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(54) **An integrated real time clock circuit**

Integrierte Zeitgeberschaltung

Circuit intégré d'horloge à temps réel

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EP 2 708 962 B1

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Description

[0001] The invention relates to an integrated circuit comprising an integrated real time clock unit adapted to provide a precise real time for an electronic device.

[0002] In many applications it is necessary to provide a precise real time PRT for a device, in particular for a mobile device which may be transported between different time zones.

[0003] A conventional real time clock circuit can be formed by a chip used in a computer or a mobile device to keep a current time and date.

[0004] Conventional devices having conventional integrated real time clock units can use precise quartz crystals which are normally embedded inside a chip package of the respective chip. However even for a precise quartz crystal which can be even temperature compensated during continuous use of the respective device normally a time drift is observed. In many cases the observed time drift can be substantial. In some cases the time drift may be more than 10 minutes during a time period of a few months of operation of the respective device. A further disadvantage is when the mobile device comprising the real time clock unit is transported between different time zones, the user of the mobile device has always to adjust the system time of the device corresponding to the current time of the momentary location or time zone. Moreover, if the change of summer to wintertime and reverse is not supported by a software implemented in the respective device further adjustment has to be performed by a user of the mobile device.

[0005] EP 2 161 633 A2 discloses an integrated circuit, referenced as 30, embedding a Real Time Clock unit and a multi-channel GPS receiver. Synchronization signals are received, during predetermined time intervals, from several GPS satellites and the RTC contents are updated based on the time contents of the synchronization signal having the highest signal strength.

[0006] Accordingly, it is an object of the present invention to provide an integrated circuit comprising an integrated real time clock unit adapted to provide a precise real time without any necessary adjustments by the user of a device within which the integrated circuit is provided when the device is moved between different time zones.

[0007] This object is achieved by an integrated circuit comprising the features of claim 1.

[0008] In a possible embodiment of the integrated circuit according to the present invention the embedded multizone radio receiver of said integrated circuit is connected to at least one antenna of said integrated circuit to receive said external synchronization signals.

[0009] In a further possible embodiment of the integrated circuit according to the present invention the at least one antenna of said integrated circuit comprises a ferrite antenna.

[0010] In a still further embodiment of the integrated circuit according to the present invention said real time clock unit of the integrated circuit is connected to an em-

bedded quartz crystal of said integrated circuit to provide a current real time stored in a real time memory of said real time clock unit.

[0011] In a possible embodiment of the integrated circuit according to the present invention the current real time stored in said real time memory of said real time clock unit is corrected according to time information carried in the received external synchronization signal having the highest signal strength when said embedded multizone receiver is powered up by said power management unit to operate in said time correction mode. In a further possible embodiment of the integrated circuit according to the present invention the integrated power management unit switches said embedded multizone radio receiver from said power-down sleeping mode for a predetermined time period to said power-up time correction mode in response to an embedded signal received by said real time clock unit in regular time intervals determined on the basis of the current real time stored in said real time memory of said real time clock unit.

[0012] In a further possible embodiment of the integrated circuit according to the present invention the integrated circuit further comprises a battery which supplies said real time clock unit having a low power consumption permanently with electrical power and said embedded multizone receiver only when it has been switched by said power management unit in said power-up time correction mode.

[0013] In a further possible embodiment of the integrated circuit according to the present invention the battery is embedded in a package of said integrated circuit.

[0014] In a possible embodiment of the integrated circuit according to the present invention said integrated circuit further comprises an integrated embedded multizone GPS/GALILEO receiver adapted to extract in time information carried in a received GPS signal.

[0015] The invention further provides a user device comprising an integrated circuit as defined above. In a possible embodiment of the user device according to the present invention the user device is a personal computer.

[0016] In a further possible embodiment of the present invention the user device is a mobile computer.

[0017] In a still further embodiment of the user device according to the present invention the user device is an automotive device of a vehicle.

[0018] The invention further provides a system comprising the features of claim 14. Accordingly, the invention further provides a system comprising transmitters located in different time zones and adapted to transmit synchronization signals on predetermined signal frequencies and user devices as defined above. In the following possible embodiments of the integrated circuit having an integrated real time clock unit are explained in more detail with reference to the enclosed figures.

