

EXHIBIT 5

ISSN	CLASSIFICATION	5490230
39	2.34	
UTILITY SERIAL NUMBER	PATENT DATE	PATENT NUMBER
08/361474	FEB 06 1996	5490230

SERIAL NUMBER	FILING DATE	CLASS	SUBCLASS	GROUP ART UNIT	EXAMINER
08/361,474	12/22/95	395	2.34	2308	KNEPPER

APPLICANTS: IRA A. GERSON, HOFFMAN STATES, IL; MARK A. JASIUK, CHICAGO, IL.

CONTINUING DATA***
 VERIFIED THIS IS A CON OF 077688,463 05/20/92 ABN
 VERIFIED THIS IS A CON OF 077422,927 10/17/89 ABN

FOREIGN/PCI APPLICANTS***
 VERIFIED
 NonBAD

CERTIFICATE
OCT 01 1996
OF CORRECTION

FOREIGN FILING LISTED: PRINTED 03/18/95

Foreign priority claimed 35 USC 119 conditions met	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no	AS FILED	STATE OR COUNTRY	SHEETS DRWGS.	TOTAL CLAIMS	INDEP. CLAIMS	FILING FEE RECEIVED	ATTORNEY'S DOCKET NO.
Verified and Acknowledged	Examiner's Initials	→	IL	2	12	5	\$882.00	CH00476HC2

ADDRESS: JOHN W HAYES MOTORCYCLE INTELLECTUAL PROPERTY CORPORATE OFFICE 1303 E ALGONQUIN ROAD SCHUMBERG IL 60196

TITLE: DIGITAL SPEECH CODING USING OPTIMIZED SIGNAL ENERGY PARAMETERS

U.S. DEPT. of COMM.-Pat. & TM Office-PTO-436L (rev. 10-78)

PARTS OF APPLICATION FILED SEPARATELY		SEP 3 1995	M. Jones Application Examiner 10249
NOTICE OF ALLOWANCE MAILED	OF CORRECTION		CLAIMS ALLOWED
102099	Assistant Examiner	Total Claims	Print Claim
ISSUE FEE	DAVID D. KNEPPER PRIMARY EXAMINER GROUP 230 Primary Examiner	9	1
Amount Due Date Paid \$125000 11-13-95		DRAWING	
Label Area	PREPARED FOR ISSUE	Sheets Drwg.	Figs. Drwg. Print Fig.
		4	6 1
		ISSUE BATCH NUMBER	Q31
WARNING: The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368. Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.			

Form PTO-436A (Rev. 8/92)

(FACE)

07/422,927



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
07/422,927	10/17/89	GERSON	I CM00476H

DONALD B. SOUTHARD
MOTOROLA, INC.,
1303 EAST ALGONQUIN ROAD
SCHAUMBURG, IL 60196

EXAMINER	
KNEPPER, J.	
ART UNIT	PAPER NUMBER
231	3

DATE MAILED: 12/18/90

This is a communication from the examiner in charge of your application.

COMMISSIONER OF PATENTS AND TRADEMARKS

This application has been examined Responsive to communication filed on 12 Jun '90 This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), — days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- 1. Notice of References Cited by Examiner, PTO-892.
- 2. Notice re Patent Drawing, PTO-948.
- 3. Notice of Art Cited by Applicant, PTO-1449
- 4. Notice of Informal Patent Application, Form PTO-152
- 5. Information on How to Effect Drawing Changes, PTO-1474
- 6. List of Bonded Draftsman

Part II SUMMARY OF ACTION

- 1. Claims 1-12 are pending in the application.
Of the above, claims _____ are withdrawn from consideration.
- 2. Claims _____ have been cancelled.
- 3. Claims _____ are allowed.
- 4. Claims 1-12 are rejected.
- 5. Claims _____ are objected to.
- 6. Claims _____ are subject to restriction or election requirement.
- 7. This application has been filed with informal drawings which are acceptable for examination purposes until such time as allowable subject matter is indicated.
- 8. Allowable subject matter having been indicated, formal drawings are required in response to this Office action.
- 9. The corrected or substitute drawings have been received on _____. These drawings are acceptable; not acceptable (see explanation).
- 10. The proposed drawing correction and/or the proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been approved by the examiner. disapproved by the examiner (see explanation).
- 11. The proposed drawing correction, filed _____, has been approved. disapproved (see explanation). However, the Patent and Trademark Office no longer makes drawing changes. It is now applicant's responsibility to ensure that the drawings are corrected. Corrections MUST be effected in accordance with the instructions set forth on the attached letter "INFORMATION ON HOW TO EFFECT DRAWING CHANGES", PTO-1474.
- 12. Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has been received not been received been filed in parent application, serial no. _____; filed on _____.
- 13. Since this application appears to be 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.
- 14. Other

1. 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."

The specification is objected to under 35 U.S.C. §112, first paragraph, as failing to provide an enabling disclosure and failing to provide an adequate written description of the invention.

Claims 1-7 are directed towards "a method of transmitting information." However, the specification and drawings only show reconstructing speech from transmitted parameters. Nothing is shown to explain how the information sent is coded for transmission.

No specifics related to the gain values are taught in the specification nor illustrated in the drawings. The "long term energy" and "gain vector" are shown in figure 1 as the only inputs from which to calculate the excitation source. These terms are apparently the claimed "first parameter" and "second parameter" but there is no disclosure or drawing which shows how these terms relate to the voice signal nor how to calculate them mathematically or otherwise.

The specification is also vague about the differences between a "frame" and a "subframe" as well as what the inventor considers a "component" to be, since gain is commonly measured with respect to both time and/or frequency. It is unknown what a "pre-component" is (claims 8-12).

No "vector quantizing" (claim 3) is disclosed or illustrated.

2. Claims 1-12 are rejected under 35 U.S.C. §112, first paragraph, for the reasons set forth in the objection to the specification.

3. Claims 1-12 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.

Claims 1-7 and 12 are directed towards desired results with no actual steps performed which are of any substance. For example, claim 1 has the steps of "processing" two parameters and "transmitting" the results. The "first" and "second" gain values claimed in the preamble suggest the data values to be used in the processing calculations.

Claims 8-11 indicate that an energy value is "modified, when necessary." However, there is no decision step or other claim language that would indicate why someone would ever think it necessary to make a modification. It is unknown what a "pre-component" is.

None of the claims could be read on the drawings because most of the claimed steps simply are not illustrated. It appears that most the invention is hidden in the box labelled "GAIN CONTROL 101" in figure 1.

4. The following is a quotation of 35 U.S.C. §103 which forms the basis for all obviousness rejections set forth in this Office action:

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section §102 of this title, if the differences

between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) and (g) of section §102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

5. Claims 1-12 are rejected under 35 U.S.C. §103 as being unpatentable over Davidson (4,868,867).

As per claim 1, "a method of transmitting information that relates to gain" is taught or suggested by Davidson:

"processing at least the signal sample to provide:

a first parameter that relates to an overall energy value" (his short-term linear predictive coding (LPC) analysis on the signals in block 54 to extract from a frame of vectors a set of ten parameters {a_i}, col 13, lines 42-45 and figure 5 - see also his compute gain 66, figure 5 in which A gain factor G_j has to be selected for every excitation., col 16, lines 40-41);

"a second parameter based, at least in part, upon a relative contribution of at least one of the first and second gain values to the overall energy value" (his Long-term LPC analysis is performed on the residual signal r in block 56 to extract a set of four parameters {b_j} and P., col. 13, lines 55-57 and figure 5);

"transmitting information" (he transmits information with his multiplexer 67, figure 5).

It is noted that Davidson does not explicitly teach gain values related to "a first component" and "a second component." However, he does teach perform calculations from a frame of vectors which does contain gain values for each of ten frequencies as noted above.

Claim 2: Using more than two values ("three") is taught by Davidson as noted above.

Claims 3 and 4: Using "vector quantizing" is taught by Davidson's Vector Excitation Coding (VXC) using vector quantization, col. 1, line 30.

Claim 5: If the energy value only applied to a single sample it would not be "long-term" it would be a sample or short-term.

Claim 6: The first parameter used as "a correction factor that relates to the long term energy value" is suggested by his gain factors which are used to correct the pulses to their proper amplitudes.

Claim 7 is rejected under similar arguments as applied to claim 1 above. Since there are more short-term coefficients than long-term coefficients, the short-term coefficients would have to be sent "more often" than the long-term term coefficients.

Claim 8 is rejected as obvious in view of Davidson's figure 2:

"receiving at least a first parameter" (his a_i and b_i which are short and long-term predictor coefficients);

"receiving component definition information" (his index which defines the excitation from the codebook);

"processing the component definition information to provide a pre-component" (his pulse excitation codebook 32 provides the excitation for the filter);

"using at least the first parameter and modifying, when necessary, the energy value of the pre-component" (his amplifier 29 which modifies by gain values G_j , long term synthesizer 27 and short term synthesizer 28 which reconstruct the speech signal).

Claims 9-12 are rejected under similar arguments as applied to claims 1-8 above. "Receiving" and "demodulating the radio signal" is considered obvious because the use of radio signals for transmitting speech, music, etc. is extremely well known.

Therefore, it would have been obvious to one of ordinary skill in the art, to configure a device such as Davidson's, forming a system on which claims 1-12 read.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Serial Number: 07/422,927
Art Unit 231

Page 6
Paper #3

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner David D. Knepper whose telephone number is (703) 308-1436. 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) 308-0754.

DAK
David D. Knepper
Examiner
Art Unit 231
11/19/90

[Handwritten Signature]
DAVID D. KNEPPER
EXAMINER
ART UNIT 231

7

67231

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: IRA ALAN GERSON ET AL.

EXAMINER: KNEPPER, D.

#5/A

SERIAL NO.: 07/422,927

ART GROUP: 231

B#
7-5-91

FILED: OCTOBER 17, 1989

DOCKET NO.: CM-00476H

APPLICATION: DIGITAL SPEECH CODER HAVING OPTIMIZED SIGNAL ENERGY PARAMETERS

Motorola, Inc.
Corporate Offices
1303 E. Algonquin Road
Schaumburg, IL 60196
Date: June 17, 1991

RESPONSE

RECEIVED

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

JUN 27 1991

GROUP 230

Dear Sir:

In response to the Office Action dated December 18, 1990 (Paper No. 3) as entered in the above captioned matter, the Applicants respectfully submit the following Response.

In the Claims:

Please amend claims 8, 9, and 10 as follows:

8. (amended once) A method of recovering information that relates to gain information for components of a signal, comprising the steps of:
- A) receiving at least a first parameter that relates to energy for at least one component of the signal;
 - B) receiving component definition information for the at least one component;
 - C) processing the component definition information to provide a pre-component, which pre-component has an energy value;
 - D) using at least the first parameter and the energy value of the precomponent to provide a gain value; [and modifying, when necessary the energy value of]

91

E) applying the gain value to the pre-component, to provide a recovered component of the signal.

