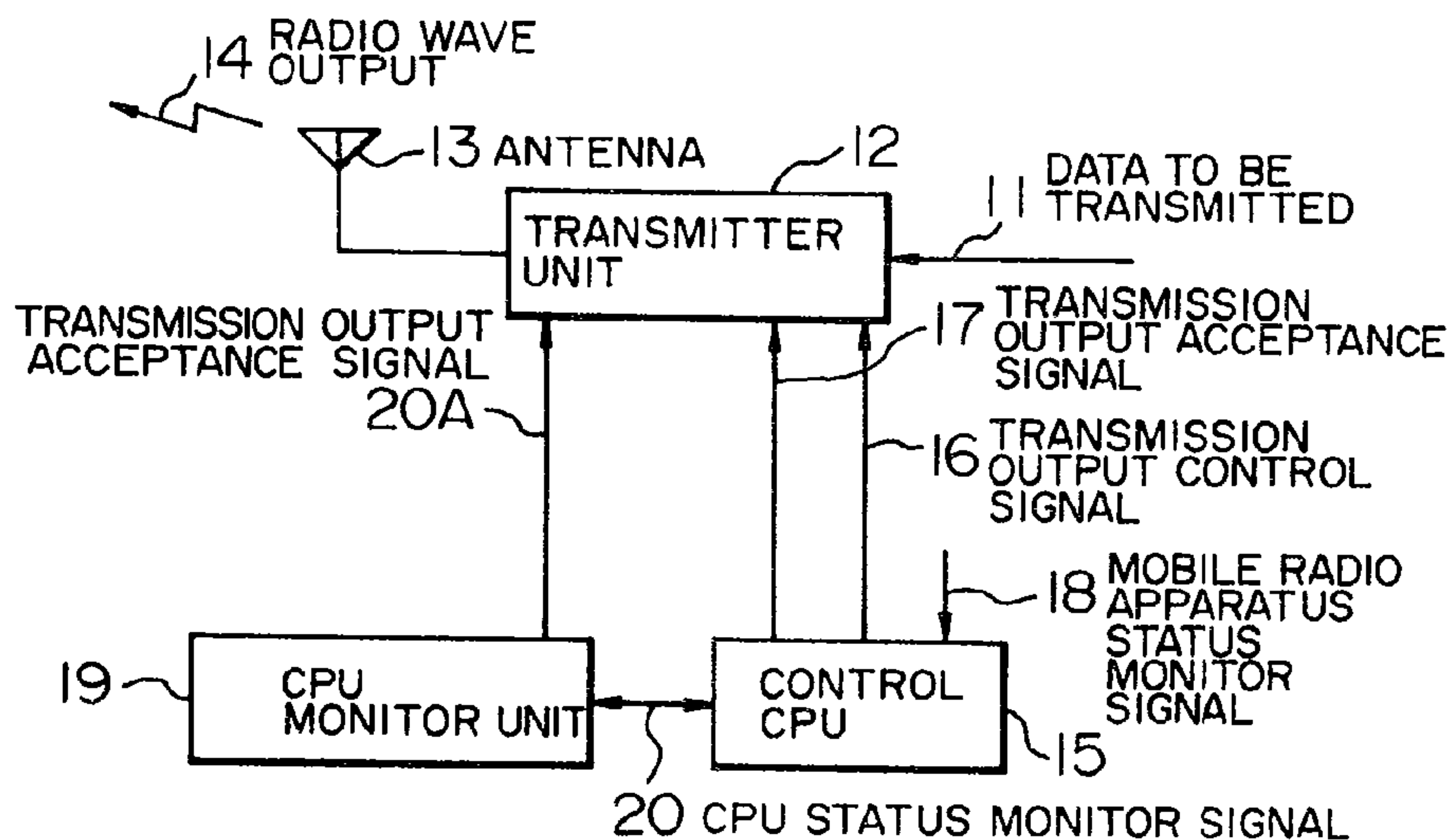




(11) (21) (C) **2,127,672**
(22) 1994/07/08
(43) 1995/01/17
(45) 2000/02/01

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(51) Int.Cl.⁵ H04B 7/26, H04B 17/00
(30) 1993/07/16 (05-199018) JP
(54) **SYSTEME RADIO MOBILE**
(54) **MOBILE RADIO SYSTEM**