Fig. 1 shows a block diagram of a possible embodiment of the integrated circuit in an integrated real time clock unit according to the present in-

- vention;
- Fig. 2 shows a block diagram of a possible implementation of a radio receiver provided in the integrated circuit of the present invention;
- Fig. 3 shows a diagram for illustrating a possible implementation of a power management unit according to a possible embodiment of the integrated circuit according to the present invention.

[0019] As can be seen in Fig. 1 the integrated circuit 1 according to the present invention comprises in the shown implementation different units embedded in an integrated circuit package as shown in Fig. 1. In the shown implementation the integrated circuit 1 comprises an integrated real time clock unit 2 adapted to provide a precise real time PRT which can output at a terminal 3 of the IC package to other components or units of the respective device such as a mobile device. The integrated circuit 1 further comprises at least one embedded multizone receiver 4 adapted to receive external synchronization signals transmitted on predetermined signal frequencies by means of an antenna 5 which can also be embedded in the integrated circuit 1. In the shown implementation of Fig. 1 the at least one antenna 5 of the integrated circuit 1 comprises a ferrite antenna. The ferrite antenna 5 is connected in the shown implementation to an embedded multizone radio receiver 4 of the integrated circuit 1 which is adapted to receive and demodulate received external radio synchronization signals transmitted on predetermined radio signal frequencies. The embedded multizone receiver 4 such as the embedded multizone radio receiver as shown in Fig. 1 is powered up by a power management unit 6 of said integrated circuit 1 from a power-up-down sleeping mode to a time correction mode for a predetermined time period in regular time intervals to correct the current real time CRT according to time information carried in the received external synchronization signals received by this embedded multizone receiver 4. In a possible embodiment such as in the implementation shown in Fig. 1 the real time clock unit 2 of the integrated circuit 1 can be connected to an embedded quartz crystal 7 of the integrated circuit 1 to provide a current real time CRT which may be stored in an internal real time memory or time register of the real time clock unit 2. The current real time CRT stored in the real time memory of the real time clock unit 2 is corrected according to the time information carried in the received external synchronization signal having the highest signal strength when the embedded multizone receiver 4 is powered up by the power management unit 6 to operate in a time correction mode of the integrated circuit 1. In a possible embodiment the integrated power management unit 6 switches the embedded multizone receiver 4 from a power-down sleeping mode for a predetermined time period sad as 60 sacs to said power-up time correction mode in response to an embedded signal received by the real time clock unit 2 in regular time intervals deter-

mined on the basis of the current real time CRT updated in the real time memory of the real time clock unit 2 on the basis of an oscillation signal generated by the quartz crystal 7.

[0020] In a possible embodiment such as in the implementation shown in Fig. 1 the integrated circuit 1 further comprises an embedded battery 8 which supplies said real time clock unit 2 having a low power consumption permanently with electrical power. In contrast, the embedded multizone receiver 4 is only supplied with electrical power by the embedded battery 8 when it has been switched by the power management unit 6 in the power-up time correction mode of the integrated circuit 1. The battery 8 can be embedded in the package of the integrated circuit 1.

[0021] The integrated circuit 1 as shown in Fig. 1 can be used within a user device, in particular in a mobile computer, laptop or in an automotive device of a vehicle such as a car. This mobile device can travel between different time zones. Moreover, the integrated circuit 1 according to the present invention can also be used in not mobile devices such as a personal computer to minimize a time drift of the internal reference time.

[0022] Fig. 2 shows a block diagram of a possible embodiment of an embedded multizone receiver 4 which is used by the real time clock unit 2 and embedded in an integrated circuit 1. The embedded multizone receiver 4 is in the shown implementation an embedded multizone radio receiver adapted to receive and demodulate received external radio synchronization signals transmitted on predetermined radio signal frequencies. The radio receiver can be connected to antenna 5 such as a ferrite antenna. An RF amplifying stage receives the radio signal and supplies it to an analog mixer connected to an analog local oscillator as shown in Fig. 2. An IF amplifier and filter can be provided receiving the mixed signal wherein the output of the IF amplifier and filter connected to a decoder. The output of the decoder is connected to a single bit analog-digital converter ADC as shown in Fig. 2.

