



US007548037B2

(12) **United States Patent**
Boisvert et al.

(10) **Patent No.:** **US 7,548,037 B2**
(45) **Date of Patent:** **Jun. 16, 2009**

(54) **COLLISION MONITORING SYSTEM**
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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 351 days.

(21) Appl. No.: **10/100,892**

(22) Filed: **Mar. 18, 2002**

(65) **Prior Publication Data**
US 2002/0101210 A1 Aug. 1, 2002

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/562,986,
filed on May 1, 2000, now Pat. No. 6,404,158, which is
a continuation-in-part of application No. 08/736,786,
filed on Oct. 25, 1996, now Pat. No. 6,064,165, which
is a continuation of application No. 08/275,107, filed
on Jul. 14, 1994, now abandoned, which is a continu-
ation-in-part of application No. 07/872,190, filed on
Apr. 22, 1992, now Pat. No. 5,334,876.

(60) Provisional application No. 60/169,061, filed on Dec.
6, 1999.

(51) **Int. Cl.**
G05D 3/00 (2006.01)

(52) **U.S. Cl.** **318/466; 318/461; 318/465;**
318/467; 318/468; 318/469

(58) **Field of Classification Search** **318/264-266,**
318/280-286, 460-470, 565, 626, 434, 139,
318/474-477, 815, 833, 903; 701/36, 49

See application file for complete search history.

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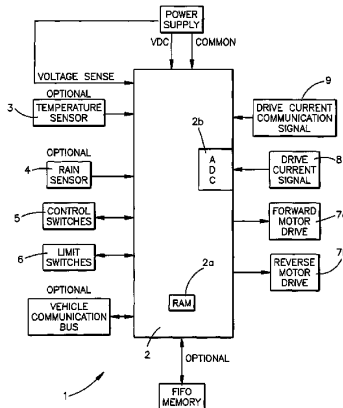
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Tummino LLP

(57) **ABSTRACT**

Disclosed is an improved system and method for sensing both
hard and soft obstructions for a movable panel such as a
sunroof. A dual detection scheme is employing that includes
an optical sensing as the primary means and electronic sens-
ing of motor current as a secondary means. The secondary
means utilizes system empirical precharacterization, fast pro-
cessing algorithms, motor parameter monitoring including
both current sensing and sensorless electronic motor current
commutation pulse sensing, and controller memory, to adap-
tively modify electronic obstacle detection thresholds in real
time without the use of templates and cycle averaging tech-
niques.

24 Claims, 9 Drawing Sheets



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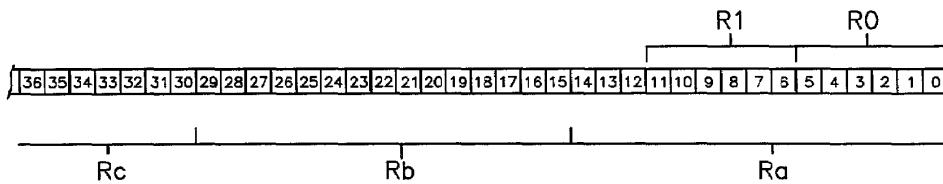
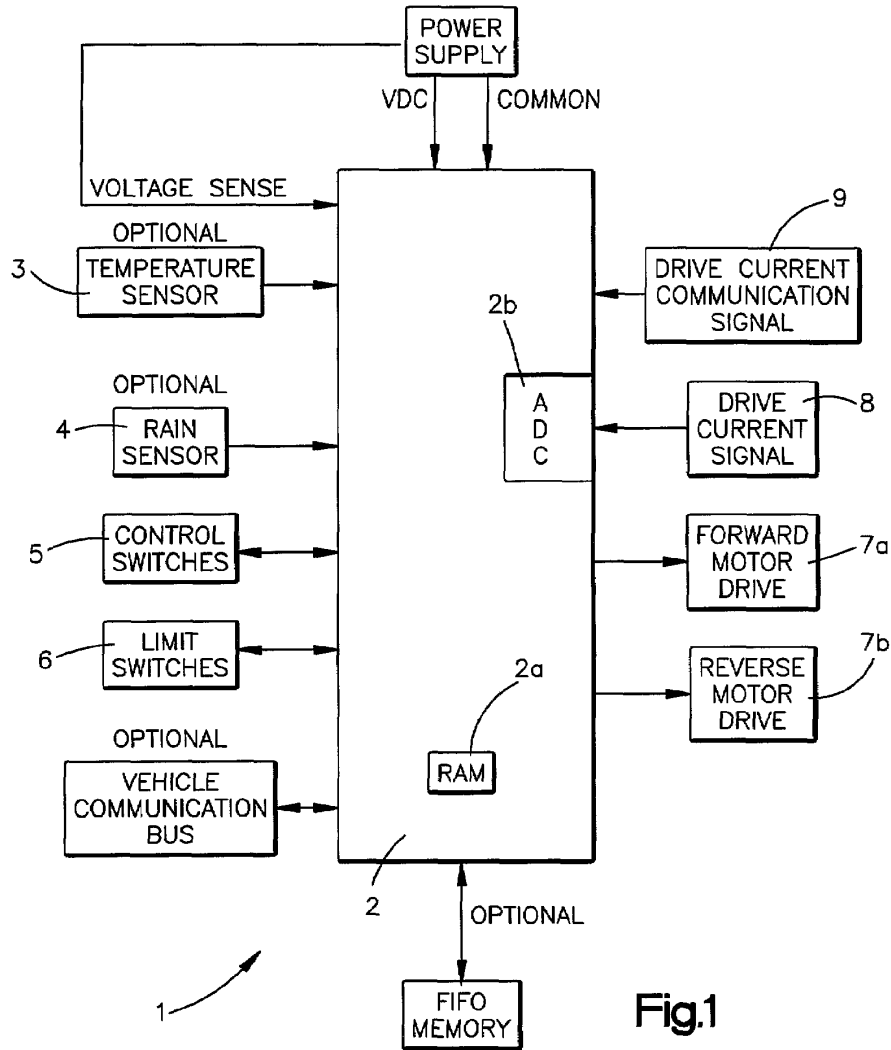


