

(12) **United States Patent**  
**Stilp**

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(54) **INTERNAL CALIBRATION METHOD FOR RECEIVER SYSTEM OF A WIRELESS LOCATION 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 0 days.

This patent is subject to a terminal disclaimer.

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**Related U.S. Application Data**

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(51) **Int. Cl.**<sup>7</sup> ..... **G01S 1/24**

(52) **U.S. Cl.** ..... **342/387; 342/174**

(58) **Field of Search** ..... 342/165, 174,  
342/385, 387, 450, 457

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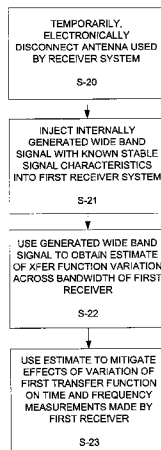
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(57) **ABSTRACT**

Methods and apparatus for calibrating a Wireless Location System to enable the system to make highly accurate TDOA and FDOA measurements are disclosed. An external calibration method in accordance with the present invention comprises the steps of transmitting a first reference signal from a reference transmitter; receiving the first reference signal at first and second receiver systems; determining a first error value by comparing a measured TDOA (or FDOA) value with a theoretical TDOA (or FDOA) value associated with the known locations of the receiver systems and the known location of the reference transmitter; and utilizing the first error value to correct subsequent TDOA measurements associated with a mobile transmitter to be located. An internal calibration method in accordance with the present invention comprises the steps of injecting a comb signal into the first receiver system; utilizing the comb signal to obtain an estimate of the manner in which the transfer function varies across the bandwidth of the first receiver system; and utilizing the estimate to mitigate the effects of the variation of the first transfer function on the time measurements made by the first receiver system.