[0023] In a possible embodiment the ferrite antenna 5 can also be embedded inside the IC package of the integrated circuit 1. To keep the power consumption of the integrated circuit 1 low the radio receiver 4 is in a possible embodiment kept in a power-down mode and is only powered up or started once a day or week for a few minutes to catch a synchronization signal in a time correction mode. The embedded multizone radio receiver 4 is then powered down again in a power-off state after a predetermined time during after the synchronization signal has been received and extracted. A control of the power-up or power-down of the multizone radio receiver 4 can be performed by the power management unit 6 which can be also embedded in the IC package of the integrated circuit 1.

[0024] Since synchronization signals can be transmitted on different frequencies in different multi-time zones. Further different types of modulation can be used and

corresponding demodulators can be arranged in the integrated multizone receiver 4 which is formed by a wide-band receiver adapted to decode different types of data coding. In a possible embodiment the embedded radio receiver comprises different input stages adjusted for the most used frequencies for different time zones and these stages can be supplied concurrently with power by the power management unit 6. In a possible implementation also a GPS receiver stage can be implemented.

[0025] To save battery power supplied by the embedded battery 8 such as a lithium battery, the power management unit 6 can enable the radio/GPS receiver 4 for some period, for example each day or week for a predetermined time which lasts long enough to allow that the time synchronization signal TSS transmitted in the respective time zone is caught and decoded. In a possible embodiment the power management unit 6 is enabled by the RTC unit 2 wherein an enable signal EN is applied by the RTC unit 2 to the power management unit 6 as shown in Fig. 1. When a multizone function is implemented the power management unit 6 can scan in a possible implementation the receivers and/or input stages supplying a supply voltage to the respective stages for a short time one by one to each stage until a synchronization signal is caught or all receivers have been scanned by the power management unit 6 as shown in principle in Fig. 3.

[0026] In the shown implementation the power management unit 6 comprises a power switch control which is adapted to control switches SW₁, SW₂, SW₃, SW₄ connected in parallel to a power supply unit, for instance the embedded battery 8 shown in Fig. 1. A switch is connected to a receiver/input stage connected to receive a synchronization signal in a different time zone or with a different modulation scheme. The different switches SW₁ to SW₄ are activated and closed consecutively by the power switch control of the power management unit 6 and scanned for different synchronization signals transmitted in the area where the device comprising the integrated circuit 1 is located. In the shown implementation the power management unit 6 receives an enable signal from the RTC unit 2 and is activated to perform a consecutive switching of the power supply to the different input stages of the multizone receiver 4. The switch SW₁ is closed under the control of the power switch control and activates the receiver or input stage adapted to catch a synchronization signal in a first zone A. After a predetermined time the power switch control activates the next input stage of the multizone receiver 4 to scan for another synchronization signal. Step by step each of the switches SW₁ to SW₄ are closed under the control of the power switch control of the power management unit 6. In a possible implementation one switch, for example switch 4, can be connected to a GPS/GALILEO receiver which receives a power supply if switch SW₄ is closed. The GPS/GALILEO receiver is adapted to extract time information carried in a received GPS signal. The integrated circuit 1 shown in Fig. 1 has a multizone radio receiver

4 as shown in Fig. 2 and an embedded power management unit 6 as shown in Fig. 3. The integrated circuit IC can be provided within a user device such as a personal computer or a mobile computer. This user device can move between different locations and different time zones. Each time zone having one transmitter can be provided adapted to transmit synchronization signals on predetermined signal frequencies. Accordingly, the invention provides a system having transmitters located in different time zones adapted to transmit synchronization signals on predetermined signal frequencies as well as user devices each having an integrated circuit 1 with an integrated RTC unit 2 as shown in Fig. 1.

[0027] The RTC unit 2 has the advantage that it frees the main system of the device from time-critical tasks. The quartz crystal 7 can be embedded inside the chip package as shown in Fig. 1. Also the antenna 5 can be embedded in the IC package.