9. (amended once) A method of recovering information that relates to gain information for components of a signal, comprising the steps of:

A) receiving a radio signal;

B) demodulating the radio signal to provide a recovered signal;

C) extracting from the recovered signal at least a first parameter that relates to energy for at least one component of the signal;

[B] ~~D~~ extracting from the recovered signal component definition information for the at least one component;

[C] ~~E~~ processing the component definition information to provide a pre-component, which pre-component has an energy value;

[D] ~~E~~ using at least the first parameter and the energy value of the pre-component to provide a gain value;

~~G~~ applying the gain value to [and modifying, when necessary the energy value of] the pre-component, to provide a recovered component of the signal.

10. (amended once) A radio that receives speech coded information and that synthesizes speech in response thereto, comprising:

A) RF means for receiving and demodulating a radio signal that includes speech coded information;

B) excitation source means operably coupled to the RF means for receiving the speech coded information and:

1) extracting from the speech coded information at least a first parameter that relates to energy for at least one component of a signal that relates to an original speech signal;

2) extracting from the speech coded information component definition information for the at least one component;

3) processing the component definition information to provide a pre-component, which pre-component has an energy value;

4) using at least the first parameter and the energy value of the pre-component to provide a gain value;

5) applying the gain value to [and modifying, when necessary the energy value of] the pre-component, to provide a recovered component of the signal;

a¹

6 [5]) providing an excitation signal using the recovered component of the signal;

C) LPC filter means for receiving the excitation signal and for providing a synthesized speech signal in response thereto.

Please add new claims 13-19 to read as follows:

13. (new) A method of transmitting information that relates to gain information for a subframe, wherein the gain information includes:
 a first gain value that relates to gain for a first component;
 at least a second gain value that relates to gain for a second component;
 comprising the steps of:
 A) processing at least the subframe to provide:
 a first parameter that relates to an overall energy value for the subframe;
 a second parameter based, at least in part, upon a relative contribution of at least one of the first and second gain values to the overall energy value;
 B) transmitting information related to the first and second parameters.

a²

14. (new) The method of claim 13, wherein:
 the gain information includes at least a third gain value that relates to gain for a third component;
 the step of processing includes additionally providing a third parameter based, at least in part, upon a relative contribution of a different one of the first, second, and third gain values to the overall energy value;
 the step of transmitting information includes transmission of information relating to the third component.

15. (new) The method of claim 13, wherein the step of processing includes the step of vector quantizing at least the first parameter and second parameter information to provide a code.

16. (new) The method of claim 15, wherein the step of transmitting includes transmitting the code.

17. (new) The method of claim 13, and further including the step of transmitting, from time to time, long term energy value information that relates to a plurality of subframes.

18. (new) The method of claim 17, wherein the first parameter comprises a correction factor that relates to the long term energy value information.

19. (new) A method of transmitting information that relates to gain information for a subframe, wherein the gain information includes:

a first gain value that relates to gain for a first component; and

at least a second gain value that relates to gain for a second component:

comprising the steps of:

A) processing at least the subframe to provide at least first and second parameters that together relate to an overall energy value for the subframe and the relative contribution of at least one of the first and second gain values to the overall energy value;

B) transmitting information related to the first and second parameters.

a²

REMARKS

1. In the above noted office action, the Examiner objected to both the specification and the claims under 35 U.S.C. §112, first and second paragraphs. Claims 1-12 were rejected under 35 U.S.C. §103 given Davidson et al. (U.S. Patent No. 4,868,867). The Applicants respectfully traverse these rejections and request reconsideration.

2. The specification has been objected to under 35 U.S.C. §112, first paragraph. The Examiner argues various instances where the specification is perceived to fail to provide an enabling disclosure or to provide an adequate written description of the invention. The Examiner's specific points of contention will be considered here in seriatim fashion in the order in which the Examiner raised them.

The Examiner argues that no information is provided regarding "transmission" of the gain parameters. The application, however, is replete with numerous references to transmission activity in general, and of the gain information in particular. Consider the following excerpts:

The pitch and code book information will then be coded and transmitted to the decoder by a transmission medium of choice [page 7, lines 7-9].

This value [the quantized signal energy value $E_q(0)$] is transmitted from the coder to the decoder from time to time as appropriate to provide the decoder with this information [page 10, lines 23-26].

In this embodiment, the coder does not actually transmit the three parameters α , β , and π to the decoder. Instead, these parameters are vector quantized, and a representative code that identifies the result is transmitted to the decoder [page 12, lines 4-8].

When the vector code that yields the smallest ERROR value has been identified, that vector code is then transmitted to the decoder [page 13, lines 20-22].

Further, the interrelationship of the original gain information as represented in the α , β , and π parameters allows for a greater condensation of information, and concurrently further minimizes transmission capacity requirements to support transmittal of this information. As a result, this methodology yields improved reconstructed speech results with a concurrent reduced transmission capacity requirement [page 14, lines 8-15].

Further, FIG. 2 makes quite clear that the transmission medium of choice comprises radio waves (201). The mechanism for encoding the speech information is either well known in the art (i.e., see U.S. 4,817,157 as incorporated by reference by the applicant into the specification) or disclosed in the instant specification (particularly with respect to the gain parameters themselves). The exact specifics for any particular RF encoding scheme are, of course, not particularly relevant to this invention. Any modulation scheme, now known or hereafter developed, could be used, so long as it succeeded in transferring the speech coded information (including the gain parameters) from a coder to a decoder.

If the Examiner believes that, notwithstanding the above, the application could benefit from the standpoint of clarity by including an additional figure and related description specifically directed towards transmission, the applicant respectfully

submits that the drawing below and the following text could readily be included in the application without introducing new matter:

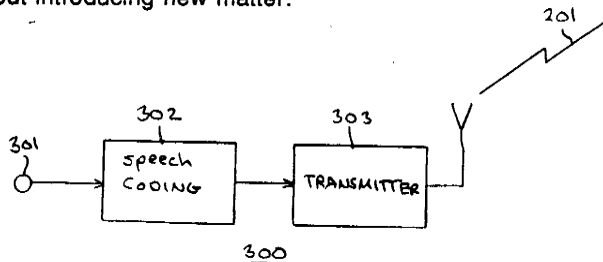


FIG. 3

Referring now to FIG. 3, a radio transmitter (300) embodying the invention includes a source (301) for receiving a voiced message intended for transmission. This voiced message is processed in a speech coding unit (302) in accordance with the above, and the resulting data is provided to a transmitter (303) which serves to transmit the speech coded signal (201). Importantly, in addition to the speech coding elements that are common to the art, the speech coded signal (201) also includes data that is representative of the α and β parameters.

If the Examiner so requests, the applicant shall so amend the application.

The Examiner next argues that the specification provides no specifics with respect to "gain values", and he suggests that the "long term energy" and "gain vectors" are the "first parameter" and "second parameter" of the claim.

To begin, the "long term energy" and the "gain vector" are *not* the "first" and "second parameter" of the claims. Rather, the "first parameter" and the "second parameter" of the claims are the "parameters α and β " of the specification, regarding which the specification includes a significant quantity of enabling information. (In FIG. 1, both of these parameters are provided via the "gain vector" as explained in the text.)

The applicant also believes it appropriate to point out an apparent misunderstanding on the part of the Examiner. The Examiner's statement, "The 'long term energy' and 'gain vector' are shown in figure 1 as the only inputs from which to calculate the excitation source," mistakenly suggests that the long term energy and

gain vectors are used to calculate an excitation source. Instead, it is the pitch filter state (112) that sources pitch excitation information, and the codebooks (103 and 104) that source codebook excitation information.

Lastly, a significant amount of information is provided relevant to calculation of the gain values, particularly when one keeps in mind that *how* one calculates the gain values is not particularly relevant here; what is relevant is *how one combines* those gain values to make them more suitable for transmission (by whatever medium one might choose). With this in mind, the teachings of 4,817,157, as incorporated by reference into the specification, provides significant details regarding calculation of gain in the context of speech coding. Beyond this, specific equations are set forth on pages 9 and 10 that allow the calculation of both GAIN 1 and GAIN 2.

The Examiner next argues that the differences between a "frame" and a "subframe" are unclear. A "frame" is well understood in the art. For example, specific details regarding what constitutes a frame can be found in 4,817,157 as incorporated by reference into the specification by the applicant. A "subframe" is simply a subordinate portion of a frame, in accordance with a straight-forward grammatical interpretation of the term and in accordance with well understood prior art knowledge. Further, the applicant has specifically stated, at page 8, that in his embodiment, each frame is made up of four subframes. The applicant therefore respectfully submits that the specification is not unduly "vague" regarding the difference between a frame and a subframe.

The Examiner argues that it is unclear what a "component" is, and what a "pre-component" is. The use of both terms in the claims has clear antecedent basis in the specification. For example, at page 7, beginning at line 25, the specification reads:

The energy of the pitch excitation and codebook excitation signals that are output from the pitch excitation filter state (102) and the codebook(s) (103 and 104) (i.e., the **precomponents**) can be readily determined by the gain control (101).

Therefore, the pre-components are simply the pitch excitation signals and the codebook excitation signals as output by the pitch filter state (102) and the codebooks

(103 and 104), respectively. The concept of component is presented on page 10 of the specification, beginning at line 9:

With GAIN 1 and GAIN 2 calculated as determined above, the pitch excitation and codebook excitation information will be properly scaled, both with respect to their values vis a vis one another, and as a composite result provided at the output of the summation function (109), thereby providing appropriate recovered **components** of the signal.

Therefore, the components are simply the scaled pitch excitation signals and the codebook excitation signals.

The Examiner argues that "vector quantizing" as specified in claim 3 is not disclosed. The applicant refers the Examiner to page 12, beginning at line 4, which reads:

In this embodiment, the coder does not actually transmit the three parameters α , β , and π to the decoder. Instead, these parameters are **vector quantized**, and a representative code that identifies the result is transmitted to the decoder.

Vector quantizing, of course, is well understood in the art, and particularly in the art of speech coding. The applicant therefore respectfully submits that direct and adequate support exists for use of the expression in the claims.

The applicants therefore respectfully submit that the specification fully complies with the requirements of 35 U.S.C. §112, first paragraph.

3. Claims 1-12 have been rejected under 35 U.S.C. §112, first paragraph, for the same reasons as set forth above with respect to the specification. That objection to the specification has been traversed above, and those same observations are applicable here as well. These same observations will not be presented here, however, for the sake of brevity. The applicants respectfully submit that the specification is compliant with 35 U.S.C. §112, first paragraph and that the claims are not rejectable in view thereof.

4. Claims 1-12 have been rejected under 35 U.S.C. §112, second paragraph. The Examiner argues that the claims fail to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With respect to claims 1-7 and claim 12, the Examiner specifically argues that these claims:

[A]re directed towards desired results with no actual steps performed which are of any substance. For example, claim 1 has the steps of "processing" two parameters and "transmitting" the results. The "first" and "second" gain values claimed in the preamble suggest the data values to be used in the processing calculations.

First, the applicant disputes that the steps of these claims lack "substance." Although the "processing" step allows for a broad interpretation as to exactly how the processing occurs, the net result of this particular function reads quite specifically; i.e., the processing results in, "a first parameter that relates to an overall energy value for the signal sample [, and] a second parameter based, at least in part, upon a relative contribution of at least one of the first and second gain values to the overall energy value." Similarly, the step of "transmitting", while relatively broad and admitting of many modes of transmission, can hardly be said to be nonsubstantive. As well stated in the Manual of Patent Examining Procedure,

The fact that a claim is broad does not necessarily justify a rejection on the ground that the claim is vague and indefinite or incomplete. In nonchemical cases, a claim may, in general, be drawn as broadly as permitted by the prior art [MPEP 706.03(d)].