(57) A mobile radio system having a base station and a plurality of mobile radio apparatuses, each mobile radio apparatus includes a control CPU for controlling the mobile radio apparatus and monitoring the state of the hardware of the mobile radio apparatus, a transmitter unit for transmitting data in the form of a radio wave, and a CPU monitor unit for monitoring an abnormality of the control CPU, wherein the control CPU regularly monitors and checks an abnormality of the hardware of the mobile radio apparatus, the CPU monitor unit regularly monitors and checks an abnormality of the control CPU, and if there is an abnormality, a disabled transmission output acceptance signal is supplied to the transmitter unit to perform a control of inhibition or suppression of a radio wave output, thereby avoiding an interference to the system to be caused by an unnecessary radio wave transmission from an abnormal mobile radio apparatus.

ABSTRACT OF THE DISCLOSURE

A mobile radio system having a base station and a plurality of mobile radio apparatuses, each mobile radio apparatus includes a control CPU for controlling the mobile radio apparatus and monitoring the state of the hardware of the mobile radio apparatus, a transmitter unit for transmitting data in the form of a radio wave, and a CPU monitor unit for monitoring an abnormality of the control CPU, wherein the control CPU regularly monitors and checks an abnormality of the hardware of the mobile radio apparatus, the CPU monitor unit regularly monitors and checks an abnormality of the control CPU, and if there is an abnormality, a disabled transmission output acceptance signal is supplied to the transmitter unit to perform a control of inhibition or suppression of a radio wave output, thereby avoiding an interference to the system to be caused by an unnecessary radio wave transmission from an abnormal mobile radio apparatus.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a mobile radio system equipped with means for suppressing an output of interference radio waves in the technical field of mobile radio.

Description of the Related Art

Fig. 3 is a schematic diagram showing the structure of a conventional mobile radio transmitter. In Fig. 3, reference numeral 1 represents data to be transmitted, reference numeral 2 represents a transmitter unit, and reference numeral 3 represents an antenna. Data 1 supplied to the transmitter unit 2 is modulated and transmitted as a radio wave output 4 from the antenna 3. Reference numeral 5 represents a control CPU which supplies a transmission output control signal to the transmitter unit 2. The transmission output control signal controls the on/off of transmission, transmission power level, and the like.

A method of controlling a radio wave output of the mobile radio apparatus constructed as above will be described. Referring to Fig. 3, if there is data 1 to be transmitted, the control CPU 5 controls the transmission on/off, transmission power level, and the like of a transmission power amplifier and the like of the

transmitter unit 2. The data modulated at the transmitter unit 2 is transmitted as a radio wave output 4 from the antenna 1 at a predetermined transmission power level.

5 In the above-described manner, the control CPU has performed the radio wave output control of the conventional mobile radio apparatus described above.

With such a conventional mobile radio apparatus, however, if the control CPU controlling the
10 transmission power of the mobile radio apparatus crashes or the hardware of the mobile radio apparatus breaks down, there is a possibility of transmitting radio waves at an unexpected timing or at an unexpected power level. For example, in a mobile radio system using CDMA (code
15 division multiple access), users in one area are assigned a same carrier. Therefore, a radio wave output of one mobile radio apparatus becomes an interference radio wave to another mobile radio apparatus. It is therefore necessary for each mobile radio apparatus to
20 control its transmission power correctly. If a mobile radio apparatus transmits a radio wave output at a power level larger than the predetermined level, another mobile radio apparatus may possibly be interfered by the large radio wave. In such a case, the number of users
25 in one area is required to be reduced. The mobile radio system may become unable to operate if a mobile radio apparatus becomes defective and transmits too a large radio wave output.

The above-described problems are also associated with a parent-child communication system (JP-A-3-240328) in which any abnormality between a parent apparatus and a child apparatus is monitored.

5 SUMMARY OF THE INVENTION

The present invention solves the above-described problems of the prior art and aims at providing an excellent mobile radio system capable of stopping or suppressing a radio wave output when an
10 abnormality of a mobile radio apparatus is detected.