Claims

1. An integrated circuit, IC, (1) comprising an integrated Real Time Clock, RTC, unit (2) adapted to provide a precise real time (PRT), said integrated circuit (1) comprising
at least one embedded multizone radio receiver (4) adapted to receive and demodulate received external radio synchronization signals transmitted on predetermined radio signal frequencies from transmitters located in different time zones,
wherein the integrated circuit is adapted to correct a current real time (CRT) of said RTC unit (2) according to time information carried in said received external synchronization signal having the highest signal strength to provide said precise real time (PRT),
wherein said integrated circuit comprises a power management unit (6) adapted to power-up said embedded multizone radio receiver (4) of said integrated circuit (1) from a power-down sleeping mode to a time correction mode for a predetermined time period in regular time intervals to catch a synchronization signal and to correct the current real time (CRT) according to the time information carried in said received external radio synchronization signals.
2. The integrated circuit according to claim 1,
wherein the embedded multizone radio receiver (4) of said integrated circuit (1) is powered down again in a power-off state, after a predetermined time after the synchronization signal has been received and extracted.
3. The integrated circuit according to one of the preceding claims 1 or 2,
wherein said embedded multizone radio receiver (4) of said integrated circuit (1) is connected to at least one antenna (5) of said integrated circuit (1) to re-

ceive said external synchronization signals.

4. The integrated circuit according to claim 3,
wherein said at least one antenna (5) of said inte-
grated circuit (1) comprises a ferrite antenna (5). 5
5. The integrated circuit according to one of the pre-
ceding claims 1 - 4,
wherein said RTC Unit (2) of said integrated circuit
(1) is connected to an embedded quartz crystal (7) 10
of said integrated circuit (1) to provide a current real
time (CRT) stored in a real time memory of said RTC
unit (2).
6. The integrated circuit according to claim 5, 15
wherein the current real time (CRT) stored in said
real time memory of said RTC unit (2) is updated
according to time information carried in the received
external synchronization signal having the highest
signal strength when said embedded multizone radio 20
receiver (4) is powered up by said power manage-
ment unit (6) to operate in said time correction mode.
7. The integrated circuit according to claim 6, 25
wherein said integrated power management unit (6)
switches said embedded multizone radio receiver (4)
from said power-down sleeping mode for a prede-
termined time period to said power-up time correc-
tion mode in response to an embedded signal re-
ceived by said RTC unit (2) in regular time intervals 30
determined on the basis of the current real time
(CRT) provided in said real time memory of said RTC
unit (2).
8. The integrated circuit according to one of the pre- 35
ceding claims 1 - 7,
wherein said integrated circuit (1) comprises a bat-
tery (8) which supplies said RTC unit (2) having a
low power consumption permanently with electrical
power and said embedded multizone radio receiver 40
(4) when it has been switched by said power man-
agement unit (6) into said power-up time correction
mode.
9. The integrated circuit according to claim 8, 45
wherein said battery (8) is embedded in a package
of said integrated circuit (1).
10. The integrated circuit according to claim 1, 50
wherein said integrated circuit (1) further comprises
an embedded GPS/GALILEO receiver adapted to
extract time information carried in a received GPS
signal.
11. A user device comprising an integrated circuit (1) 55
with an integrated RTC unit (2) according to any of
the preceding claims 1-10.

12. A user device according to claim 11,
wherein said user device comprises
a personal computer or
a mobile computer or
an automotive device.

13. A system comprising

- transmitters located in different time zones and
adapted to transmit synchronization signals on
predetermined signal frequencies and
- user devices each having an integrated circuit
with an integrated RTC unit (2) according to one
of the preceding claims 1 - 12.

Patentansprüche

1. Integrierter Schaltkreis (Integrated Circuit, IC) (1),
der eine integrierte Echtzeituhr (Real Time Clock,
RTC)-Einheit (2) umfasst, die dafür ausgelegt ist, ei-
ne präzise Echtzeit (Precise Real Time, PRT) bereit-
zustellen, wobei der integrierte Schaltkreis (1) Fol-
gendes umfasst:

mindestens einen eingebetteten Mehrzonen-
Funkempfänger (4), der dafür ausgelegt ist,
empfangene externe Funksynchronisationssig-
nale zu empfangen und zu demodulieren, die
auf zuvor festgelegten Funksignalfrequenzen
von Sendern gesendet wurden, die sich in ver-
schiedenen Zeitzonen befinden,
wobei der integrierte Schaltkreis dafür ausge-
legt ist, eine aktuelle Echtzeit (Current Real Ti-
me, CRT) der RTC-Einheit (2) gemäß Zeitinfor-
mationen zu korrigieren, die in dem empfangen-
en externen Synchronisationssignal transpor-
tiert werden, das die höchste Signalstärke hat,
um die präzise Echtzeit (PRT) bereitzustellen,
wobei der integrierte Schaltkreis eine Energie-
verwaltungseinheit (6) umfasst, die dafür aus-
gelegt ist, den eingebetteten Mehrzonen-Funk-
empfänger (4) des integrierten Schaltkreises (1)
in regelmäßigen Zeitintervallen für einen zuvor
festgelegte Zeitraum aus einem Abschalt-
Schlummermodus in einen Zeitkorrekturmodus
hochzufahren, um ein Synchronisationssignal
aufzufangen und die aktuelle Echtzeit (CRT) ge-
mäß den Zeitinformationen zu korrigieren, die
in den empfangenen externen Funksynchroni-
sationssignalen transportiert wurden.

2. Integrierter Schaltkreis nach Anspruch 1, wobei der
eingebettete Mehrzonen-Funkempfänger (4) des in-
tegrierten Schaltkreises (1) erneut in einen Abschalt-
zustand heruntergefahren wird, wenn eine zuvor
festgelegte Zeit verstrichen ist, nachdem das Syn-
chronisationssignal empfangen und extrahiert wur-

de.

3. Integrierter Schaltkreis nach einem der vorangehenden Ansprüche 1 oder 2,
wobei der eingebettete Mehrzonen-Funkempfänger (4) des integrierten Schaltkreises (1) mit mindestens einer Antenne (5) des integrierten Schaltkreises (1) verbunden ist, um die externen Synchronisationssignale zu empfangen.
4. Integrierter Schaltkreis nach Anspruch 3,
wobei die mindestens eine Antenne (5) des integrierten Schaltkreises (1) eine Ferritantenne (5) umfasst.
5. Integrierter Schaltkreis nach einem der vorangehenden Ansprüche 1-4,
wobei die RTC-Einheit (2) des integrierten Schaltkreises (1) mit einem eingebetteten Quarzkristall (7) des integrierten Schaltkreises (1) verbunden ist, um eine aktuelle Echtzeit (CRT) bereitzustellen, die in einem Echtzeitspeicher der RTC-Einheit (2) gespeichert wird.
6. Integrierter Schaltkreis nach Anspruch 5,
wobei die aktuelle Echtzeit (CRT), die in dem Echtzeitspeicher der RTC-Einheit (2) gespeichert ist, gemäß Zeitinformationen aktualisiert wird, die in dem empfangenen externen Synchronisationssignal transportiert werden, das die höchste Signalstärke hat, wenn der eingebettete Mehrzonen-Funkempfänger (4) durch die Energieverwaltungseinheit (6) eingeschaltet wird, um in dem Zeitkorrekturmodus zu arbeiten.
7. Integrierter Schaltkreis nach Anspruch 6,
wobei die integrierte Energieverwaltungseinheit (6) den eingebetteten Mehrzonen-Funkempfänger (4) in Reaktion auf ein eingebettetes Signal, das durch die RTC-Einheit (2) in regelmäßigen Zeitintervallen empfangen wird, die anhand der in dem Echtzeitspeicher der RTC-Einheit (2) bereitgestellten aktuellen Echtzeit (CRT) bestimmt werden, für einen zuvor festgelegten Zeitraum aus dem Abschalt-Schlummermodus in den Einschalt-Zeitkorrekturmodus schaltet.
8. Integrierter Schaltkreis nach einem der vorangehenden Ansprüche 1-7,
wobei der integrierte Schaltkreis (1) eine Batterie (8) umfasst, welche die RTC-Einheit (2), die einen niedrigen Stromverbrauch aufweist, permanent mit elektrischem Strom versorgt, und den eingebetteten Mehrzonen-Funkempfänger (4), wenn er durch die Energieverwaltungseinheit (6) in den Einschalt-Zeitkorrekturmodus geschaltet wurde.
9. Integrierter Schaltkreis nach Anspruch 8,
wobei die Batterie (8) in ein Package des integrierten

Schaltkreises (1) eingebettet ist.

