—

Please amend claim 31 as follows:

—31. (amended) The apparatus according to claim 26, further comprising averaging means for determining a level of said noise within said respective frequency bin, wherein said threshold detecting means detects the position of said noise elements where said level of said noise determined by said averaging means is [within said] less than the corresponding threshold.—

Please amend claim 39 as follows:

—39. (amended) A method for driving a computer processor for generating a noise canceling signal for canceling noise from an audio signal representing audible sound including a noise signal representing audible noise, said method comprising the steps of:

inputting said audio signal which includes said noise signal;

generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal;

setting a threshold for each frequency bin using a noise estimation process;

detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding [a respective frequency bin is within said] threshold, thereby detecting the position of noise elements for each frequency bin; and

subtracting said noise elements detected in said step of detecting from said audio signal to produce an audio signal representing said audible sound substantially without said audible noise.—

Please amend claim 41 as follows:

—41. (amended) The method according to claim [40] 39, wherein said setting step [of detecting detects the positions of said noise elements by setting said] sets the threshold for each frequency bin in accordance with a current minimum value of [a magnitude of said frequency bins] the magnitude of the corresponding frequency bin; said current minimum value being derived in accordance with a future minimum value of the magnitude of the corresponding frequency bin.—

Please amend claim 42 as follows:

—42. (amended) The method according to claim 41, wherein said setting step [of detecting] further comprises the step of determining said future minimum value as [that] the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.—

Please amend claim 43 as follows:

—43. (amended) The method according to claim 42, wherein said setting step [of detecting] further comprises the step of determining said future minimum value as [that] the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.—

Please amend claim 44 as follows:

—44. (amended) The method according to claim 42, further comprising the step of averaging a level of said noise of said respective frequency bin, wherein said step of detecting detects the position of said noise elements where said level of said noise determined by said step of averaging is [within said] less than the corresponding threshold.—

Notice of Allowability	Application No.	Applicant(s)	
	09/252,874	MARASH ET AL.	
	Examiner	Art Unit	
	Richemond Dorvil	2641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

aims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included with (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS CE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative e Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

This communication is responsive to *the amendment filed Sept. 28, 2001*.

The allowed claim(s) is/are *1-27,29-39 and 41-49*.

The drawings filed on _____ are accepted by the Examiner.

Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

(a) ☐ The translation of the foreign language provisional application has been received.

Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

cant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted . Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF RMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

CORRECTED DRAWINGS must be submitted.

☒ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

1) ☐ hereto or 2) ☒ to Paper No. *6*.

☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.

☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

ntifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the top margin (not the back) each sheet. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the ed Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

nment(s)

otice of References Cited (PTO-892)
otice of Draftperson's Patent Drawing Review (PTO-948)
formation Disclosure Statements (PTO-1449), Paper No. ____.
xaminer's Comment Regarding Requirement for Deposit Biological Material
2☐ Notice of Informal Patent Application (PTO-152)
4☐ Interview Summary (PTO-413), Paper No.____ .
6☐ Examiner's Amendment/Comment
8☒ Examiner's Statement of Reasons for Allowance
9☐ Other .

RTL345-2_1020-0159

REASONS FOR ALLOWANCE

1. The following is an examiner's statement of reasons for allowance: the prior art taken alone or in combination fail to teach a noise canceling method/system comprising, inter alia, a threshold detector for setting a threshold for each frequency bin using a noise estimation process and for detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold, thereby detecting the position of noise element for each frequency bin. Hence, the examiner has allowed claims 1-27, 29-39, 41-49.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richemond Dorvil whose telephone number is (703) 305-9645. The examiner can normally be reached on T-F 9:30 to 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on 703 308-4825. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-9508 for regular communications and (703) 308-9051 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Richemond Dorvil
Primary Examiner
Art Unit 2641

RD
October 9, 2001

ATTACHMENT TO AND MODIFICATION OF NOTICE OF ALLOWABILITY (PTO-37)

(November, 2000)

NO EXTENSIONS OF TIME ARE PERMITTED TO FILE CORRECTED OR FORMAL DRAWINGS, OR A SUBSTITUTE OATH OR DECLARATION, notwithstanding any indication to the contrary in the attached Notice of Allowability (PTO-37).

If the following language appears on the attached Notice of Allowability, the portion lined through below is of no force and effect and is to be ignored[1]:

A SHORTENED STATUTORY PERIOD FOR RESPONSE to comply with the requirements noted below is set to EXPIRE **THREE MONTHS** FROM THE "DATE MAILED" of this Office action. Failure to comply will result in ABANDONMENT of this application. ~~Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).~~

Similar language appearing in any attachments to the Notice of Allowability, such as in an Examiner's Amendment/Comment or in a Notice of Draftperson's Patent Drawing Review, PTO-948, is also to be ignored.

---

[1] The language which is crossed out is contrary to amended 37 CFR 1.85(c) and 1.136. See "*Changes to Implement the Patent Business Goals*", 65 *Fed. Reg.* 54603, 54629, 54641, 54670, 54674 (September 8, 2000), 1238 *Off. Gaz. Pat. Office* 77, 99, 110, 135, 139 (September 19, 2000).

UNITED STA[illegible]S DEPARTMENT OF COMMERCE
Patent and Trademark Office

NOTICE OF ALLOWANCE AND ISSUE FEE DUE

020999 WM01/1010
FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE- 10TH FL.
NEW YORK NY 10151

APPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT	DATE MAILED
09/252,874	02/18/99	046	DORVIL, R 2641	10/10/01

[illegible]med MARASH, 35 USC 154(b) term ext. = 0 Days.
[illegible]nt

[illegible]N SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE

[illegible]TTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
[illegible] 670025-2800	704-226.000	N32	UTILITY	YES	$640.00	01/10/02

[illegible]PLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. [illegible]CUTION ON THE MERITS IS CLOSED.

