Exhibit 3

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(12) **United States Patent**

Nakao et al.

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(54) **RADIO COMMUNICATION APPARATUS AND RESPONSE SIGNAL SPREADING METHOD**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/280,190**

(22) Filed: **Oct. 24, 2011**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation of application No. 13/165,538, filed on Jun. 21, 2011, which is a continuation of application No. 12/593,904, filed as application No. PCT/JP2008/001526 on Jun. 13, 2008, now Pat. No. 8,009,721.

(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
H04B 1/00   (2006.01)

(52) **U.S. Cl.** **375/146**

(58) **Field of Classification Search** 375/130, 375/146, 260, 295; 370/208–210
See application file for complete search history.

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(57)   **ABSTRACT**

A wireless communication apparatus capable of minimizing the degradation in separation characteristic of a code multi-plexed response signal. In this apparatus, a control part (**209**) controls both a AC sequence to be used in a primary spreading in a spreading part (**214**) and a Walsh sequence to be used in a secondary spreading in a spreading part (**217**) so as to allow a very small circular shift interval of the ZC sequence to absorb the interference components remaining in the response signal; the spreading part (**214**) uses the ZC sequence set by the control part (**209**) to primary spread the response signal; and the spreading part (**217**) uses the Walsh sequence set by the control part (**209**) to secondary spread the response signal to which PC has been added.