10. Integrierter Schaltkreis nach Anspruch 1,
wobei der integrierte Schaltkreis (1) des Weiteren einen eingebetteten GPS/GALILEO-Empfänger umfasst, der dafür ausgelegt ist, Zeitinformationen zu extrahieren, die in einem empfangenen GPS-Signal transportiert werden.
11. Nutzereinrichtung, die einen integrierten Schaltkreis (1) mit einer integrierten RTC-Einheit (2) nach einem der vorangehenden Ansprüche 1-10 umfasst.
12. Nutzereinrichtung nach Anspruch 11,
wobei die Nutzereinrichtung Folgendes umfasst:

einen Personalcomputer oder
einen mobilen Computer oder
eine automobilen Vorrichtung.
13. System, das Folgendes umfasst:

- Sender, die sich in verschiedenen Zeitzonen befinden und dafür ausgelegt sind, Synchronisationssignale auf zuvor festgelegten Signalfrequenzen zu senden, und
- Nutzereinrichtungen, die jeweils einen integrierten Schaltkreis mit einer integrierten RTC-Einheit (2) nach einem der vorangehenden Ansprüche 1-12 aufweisen.

Revendications

1. Circuit intégré, CI, (1) comprenant une unité (2) d'horloge en temps réel, RTC, intégrée conçue pour fournir un temps réel précis (PRT), ledit circuit intégré (1) comprenant :

au moins un récepteur radio multifuseaux incorporé (4) conçu pour recevoir et démoduler des signaux de synchronisation radio externes reçus transmis sur des fréquences de signaux radio prédéterminées à partir d'émetteurs situés dans différents fuseaux horaires,
dans lequel le circuit intégré est conçu pour corriger un temps réel actuel (CRT) de ladite unité RTC (2) en fonction d'informations temporelles véhiculées dans ledit signal de synchronisation externe reçu ayant la plus grande force de signal pour fournir ledit temps réel précis (PRT),
dans lequel ledit circuit intégré comprend une unité de gestion d'alimentation (6) conçue pour mettre sous tension ledit récepteur radio multifuseaux incorporé (4) dudit circuit intégré (1) à partir d'un mode veille hors tension pour adopter un mode de correction temporelle pendant une période de temps prédéterminée dans des in-

- tervalles de temps réguliers pour capturer un signal de synchronisation et pour corriger le temps réel actuel (CRT) en fonction des informations temporelles véhiculées dans lesdits signaux de synchronisation de radio externes reçus.
2. Circuit intégré selon la revendication 1, dans lequel le récepteur radio multifuseaux incorporé (4) dudit circuit intégré (1) est mis hors tension à nouveau dans un état désactivé, après un temps prédéterminé après que le signal de synchronisation a été reçu et extrait.
 3. Circuit intégré selon l'une des revendications précédentes 1 ou 2, dans lequel ledit récepteur radio multifuseaux incorporé (4) dudit circuit intégré (1) est connecté à au moins une antenne (5) dudit circuit intégré (1) pour recevoir lesdits signaux de synchronisation externes.
 4. Circuit intégré selon la revendication 3, dans lequel ladite au moins une antenne (5) dudit circuit intégré (1) comprend une antenne en ferrite (5).
 5. Circuit intégré selon l'une quelconque des revendications précédentes 1 à 4, dans lequel ladite unité RTC (2) dudit circuit intégré (1) est connectée à un cristal à quartz incorporé (7) dudit circuit intégré (1) pour fournir un temps réel actuel (CRT) stocké dans une mémoire de temps réel de ladite unité RTC (2).
 6. Circuit intégré selon la revendication 5, dans lequel le temps réel actuel (CRT) stocké dans ladite mémoire de temps réel de ladite unité RTC (2) est mis à jour en fonction des informations de temps véhiculées dans le signal de synchronisation externe reçu ayant la plus grande force de signal lorsque ledit récepteur radio multifuseaux incorporé (4) est mis sous tension par ladite unité de gestion d'alimentation (6) pour fonctionner dans ledit mode de correction temporelle.
 7. Circuit intégré selon la revendication 6, dans lequel ladite unité de gestion d'alimentation intégrée (6) commute ledit récepteur radio multifuseaux incorporé (4) à partir dudit mode veille hors tension pendant une période de temps prédéterminée sur ledit mode de correction temporelle sous tension en réponse à un signal intégré reçu par ladite unité RTC (2) dans des intervalles de temps réguliers déterminés sur la base du temps réel actuel (CRT) fourni dans ladite mémoire de temps réel de ladite unité RTC (2).
 8. Circuit intégré selon l'une quelconque des revendications précédentes 1 à 7, dans lequel ledit circuit intégré (1) comprend une batterie (8) qui alimente ladite unité RTC (2) ayant une faible consommation électrique de façon permanente avec de l'énergie électrique et ledit récepteur radio multifuseaux incorporé (4) lorsqu'il a été commuté par ladite unité de gestion d'alimentation (6) dans ledit mode de correction temporelle sous tension.
 9. Circuit intégré selon la revendication 8, dans lequel ladite batterie (8) est incorporée dans un boîtier dudit circuit intégré (1).
 10. Circuit intégré selon la revendication 1, dans lequel ledit circuit intégré (1) comprend en outre un récepteur GPS/GALILEO incorporé conçu pour extraire des informations temporelles véhiculées dans un signal GPS reçu.
 11. Dispositif utilisateur comprenant un circuit intégré (1) avec une unité RTC intégrée (2) selon l'une quelconque des revendications 1 à 10 précédentes.
 12. Dispositif utilisateur selon la revendication 11, dans lequel ledit dispositif utilisateur comprend :
 - un ordinateur personnel ou
 - un ordinateur mobile ou
 - un dispositif automobile.
 13. Système comprenant :
 - des émetteurs situés dans différents fuseaux horaires et conçus pour émettre des signaux de synchronisation sur des fréquences de signaux prédéterminées, et
 - des dispositifs utilisateurs ayant chacun un circuit intégré avec une unité RTC intégrée (2) selon l'une quelconque des revendications précédentes 1 à 12.