[illegible]SUE FEE MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS [illegible]ATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED.

[illegible]TO RESPOND TO THIS NOTICE:

[illegible]w the SMALL ENTITY status shown above.
[illegible]SMALL ENTITY is shown as YES, verify your [illegible]t SMALL ENTITY status:

[illegible]he status is changed, pay twice the amount of the [illegible]E DUE shown above and notify the Patent and [illegible]ademark Office of the change in status, or
[illegible]he status is the same, pay the FEE DUE shown [illegible]ove.

If the SMALL ENTITY is shown as NO:

A. Pay FEE DUE shown above, or

B. File verified statement of Small Entity Status before, or with, payment of 1/2 the FEE DUE shown above.

[illegible]B-Issue Fee Transmittal should be completed and returned to the Patent and Trademark Office (PTO) with your [illegible]UE FEE. Even if the ISSUE FEE has already been paid by charge to deposit account, Part B Issue Fee Transmittal [illegible]ld be completed and returned. If you are charging the ISSUE FEE to your deposit account, section "4b" of Part [illegible]sue Fee Transmittal should be completed and an extra copy of the form should be submitted.

[illegible]ommunications regarding this application must give application number and batch number.
[illegible]se direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

[illegible]TANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PATENT AND TRADEMARK OFFICE COPY

[illegible]REV. 10-96) Approved for use through 06/30/99. (0651-0033)

RTL345-2_1020-0163

PATENT
670025-2800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#16

Applicant(s)	:	Joseph MARASH Baruch BERDUGO
Serial No.	:	09/252,874
For	:	SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE
Filed	:	February 18, 1999
Group	:	2641
Examiner	:	R. Dorvil
Batch No.	:	N32

745 Fifth Avenue
New York, NY 10151

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231, on December 11, 2001

THOMAS J. KOWALSKI, Reg. No. 32,147
Name of Applicant, Assignee or Registered Representative

Signature

December 11, 2001
Date of Signature

COMMUNICATION

Hon. Commissioner For Patents
Washington, D.C. 20231

Sir:

In response to the October 10, 2001 Notice of Allowance, enclosed are formal drawings for this application.