24 Claims, 15 Drawing Sheets

CYCLIC SHIFT VALUE OF ZC SEQUENCE (0~11)
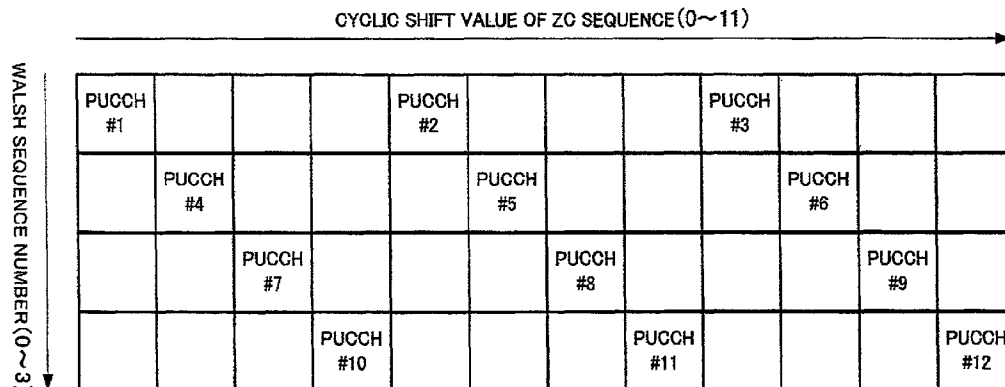
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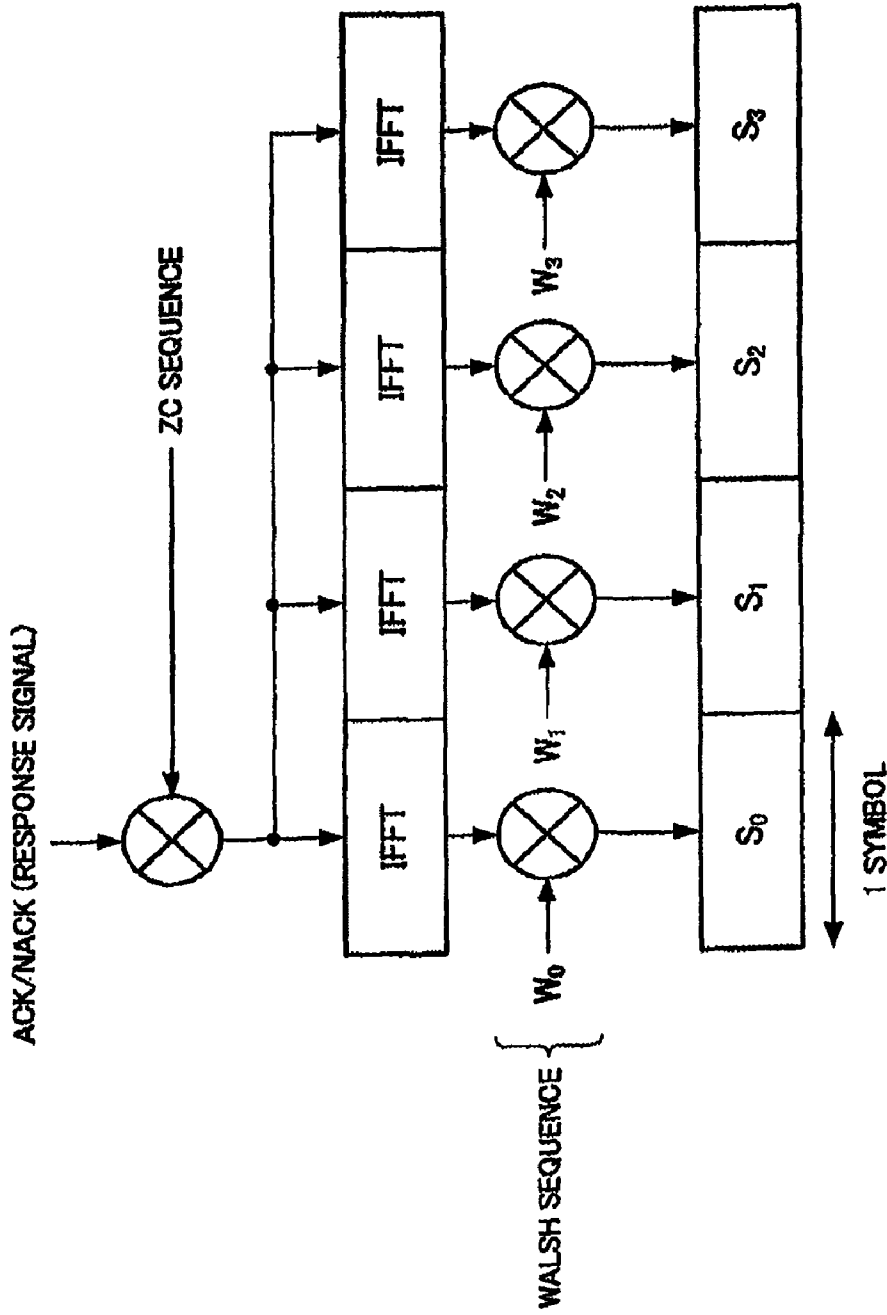
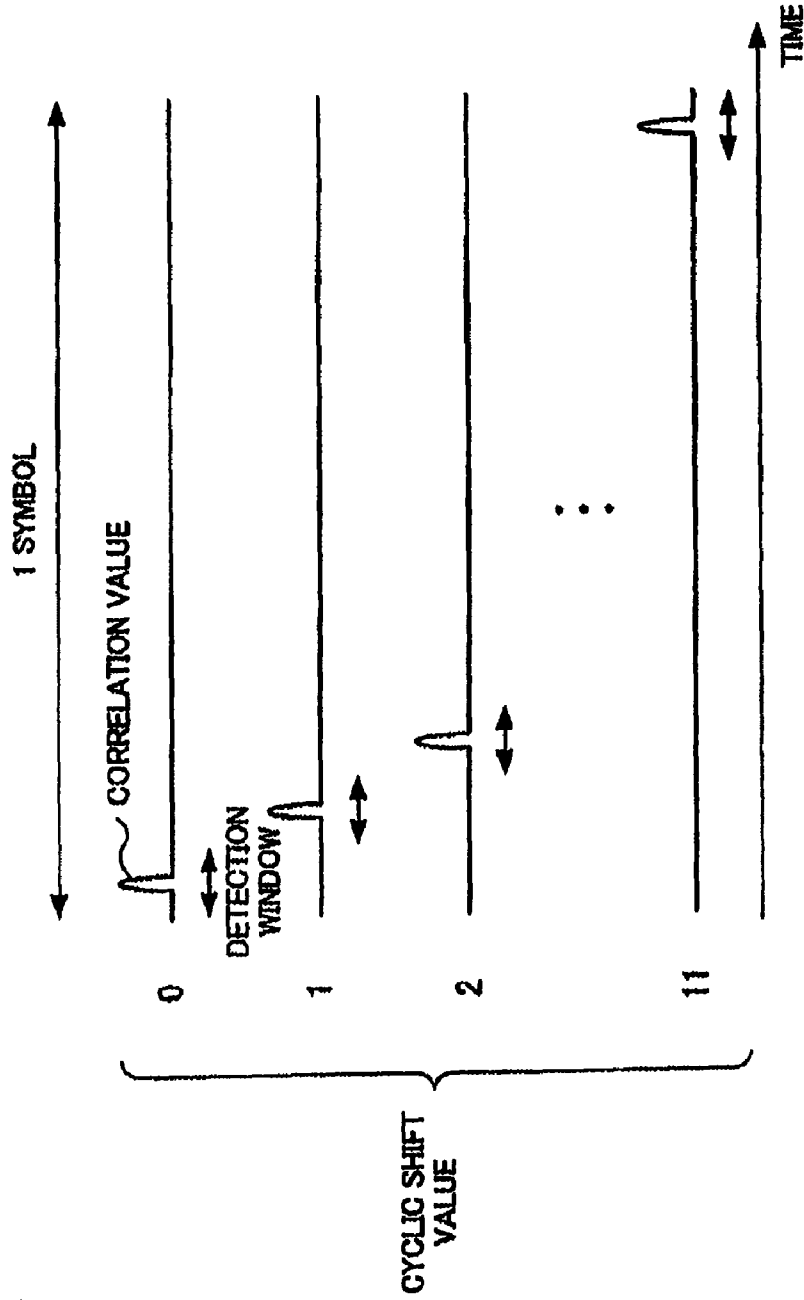* cited by examiner

FIG.1   (Prior Art)

1 SYMBOL

CORRELATION VALUE

DETECTION WINDOW

0

1

2

11

· · ·

TIME

CYCLIC SHIFT VALUE

FIG.2   (Prior Art)

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