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(74) Agents: KEANE, Patrick, C. et al.; Burns, Doane, Swecker & Mathis, L.L.P., P.O. Box 1404, Alexandria, VA 22313-1404 (US).

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(71) Applicant (for all designated States except US): LOCKHEED MARTIN CORPORATION [US/US]; 6801 Rockledge Drive, Bethesda, MD 20817 (US).

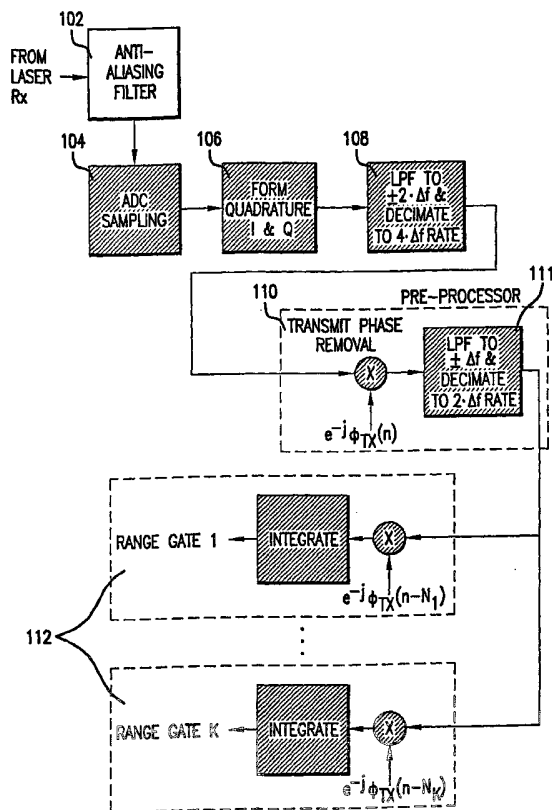
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(72) Inventor; and

(75) Inventor/Applicant (for US only): MATTOX, Barry, G. [US/US]; 201 E. Miller Street, Orlando, FL 32806 (US).

[Continued on next page]

(54) Title: TRANSMIT PHASE REMOVAL IN FM HOMODYNE RADARS



(57) Abstract: In a homodyne-receiver radar system used for ranging and/or target detection, the frequency-modulated (FM) transmit phase is removed from the received signal (Rx). Removal of the known FM transmit phase from the received signal (110) reduces the bandwidth of the received signal to half that of a system that does not remove the transmit phase. This allows the sampling rate, and thus the processor throughput, to be cut in half. With the FM transmit phase removed, the phase sequence of the processed signal is akin to a delayed version of the transmit signal phase history. This allows the range processing to use segments of a single phase sequence for processing all range gates (112), resulting in a large reduction in the amount of coefficient storage used for the matched-phase sequences required to process the set of range gates.



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**Declaration under Rule 4.17:**

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent

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**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US02/15183

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC(7) : G01S 13/58, 13/08, 13/00  
 US CL : 342/194, 115, 127, 135  
 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)  
 U.S. : 342/194, 115, 127, 135

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 practicable, search terms used)  
 EAST, search terms: transmit phase, complex conjugate, range gate, subtract or remove phase

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,211,815 A (Richey et al) 3 April 2001 (03.04.2001), column 3, lines 54-67; column 4, lines 45-46 and 52-53; column 5, lines 14-17, 34-38, and 60-65; column 6, lines 58-62.	1-4, 6, 7
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Y		5, 9-16
Y, P	US 6,317,074 A (Johnson) 13 November 2001 (13.11.2001), column 2, line 63 to column 3, line 3.	9-16
A	US 3,889,261 A (Sirven) 10 June 1975 (10.06.1975).	1-17
A	US 5,289,188 A (Chudleigh, Jr.) 22 February 1994 (22.02.1994).	1-17
A	US 6,040,898 A (Mrosik et al.) 21 March 2000 (21.03.2000).	1-17

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"B" earlier application or patent published on or after the international filing date	"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
"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)	"&"	document member of the same patent family
"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		

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 Commissioner of Patents and Trademarks  
 Box PCT  
 Washington, D.C. 20231  
 Facsimile No. (703)305-3230  
 Authorized officer: Thomas Tarcza  
 Telephone No. (703) 308-1113

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/15183

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claim Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claim Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
  4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
- Remark on Protest  The additional search fees were accompanied by the applicant's protest.  
 No protest accompanied the payment of additional search fees.