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METHOD FOR THE USE OF DATA TELEGRAMS IN RIPPLE-CONTROL SYSTEM AND ALSO RIPPLE-CONTROL SYSTEM FOR CARRYING OUT THE METHOD

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(56) Prior Art Documents
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(57) Claim

1. Method for the use of data telegrams in accordance with the VERSACOM communications protocol in ripple-control systems which work with DECABIT-coded ripple-control telegrams, characterised in that

a) each bit of the VERSACOM data telegram is formed by a character consisting of one pulse and one pause of the length predetermined by the DECABIT pulse code in each case,

b) in the ripple-control system, no DECABIT ripple-control telegram with a pulse sequence of 0L0L0L0L0L following a start pulse S is used for transmitting ripple-control commands, L representing an active pulse and 0 representing a pulse gap, and

c) VERSACOM data telegrams are initiated by transmitting a switchover command for switching over the receiver function from reception and evaluation of ripple-control commands to VERSACOM data telegrams, the switchover command being a DECABIT-coded telegram part.

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ORIGINAL
COMPLETE SPECIFICATION
STANDARD PATENT

Invention Title:

METHOD FOR THE USE OF DATA TELEGRAMS IN RIPPLE- CONTROL SYSTEM AND ALSO RIPPLE-CONTROL SYSTEM FOR CARRYING OUT THE METHOD

The following statement is a full description of this invention including the best method of performing it known to us:-

The invention relates to a method for the use of data telegrams in accordance with the VERSACOM communications protocol in ripple-control systems which work with DECABIT-coded ripple-control telegrams, and also a ripple-control system for carrying out the method.

Electricity supply companies influence the load characteristics in power supply networks with the aid of ripple-control systems. Ripple-control systems are in fact defined both by hardware devices, in particular by the central transmitting systems and a multiplicity of ripple-control receivers installed in the network, and by the software that is used for their operation, in particular the type of coding of the ripple-control commands to be transmitted. However, it is the code used for forming the ripple-control telegrams, with the aid of which ripple-control commands are transmitted, which primarily characterises a ripple-control system. The codes used, which are nowadays synonymous with particular ripple-control systems, are designated by names that have been selected by companies and often registered as trademarks. Such a system is the DECABIT system, which in contrast to most ripple-control systems does not work according to the pulse interval method, but with a 5 from 10 coding, that is to say a time-division multiplex coding, in which pulse pauses also contain information. Details on ripple-control technology and the conventional ripple-control systems can be found in the book "Fernwirktechnik, Überwachen und Steuern von Prozessen" (Telecontrol technology, monitoring and controlling processes), VDI-Verlag 1975, pages 134 to 154. The DECABIT system is described in an article entitled

"DECABIT, das neue elektronische AEG-Zellweger-Rundsteuersystem" (DECABIT, the new electronic AEG-Zellweger ripple-control system) published in an AEG special publication from "Technische Mitteilungen AEG-Telefunken", 61 (1971), No. 8.

More recent ripple-control systems, in particular more recent ripple-control receivers, work not only on the basis of switching commands received and to be directly executed, but also on the basis of time programs and schedules stored in the receiver. Schedules determine a sequence of switching operations which a receiver executes autonomously, for example in the course of a day or a week. Such programs or other parameters can be transmitted by a central station to the receivers with the aid of data telegrams. It is also possible to transmit instructions to the receivers with such data telegrams, for example to activate specific programs, to set an internal clock in the receiver, or the change the operating mode.

A communications protocol with the preliminary designation "VERSACOM" was drawn up by subcommittee 461.1 "Ripple-control receivers" of the German Electrotechnical Commission in DIN and VDE (DKE) for such remote parameterisation of ripple-control receivers and it was proposed that it be published as a draft standard (new communications protocol with data protection for various communication tasks in ripple-control technology). Besides the transmission of switching commands, the protocol also permits the transmission of remote parameter data and other instructions, for example disabling and releasing schedules. In addition, it permits data protection and flexible addressing. It is stated in the draft standard in Chapters 1 and 2 that although the standard drawn up sought to achieve compatibility between receivers made by different manufacturers, no full applicability of the standard in all existing ripple-control systems is guaranteed. It must be checked in each case whether VERSACOM telegrams and ripple-control telegrams of the respective ripple-control system can

operate in parallel. If VERSACOM telegrams are not compatible with the ripple-control telegrams, undesired switching operations can be triggered.