In order to achieve the above object, the mobile radio apparatus of a mobile radio system of the invention includes a CPU for controlling the mobile radio apparatus and monitoring the status of the
15 hardware of the mobile radio apparatus, a transmitter unit for transmitting data in the form of a radio wave, and a CPU monitor unit for regularly monitoring and checking an abnormality of the CPU, wherein the CPU regularly monitors and checks an abnormality of the
20 hardware of the mobile radio apparatus, the CPU monitor unit regularly monitors and checks an abnormality of the CPU, and if one of the CPU and CPU monitor unit detects any abnormality, a signal for inhibiting or suppressing a radio wave output is supplied to the transmitter unit.

25 Furthermore, a base station of the mobile radio system of the invention includes means for transmitting a signal for inhibiting or suppressing a

radio wave output to a mobile radio apparatus when the base station detects that the mobile radio apparatus is abnormal.

According to the present invention, the CPU
5 controlling a mobile radio apparatus regularly monitors and checks an abnormality of the hardware of the mobile radio apparatus, and the CPU monitor unit regularly monitors and checks an abnormality of the CPU. Therefore, if one of the hardware of the mobile radio
10 apparatus and the CPU becomes abnormal, a radio wave output of the transmitter unit is inhibited or suppressed so that an interference to the system can be avoided.

Furthermore, according to the present invention, if the base station detects an abnormality of a
15 mobile radio apparatus, it transmits a signal like the signal supplied from the CPU or CPU monitor unit to the transmitter unit of the mobile radio apparatus, to the mobile radio apparatus. It is therefore possible to
20 inhibit or suppress a radio wave output of the transmitter unit of the mobile radio apparatus, thereby avoiding an interference to the system.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic block diagram showing
25 the structure of a transmitter unit of a mobile radio apparatus according to a first embodiment of the present invention.

Fig. 2 is a schematic block diagram showing the structure of a transceiver unit at a base station according to a second embodiment of the present invention.

5 Fig. 3 is a schematic block diagram showing the structure of a transmitter unit of a conventional mobile radio apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS
(1st Embodiment)

10 Fig. 1 shows the outline of the structure of a transmitter unit of a mobile radio apparatus according to the first embodiment of the invention. In Fig. 1, reference numeral 11 represents data to be transmitted, reference numeral 12 represents a transmitter unit, and
15 reference numeral 13 represents an antenna. Data 11 supplied to the transmitter unit 12 is modulated and transmitted as a radio wave output 14 from the antenna 13. Reference numeral 15 represents a control CPU which supplies a transmission output control signal to the
20 transmitter unit 12. The transmission output control signal controls the on/off of transmission, transmission power level, and the like. Reference numeral 17 represents a transmission output acceptance signal supplied from the control CPU 15, and reference numeral
25 18 represents a mobile radio apparatus status monitor signal. Reference numeral 19 represents a CPU monitor unit, reference numeral 20 represents a CPU status

monitor signal to be transferred between the control CPU 15 and the CPU monitor unit 19, and reference numeral 20A represents another transmission output acceptance signal supplied from the CPU monitor unit 19.

5 A method of controlling a radio wave output of the transmitter unit of the mobile radio apparatus constructed as above will be described. Referring to Fig. 3, if there is data 11 to be transmitted, the control CPU 5 controls the transmission on/off, trans-
10 mission power level, and the like of a transmission power amplifier and the like of the transmitter unit 12 in the normal state. The data modulated at the transmitter unit 12 is transmitted as a radio wave output 14 from the antenna 11 at a predetermined
15 transmission power level. During data transmission, the control CPU 15 monitors the mobile radio apparatus status monitor signal 18 to check any abnormality of the status of the hardware of the mobile radio apparatus. The CPU monitor unit 19 monitors the CPU status signal
20 20 to check any abnormality of the status of the control CPU 15. The CPU monitor unit 19 is typically a watch dog timer. The control CPU 15 and CPU monitor unit 19 monitor each other. If the control CPU 15 detects any abnormality, a disabled transmission output acceptance
25 signal 17 is supplied to the transmitter unit 12 to control or inhibit the radio wave output 14, whereas if the CPU monitor unit 19 detects any abnormality, a disabled transmission output acceptance signal 20A is

supplied to the transmitter unit 12 to control or inhibit the radio wave output 14. When such control or inhibition is executed, an error is displayed on a display panel of the mobile radio apparatus. As a
5 method of controlling or inhibiting a radio wave output of the transmitter unit 12, various methods may be used such as stopping a power supply to a transmission power amplifier, setting a local frequency so as to modulate transmission data into the outside of an assigned use
10 frequency range and controlling the power level of the transmission data by a BPF at the following stage, masking upper bits of transmission data in a digital communication system before digital-to-analog conversion to control the transmission power level.