Second, even if the Examiner's comments were accurate, the applicant does not understand how 35 U.S.C. §112, second paragraph would be contradicted. As established at least as early as 1938, there is nothing *per se* wrong with simply claiming results. See, for example, *Wabash*, 37 U.S.P.Q. 466 (S.Ct. 1938).

35 U.S.C. §112, second paragraph simply requires that an applicant particularly point out and distinctly claim the subject matter that the applicant regards as his invention. In that light, exactly *how* one processes the signal sample is not considered by the applicant to be a part of his invention; rather, it is the fact that the processing results in a first parameter that relates to an overall energy value for the signal sample

on the one hand, and a second parameter based, at least in part, upon a relative contribution of at least one of the first and second gain values to the overall energy value on the other hand, that is important. Similarly, it is not particularly how one transmits the information related to the first and second parameters that is important, so long as transmission in some manner is accommodated.

The applicants terminology of choice is, admittedly, broad. Again, however, breadth does not necessarily equate with vagueness. From the standpoint of applying prior art, the Examiner is free to apply any art that processes a signal sample in any manner, where that processing yields the first and second parameters as specifically set forth in the claim. Therefore, with all due respect, the applicants submit that claims 1-7 and claim 12 are not so mysteriously worded as to run afoul of the requirements of 35 U.S.C. §112, second paragraph.

The Examiner has also objected to claims 8-11 under this section. In particular, the Examiner questions the applicants' phrase, "modified, when necessary." In an effort to resolve the Examiner's concern in as straight forward a manner as possible, the applicants have amended the relevant claims to avoid the expression "when necessary." If the Examiner still harbors concerns notwithstanding this change, the applicants specifically invite the Examiner to contact applicants' counsel by telephone to discuss other changes that the Examiner believes might be appropriate.

Lastly, the Examiner suggests that the claims cannot be read on the drawings. At the outset, the applicants note that such a condition, when present, does not necessarily constitute a rejection under 35 U.S.C. §112. Rather, it may be an indication that the Examiner wishes to exert his authority under 37 C.F.R. 1.81(c). If in fact there are other drawings that the Examiner believes would be helpful to the reader in better understanding the invention, the applicants would be happy to comply. It is appropriate, however, that the Examiner indicate with greater specificity those particular elements that the Examiner believes should be specifically depicted in the drawings. Although the applicants believe that many of the processing activities comprising the invention, which activities are defined quite specifically in the specification via equations and associated text are best described as presently set forth, the applicants are quite willing to consider those specific changes that the Examiner believes appropriate. Again, the applicants invite the Examiner to contact

applicants' counsel by telephone as a means of perhaps most quickly resolving this issue.

5. Claims 1-12 have been rejected under 35 U.S.C. §103 given Davidson. At the outset, the applicants note that Davidson describes a speech coder that intentionally seeks to limit computational capacity resource requirements at the coder in order to facilitate a less complicated and less expensive coding platform. To this end, Davidson expresses particular concern for, and poses a solution for, the problem of selecting an appropriate excitation vector from a code book, as versus simply trying all candidate code book entries as often proposed in the art. Computation of various *gain values*, however, does **not** appear to concern Davidson in the same way. Further, Davidson does not seem particularly concerned with respect to transmission capacity issues represented by transmission of gain values. This seems particularly so since *Davidson merely implements the prior art technique of transmitting a corresponding gain value for each pulse excitation vector indices.* (For one of many illustrative comments to this effect, see, for example, column 17, lines 18-25.) Therefore, the fundamental approach and concerns of Davidson are quite distinct from those of the instant application. The applicants' invention is not particularly concerned with how one selects a particular code book excitation entry. Rather, the instant invention is more concerned with how gain information (which gain information is relevant to ultimately properly reconstituting the speech signal) can be transmitted with minimum transmission capacity requirements.

With the above in mind, the Examiner's specific application of Davidson to the claims will now be considered. To begin, Davidson does admittedly teach a method of transmitting information that relates to gain information for his signal sample as already noted above. The Examiner suggests, however, that the "first parameter of claim 1 corresponds to both the short term linear predictive coding analysis (block 54 in FIG. 5) and a "compute gain" (66) block. The applicant vigorously disagrees with the Examiner's characterization of the short term LPC analysis block. That particular block relates to processing of the original signal with respect to a spectral envelope, and does not correspond in any viable sense to a first parameter that relates to an overall energy value for the signal sample. More particularly, the output of the short term LPC analysis block can hardly be considered to be an "overall energy value for the signal sample." The compute gain block (66), however, does function to select a gain factor for every excitation value. Therefore, at least for the sake of argument and

this discussion, the applicants are willing to concede for the moment that the compute gain block does produce a first parameter that relates to an overall energy value for the signal sample, which in the case of Davidson, constitutes a gain factor for each excitation value.

The Examiner next asserts that the second parameter is provided in Davidson through the long term LPC analysis that is performed on the residual signal in block 56. The applicants strongly dispute this characterization of Davidson. The second parameter, according to the claim, *must be based*, at least in part, *upon a relative contribution of at least one of the first and second gain values* (which first and second gain values are specified to relate to first and second components of the signal sample) *to the overall energy value*, the latter having antecedent basis in that the first parameter itself relates to the overall energy value. Quite simply, the long term LPC analysis block (56) does not equate with the requirements of the claim in this regard. Instead, as quite clearly depicted in FIG. 5 as relied upon by the Examiner, the gain information, such as it is, from the compute gain block (66) is **never** provided to the long term LPC analysis block (56) or any other block in the analysis section of Davidson's encoder. Therefore, Davidson clearly makes no teachings that equate with the sum of the recitations of claim 1. Furthermore, there is no suggestion in Davidson or other of the references cited by the Examiner that one might wish to modify the structure of Davidson in some manner so as to meet the limitations of claim 1. Therefore, the applicant respectfully submits that claim 1 is neither anticipated by nor rendered obvious in view of the Davidson reference.

Claim 2 sets forth a third gain value that relates to yet a third component of the signal sample, and provides for a modified processing step wherein a third parameter is provided, which third parameter is based, at least in part, upon a relative contribution of a different one of the first, second, and third gain values to the overall energy value, as distinct from the relative contribution represented by the second parameter. Davidson wholly fails to teach or suggest provision of such a parameter.

Claim 3 requires that the first and second parameters are vector quantized to provide a code. The applicant readily concedes that the concept of vector quantizing is certainly known in the art, and is also applied in the context of voice coders. The applicants respectfully submit, however, that vector quantizing has not been utilized

with respect to a first and second parameter as defined in these claims. Therefore, the applicant submits that claim 3 may be passed to allowance.

Claim 4 depends from claim 3, which claim has been shown allowable above. Therefore, claim 4 may be passed to allowance as well.

With respect to claim 5, the Examiner makes the following statement:

If the energy value only applied to a single sample it would not be "long term" it would be a sample or short term.

In the context of an obviousness type rejection, the applicant is uncertain as to the Examiner's point. Therefore, the applicant is uncertain as to the response that should be made. The applicant will note that claim 5 includes an additional step of transmitting, from time to time, long term energy value information that relates to a plurality of signal samples, as distinct from the first and second parameters, which correspond to a signal sample or to a component thereof. This concept is absent from Davidson, and hence the applicants respectfully submit that the claim may be passed to allowance. If the Examiner had a different point in mind to raise, the applicants respectfully submit that such point should be articulated in a non-Final Office Action.

Claim 6 specifies that the first parameter comprises a correction factor that relates to the long term energy value information specifically provided in claim 5. The Examiner suggests that the gain values of Davidson are used to correct pulses to their proper amplitudes. The applicants observe, however, that even viewed in this light, the gains being corrected do not constitute long term energy value information. Instead, they represent discrete independent events. Therefore, claim 6 may be passed to allowance.

Claim 7 is an independent claim, and provides for transmitting information that relates to a first value, which itself relates to a long term energy value for a signal, and for then transmitting, on a more frequent basis, information relating to a second value, which second value relates to a short term energy value for the signal, which itself comprises a correction factor to be applied in conjunction with the first value. Davidson does not provide for long term, as distinguished from short term, energy values, and specifically does not provide a correction factor to be applied against a

long term energy value to accommodate a short term condition. Therefore, the applicants respectfully submit that claim 7 be passed to allowance.

Claim 8 constitutes an independent claim, and addresses recovering some of the information developed in accordance with the earlier claims. The Examiner has rejected claim 8 as being obvious in view of Davidson's FIG. 2. With reference to that figure, Davidson does admittedly teach reception of a first parameter that relates to energy for at least one component of the signal (this being QG_J). Davidson also appears to teach receiving component definition information for the at least one component (for example, the information provided to the short term and long term synthesizers). As amended, however, claim 8 now requires that *both* the pre-component energy value *and* the first parameter be used to provide a gain value, and that this gain value then be applied to the precomponent to obtain the recovered component. Claims 9 and 10 have been similarly altered. Davidson makes no such provision. Instead, he appears to practice the prior art convention of applying a gain value (previously calculated at and transmitted by the transmitter) to his pre-component in order to obtain his recovered component. Therefore, the applicants respectfully submit that claims 8-10 (along with dependent claim 11) may be passed to allowance.

Claim 12 was rejected under similar grounds as applied to claim 1 above, which rejections were traversed. The applicants therefore respectfully submit that claim 12 may be passed to allowance as well.

6. The applicants readily concede that the instant invention involves complex subject matter. Accordingly, if the Examiner believes that additional discussion will be helpful, either to facilitate a better understanding of the invention, of the claim terminology, or of distinctions between the invention and the prior art, the Examiner is expressly invited to contact applicants' counsel by telephone. In the alternative, if the Examiner believes it would be helpful, applicants' counsel is quite willing to meet with the Examiner for an in-office interview to discuss these same issues.

The applicants respectfully solicit Notice of Allowance of claims 1-12.

RESPECTFULLY SUBMITTED,
IRA ALAN GERSON ET AL.

By:



Steven G. Parmelee
Attorney of Record
Registration No. 28,790
Phone: (708)576-5066
Fax (708)576-3750

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on 6/18/91 (Date of Deposit)
Ira Gerson et al
Name of applicant, assignee, or Registered Rep.
Steven G. Parmelee 6/18/91
Signature Date



#15
11

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS: IRA A. GERSON ET AL. EXAMINER: D. KNEPPER
 SERIAL NO: 07/888,463 ART GROUP: 2308 ✓
 FILED: MAY 20, 1992 DOCKET NO.: CM-00476HC01
 APPLICATION: DIGITAL SPEECH CODER HAVING OPTIMIZED SIGNAL ENERGY PARAMETERS

MJ
7/30/93

Motorola, Inc.
 Corporate Offices
 1303 E. Algonquin Road
 Schaumburg, IL 60196
 Date: June 11, 1993

AMENDMENT AND RESPONSE

Honorable Commissioner of
 Patents and Trademarks
 Washington, D.C. 20231

Dear Sir:

In response to an Office Action dated September 10, 1992 (Paper No. 10), as entered in the above-captioned matter, the Applicants respectfully submit the following Amendment and Response and request further examination.