In order to ensure fault-free operation when the two types of telegram are used side by side, a compatibility test must be carried out on the basis of a plurality of criteria specified in the draft standard.

The result of this compatibility testing is that a parallel operation of VERSACOM telegrams and ripple-control telegrams is possible in a number of ripple-control systems which work according to the pulse interval method. In contrast, it is found to be not possible to use data telegrams according to the VERSACOM protocol in DECABIT systems since all the compatibility criteria are not fulfilled.

This state of affairs is discussed in greater detail below, it also being taken into account that both old types of ripple-control receivers, which are set up only for the reception of ripple-control telegrams and not for the processing of VERSACOM telegrams, and new types of ripple-control receivers, which are set up for a reception of and the processing of both types of telegram, may be present in a ripple-control system.

Considered first of all will be ripple-control systems which work according to the pulse interval system and whose ripple-control telegrams are 50 bits long, such as the RICONTIC system for example, whereas VERSACOM telegrams may be 128 bits long. In the pulse interval system, ripple-control telegrams conventionally contain a telegram part designated as prefix addressing, which is used for increasing the address capacity, for example number of prefix pulses multiplied by the number of selection pulses produces the total address capacity, but is also provided for selecting user groups. Such a freely available prefix address can be used for switching the new type of ripple-control receiver over from the customary receiver function, that is to say reception of ripple-control commands, to reception and evaluation of VERSACOM telegrams. This possible mode of operation is

explained in greater detail with reference to pulse diagrams, which are shown in Figures 4a to 4c.

Figure 4a shows the pulse code of a ripple-control telegram of a ripple-control system according to the pulse interval method, for example of the RICONTEC system. This code has a 1600 ms long start pulse S and 640 ms long telegram pulses. There is a 1360 ms pause between the pulses in each case. n designates the number 1 to 50 of the possible pulses in the code. If a ripple-control receiver has received the start pulse correctly "the receiver starts up", that is to say it generates the telegram code also used by the transmitter for carrying out the coincidence test. After execution of the cycle set, in this case after execution of 50 information bits, the receiver returns to its idle position, provided that a termination process does not initiate an earlier return.

Figure 4b shows the pulse code of a new type of ripple-control receiver. Like all ripple-control receivers, after receiving the start pulse S it generates its pulse code to check whether a ripple-control command is present. If the first part of the telegram, namely the part provided for the prefix addressing, contains a switchover command, the receiver switches over to VERSACOM telegram to evaluate the further pulses. Old types of ripple-control receivers do not detect any valid prefix addressing and return - depending on the system - at the latest after the 50th step to the idle position. Since none of the telegram pulses simulates the start pulse S, a restarting of such ripple-control receivers is prevented during the further course of the transmitted VERSACOM telegram. If, however, a VERSACOM telegram pulse were incorrectly interpreted as a start pulse by old types of receivers, that is to say a restarting occurs, then given a defined length difference between start pulse including pause and telegram pulse including pause, a telegram code is generated in the receiver which has a time offset in comparison with the code of the transmitted VERSACOM telegram that is still running, so that

the coincidence test produces a negative result, that is to say no ripple-control comrand can be derived from the VERSACOM telegram. This offset V in the event of a restart is shown in Figure 4c in connection with Figure 4b. After the switchover of the receiver function has been effected, new types of receivers then only interpret the received pulses as VERSACOM telegram pulses.

Several measures have thus been taken to prevent incorrect switching. The requirements for ensuring compatibility, namely in the case of VERSACOM telegrams to use the pulses and pulse pauses of the respective ripple-control system, and the condition that the start pulse including pause of the ripple-control system, that is to say of the associated ripple-control telegram, must be longer than a telegram pulse including pause are therefore fulfilled in the pulse interval system.

In contrast, quite different conditions exist for the DECABIT system. In this system there is no prefix addressing and the length of the start pulse is the same as that of the telegram pulses, is not longer that is; the telegram pulses follow one another without a pause. A DECABIT telegram comprises a total of eleven bits, namely one start bit S and ten telegram bits, which are occupied by five pulses at ten positions (telegram steps). Figures 5a and 5b show two examples of possible DECABIT telegrams with a start pulse S and telegram steps designated by L or 0, active pulses being designated by L and pulse gaps being designated by 0 in each case.