Respectfully submitted,

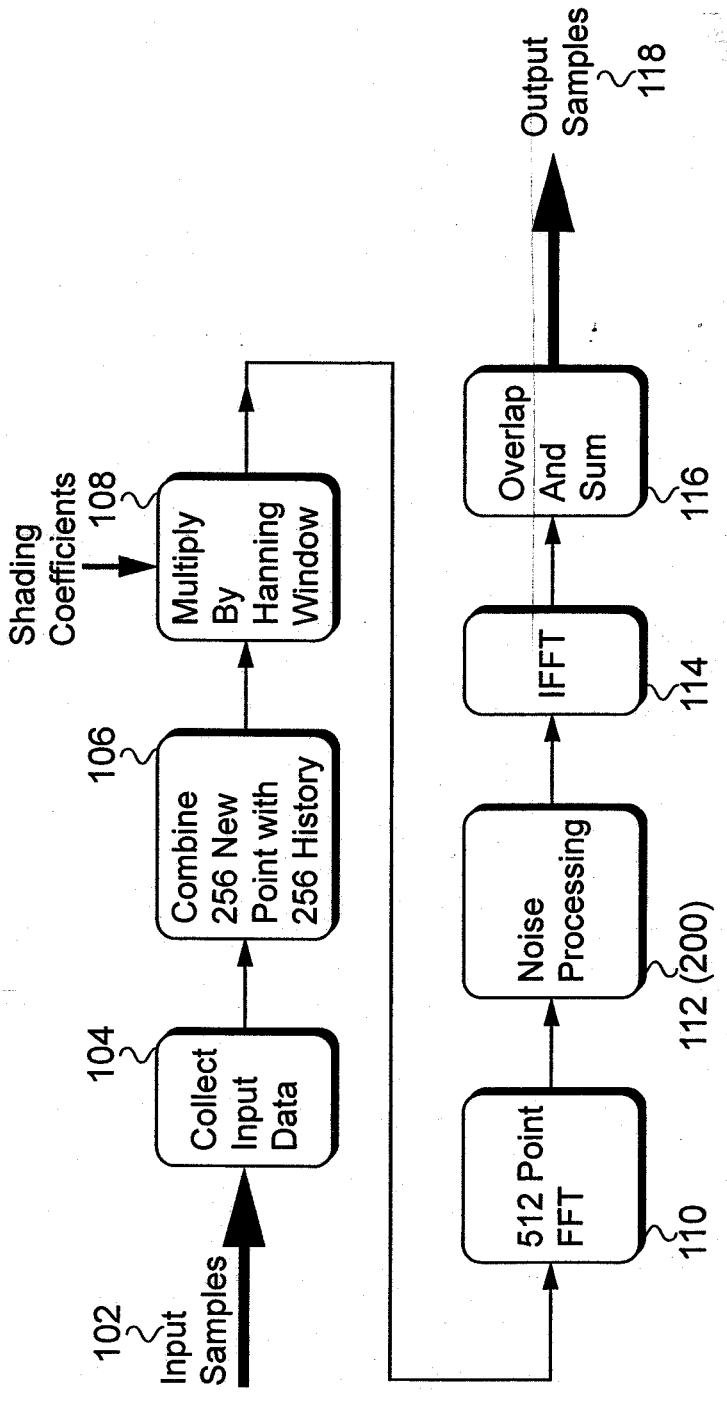
FROMMER LAWRENCE & HAUG LLP

By:
THOMAS J. KOWALSKI, Reg. No. 32,147
(212) 588-0800

00037699

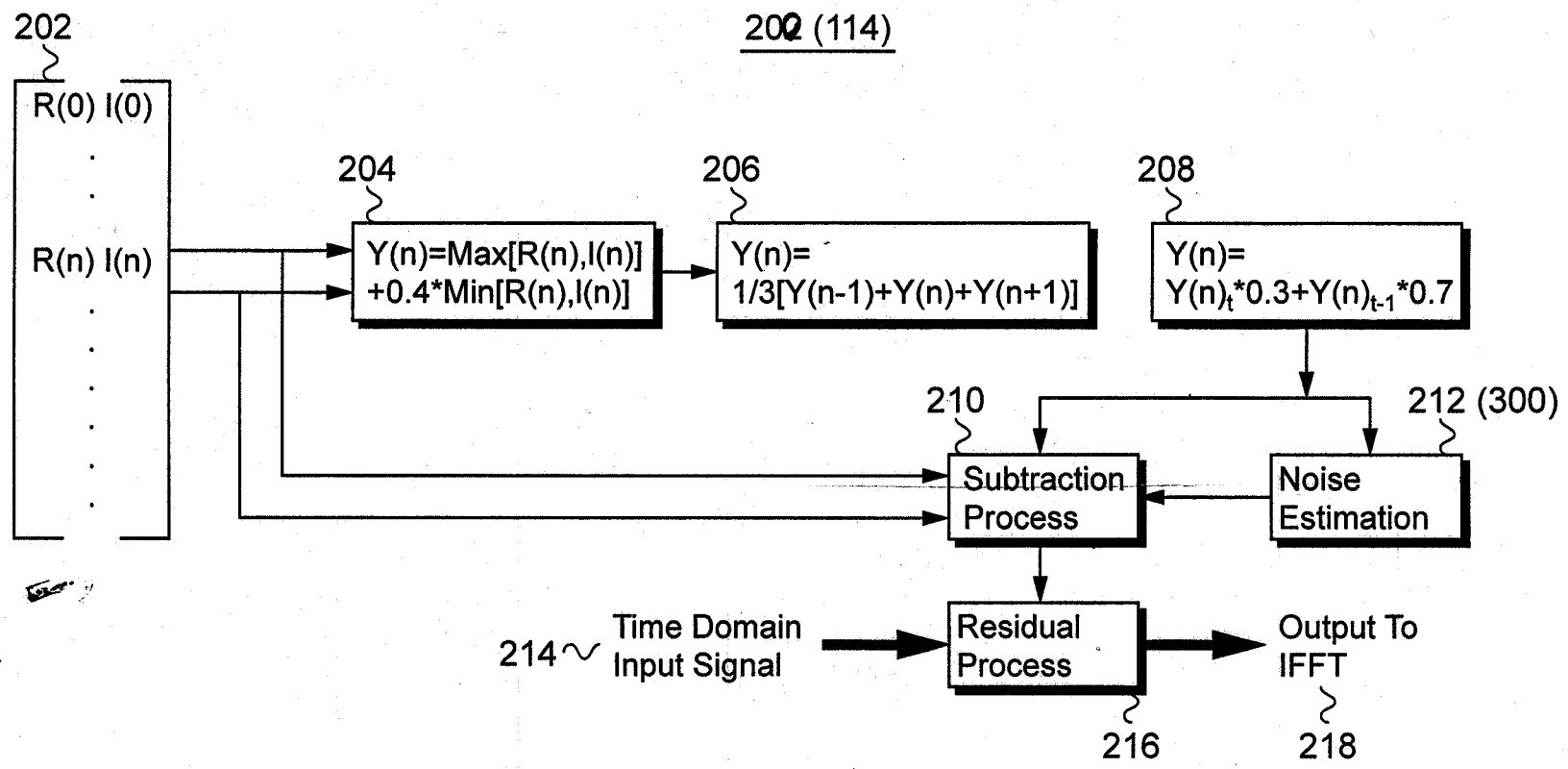
10-01

RTL345-2_1020-0164



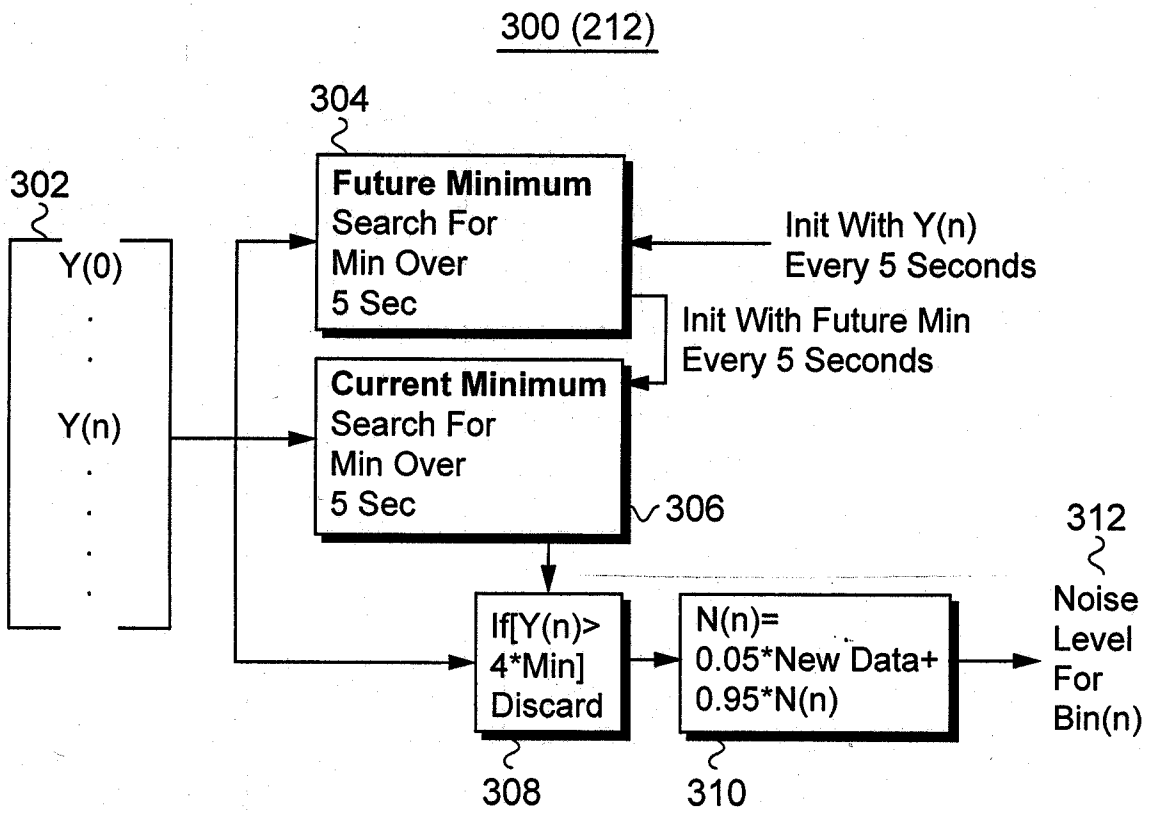
Spectral Subtraction System

FIG. 1



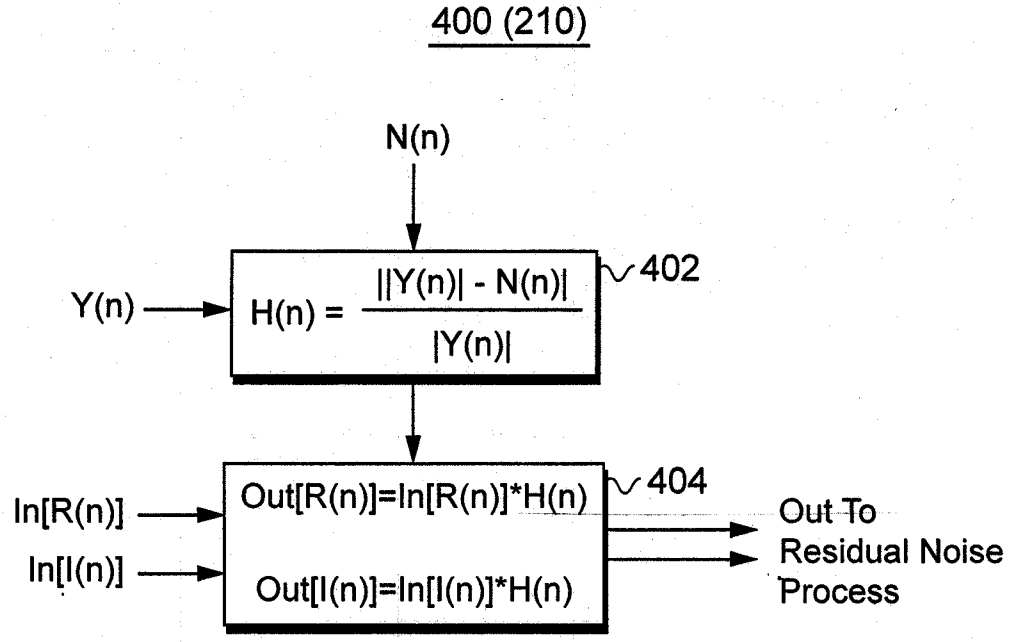