In the Specification:

On page 5, line 5, please replace the period (.) after the word "invention" with a semicolon (;), then add the following new paragraphs:

Fig. 3 is a flowchart depicting a speech coding methodology in accordance with the present invention;

Fig. 4 is a block diagram of a radio transmitter employing a speech coder;

Fig. 5 illustrates frame and subframe organization of digitized speech samples; and

DI

20

D1

Fig. 6 is a chart showing portions of a vector quantized signal energy parameter data base.

L

On page 7, line 9, after the word "choice" please add the following

sentences: Fig. 4 illustrates this transmission process in block diagram form.

D2

Speech samples are provided to a speech coder (402), such as the one discussed above, through an associated microphone (401). The output of the speech coder (403) is then coupled to a radio transmitter (403), well-known in the art, where the speech coder output signals are used to generate a modulated RF carrier (405) that can be transmitted through a suitable antenna structure (404).

L

On page 14, line 15, after the word "requirement" please add the

following new paragraphs: The flowchart of Fig. 3 provides a concise

representation of method steps used to code and transmit a succession of speech samples in the manner taught by the present invention. As discussed previously, a speech sample is provided to a speech coder (block 301) and digitized (302). In the next step (303), the sample is subdivided into selected portions or subframes.

D3

In the subsequent operation (304), a long term energy value $E_q(0)$ is determined for the sample. Then (305), for a selected portion of the sample, a first parameter α is calculated with respect to the long term energy value. As suggested in the discussion above, this first parameter α may be a scale factor that relates the long term energy value to the overall energy in a particular subframe.

In the next step (306), at least one excitation component as corresponds to the speech sample is selected. This excitation component may be the pitch excitation information energy for a particular subframe. After this component is selected, the next operation (307) determines a second parameter

β by calculating the relative contribution of this selected excitation component (or components) to the overall energy value for that subframe.

D³
The subsequent operation (308) vector quantizes the first and second parameters in order to develop representative information. Vector quantizing, of course, yields a representative code that identifies the information. This results in significant information compression when compared to the first and second parameters themselves. Finally (309), the representative information is transmitted.

[On page 12, line 3, after the word "method" please add the following new paragraph: Fig. 5 illustrates how a complete frame of digitized speech

D⁴
samples, generally depicted by the numeral 500, is divided into subframes. As mentioned previously, each frame is divided into four subframes (501-504). The quantized signal energy value $E_q(0)$ (505), calculated for each complete frame of digitized speech samples, is transmitted once per frame. The α and β parameters, indicated in the figure as part of a gain vector (GV) (506-509) are transmitted for every subframe.

[On page 12, line 8, after the word "decoder" please add the following sentences: Portions of a vector quantized signal energy parameter data base,

D⁵
generally depicted by the numeral 600, are shown in Fig. 6. The data base comprises a set of seven-bit representative codes or vectors (601), and a set of associated signal energy parameters. There are 128 possible vector codes (601) in this example, with each vector code having an associated α , β , and π parameter (602-604). The decimal numbers shown in the figure are for example purposes only, and would have to be selected in practice to compliment all of the particulars of a specific application.

In the Claims:

Please cancel, without prejudice, claims 5, 6, and 12 through 21.

Please amend claims 1 through 3 and 7 through 10 as follows:

Sub C
H1

1. (Once Amended) A method [of] ~~for transmitting information that relates to gain information [for] , which gain information is to be applied to excitation information that corresponds to a [signal] speech sample, wherein the gain information includes:~~

~~a first gain value that relates to gain [for] to be applied to a first excitation component, which first excitation component represents a first voice component of the speech sample, which first voice component has a first energy value;~~

D4

~~at least a second gain value that relates to gain [for] to be applied to a second excitation component, which second excitation component represents a second voice component of the speech sample, which second voice component has a second energy value;~~

~~the method comprising the steps of:~~

~~A) providing a speech sample;~~

~~B) digitizing the speech sample to provide a digitized speech sample;~~

~~C) [processing at least the signal sample to provide:]~~

~~determining a long term energy value for the digitized speech sample;~~

~~D) selecting at least a portion of the digitized speech sample to provide a selected portion of the digitized speech sample;~~

~~E) providing a first parameter that relates to an overall energy value for the selected portion of the [signal] digitized speech sample;~~

~~F) providing a second parameter based, at least in part, upon a relative contribution of at least [one of] the first [and second] gain value[s] to the overall energy value for the selected portion of the digitized speech sample;~~

D4

[B] G) transmitting information related to the long term energy value and the first and second parameters.

2. (Once Amended) The method of claim 1 wherein:
the gain information includes at least a third gain value that relates to gain [for] to be applied to a third excitation component, which third excitation component represents a third voice component of the speech sample, which third voice component has a third energy value;

the method includes the additional step, before step G), of:

F1) [the step of processing includes additionally] providing a third parameter based, at least in part, upon a relative contribution of [a different one of] at least the first[,] and second[,] and third] gain values to the overall energy value for the selected portion of the digitized speech sample;

the step of transmitting information includes transmission of information relating to the third [component] parameter.

3. (Once Amended) The method of claim 1 [wherein the step of processing includes] further including the step of vector quantizing at least the first parameter and second parameter information to provide a code.

7. (Once Amended) A method [of] for transmitting information that relates to gain information for a [signal] speech sample, wherein the gain information includes:

a first value that relates to a long term energy value for the [signal] speech sample;

at least a second value, wherein the second value relates to a short term energy value for the speech sample [signal], and comprises a correction factor to be applied with the first value;

comprising the steps of:

A) transmitting, from time to time, information relating to the first value;

B) transmitting, more often than from time to time, information relating to the second value.

8. (Twice Amended) A method [of] ~~for~~ recovering information that relates to gain information for excitation components of a signal, ~~the method~~ comprising the steps of:

A) receiving at least a first parameter that relates to energy for at least one excitation component of the signal;

B) receiving excitation component definition information for the at least one excitation component;

C) processing the excitation component definition information to provide a pre-component, which pre-component has an energy value;

D) using at least the first parameter and the energy value of the pre-component to provide a gain value;

E) applying the gain value to the pre-component, to provide a recovered excitation component of the signal.

9. (Twice Amended) A method [of] ~~for~~ recovering information that relates to gain information for excitation components of a signal, ~~the method~~ comprising the steps of:

A) receiving a radio signal;

- B) demodulating the radio signal to provide a recovered signal;
- C) extracting from the recovered signal at least a first parameter that relates to energy for at least one excitation component of the signal;
- D) extracting from the recovered signal excitation component definition information for the at least one excitation component;
- E) processing the excitation component definition information to provide a pre-component, which pre-component has an energy value;
- F) using at least the first parameter and the energy value of the pre-component to provide a gain value;
- G) applying the gain value to the pre-component[,] to provide a recovered component of the signal.

D7

10. (Twice Amended) A radio that receives speech coded information and that synthesizes speech in response thereto, comprising:

- A) RF means for receiving and demodulating a radio signal that includes speech coded information;
- B) excitation source means operably coupled to the RF means for receiving the speech coded information and:
- 1) extracting from the speech coded information at least a first parameter that relates to energy for at least one excitation component of a signal that relates to an original speech [signal] sample;
 - 2) extracting from the speech coded information excitation component definition information for the at least one excitation component;
 - 3) processing the excitation component definition information to provide a pre-component, which pre-component has an energy value;

4) using at least the first parameter and the energy value of the pre-component to provide a gain value;

5) applying the gain value to the pre-component, to provide a recovered component of the signal;

6) providing an excitation signal using the recovered component of the signal;

C) LPC filter means for receiving the excitation signal and for providing a synthesized speech signal in response thereto.

Please add new claims 22 through 24 as follows:

22. (New) The method of claim 1, wherein the digitized speech sample comprises a frame of information and the selected portion of the digitized speech sample comprises a subframe.

23. (New) The method of claim 22, wherein the first parameter is a scale factor that relates the long term energy value for the frame of information to the overall energy value for the subframe.

24. (New) The method of claim 22, wherein the second parameter is a ratio that relates pitch excitation energy for the subframe to the overall energy value for the subframe.

REMARKS

1. Pursuant to the above-noted Office Action, the drawings have been objected to under 37 C.F.R. 1.83(a) on the ground that the drawings fail to show every feature of the invention specified in the claims. The Specification

has been objected to under 35 U.S.C. 112, first paragraph, as failing to provide an enabling disclosure and failing to provide an adequate written description of the invention, and claims 1 through 21 have been rejected under the same paragraph of the above-cited section for the reasons set forth in the objection to the Specification. Claims 1 through 16 have also been 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 the Applicants regard as the invention.

Further, claims 1 through 8 and 11 through 21 have been rejected under 35 U.S.C. 101 on the ground that the claimed invention is directed toward non-statutory subject matter. Claims 1 through 21 have also been rejected under 35 U.S.C. 103 as being unpatentable over Davidson et al. (U.S. Patent No. 4,868,867). These rejections are respectfully traversed.

2. In response to the Examiner's objection to the drawings, four proposed drawing sheets including six drawing figures are attached hereto for the Examiner's approval. Sheet 1 is essentially a duplicate of original Fig. 1, except that the label "PRE-COMPONENT" has been added to the outputs of the PITCH FILTER STATE (102), CODEBOOK NO. 1 (103), and CODEBOOK NO. 2 (104). Also, the LONG TERM ENERGY input to the GAIN CONTROL block (101) has been labelled $E_q(0)$, while the GAIN VECTOR input had been labelled $GV(\alpha, \beta, \pi)$. The use of the term "pre-component" to describe the excitation signals that are output from the pitch excitation filter state and the codebooks is well-supported in the Specification (See, for example, page 7, lines 25-29). Also, the Specification recites that the gain control function (101) provides gain information "as a function of . . . the long term energy value as provided by the coder [$E_q(0)$], and a gain vector (GV) provided by the coder that supplies a

short term correction value for the long term energy value." (Page 7, lines 16-24). The long term energy value is defined as $E_q(0)$ on page 9 of the Specification [Lines 1-2], while the parameters α , β , and π are identified as gain vector parameters on page 12 [Lines 4-8]. For these reasons, the Applicants submit that the additional markings on Fig. 1 do not constitute new matter, and should therefore be permitted.

Proposed drawing sheet number 2 includes a duplicate of old Fig. 2 and proposed Fig. 4. Fig. 4 shows, in block diagram form, a transmitter employing a speech coder. The Specification recites that "[i]n one embodiment of the invention, the first and second parameters . . . are vector quantized to provide a code. This code then comprises the information that is transmitted to the decoder." [Page 3, line 30 to page 4, line 2]. The Specification also suggests that "the speech coder/decoder platform is located in a radio." [Page 4, lines 28-29]. Also, "[t]he pitch and codebook information will then be coded and transmitted to the decoder by a transmission medium of choice." [Page 7, lines 7-9]. Since the concept of locating the speech coder in a radio is also claimed, the Applicants respectfully submit that proposed drawing figure 4, and the associated descriptive text added pursuant to this Amendment, do not constitute new matter, and should therefore be entered.