Fig.8

Fig.2A

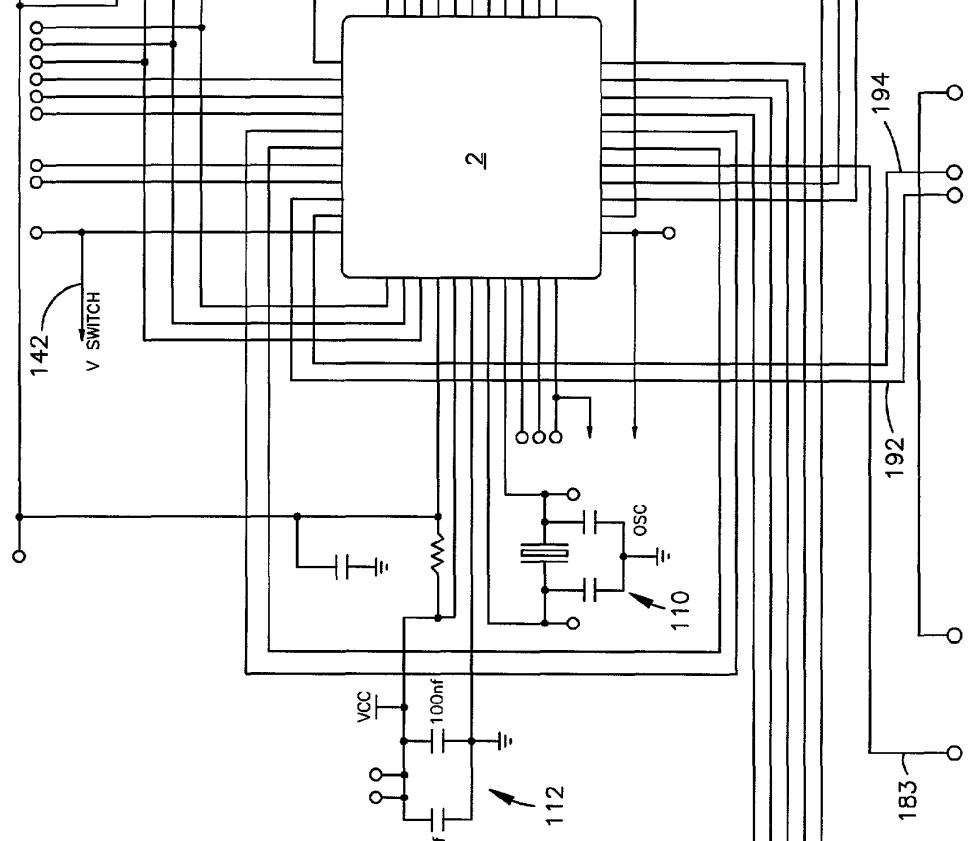
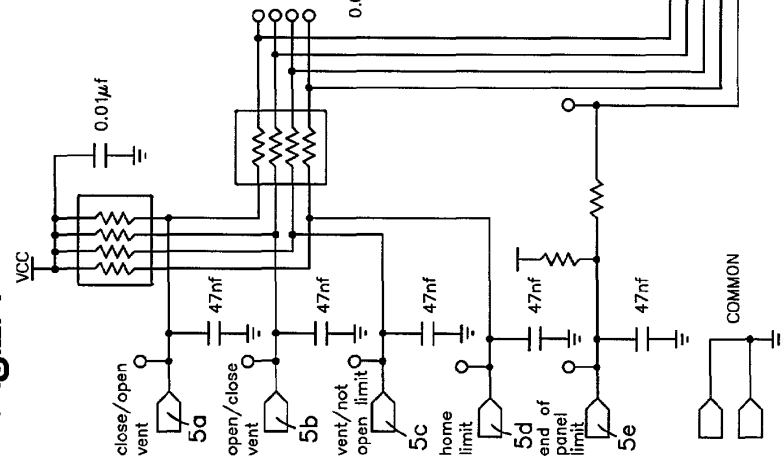


Fig.2C

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