Noise Processing

FIG. 2



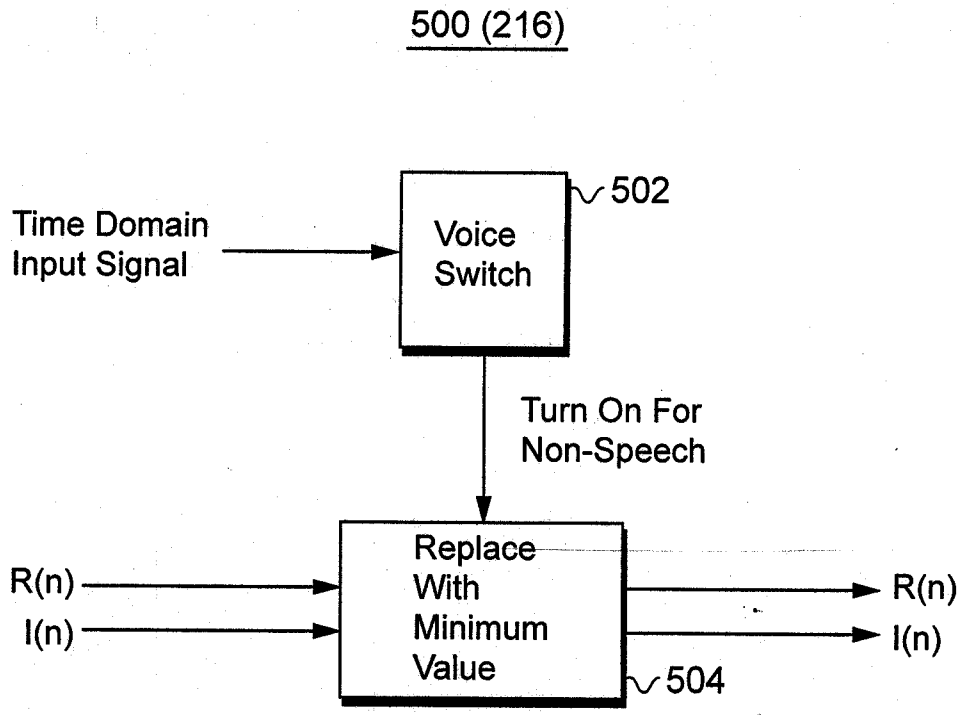
Noise Estimation Process

FIG. 3



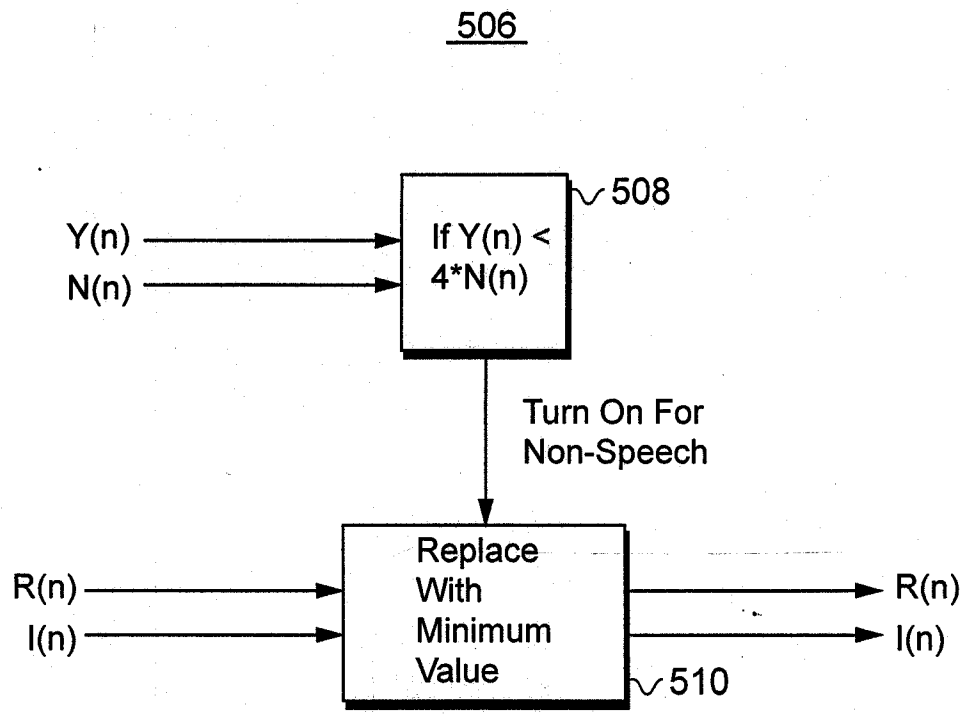
Subtraction Process

FIG. 4



Residual Noise Process

FIG. 5



Residual Noise Process Alternative

FIG. 5A

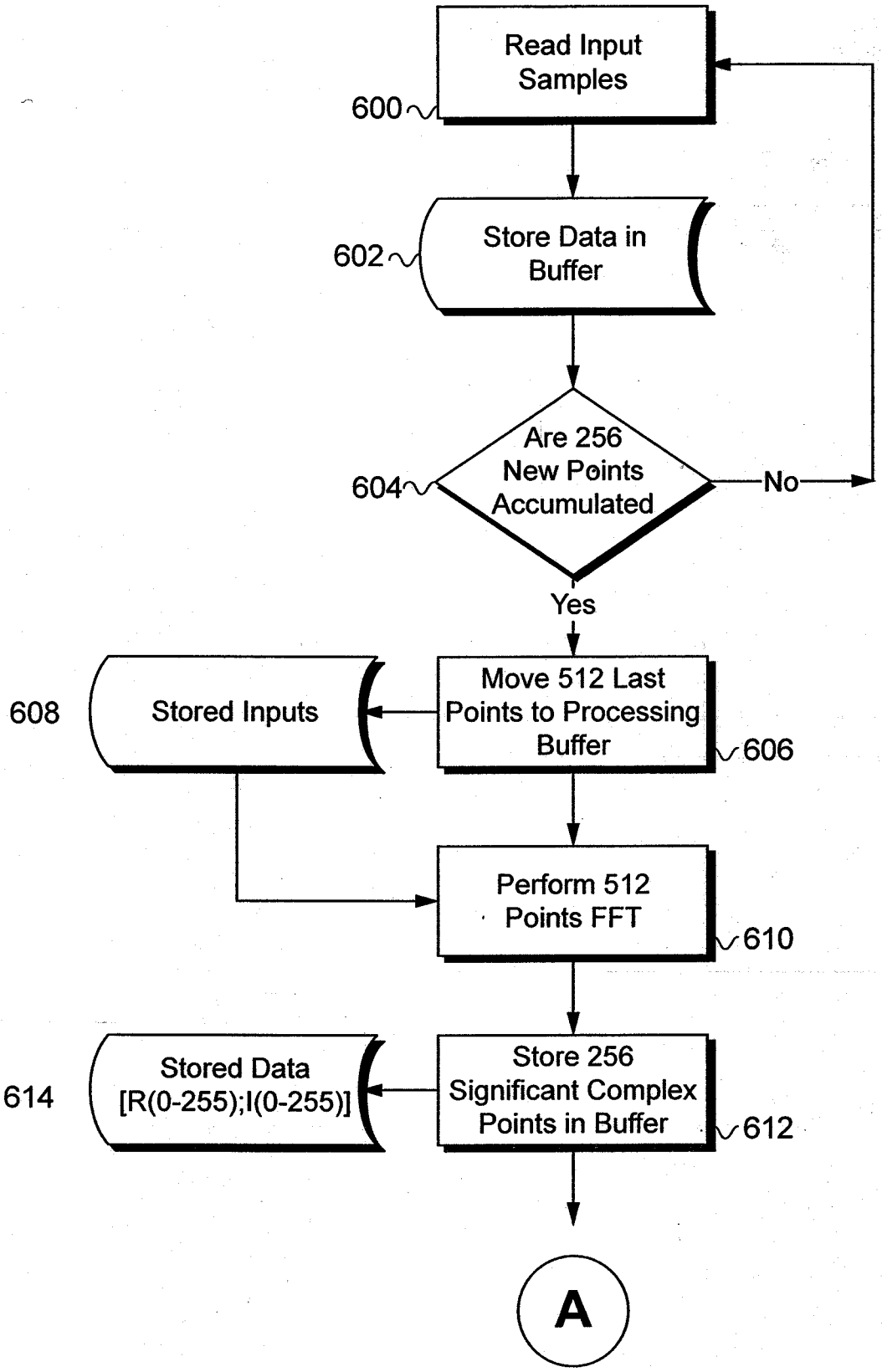

Read Input Samples
600
Store Data in Buffer
602
Are 256 New Points Accumulated