Proposed drawing sheet 3 includes proposed Fig. 3, which is a flowchart that closely tracks the method steps of claim 1, as amended. The first steps depicted in the flowchart, those of providing a speech sample and digitizing, are common to any speech coder implementation, and are illustrated in Gerson (U.S. Patent No. 4,817,157), which patent is incorporated by reference into the instant Application. In addition, the Specification describes the process as follows:

For purposes of this description, it will be presumed that an original speech sample (or at least a portion thereof) is digitized, and that the resultant digital information is divided as necessary into frames and subframes of data, all in accordance with well understood prior art technique. In this description, it will also be presumed that each frame is comprised of four subframes.

[Specification, page 8, lines 14-21]. The remaining steps of calculating the first and second parameters and vector quantizing are discussed at some length on pages 11 through 14. Therefore, the Applicants submit that Fig. 3 does not encompass new matter and should, consequently, be entered.

Sheet 4 includes proposed new drawing figures 5 and 6. Fig. 5 illustrates the frame and subframe organization of digitized speech samples. As described above, the Specification includes a discussion of the frame and subframe nature of the digitized speech information with which the present invention is concerned. The Specification also recites that "the quantized signal energy value $E_q(0)$ can be calculated for a complete frame of digitized speech samples (and) transmitted from the coder to the decoder from time to time." [Page 10, lines 21-24]. Modification of long term energy information to derive appropriate parameters for each subframe is treated in detail on pages 11 through 14. Fig. 6 illustrates portions of a data base of vector quantized signal energy parameters as they relate to a set of vector codes. This concept of vector quantizing the subframe signal energy parameters is described starting with page 12, line 4, and ending on page 14, line 15. For these reasons, the Applicants respectfully submit that proposed drawing figures 5 and 6, along with associated explanatory text, do not constitute new matter and are suitable for entry.

3. The specification has been objected to under 35 U.S.C. 112, first paragraph, for failing to provide an enabling disclosure and failing to provide

an adequate written description of the invention. The Examiner asserts, among other objections, that, while claims 1-7 seem directed toward "a method of transmitting information," the Specification and drawings only show reconstructing speech from transmitted parameters and do not explain how the information sent is coded for transmission. Pursuant to this Amendment, new drawing figures 4 and 5, with attendant descriptive matter, are submitted for the Examiner's review. For the reasons set forth above with respect to entry of these new figures and descriptions, the Applicants respectfully submit that the Specification now avoids the Examiner's objections relating to a method of transmitting information.

The Examiner also maintains that no specifics related to gain values are taught in the Specification or illustrated in the drawings. A thorough discussion of the inputs used in calculation of the excitation source is included in the Gerson patent ('157) incorporated by reference into the instant disclosure. As to the claimed "first parameter" and "second parameter," the flowchart of proposed Fig. 3 and the associated description clearly articulate the relationship between these terms and the voice signal. Contrary to the Examiner's impression, the first and second parameters are actually corrections to the long-term energy that relate to energy within a subframe. As discussed above, this relationship was covered in detail in the Specification even before the proposed introduction of the additional explanatory matter included in this Amendment. Thus, the Applicants believe the Specification makes an adequate disclosure of material related to gain values, and avoids the Examiner's objections as to this issue.

In the present Office Action, the Examiner also raises an issue of vagueness as to the differences between a frame and a subframe, as well as what the inventors might consider a "component" to be. In addition, the

meaning of the term "pre-component" is alleged to be unknown. As discussed above with relation to the introduction of proposed drawing figure 5, the difference between a frame and a subframe is articulated in the Specification, and, with the addition of Fig. 5, should be more than clear. The term "component" should be given its ordinary meaning: "a constituent part." Webster's Ninth New Collegiate Dictionary 270 (1988). "Pre-components" are introduced on page 7 of the Specification as outputs from the pitch excitation filter state and the codebooks [Lines 25-28]. The additional labelling proposed pursuant to this Amendment for drawing figure 1 should help to make this even more clear.

Vector quantizing, as discussed previously with reference to new drawing figure 6, is introduced on page 12 of the Specification, lines 4 through 8. In addition, Gerson ('157) refers to the concept frequently. [See, for example, column 1, lines 38-42]. Vector quantizing as it applies to parameters α , β , and π is illustrated in Fig. 6.

The Applicants submit that the Specification and claims are now consistent with the characterization of α as a first parameter that relates to an overall energy value, while β is based upon a relative contribution of the first gain value to the overall energy value. The term "vector" can mean an ordered sequence, as in a sequence of excitation samples [See Gerson ('157), column 1, lines 40-42]. Thus, the term "vector code" is applied to the representative code that identifies the result of vector quantizing the parameters α , β , and π .

The Examiner asserts that the Specification and drawings only show reconstructed speech and that nothing is shown to explain how the information that is sent is coded for transmission. First, the essential elements of a speech decoder, as shown in Fig. 1, are identical to the essential elements

of a compatible coder. Further, the Specification describes a coder embodiment in detail from page 10, line 19 to page 13, line 22. Based upon these reasons, and the reasons set forth above, the Applicants submit that the Specification is enabling with respect to coding a signal for transmission, particularly in light of the proposed new drawing figures and additional explanatory text including with this Amendment.

Explanation of the difference between "component" and "pre-component" has been offered above, and the claim language has been modified pursuant to this Amendment in an effort to minimize confusion that may result from the use of these terms. And a new drawing figure has been submitted showing the claimed frame and subframe relationship.

The Applicants respectfully disagree with the Examiner's assertion that the terms "gain information," "components", and "energy" have not been adequately distinguished from each other in the Specification and claims. The Specification indicates that the energy in the pitch excitation and codebook excitation signals (called pre-components) is necessary in order to determine the amount of energy correction that will be required. Energy correction is accomplished through adjustment of GAIN values on a subframe by subframe basis. [See, page 7, line 25 through page 8, line 6].

4. Claims 1-21 have been rejected under 35 U.S.C. 112, first paragraph, for the same reasons set forth in the objection to the Specification. For the same reasons set forth in response to the Examiner's objections to the Specification, the Applicants respectfully submit that the claims avoid the Examiner's objections under the first paragraph of section 112.

5. Claims 1-21 have been 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 the Applicants regard as the invention. Once again, the Examiner raises an objection to the terms "gain information," "components," and "energy." For the reasons set forth above, the Applicants submit that these terms are adequately distinguished from one another.

Claim 1 has been amended so it no longer contains "processing" steps. The method steps of claim 1 now carefully follow the process outlined in the Specification, and proposed drawing figure 3 flowcharts the steps of the claim to illustrate their interrelationship.

The language of claims 8-11 is not directed toward using a "component" to form a "pre-component." It should be especially clear in view of the modified claim language (pursuant to this Amendment) that the claims recite a method for recovering information that *relates to gain information for excitation components* of a signal. The method generally requires that a first parameter relating to energy be received, followed by excitation component definition information. This information is processed to provide a pre-component, and an associated energy value. From the data acquired above, a gain value is determined that can be applied to the pre-component to yield the desired recovered excitation component of the signal.

Even allowing the term "pre-component" to be interpreted in light of the commonly understood meaning of its prefix, there is no contradiction; pre-component information is used to arrive at the excitation component. However, in this instance the Specification provides a definition for the term "pre-component," as discussed previously, and this definition should be

applied when interpreting the language of the claims. Claims 13 through 19 have been cancelled pursuant to this Amendment.

The Examiner has objected to the "pitch excitation filter state" of claim 21. Claim 21 has also been cancelled.

6. Claims 1 through 8 and 11 through 21 have been rejected under 35 U.S.C. 101 on the ground that the claimed invention is directed toward non-statutory subject matter. (The Applicants assume that the Examiner meant to reject claims 12 through 21, since claim 11 is a dependent claim). While the Applicants are not prepared to dispute, at this time, the Examiner's contention that a mathematical algorithm is present, the Applicants do take exception to the Examiner's interpretation of the second element of the "two-part test" adopted by the Examiner.

Claims 1, 7, and 8 are the only independent claims remaining for consideration as to rejections under the above-cited section, since claims 12, 13, and 19 through 21 have been cancelled pursuant to the instant Amendment. Claim 1 in particular (as amended) includes essential limitations that are arguably distinguishable from data gathering steps "which merely determine values for the variables used in the mathematical formulae used in making the calculations." The method steps of claim 1 include the following:

- A) providing a speech sample;
- B) digitizing the speech sample to provide a digitized speech sample;
- C) determining a long term energy value for the digitized speech sample;
- D) selecting at least a portion of the digitized speech sample to provide a selected portion of the digitized speech sample;

[Applicants' claim 1, as amended]. These steps do not represent mere acquisition and substitution of values. Provision of the speech sample

requires that an analog speech signal be input via an appropriate transducer (such as a microphone), and digitizing requires an analog-to-digital conversion operation. Establishment of the long term energy value and arrangement of the digitized speech sample into subframes, while they may be characterized as preparatory steps, do not merely act to provide values for variables used in mathematical computation. For these reasons, the Applicants believe that claim 1 avoids the Examiners objections under section 101.

The Court of Customs and Patent Appeals has suggested that a claim drawn to a process which merely uses equation solutions as one step in achieving some result other than solution of the equations would be drawn to statutory subject matter. In re de Castelet, 195 U.S.P.Q. 439, 446 (1977). The Applicants maintain that that is the case here. In claim 7, for example, the method steps are directed toward transmission of first and second values. The first value relates to long term energy for the speech sample, while the second value relates to short term energy. The first value is transmitted periodically, while the second value need be transmitted less frequently because of the design of the Applicants' system. Similarly, the method steps of claim 8 lead to application of a gain value to the pre-component in order to yield a recovered excitation component of the signal. For the reasons set forth above, the Applicants respectfully submit that the claims cited above are directed toward patentable subject matter.

7. Claims 1 through 21 have been rejected under 35 U.S.C 103 as being unpatentable over Davidson et al. (U.S. Patent No. 4,868,867). The Examiner suggests that LPC information contains energy information. In actuality, however, the LPC parameters are just filter coefficients. He is

correct, however, that block 66 computes gain factor G_j , which relates to an overall energy value.

In attempting to draw an analogy between the "second parameter" of the Applicants' claim 1 and the long-term LPC analysis of Davidson, the Examiner is again confusing LPC parameters with gain values; they are actually filter coefficients. If one were to draw a block diagram of an LPC filter, one might be tempted to call the coefficients gain terms, since they are used to multiply signals. This, however, is not what someone "skilled in the art" would consider gain values.

The Examiner theorizes that Davidson teaches analysis of the spectral envelope and performs calculations from a frame of vectors which contain gain values for each of ten frequencies. Again, the Examiner seems confused about LPC analysis. The notion that LPC coefficients "contain gain values for each of ten frequencies" is clearly incorrect. LPC information provides filter coefficients for an all-pole filter.

The Examiner asserts that the "long-term analysis uses the energy located at the pitch frequency and is, therefore, also related to overall energy." While energy terms are typically used in LPC analysis, the overall energy is factored out, so that the resulting LPC parameters are independent of the overall signal energy.

With respect to claim 7, the Examiner maintains that "since there are more short-term coefficients than long-term coefficients, the short term coefficients would have to be sent "more often" than the long term coefficients." Claim 7 is not directed toward sending more parameters, but sending the same parameters more often. The Examiner may also be confusing the Applicants' "long-term energy" with Davidson's "long-term coefficients."