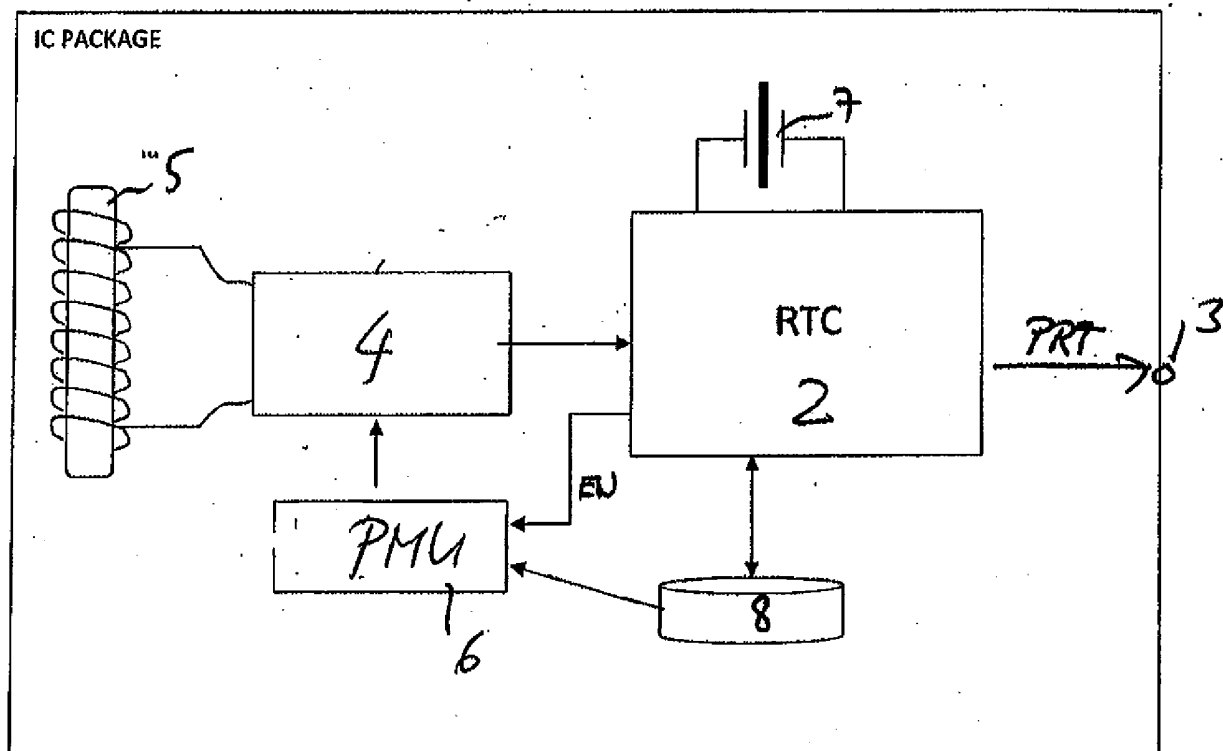


Fig 1

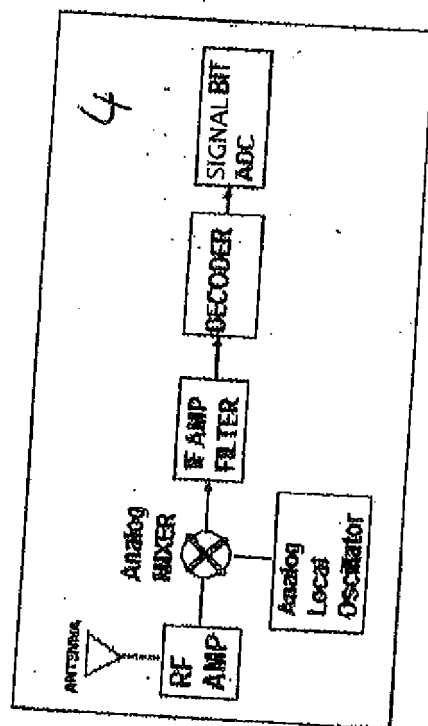


Fig. 2