604
No
Yes
608
Stored Inputs
Move 512 Last Points to Processing Buffer
606
Perform 512 Points FFT
610
614
Stored Data [R(0-255);I(0-255)]
Store 256 Significant Complex Points in Buffer
612
A

FIG. 6

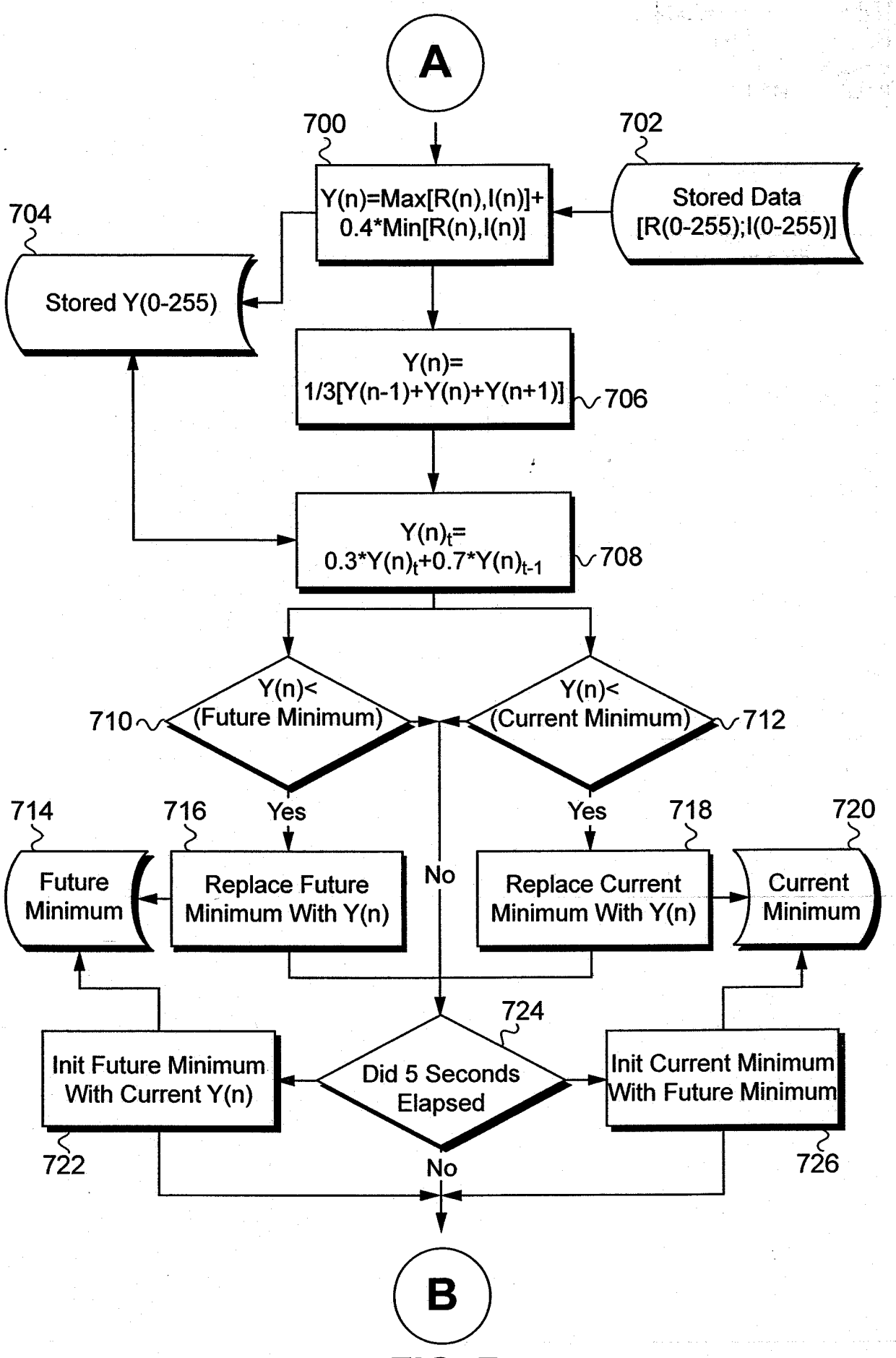

A
700
Y(n)=Max[R(n),I(n)]+
0.4*Min[R(n),I(n)]
702
Stored Data
[R(0-255);I(0-255)]
704
Stored Y(0-255)
Y(n)=
1/3[Y(n-1)+Y(n)+Y(n+1)]
706
Y(n)t=
0.3*Y(n)t+0.7*Y(n)t-1
708
Y(n)<
(Future Minimum)
710
Y(n)<
(Current Minimum)
712
Yes
Yes
No
714
Future
Minimum
716
Replace Future
Minimum With Y(n)
718
Replace Current
Minimum With Y(n)
720
Current
Minimum
724
Did 5 Seconds
Elapsed
Init Future Minimum
With Current Y(n)
722
Init Current Minimum
With Future Minimum
726
No
B