There is no relation since, in Davidson, "long-term" refers to a pitch prediction filter, and the Applicants' claim is related to energy.

As to claim 8's recitation of "receiving at least a first parameter," the a_i's and b_i's are not related to energy. What the Examiner may have meant is G_j, from block 35a. In any event, what Davidson does not provide for is element D of claim 8. Davidson does not teach using "the energy value of the pre-component to provide a gain value" at the receiver. Energy values may be computed at the encoder (transmitter) to compute the transmitted gain term, G_j, but Davidson certainly does not compute the energy at the receiver to generate the gain term to be utilized. For these reasons, the Applicants respectfully submit that the remaining claims are distinguishable over the prior art of record.

8. For the reasons set forth above, allowance of claims 1 through 4, 7 through 11, and 22 through 24 is hereby respectfully solicited.

Respectfully submitted,

IRA A. GERSON ET AL.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:
Commissioner of Patents and Trademarks
Washington, D.C. 20231
on June 11, 1993
(Date of Deposit)
Atorady, Inc.
Name of applicant, assignee, or Registered Rep.
Eric J. Hayes 6/11/93
Signature Date

By: John W. Hayes
John W. Hayes
Attorney for Applicants
Registration No. 33,900
Phone: (708) 538-2453
FAX: (708) 576-3750



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS: IRA A. GERSON ET AL. EXAMINER: D. KNEPPER
SERIAL NO: 07/888,463 ART GROUP: 2308
FILED: MAY 20, 1992 DOCKET NO: CM-00476HC01
APPLICATION: DIGITAL SPEECH CODER HAVING OPTIMIZED SIGNAL ENERGY
PARAMETERS

21/E
Not entered

Motorola, Inc.
Corporate Offices
1303 E. Algonquin Road
Schaumburg, IL 60196
Date: May 3, 1994

AMENDMENT UNDER 37 C.F.R. 1.116

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Dear Sir:

In response to a Final Action dated October 1, 1993 (Paper No. 18), as entered in the above-captioned matter, the Applicants respectfully submit the following Amendment. As a result of an Examiner Interview conducted on November 18, 1993, and documented on Paper No. 19, it has been determined that the Amendment filed on June 11, 1993, (Papers Nos. 14 and 15) will be entered in its entirety, with the exception of proposed Fig. 4 and its associated descriptive text. This drawing figure and its description are dealt with in subsequent sections, and new claim language is proposed which the Applicants believe may render the pending claims allowable, or, at least, place the claims in better condition for consideration on appeal.

In the Specification:

The Amendment filed on June 11, 1993, requested that a line of text be added to the Brief Description of the Drawings section of the specification

relating to Fig. 4. Please ensure that that line is added to the Specification, amended to read as follows: --Fig. 4 is a block diagram of a radio transmitter of the prior art employing a speech coder;--

The Amendment of June 11 also requested that a paragraph of text descriptive of Fig. 4 be added to page 7 of the Specification. In view of the fact that the Applicants are willing to concede that Fig. 4 can indeed be labelled as "Prior Art," the associated description should be relocated and reworded slightly. Please ensure that the description of Fig. 4, amended in small measure, is added to the Specification on page 5, line 17, after the word "vectors" as a new paragraph reading as follows: --Use of a speech coder for transmission of information over an RF channel is known. Fig. 4 illustrates this transmission process in block diagram form. Speech samples are provided to a speech coder (402), through an associated microphone (401). The output of the speech coder (403) is then coupled to a radio transmitter (403), well-known in the art, where the speech coder output signals are used to generate a modulated RF carrier (405) that can be transmitted through a suitable antenna structure (404).--.

In the Claims:

Please amend claim 1 as follows:

1. (Twice Amended) A method for transmitting information that relates to gain information, which gain information is to be applied to excitation information that corresponds to a speech sample, wherein the gain information includes:

a first gain value that relates to gain to be applied to a first excitation component, which first excitation component represents a first voice

component of the speech sample, which first voice component has a first energy value;

at least a second gain value that relates to gain to be applied to a second excitation component, which second excitation component represents a second voice component of the speech sample, which second voice component has a second energy value;

the method comprising the steps of:

A) providing a speech sample;

B) digitizing the speech sample to provide a digitized speech sample;

C) determining [a long term energy value for] total energy of the digitized speech sample to provide a long term energy value;

D) determining an overall energy value for a select[ing]ed [at least a] portion of the digitized speech sample [to provide a selected portion of the digitized speech sample];

E) providing a first parameter that relates [to an] the overall energy value for the selected portion of the digitized speech sample to the long term energy value;

F) providing a second parameter based, at least in part, upon a relative contribution of at least the first gain value to the overall energy value for the selected portion of the digitized speech sample;

G) transmitting information related to the long term energy value and the first and second parameters.

REMARKS

1. Enclosed with this Amendment is a copy of drawing figure 4 marked in red to add the words --PRIOR ART-- as suggested by the Examiner in

the last Official Action. The Applicants respectfully request that the Examiner approve this change.

2. Claim 1 has been amended to reflect the subject matter discussed by the Examiner and the Applicants' counsel during the Examiner Interview of November 18, 1993. The Applicants respectfully submit that the changes to the claim more clearly recite the nature of the parameters that are manipulated in the Applicants' system, and that these changes further distinguish the Applicants' claim over the prior art upon which the Examiner has based his rejection of the claim.

3. The Applicants respectfully request that the subject matter of the instant Amendment be entered, since it acts to place the Application in better form for consideration on Appeal. The Applicants further request that, in view of the Examiner Interview conducted November last, and the changes proposed by this Amendment, that the Examiner review the subject matter and the arguments presented in the prior Amendment, and advise the Applicants by Advisory Action of the Examiner's view of the case as it stands today.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:
Commissioner of Patents and Trademarks
Washington, D.C. 20231
or May 3, 1994
(Date of Deposit)
Ira A. Gerson et al
Name of applicant, assignee, or Registered Rep.
John W. Hayes 5/3/94
Signature Date

Respectfully submitted,

IRA A. GERSON ET AL.

By: John W. Hayes
John W. Hayes
Attorney for Applicants
Registration No. 33,900
Phone: (708) 538-2453
FAX: (708) 576-3750

4. The Applicants hereby petition the Commissioner to revive the above-captioned Application, and to allow prosecution to continue.

Respectfully submitted,

IRA A. GERSON ET AL.

By: *John W. Hayes*
John W. Hayes
Attorney for Applicants
Registration No. 33,900
Phone: (708) 538-2453
FAX: (708) 576-3750

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:
Commissioner of Patents and Trademarks
Washington, D.C. 20231

on May 3, 1994
(Date of Deposit)

Ira A. Gerson et al
Name of applicant, assignee, or Registered Rep.

J. Anne Palocz 5/3/94
Signature Date

08/361,474



**UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office**

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
---------------	-------------	----------------------	---------------------

08/361,474 12/22/94 GERSON

I CM00476HC2
EXAMINER

KNEPPER, D

ART UNIT PAPER NUMBER

E3M1/0612

JOHN W HAYES MOTOROLA
INTELLECTUAL PROP DEPT
CORPORATE OFFICES
1303 E ALGONQUIN ROAD
SCHUMBURG IL 60196

29

2308
DATE MAILED:

06/12/95

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

This application has been examined Responsive to communication filed on 22 Dec 94 This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), — days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- Notice of References Cited by Examiner, PTO-892.
- Notice of Draftsman's Patent Drawing Review, PTO-948.
- Notice of Art Cited by Applicant, PTO-1449.
- Notice of Informal Patent Application, PTO-152.
- Information on How to Effect Drawing Changes, PTO-1474.
-

Part II SUMMARY OF ACTION

1. Claims 1-4, 7-11 and 22-24 are pending in the application.

Of the above, claims _____ are withdrawn from consideration.

2. Claims 5, 6, and 12-21 have been cancelled.

3. Claims _____ are allowed.

4. Claims 1-4, 7-11 and 22-24 are rejected.

5. Claims _____ are objected to.

6. Claims _____ are subject to restriction or election requirement.

7. This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

8. Formal drawings are required in response to this Office action.

9. The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are acceptable; not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).

10. The proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been approved by the examiner; disapproved by the examiner (see explanation).

11. The proposed drawing correction, filed _____, has been approved; disapproved (see explanation).

12. Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has been received not been received been filed in parent application, serial no. _____; filed on _____.

13. Since this application appears to be 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.

14. Other

EXAMINER'S ACTION

PTOL-326 (Rev. 2/93)

1. Applicant's correspondence filed on 22 December (papers 27 and 28) has been received and considered. Claims 1-4, 7-11 and 22-24 are pending.

2. Claims 1-4, 7-11 and 22-24 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.

The claim continue to be vague because they are not directed to any specific relationships between components. In all cases, the claims are carefully worded to indicate that various values are merely "related" or "provided" without any specific interrelationships. Other claim language makes it clear that any and all relationships are meant to be given protection with such language as "a selected portion", "at least in part" and "from time to time." Since the claims fail to define how the data values relate to each other, it cannot be positively determined how the values are calculated.

The relationships between "total energy", "long term energy value", "a first parameter", "a second parameter", "overall energy", "a speech sample" and a "portion of the digitized speech sample" is unclear. A single speech sample would merely indicate the amplitude of a continuous speech signal (over time) at a specific point in time. Calculating an overall energy value such as the zero cepstrum coefficient is known in the art but requires multiple samples over time such as an analysis frame (i.e. - 10-20

ms.). Multiple samples are also required to develop pitch or spectral envelope information such as are exhibited by long term and short term predictive techniques. Therefore, the claims fails to specify what type of data is being sought and the particular
5 method for deriving the desired data.

3. 35 U.S.C. § 101 reads as follows:

"Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter or any new and useful improvement thereof, may obtain a patent therefore,
10 subject to the conditions and requirements of this title".

Applicant is referred to the rejection of claims ~~1-4, 7-11~~⁷ and ~~22-24~~ under 35 USC §101 in paper #18, mailed October 1, 1993, pages 2-6.

The applicant has presented no argument against this rejection
15 and therefore it is maintained.

4. The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not
20 identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in
25 the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as
30 prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

5. Claims 1-4, 7-11 and 22-24 are rejected under 35 U.S.C. § 103 as being unpatentable over Davidson (4,868,867).

Applicant is referred to the body of the Final rejection of claims 1-4, 7-11 and 22-24 in paper #18, mailed October 1, 1993, pages 10-14.

The amendment to claim 1 fails to make any substantive changes to address the previous rejection nor are any arguments presented to indicate why the previous rejection is overcome.

6. As indicated in the Examiner's Interview Summary of 18 November 1993 (paper #19), the new matter objection and rejection was overcome because the original specification does support the drawing changes.

7. This is a File Wrapper Continuation (FWC) of applicant's earlier application S.N. 07/888,463. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds or art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See M.P.E.P. § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 C.F.R. § 1.136(a).