**8 Claims, 27 Drawing Sheets**



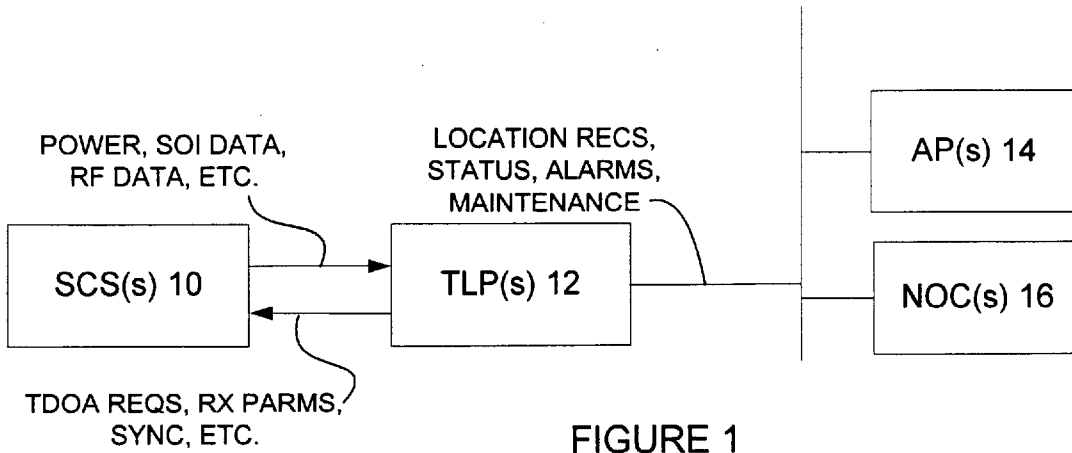


FIGURE 1

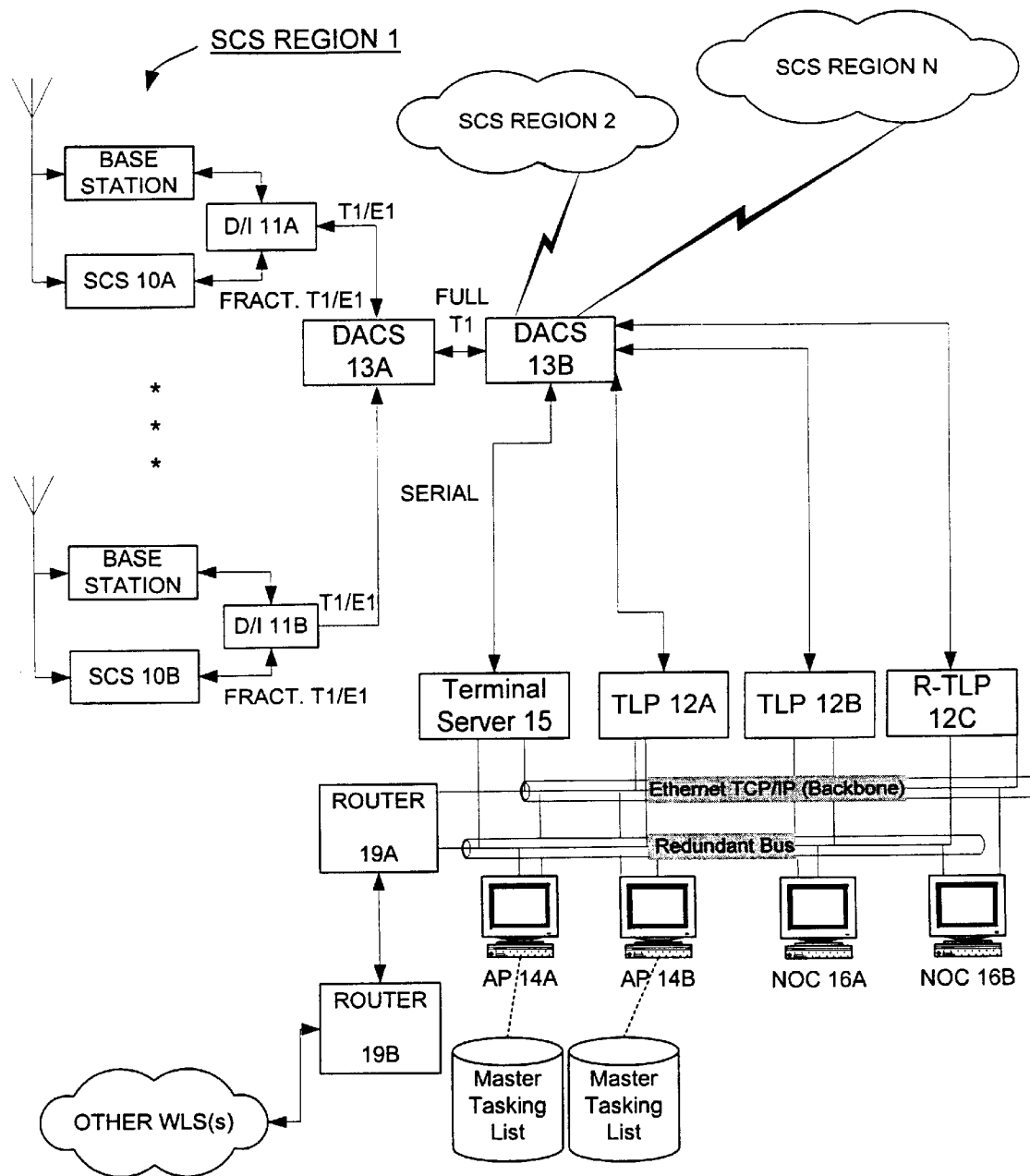


FIGURE 1A