FIG. 7

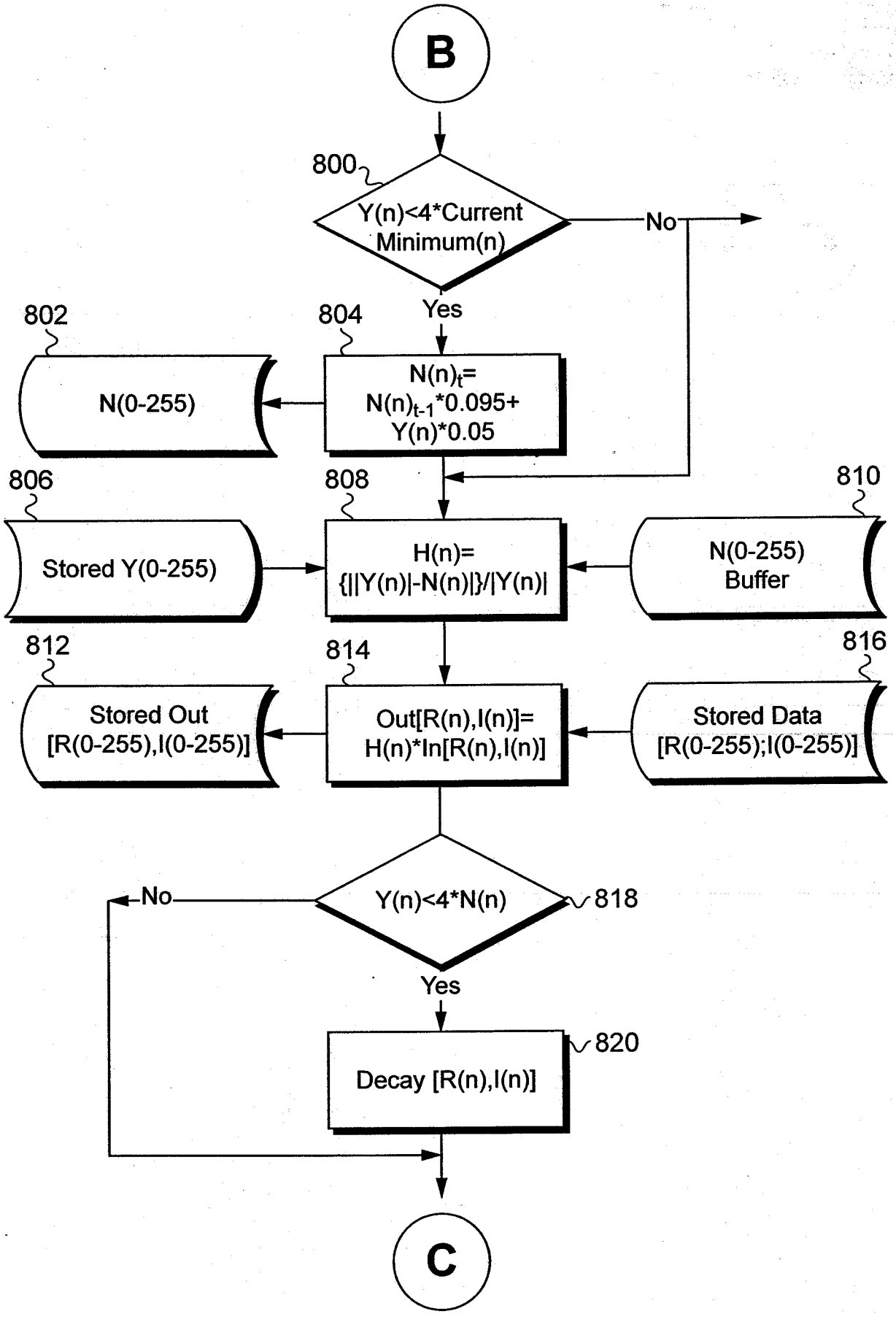

B
800
Y(n)<4*Current Minimum(n)
No
Yes
802
804
N(0-255)
N(n)t= N(n)t-1*0.095+ Y(n)*0.05
806
808
810
Stored Y(0-255)
H(n)= {||Y(n)|-N(n)|}/|Y(n)|
N(0-255) Buffer
812
814
816
Stored Out [R(0-255),I(0-255)]
Out[R(n),I(n)]= H(n)*In[R(n),I(n)]
Stored Data [R(0-255);I(0-255)]
No
Y(n)<4*N(n)
818
Yes
820
Decay [R(n),I(n)]
C