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS FINAL ACTION IS SET TO EXPIRE THREE MONTHS FROM THE DATE OF THIS ACTION. IN THE EVENT A FIRST RESPONSE 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 C.F.R. § 1.136(a) WILL BE CALCULATED FROM THE MAILING DATE OF THE

Art Unit 2308
Serial NO.: 08/361,474

Page-4-
Paper #29

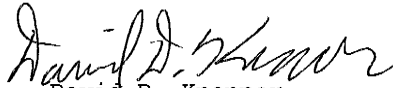
ADVISORY ACTION. IN NO EVENT WILL THE STATUTORY PERIOD FOR RESPONSE EXPIRE LATER THAN SIX MONTHS FROM THE DATE OF THIS FINAL ACTION.

8. Any inquiry concerning this communication or earlier
5 communications from the examiner should be directed to David D. Knepper whose telephone number is (703) 305-9644. The examiner can normally be reached on Monday-Thursday from 07:30 a.m.-6:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Allen MacDonald, can be
10 reached on (703) 305-9708. The facsimile phone number for this Group is (703) 305-9564 or -9565.

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) 305-9600.

15


David D. Knepper
Primary Examiner
Art Unit 2308
June 11, 1995



RECEIVED

AUG 21 1995

AF GP2308
30/44

PATENT APPLICATION

GROUP 2300

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OK to
Enter
JDD

APPLICANTS:	IRA A. GERSON ET AL.	EXAMINER:	KNEPPER, D.
SERIAL NO.:	08/361,474	ART UNIT:	2308
FILED:	22 DECEMBER 94	CASE NO.:	CM00476HC02
ENTITLED:	DIGITAL SPEECH CODER HAVING OPTIMIZED SIGNAL ENERGY PARAMETERS		

~~(N.E.)~~
MDS
8/23/95

Motorola, Inc.
Corporate Offices
1303 E. Algonquin Road
Schaumburg, IL 60196
August 14, 1995

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

AMENDMENT AND RESPONSE

Responsive to the Office Action dated June 12, 1995 as entered in the above-captioned matter, the applicant hereby respectfully submits the following amendment and response.

In The Claims:

Please cancel, without prejudice, claims 22-24.

Please amend claims 1-2 and 7-10 as follows:

H

1. **(Thrice Amended)** A method for transmitting information that relates to gain information, which gain information is to be applied to excitation information that corresponds to a speech sample, wherein the gain information includes:

a first gain value [that relates to gain] to be applied to a first excitation component, which first excitation component represents a first voice component of the speech sample, which first voice component has a first energy value;

25

at least a second gain value [that relates to gain] to be applied to a second excitation component, which second excitation component represents a second voice component of the speech sample, which second voice component has a second energy value;

the method comprising the steps of:

A) providing a speech sample;

B) digitizing the speech sample to provide a [digitized speech sample] frame of information comprising at least one subframe;

C) determining total energy of the [digitized speech sample] frame of information to provide a long term energy value;

D) determining an overall energy value for a [selected portion of the digitized speech sample] subframe of the at least one subframe;

E) providing a first parameter, wherein the first parameter is proportional to [that relates] the overall energy value [for the selected portion of the digitized speech sample] and inversely proportional to the long term energy value;

F) providing a second parameter, wherein the second parameter is proportional to the first energy value [based, at least in part, upon a relative contribution of at least the first gain value] and inversely proportional to the overall energy value [for the selected portion of the digitized speech sample]; and

G) transmitting information related to the long term energy value and the first and second parameters.

2. **(Twice Amended)** The method of claim 1 wherein:

the gain information includes at least a third gain value that relates to gain to be applied to a third excitation component, which third excitation component represents a third voice component of the speech sample, which third voice component has a third energy value;

the method includes the additional step, before step G), of:

F1) providing a third parameter, wherein the third parameter is proportional to the second energy value [based, at least in part, upon a relative contribution of at least the first and second gain values] and inversely proportional to the overall energy value [for the selected portion of the digitized speech sample];

the step of transmitting information includes transmission of information relating to the third parameter.

5. (Twice Amended) A method for transmitting information that relates to gain information for a speech sample, [wherein the gain information includes] comprising the steps of:

A) providing a speech sample;

B) digitizing the speech sample to provide a frame of information comprising at least one subframe;

C) determining a first value [that relates to] comprising a long term energy value for the [speech sample] frame of information;

D) determining at least a second value, wherein the second value is proportional to an overall energy value [relates to a short term energy value for the speech sample,] and inversely proportional to the long term energy value, wherein the overall energy value is determined for a subframe of the at least one subframe;

[comprises a correction factor to be applied with the first value; comprising the steps of:]

[A] E) transmitting, [from time to time] at a first rate, information relating to the first value; and

[B] E) transmitting, [more often than from time to time] at a second rate more frequent than the first rate, information relating to the second value.

6. (Twice Amended) A method for recovering information that relates to gain information for excitation components of a [signal,] speech sample, wherein the speech sample is digitized to provide a frame of information comprising at least one subframe, the method comprising the steps of:

A) receiving at least [a first] one parameter [that relates to] comprising a long term energy value for [at least one excitation component of the signal] the frame of information;

B) receiving excitation component definition information for [the] at least one excitation component;

C) processing the excitation component definition information to provide a pre-component, which pre-component has an energy value;

D) determining a gain value that is proportional to [using at least] the [first parameter] long term energy value and inversely proportional to the energy value [of the pre-component to provide a gain value]; and

E) applying the gain value to the pre-component, to provide a recovered excitation component of the [signal] speech sample.

7.8. (Thrice Amended) A method for recovering information that relates to gain information for excitation components of a [signal,] speech sample wherein the speech sample is digitized to provide a frame of information comprising at least one subframe, the method comprising the steps of:

- A) receiving a radio signal;
- B) demodulating the radio signal to provide a recovered signal;
- C) extracting from the recovered signal at least [a first] one parameter [that relates to] comprising a long term energy value for [at least one excitation component of the signal] the frame of information;
- D) extracting from the recovered signal excitation component definition information for [the] at least one excitation component;
- E) processing the excitation component definition information to provide a pre-component, which pre-component has an energy value;
- F) determining a gain value that is proportional to [using at least] the [first parameter] long term energy value and inversely proportional to the energy value [of the pre-component to provide a gain value]; and
- G) applying the gain value to the pre-component to provide a recovered component of the [signal] speech sample.

Handwritten mark resembling a stylized 'H' or '8'.

10. (Thrice Amended) A radio that receives speech coded information and that synthesizes speech in response thereto, comprising:

- A) RF means for receiving and demodulating a radio signal that includes speech coded information;
- B) excitation source means operably coupled to the RF means for receiving the speech coded information; and for:
 - 1) extracting from the speech coded information at least [a first] one parameter [that relates to] comprising a long term energy value for [at least one excitation component of a signal that relates to an original speech sample] a frame of information, wherein a speech sample is digitized to provide the frame of information comprising at least one subframe;
 - 2) extracting from the speech coded information excitation component definition information for [the] at least one excitation component;
 - 3) processing the excitation component definition information to provide a pre-component, which pre-component has an energy value;

Handwritten checkmarks and arrows pointing to the right.

- 17 ~~10~~ 4) determining a gain value that is proportional to [using at least] the [first parameter] long term energy value and inversely proportional to the energy value [of the pre-component to provide a gain value]; ✓
- 5) applying the gain value to the pre-component to provide a recovered component of the [signal] speech sample;
- 6) providing an excitation signal using the recovered component [of the signal]; and
- 20 C) LPC filter means for receiving the excitation signal and for providing a synthesized speech signal in response thereto.

REMARKS

1. In the above captioned Office Action, the Examiner rejected claims 7-8 under 35 U.S.C. §101. Claims 1-4, 7-11, and 22-24 were rejected under 35 U.S.C. § 103 as being unpatentable over Davidson et al. Claims 1-4, 7-11, and 22-24 were rejected under 35 U.S.C. § 112, second paragraph. These rejections are traversed and reconsideration is hereby respectfully requested.

2. Claims 22-24 have been canceled above. Therefore no further discussion of claims 22-24 will be presented.

3. Claims 1-4, 7-11, and 22-24 have been rejected under 35 U.S.C. § 112, second paragraph. It has been asserted that the claims "continue to be vague because they are not directed to any specific relationships between components." In particular, "the relationships between 'total energy', 'long term energy', 'a first parameter', 'a second parameter', 'overall energy', 'a speech sample', and 'a portion of the digitized speech sample' " were cited as unclear.

Regarding the terms "total energy" and "long term energy value", the applicants note that these terms, as used in claim 1, represent the same thing. That is, claim 1 calls for the "total energy" to be determined "to provide [the] long term energy value". These terms represent $E_q(0)$ as described, for example, on page 9, lines 1-2.

Regarding the terms "a first parameter", "a second parameter", and "overall energy", claims 1, and 7-10 have been amended above to more clearly recite their respective relationships. In particular, the first parameter (in accordance with page 11, lines 12-16) is claimed as "proportional to the overall energy value and inversely proportional to the long term energy value". Expressed as an equation, this states:

$$\alpha \propto \frac{\text{Overall Energy Value}}{E_q(0)} \quad (1)$$

which in turn yields:

$$\alpha \cdot E_q(0) \propto \text{Overall Energy Value} \quad (2)$$

Eq. (2) expresses the relationship described on page 11, lines 12-16 when one recognizes that the overall energy value is the sum of the pitch and excitation energies for a subframe (page 11, lines 27-31).

This relationship is more readily seen using the equations given for GAIN 1 or GAIN 2. The equation for GAIN 1 is given on page 9:

$$\text{GAIN 1} = \sqrt{\frac{EE\alpha\beta}{E_x(0)}} \quad (3)$$

Expressed in this form, the relationship described on page 9, lines 24-27 that "the term EE (the estimate of the subframe residual energy based on the long term signal energy [E_q(0)]) is scaled by α to match the short term energy in the excitation signal" is more clearly seen. EE, the estimate of the residual energy for a subframe, is described on page 8. Substitution for EE yields:

$$\text{GAIN 1} = \sqrt{\frac{E_q(0)\alpha\beta}{(\text{F.P.G.})(\text{N_SUBS})}} \cdot \frac{1}{E_x(0)} \quad (4)$$

where: F.P.G. and N_SUBS are the filter power gain and number of subframes per frame, respectively, described on page 9.

Thus, if the bold-faced portion (which is nothing more than EEα) of Eq. (4) is used in Eq. (2), the proportionality of Eq. (2) is replaced by equivalence:

$$\alpha \cdot \frac{E_g(0)}{(F.P.G.)(N_SUBS)} = \text{Overall Energy Value} \quad (5)$$

which can be re-written as:

$$\alpha = \frac{(\text{Overall Energy Value})(F.P.G.)(N_SUBS)}{E_g(0)} \quad (6)$$

Thus, it can be seen that the claimed relationship between the first parameter, the long term energy value, and the overall energy value is accurately stated.

Likewise, the second parameter is claimed as "proportional to the first energy value and inversely proportional to the overall energy value". This relationship is directly supported on page 11, lines 17-21.

Regarding the terms "a speech sample", and "a portion of the digitized speech sample", the applicants note that the claims, as amended above, now use the terms "frame of information" and "subframe" to describe the digitized versions of the speech sample (page 8, lines 14-19). It has been noted in the rejection that the term "speech sample" is often recognized as the "amplitude of a continuous speech signal (over time) at a specific point in time." Notwithstanding this observation, the applicants submit that the cited portion of the specification makes it clear how a speech sample is related to frames and subframes in the context of the present invention.

