CLAIMS

What is claimed is:

1. A navigation signal transmitter comprising:

a receiving section for receiving a transmission wave and generating a synchronization pulse in synchronization with a predetermined data frame;

a reference signal synchronizing section for generating an internal clock fundamental oscillation by using a pulse generated in the receiving section as a reference pulse;

an IMES signal generating section for generating an IMES signal based on the internal clock fundamental oscillation; and

a transmission antenna through which the IMES signal generated in the IMES signal generating section is transmitted,

wherein the reference signal synchronizing section comprises a counter circuit, a comparator, a low-pass control filter, a D/A converter, a voltage controlled oscillator, and a frequency dividing circuit,

wherein the counter circuit is operable to count the number of clock pulses generated in the voltage controlled oscillator, using a signal input from the transmission wave as a reference signal, and the comparator is operable to compare the counted value with a reference value, and

wherein the reference signal synchronizing section is configured to, when a magnitude relationship as a result of the comparison in the comparator falls within a predetermined value and continues a predetermined number of times in one direction, controllably adjust a level of control voltage of the voltage controlled oscillator.

2. The navigation signal transmitter as defined in claim 1, wherein when the magnitude relationship as a result of the comparison in the comparator exceeds the predetermined value, the counted value is controllably discarded.

3. The navigation signal transmitter as defined in claim 2, wherein when the magnitude relationship as a result of the comparison in the comparator exceeds the predetermined value and the value exceeding the predetermined value continues a predetermined number of times within a predetermined time period, a value as a time constant is controllably changed.

4. The navigation signal transmitter as defined in any one of claims 1 to 3, wherein; the transmission wave is a GSM or LTE wave in transmitted from a GSM or LE base station; the data frame is a GSM or LTE data frame; and the synchronizing pulse is a pulse having a cycle of 10/100/1000ms.

5. The navigation signal transmitter as defined in any one of claims 1 to 4, wherein; the transmission wave is a PHS radio wave in 1.9 GHz band transmitted from a PHS base station; the data frame is a PHS data frame; and the synchronizing pulse is a pulse having a cycle of 100ms.

6. The navigation signal transmitter as defined in any one of claims 1 to 4, wherein the transmission wave is an FM broadcast wave.

7. The navigation signal transmitter as defined in any one of claims 1 to 4 when the transmission wave is a terrestrial digital broadcast wave.

8. A method of transmitting a navigation signal comprising the steps of:

receiving by a receiving section a transmission wave and generating a synchronization pulse in synchronization with a predetermined data frame;

generating by a reference signal synchronizing section an internal clock fundamental oscillation by using a pulse generated in the receiving section as a reference pulse;

generating by an IMES signal generating section an IMES signal based on the internal clock fundamental oscillation; and

transmitting by a transmission antenna the IMES signal generated in the IMES signal generating section;

wherein the reference signal synchronizing section comprises a counter circuit, a comparator, a low-pass control filter, a D/A converter, a voltage controlled oscillator, and a frequency dividing circuit, and

wherein the step of generating an internal clock fundamental oscillation includes: counting by the counter circuit the number of clock pulses generated in the voltage controlled oscillator, using a signal input from the transmission wave as a reference signal, and the comparator is operable to compare the counted value with a reference value, and when a magnitude relationship as a result of the comparison in the comparator falls within a predetermined value and continues a predetermined number of times in one direction, controllably adjusting a level of control voltage of the voltage controlled oscillator.

9. The method as defined in claim 8, wherein when the magnitude relationship as a result of the comparison in the comparator exceeds the predetermined value, the counted value is controllably discarded.

10. The method as defined in claim 9, wherein when the magnitude relationship as a result of the comparison in the comparator exceeds the predetermined value and the value exceeding the predetermined value continues a predetermined number of times within a predetermined time period, a value as a time constant is controllably changed.

CLAIMS

1. An invention not claimed in any divisional application.