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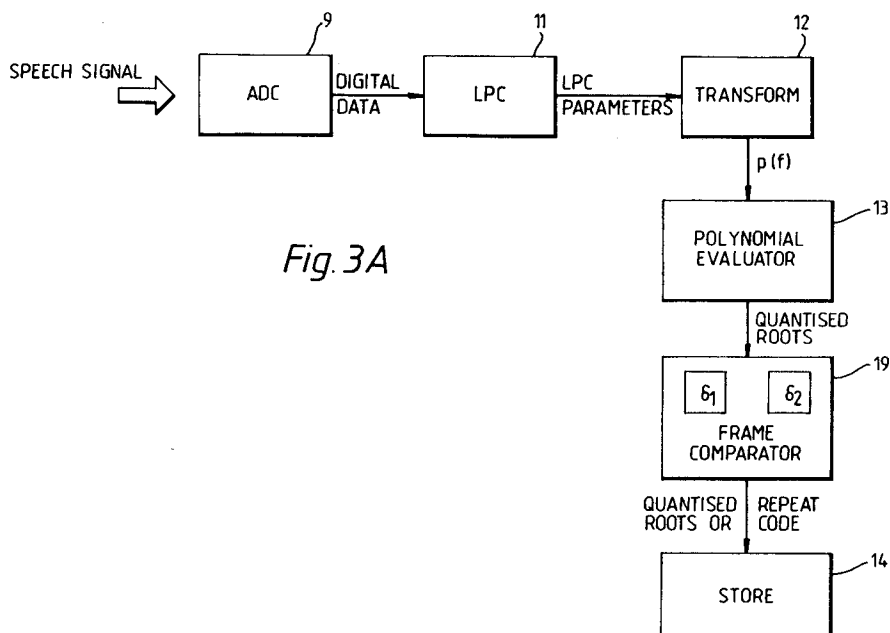
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**29.04.92 Bulletin 92/18**(71) Applicant: **PSION PLC**  
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**Gill Jennings & Every 53/64 Chancery Lane**  
**London WC2A 1HN(GB)**(54) **Encoding speech.**

(57) An apparatus for encoding speech includes circuits (2,9) which sample a speech signal and generate digital data representative of the signal. An encoder (10,11) connected to the sampling circuits encodes the digital data by linear predictive coding and generates parameters representing the speech signal. The parameters are transformed (12) to obtain sum and difference polynomials. The roots of

the sum and difference polynomials are determined (13) producing a series of line spectrum data. A storage device (14,15) stores the line spectrum data.

In one example, the line spectrum data are quantised non-uniformly in the frequency domain and the roots of the polynomials are found by evaluating those polynomials at the quantisation frequencies only.

*Fig. 3A***EP 0 440 335 A3**



## EUROPEAN SEARCH REPORT

### DOCUMENTS CONSIDERED TO BE RELEVANT

| Category                                                                                                                                                                                                                                                                                                    | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                                                                                                                                                                     | Relevant to claim                                                                                                                                                                                                             | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| X                                                                                                                                                                                                                                                                                                           | ICASSP '88 (1988 INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH, AND SIGNAL PROCESSING, New York, 11th - 14th April 1988), vol. 1, pages 675-678, IEEE, New York, US; S.S. EVERETT: "Word synthesis based on line spectrum pairs"<br>* Page 675: "Abstract", "LSP analysis" *<br>- - -                                                                                             | 1,9,15                                                                                                                                                                                                                        | G 10 L 9/14                                   |
| A                                                                                                                                                                                                                                                                                                           | ICASSP '89 (1989 INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH, AND SIGNAL PROCESSING, Glasgow, 23rd - 26th May 1989), vol. 1, pages 168-171, IEEE, New York, US; N. FARVARDIN et al.: "Efficient encoding of speech LSP parameters using the discrete cosine transformation"<br>* Paragraph 2: "LSP parameters"; paragraph 4: "Hybrid DCT-DPCM coding of LSP vectors" *<br>- - - | 1,2,9,13                                                                                                                                                                                                                      |                                               |
| A                                                                                                                                                                                                                                                                                                           | MILCOM '86 (1986 IEEE MILITARY COMMUNICATIONS CONFERENCE, Monterey, CA, 5th - 9th October 1986), vol. 2, pages 32.2.1-32.2.4, IEEE, New York, US; J.M. KOWALSKI et al.: "A 400-BPS vocoder using line spectral frequencies and frame repeat coding"<br>* Pages 32.2.1 - 32.2.3: "LSF description"; page 32.2.3: "Frame repeat VQ strategy and bit allocation" *<br>- - -          | 1,3,9,10                                                                                                                                                                                                                      | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.5)      |
| A                                                                                                                                                                                                                                                                                                           | US-A-4 815 134 (J.W. PICONE et al.)<br>* Column 8, lines 12-36 *<br>- - -                                                                                                                                                                                                                                                                                                         | 3,10                                                                                                                                                                                                                          | G 10 L 9/14                                   |
| A                                                                                                                                                                                                                                                                                                           | IEEE MICRO, vol. 7, no. 3, June 1987, pages 4-21, IEEE, New York, US; Y.A. EL-IMAM: "A personal computer-based speech analysis and synthesis system"<br>* Pages 10-13: "Speech editing and segmentation" *<br>- - - - -                                                                                                                                                           | 6,14                                                                                                                                                                                                                          |                                               |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                               |                                               |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                   | Date of completion of search<br>05 February 92                                                                                                                                                                                | Examiner<br>ARMSPACH J.F.A.M.                 |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X: particularly relevant if taken alone<br>Y: particularly relevant if combined with another document of the same category<br>A: technological background<br>O: non-written disclosure<br>P: intermediate document<br>T: theory or principle underlying the invention |                                                                                                                                                                                                                                                                                                                                                                                   | E: earlier patent document, but published on, or after the filing date<br>D: document cited in the application<br>L: document cited for other reasons<br>-----<br>&: member of the same patent family, corresponding document |                                               |