In light of the above discussion, the applicants respectfully submit that claims 1-4 and 7-11 overcome the rejection under 35 U.S.C. § 112, second paragraph and are therefore in suitable condition for allowance.

4. Claims 7-8 have been rejected under 35 U.S.C. §101 on the ground that they are directed to non-statutory subject matter. In particular, it has been asserted that:

Claim 8 merely receives information in the form of data ("parameters") and processes the data. Again, no specific manipulation or method is claimed, ensuring that any and all mathematical relationships are included. . . . The only input to the claims is the vague statement that a 'value' (claim 7) or 'parameter' (claim 8) relates to some type of information. The only operative language on these numbers is the claimed 'transmitting' No steps developed the claimed data to provide any details or relationships to physical elements or measurements. The claims are directed to pure numbers. The only suggested relationship is that the numbers are related to 'gain

information' for 'speech' or 'excitation'. The claims carefully recite that the numbers are only related to speech through an energy value making it clear that the method is only limited to the manipulation of the data values rather than any particular operation on a speech signal.

Claims 7 and 8 have been significantly amended above. As amended, both claims 7 (step D) and 8 (step D) include a "specific manipulation" which does not ensure that "any and all mathematical relationships are included." Both claims 7 (steps A-D) and 8 (preamble and step A) recite specific inputs ("a speech sample" and "at least one parameter comprising . . .", respectively) upon which various operations are performed.

Perhaps most significantly, both claims 7 and 8 are amended to include "details or relationships to physical elements or measurements". These relationships, as claimed, are discussed in section 3 above. Claim 7 recites how the second value is proportional to an overall energy value and inversely proportional to a long term energy value, the overall energy value and long term energy value respectively determined for a subframe and frame which, in turn, are derived from the speech sample. Claim 8 explicitly recites that a gain value is proportional to a long term energy value and inversely proportional to an energy value of a pre-component; the gain value and pre-component being used to provide an excitation component of a speech sample.

The applicants assert that claims 7 and 8, as amended above, include elements and limitation that direct the claims toward patentable subject matter, which claims therefore overcome the rejection under 35 U.S.C. § 101. For this reason, the applicants respectfully submit that claims 7 and 8 are in suitable condition for allowance.

5. Claims 1-4, 7-11, and 22-24 were rejected under 35 U.S.C. § 103 as being unpatentable over Davidson et al. In sustaining the final rejection made on the same grounds in paper #18, mailed October 1, 1993, it has been asserted that the first and second parameters of the present invention were taught by the LPC analysis of Davidson et al. In refuting the applicant's previous argument that such an equivalence is in error, it has been stated:

The applicant argues that Linear Predictive Coefficients (LPC) are not related to energy values. This is not true. . . . When the LPC's are derived, however, the presence of energy is necessary. If no energy is in a signal or more energy is present in some frequency bands as opposed to others, then this will cause the LPC's to vary. So, although LPC's are not directly related to overall energy, they are related to energy and how it varies in some fashion. Since the claims do not indicate specific

Rev. 9/30/92

relationships or calculations, the smallest relationship to energy is sufficient to preempt the claims. (emphasis added)

While not agreeing with this argument, the applicants note that claims 1 and 7-10, as amended above, do indicate "specific relationships" between energy values and the claimed parameters. Claims 1 and 7 specifically recite that parameters are proportional and inversely proportional to various energy values. The LPC parameters cited in Davidson et al. cannot be reasonably construed to encompass these claimed limitations. Furthermore, claims 8-10 specifically claim a gain value that is not only proportional to a received long term energy value, but is also inversely proportional to an energy value for the pre-component which the gain is applied to. Nowhere in Davidson et al. is it taught, nor even suggested, that such a gain value be based on the energy of the component it is supposed to scale. For these reasons, the applicants respectfully submit that claims 1 and 7-10 are neither anticipated by, nor made obvious from, Davidson et al. and are therefore in suitable condition for allowance.

Claims 2-4 and 11 are dependent upon claims 1 and 10, respectfully, which claims have been shown allowable above. Therefore, for both this reason, and also because claims 2-4 and 11 introduce additional subject matter that, particularly when considered in the context of the recitations of claims 1 and 10, respectfully, constitute patentable subject matter, the applicant respectfully submits that claims 2-4 and 11 are in proper condition for allowance.

6. The Examiner is invited to contact the undersigned by telephone or facsimile if the Examiner believes that such a communication may advance the prosecution of the present application.

Respectfully submitted,

IRA A. GERSON ET AL.

By Christopher P. Moreno
Christopher P. Moreno
Agent for Applicants
Registration No. 38,566
Phone: (708) 576-6942
Fax: (708) 576-3750

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:
Commissioner of Patents and Trademarks
Washington, D.C. 20231
on August 14, 1995
(Date of Deposit)
Motorola Inc.
Name of applicant, assignee, or Registered Rep.
Shirley L. Rodgers 8/14/95
Signature Date

SENT BY:

10-17-95 12:28PM ;

MOTOROLA IPD+

708 308 5856:# 2/ 4

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS: IRA A. GERSON ET AL. EXAMINER: KNEPPER, D.
SERIAL NO.: 08/361,474 ART UNIT: 2308
FILED: 22 DECEMBER 94 CASE NO.: CM00476HC02
ENTITLED: DIGITAL SPEECH CODER HAVING OPTIMIZED SIGNAL ENERGY
PARAMETERS

Motorola, Inc.
Corporate Offices
1303 E. Algonquin Road
Schaumburg, IL 60196
October 17, 1995

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

PROPOSED RESPONSE

Responsive to the Advisory Action dated August 25, 1995 as entered in the above-captioned matter, the applicant hereby respectfully submits the following proposed response.

REMARKS

1. In the above captioned Advisory Action, the applicant's amendment-after-final filed August 16, 1995 not entered and the final rejection (Office Action dated June 12, 1995) of claims 1-4, 7-11, and 22-24 was maintained. The applicants submit that their amendments made in the August 16, 1995 response have been misinterpreted, and that the amendments made therein put the application in suitable form for allowance, or in the alternative, placed the claims in better form for appeal.
2. The applicants first note that claims 22-24 were canceled by the August 16, 1995 response. Therefore no further discussion of claims 22-24 will be presented.

-2-

3. In the August 16, 1995 response, amendments were made to claims 1-2 and 7-10 which the applicants believe place the claims in condition for allowance or in better form for appeal. The amendments made to these claims may be generally categorized as follows: (i) addition of "frame" and "subframe" limitations to claims 1-2 and 7-10; (ii) addition of "proportional" and "inversely proportional" limitations to claims 1-2 and 7-10; and (iii) addition of "gain value that is proportional to the long term energy value and inversely proportional to the energy value" limitation to claims 8-10.

Regarding (i), the added "frame" and "subframe" limitations are nothing more than a reflection of that which was originally disclosed in the specification. In particular, it is stated on page 8, lines 14-19 that "[f]or the purposes of this description, it will be presumed that an original speech sample will be digitized, and . . . divided as necessary into frames and subframes, all in accordance with well understood prior art technique." Furthermore, the applicants assert that the inclusion of the "frame" and "subframe" language reflects the language used in the rejection of June 12, 1995, where, in objecting to the use of the phrase "speech sample", it was noted that the usual terminology calls for "an analysis frame". Thus, the amendments to add the "frame" and "subframe" limitations are seen to not only add that which was originally disclosed, but to also reflect that which was inherently "suggested" in the rejection.

Regarding (ii), it would appear that a significant misinterpretation of the claim terminology exists. Claims 1-2, and 7 refer to a "total energy", a "long term energy value", and an "overall energy value"; claims 8-10 refer to the "long term energy value". It has been asserted in the Advisory Action that the arguments presented in the August 16, 1995 response regarding the terms "overall energy" and "long term energy" are contradictory because "these energies cannot be the same and also be related in different proportions to another value." However, as noted in the August 16, 1995 response, the terms "total energy" and "long term energy value" are equivalent; no such equivalence between "overall energy" and "long term energy" has ever been stated. In furtherance of this misinterpretation, it has also been asserted in the Advisory Action that "the applicant intends for 'total energy' to be different than 'overall energy'. These terms were previously considered to have an equivalent meaning. It would be a new consideration to now interpret such similar language as having different meanings." While it is true that the applicants intend for "total energy" to be different from "overall energy", they vigorously assert that neither the specification or claims as originally filed, or any of the subsequent amendments have ever stated an equivalence between "total energy" and "overall energy". As such, the applicants submit that interpreting "total energy" as non-equivalent to "overall energy" does not

-3-

comprise a new consideration, but rather reflects the teachings of the present invention as consistently presented by the applicants.

In light of the above, the applicants further assert that the use of the terms "proportional" and "inversely proportional" are not contradictory. Rather, these terms accurately reflect, in claims 1-2 and 7, the relationships between the first, second and third parameters to the overall energy value and the long term energy value; and in claims 8-10, the relationship between the gain value to the long term energy value and the energy value for the pre-component.

Regarding (iii), as alluded to in the previous paragraph, claims 8-10 particularly claim the relationship between a gain value to a long term energy value and an energy value for a pre-component. The claimed relationships can be readily seen through the GAIN 1 (or GAIN 2) formulas as explained in the August 16, 1995 response. Although the Advisory Action did not address these amendments, the applicants submit that the claimed relationships constitute patentable subject matter.

3. The Examiner is invited to contact the undersigned by telephone or facsimile if the Examiner believes that such a communication may advance the prosecution of the present application.

Respectfully submitted,

IRA A. GERSON ET AL.

By _____

Christopher P. Moreno
Agent for Applicants
Registration No. 38,566
Phone: (708) 576-6942
Fax: (708) 576-3750

SENT BY:

10-17-95 12:28PM ;

MOTOROLA IPD-

703 308 5356:# 1/ 4

FAX MESSAGE TRANSMITTAL

MOTOROLA, INC.
Schaumburg Intellectual Property Department
Schaumburg, Illinois
Fax: (708) 576-3750

FAX MESSAGE
OCT 17 1995
GROUP 2308

FAX COVER SHEET

DATE: October 17, 1995
TO: Examiner D. Knepper / Group 2308
FAX #: (703) 308-5356
FROM: Christopher P. Moreno / Reg. No. 38,566
RE: Proposed response for upcoming interview.

APPLICANTS: Ira A. Gerson et al. EXAMINER: Knepper, D.
SERIAL NO.: 08/361,474 ART UNIT: 2308
FILED: 22 December 94 CASE NO.: CM00476HC02
ENTITLED: DIGITAL SPEECH CODER HAVING OPTIMIZED SIGNAL
ENERGY PARAMETERS

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Christopher P. Moreno

Type or print name of person signing certification

Christopher P. Moreno
Signature

10/17/95
Date

TOTAL NUMBER OF PAGES INCLUDING THIS PAGE: 4

IF THERE ARE ANY PROBLEMS WITH THIS TRANSMISSION, PLEASE
CALL: (708) 576-6942 (Chris)

Notice: This facsimile transmission may contain information that is confidential, privileged or exempt from disclosure under applicable law. It is intended only for the person to whom it is addressed. Unauthorized use, disclosure, copying or distribution may expose you to legal liability. If you have received this transmission in error, please immediately notify us by telephone (collect) to arrange for return of the documents received and any copies made.