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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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[Continued on next page]

- (54) Title:** DITHERING A DIGITALLY-CONTROLLED OSCILLATOR OUTPUT IN A PHASE-LOCKED LOOP

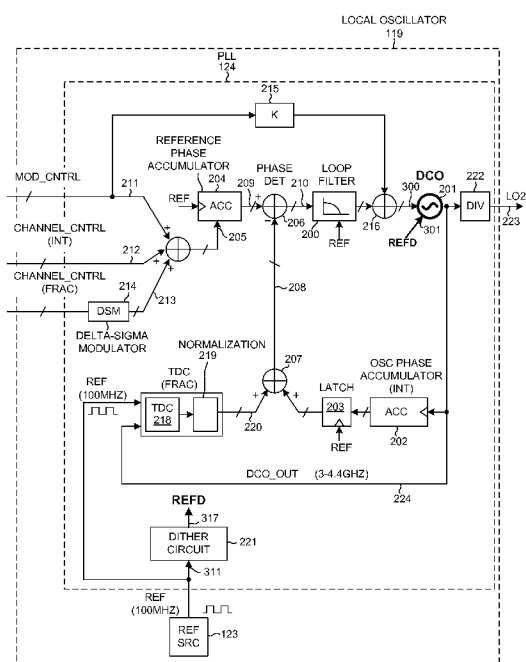


FIG. 4

(57) Abstract: A digitally-controlled oscillator (DCO) of a PLL is dithered such that a DCO_OUT signal has a frequency that changes at dithered intervals. In one example, the DCO receives an undithered stream of incoming digital tuning words, and receives a dithered reference clock signal REFD, and outputs the DCO_OUT signal such that its frequency changes occur at dithered intervals. Where the PLL is employed in the local oscillator of a cellular telephone transmitter, the novel dithering of the DCO spreads digital image noise out in frequency such that less digital image noise is present at a particular frequency offset from the main local oscillator frequency. Spreading digital image noise out in frequency allows a noise specification to be met without having to increase the frequency of the PLL reference clock. By avoiding increasing the frequency of the reference clock to meet the noise specification, increases in power consumption are avoided.



— as to the applicant's entitlement to claim the priority of
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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

INV. H03L7/099

ADD. H03L7/085 H03C3/09

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H03L H03C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 255 355 A1 (TEXAS INSTRUMENTS INC [US]) 6 November 2002 (2002-11-06) column 8, line 52 - line 56 paragraph [0028] - paragraph [0029] paragraph [0049] - paragraph [0051] figures 2,3,18,19	1-21
X	US 2002/033737 A1 (STASZEWSKI ROBERT B [US] ET AL) 21 March 2002 (2002-03-21) paragraph [0032] paragraph [0085] - paragraph [0087] figures 3,18,19 ----- -/--	1-21

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

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International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BARONTI F ET AL: "A technique for nonlinearity self-calibration of DLLs" IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 52, no. 4, 1 August 2003 (2003-08-01) , pages 1255-1260, XP011101118 ISSN: 0018-9456 page 1256, paragraph II; figure 2 -----	8,14

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1255355	A1	06-11-2002	NONE	

US 2002033737	A1	21-03-2002	NONE	