15 According to the first embodiment, if one of the control CPU 15 and CPU monitor unit 19 detects an abnormality of the mobile radio apparatus or the control CPU 15, for example, when a power of the mobile radio apparatus is turned on, a radio wave output of the
20 transmitter unit 12 is inhibited or suppressed so that an interference to the system can be avoided.

(2nd Embodiment)

 The second embodiment of the present invention will be described. In the second embodiment of the
25 invention, a base station inhibits or suppresses a radio wave output of a mobile radio apparatus even if the control by the first embodiment becomes unable to be performed. Fig. 2 shows the outline of the structure of

a transmitter unit at a base station. In Fig. 2, reference numeral 21 represents an antenna, reference numeral 22 represents a transmitter unit, reference numeral 23 represents a receiver unit, reference numeral 24 represents a control CPU which controls the transmitter unit 22 and receiver unit 23, and reference numeral 25 represents a mobile radio status monitor unit for monitoring any abnormality of a mobile radio apparatus. Reference numeral 26 represents a mobile radio apparatus status monitor signal which is outputted from the receiver 23 when any abnormality of a mobile radio apparatus is detected from signals received by the receiver unit 23, and reference numeral 27 represents a mobile radio apparatus transmission output control signal which is outputted from the mobile radio apparatus monitor unit 25 to the transmitter unit 22 when an abnormality of a mobile radio apparatus is detected. In response to this signal 27, the transmitter unit 22 transmits a signal for inhibiting or suppressing a radio wave output, to the mobile radio apparatus having the abnormality.

A method of controlling a radio wave output of a mobile radio apparatus to be performed by the transmitter at the base station constructed as above will be described. When the mobile radio apparatus monitor unit 25 detects from the mobile radio apparatus status monitor signal 26 that data transmitted by a mobile radio apparatus and received from the antenna 21 by the

receiver unit 23 has an abnormally large transmission power level, the mobile radio apparatus 25 instructs the transmitter unit 22 to transmit a signal for inhibiting or suppressing the radio wave output, to the mobile
5 radio apparatus. When the signal transmitted from the transmitter unit 22 via the antenna 21 is received by the partner mobile radio apparatus, a disabled transmission output acceptance signal 20A is supplied to the transmitter unit 12 in the manner like the first
10 embodiment shown in Fig. 1 to inhibit or suppress the radio wave output by a method stopping a power supply to the transmission power amplifier or another method.

According to the second embodiment, even if a radio wave output cannot be suppressed on the side of a
15 mobile radio apparatus having an abnormality, this abnormality is detected by the base station, and the base station performs a radio wave output control of the mobile radio apparatus so that an interference to the system can be minimized.

20 As appreciated from the above embodiments of the invention, the control CPU of a mobile radio apparatus regularly monitors and checks an abnormality of the hardware of the mobile radio apparatus, and the CPU monitor unit regularly monitors and checks an
25 abnormality of the control CPU. Therefore, if one of the hardware and the control CPU becomes abnormal, a radio wave output of the transmitter unit is inhibited or suppressed so that an interference to the system can

be avoided.