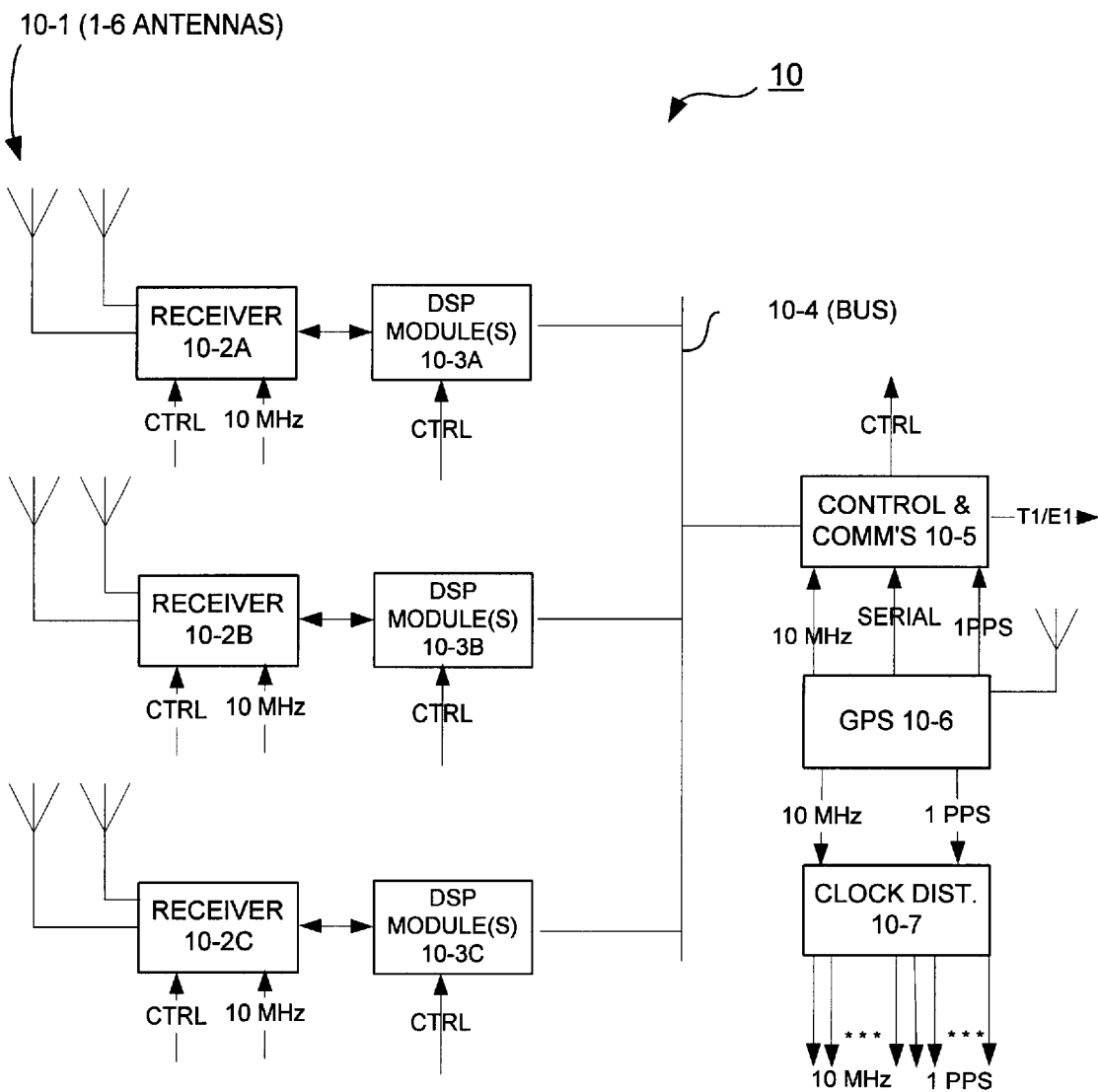


FIGURE 2

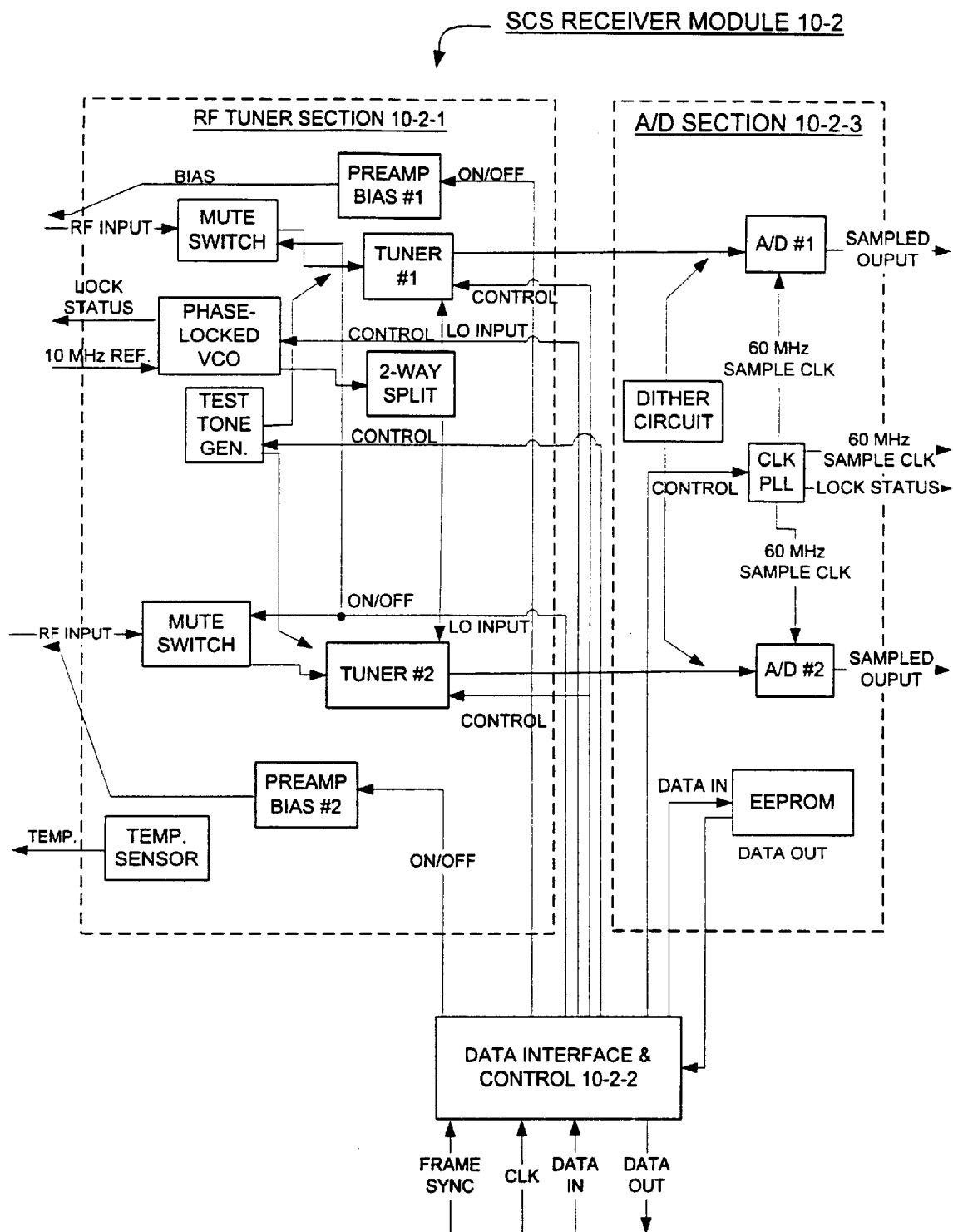


FIGURE 2A

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