FIG. 8

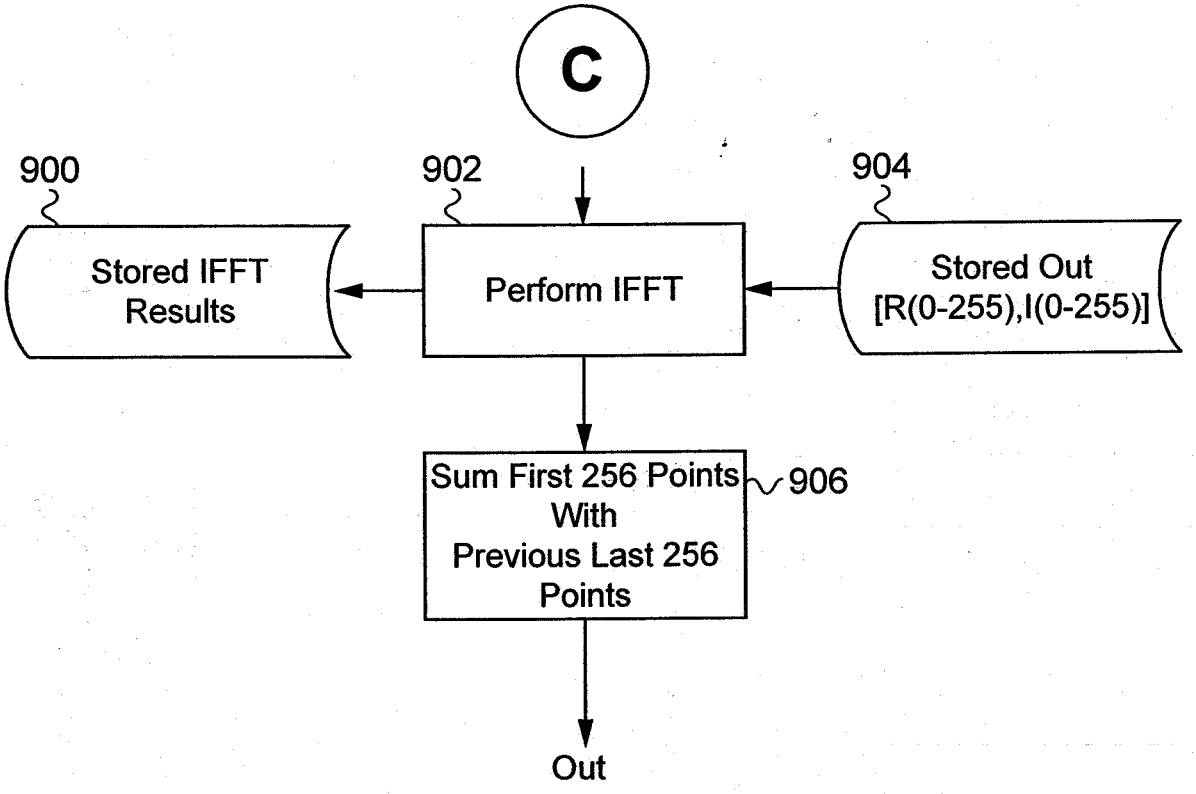

C
900
902
904
Stored IFFT Results
Perform IFFT
Stored Out [R(0-255),I(0-255)]
Sum First 256 Points With Previous Last 256 Points
906
Out

FIG. 9

BC

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Washington, D.C. 20231

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THOMAS J. KOWALSKI (Depositor's name)
[signature] (Signature)
11 Dec 2001 (Date)

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020999 WM01/1010
FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE- 10TH FL.
NEW YORK NY 10151

PPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT		DATE MAILED
09/252,874	02/18/99	046	DORVIL, R	2641	10/10/01

ed MARASH, 35 USC 154(b) term ext. = 0 Days.

SYSTEM, METHOD AND APPARATUS FOR CANCELLING NOISE

Y'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
670025-2800	704-226.000	N32	UTILITY	YES	$640.00	01/10/02

f correspondence address or indication of "Fee Address" (37 CFR 1.363). O form(s) and Customer Number are recommended, but not required.

e of correspondence address (or Change of Correspondence Address form 22) attached.

ddress" indication (or "Fee Address" Indication form PTO/SB/47) attached.

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 FROMMER LAWRENCE & HAUG
2 THOMAS J. KOWALSKI
3 ____

E NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type) NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. of assignee data is only appropiate when an assignment has been previously submitted to or is being submitted under separate cover. Completion of this form is NOT a subsititue for ssignment.

E OF ASSIGNEE ANDREA ELECTRONICS CORPORATION

DENCE: (CITY & STATE OR COUNTRY) MELVILLE, N.Y.

heck the appropriate assignee category indicated below (will not be printed on the patent)

dual ☒ corporation or other private group entity ☐ government

4a. The following fees are enclosed (make check payable to Commissioner of Patents and Trademarks):

☒ Issue Fee
☒ Advance Order - # of Copies 10

4b. The following fees or deficiency in these fees should be charged to:
DEPOSIT ACCOUNT NUMBER 50-0320
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ISSIONER OF PATENTS AND TRADEMARKS IS requested to apply the Issue Fee to the application identified above.

(Signature) [signature] Thomas J. Kowalski Reg. No. 32,147 (Date) 11 Dec 2001

Issue Fee will not be accepted from anyone other than the applicant; a registered attorney the assignee or other party in interest as shown by the records of the Patent and Office.

02/07/2002 DNGUYEN2 00000106 500320 09252874
01 FC:242 640.00 OP
02 FC:561 30.00 CH

FROMMER, LAWRENCE & HAUG, LLP
2001 OCT 13 P 1:06

our Statement: This form is estimated to take 0.2 hours to complete. Time will vary on the needs of the individual case. Any comments on the amount of time required e this form should be sent to the Chief Information Officer, Patent and Trademark shington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS . SEND FEES AND THIS FORM TO: Box Issue Fee, Assistant Commissioner for Washington D.C. 20231

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Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

1,26,39,

PATENT APPLICATION FEE DETERMINATION RECORD
Effective November 10, 1998

Application or Docket Number
09/252874

CLAIMS AS FILED - PART I

	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA
FOR		
BASIC FEE		
TOTAL CLAIMS	49 minus 20=	* 29
INDEPENDENT CLAIMS	3 minus 3 =	* —
MULTIPLE DEPENDENT CLAIM PRESENT		

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐ RATE	FEE	OR	OTHER THAN SMALL ENTITY RATE	FEE
	380.00	OR		760.00
X$ 9=		OR	X$18=	522
X39=		OR	X78=	—
+130=		OR	+260=	—
TOTAL		OR	TOTAL	1282

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 49	Minus	** 20	= 29
Independent	* 3	Minus	*** 3	= —
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY RATE	ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	ADDITIONAL FEE
X$ 9=		OR	~~X$18=~~ X$18=	522.00
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.