Furthermore, according to the present invention, if the base station detects an abnormality of a mobile radio station, it transmits a signal for
5 inhibiting or suppressing a radio wave output to the mobile radio apparatus. Therefore, even if a radio wave output suppression cannot be performed properly at the mobile radio apparatus, an interference to the system can be minimized.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A mobile radio system having a base station and a plurality of mobile radio apparatuses, each said mobile radio apparatus comprising:
 - a CPU for controlling said mobile radio apparatus and monitoring the status of the hardware of said mobile radio apparatus;
 - a transmitter unit for transmitting data in the form of a radio wave; and
 - a CPU monitor unit for monitoring an abnormality of said CPU, whereinsaid CPU regularly monitors and checks an abnormality of the hardware of said mobile radio apparatus, said CPU monitor unit regularly monitors and checks an abnormality of said CPU, and if one of said CPU and said CPU monitor unit detects any abnormality, a signal for inhibiting or suppressing a radio wave output is supplied to said transmitter unit.
2. A mobile radio system according to claim 1, wherein said base station includes means for transmitting a signal for inhibiting or suppressing a radio wave output to said mobile radio apparatus when said base station detects that said mobile radio apparatus is abnormal.

FIG. 1

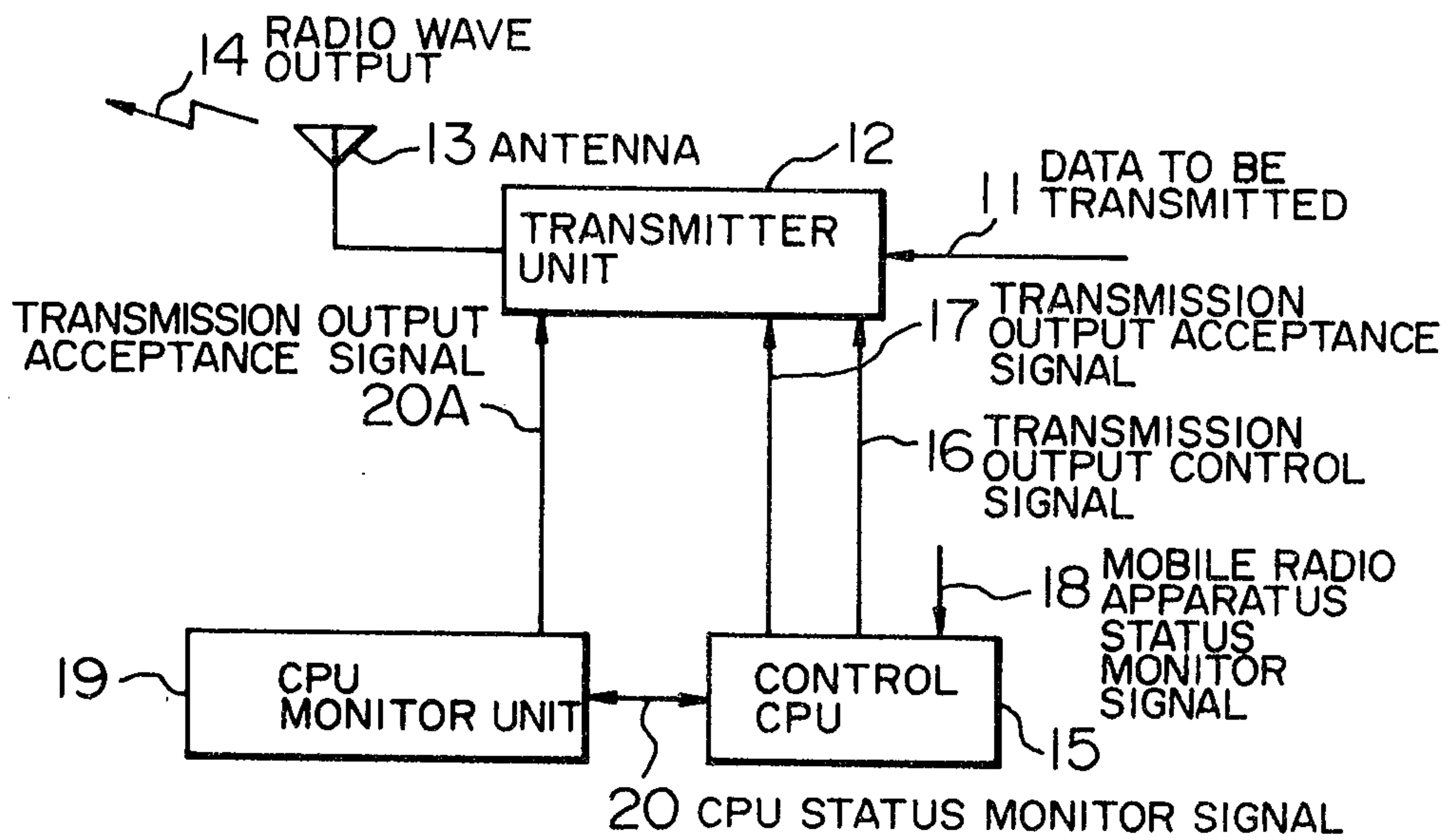
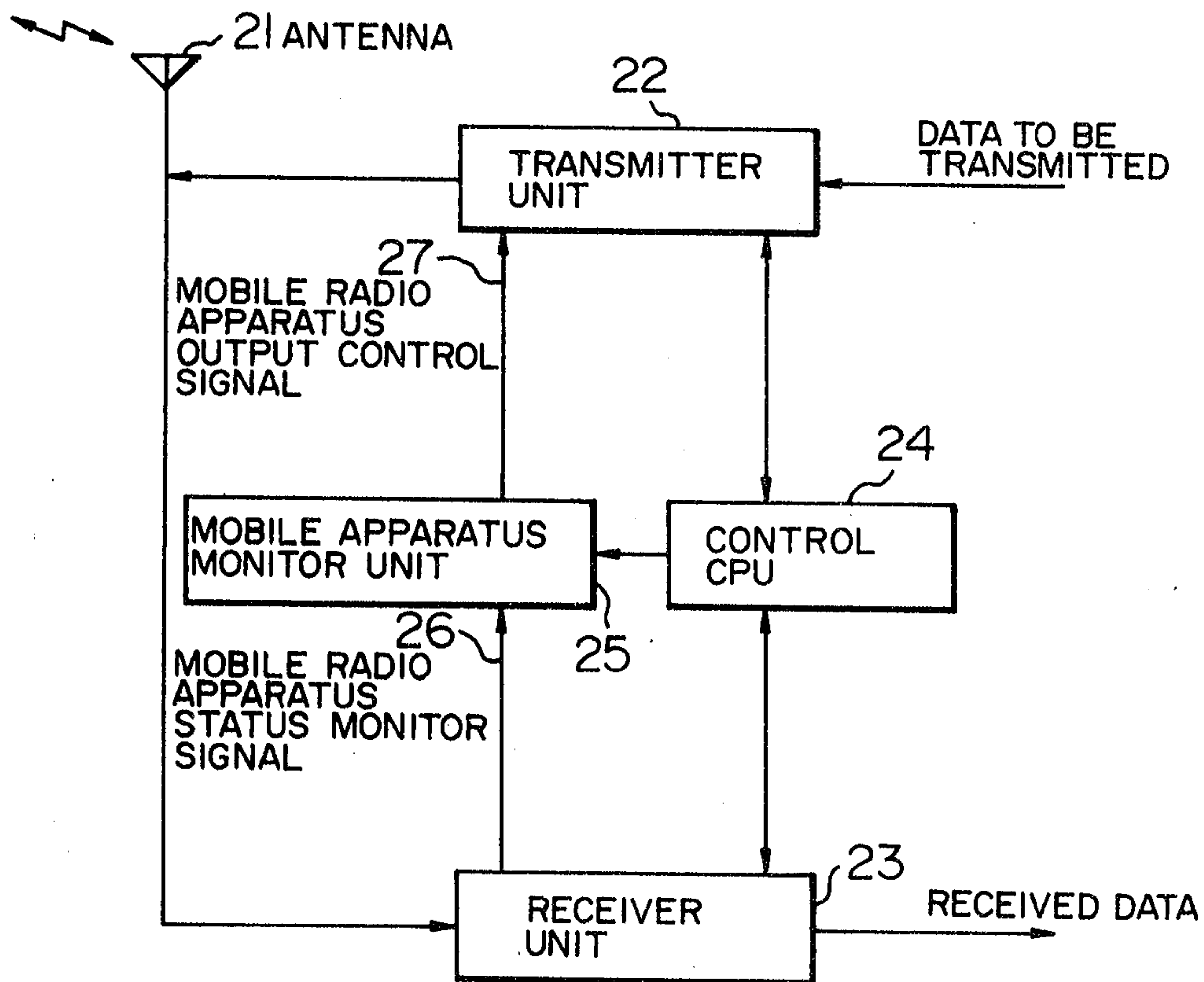
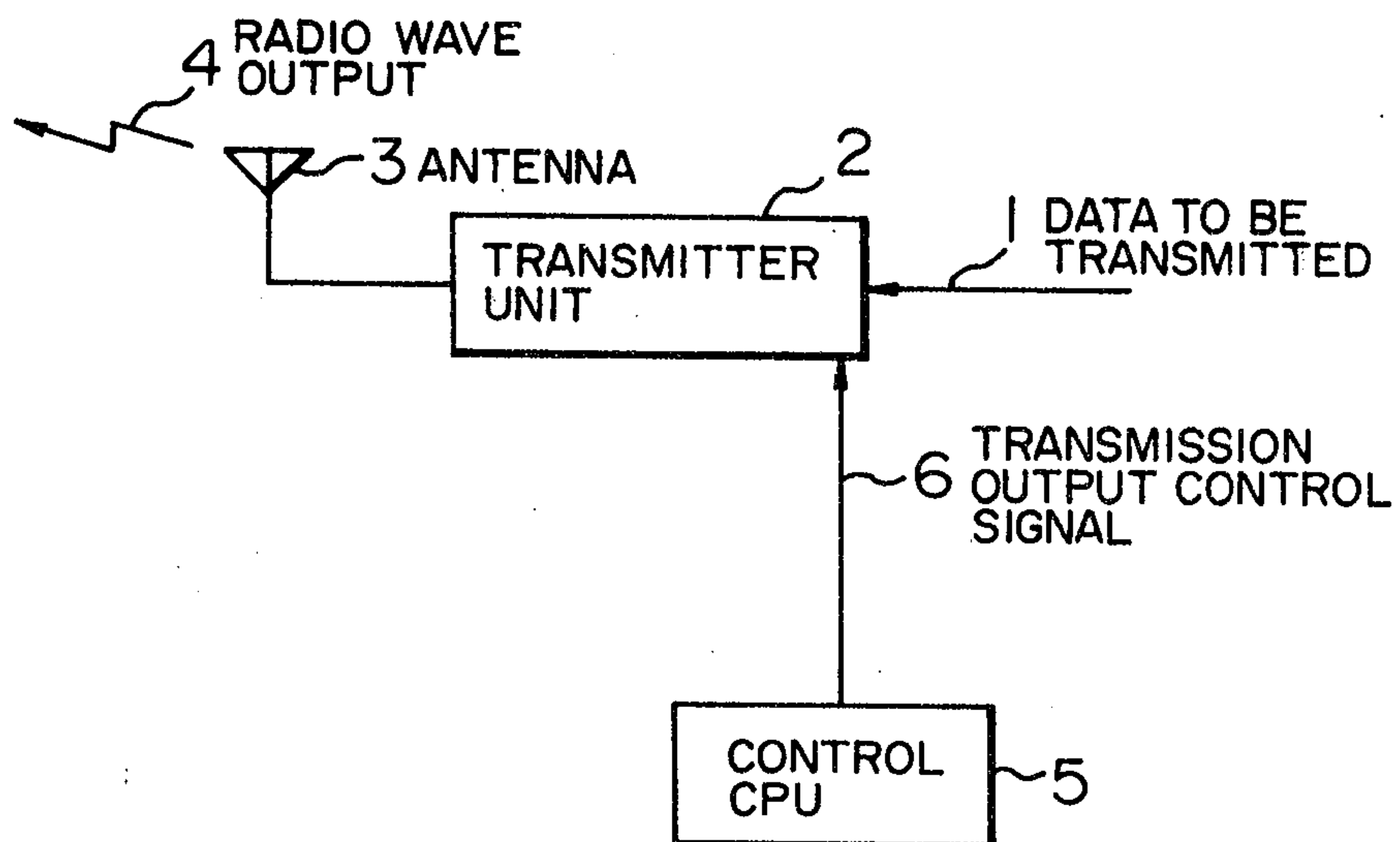


FIG. 2



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FIG. 3
PRIOR ART



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