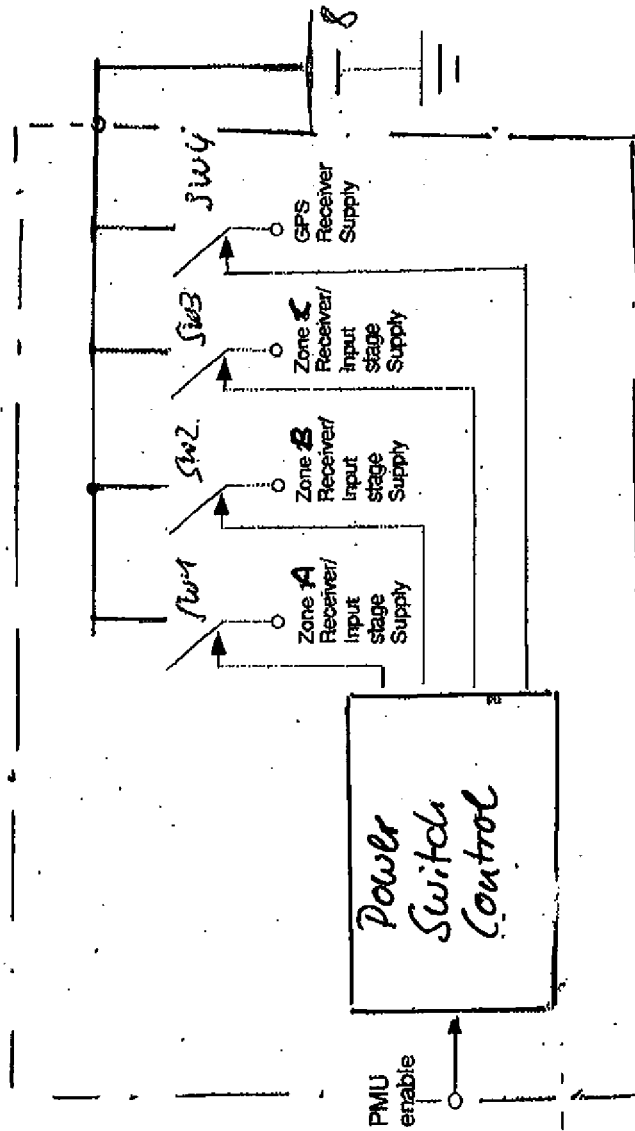


Fig 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2161633 A2 [0005]