Starting from this point, the object of the invention is to disclose a method and a ripple-control system for carrying out the method which permit the use of VERSACOM telegrams and DECABIT telegrams side by side in a ripple-control system, that is to say so-called parallel operation.

The object is achieved by a method for the use of data telegrams in accordance with the VERSACOM communications protocol in ripple-control systems which work with DECABIT-coded ripple-control telegrams, in which:

a) each bit of the VERSACOM data telegram is formed by

a character consisting of one pulse and one pause of the length predetermined by the DECABIT pulse code in each case,

b) in the ripple-control system, no DECABIT ripple-control telegram with a pulse sequence of 0L0L0L0L0L following a start pulse S is used for transmitting ripple-control commands, L representing an active pulse and 0 representing a pulse gap, and

c) VERSACOM data telegrams are initiated by transmitting a switchover command for switching over the receiver function from reception and evaluation of ripple-control commands to VERSACOM data telegrams, the switchover command being a DECABIT-coded telegram part.

In addition, the object is achieved by a ripple-control system having at least one transmitting device and a multiplicity of first ripple-control receivers for receiving and for evaluating DECABIT-coded ripple-control telegrams, in which:

a) in addition second ripple-control receivers are present, which contain means which, after reception of a DECABIT-coded switchover command, switch over the receiver function to reception and evaluation of a VERSACOM data telegram, and

b) the transmitting device contains means which, after transmission of the DECABIT-coded switchover command, switch over the transmitting device to the transmission of VERSACOM data telegrams, the characters of which are formed from a pulse-pause sequence in the timing code of the DECABIT system.

The solution according to the invention has the advantage that it is possible to provide the required compatibility between DECABIT and VERSACOM telegrams with very simple measures and in addition that, despite the lack of prefix addressing in the DECABIT system, it is possible to switch over the receiver function in new types of receivers.

An exemplary embodiment of the invention is described in greater detail below with reference to the

drawing, in which:

Fig. 1 shows a DECABIT ripple-control telegram which is not used for transmitting ripple-control commands,

Fig. 2 shows a possible pulse train,

Fig. 3 shows a block diagram of a ripple-control system.

Figure 1 shows the DECABIT ripple-control telegram which is not used for transmitting ripple-control commands, because otherwise a telegram part of the VERSACOM telegram could inadvertently trigger a switching operation.

Figure 2 shows a possible pulse train when the method is used. A DECABIT-coded switchover command precedes the VERSACOM telegram here. After this DECABIT telegram has been transmitted, both the transmitting device and all new types of ripple-control receivers switch over to VERSACOM protocol, the character representation thereby changing simultaneously. Two code positions are used in the VERSACOM telegram for representing a character 0 or L, L being represented as a pulse plus pause. The simulation of a DECABIT ripple-control command in the VERSACOM telegram is consequently prevented, with the exception of the eliminated telegram according to Figure 1.

Figure 3 shows as a block diagram a ripple-control system having a transmitting device 1 and first ripple-control receiver of the old type 2 and second ripple-control receiver of the new type 3 connected via a power supply network 4. Both the transmitting device 1 and the ripple-control receiver of the new type 3 contain devices 6, 5 for switching over from the transmission and evaluation of ripple-control commands to the transmission and evaluation of VERSACOM telegrams for remote parameterisation of the ripple-control receiver 3. Receivers of the old type 2 react only to DECABIT-coded ripple-control commands.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Method for the use of data telegrams in accordance with the VERSACOM communications protocol in ripple-control systems which work with DECABIT-coded ripple-control telegrams, characterised in that

a) each bit of the VERSACOM data telegram is formed by a character consisting of one pulse and one pause of the length predetermined by the DECABIT pulse code in each case,

b) in the ripple-control system, no DECABIT ripple-control telegram with a pulse sequence of 0L0L0L0L0L following a start pulse S is used for transmitting ripple-control commands, L representing an active pulse and 0 representing a pulse gap, and

c) VERSACOM data telegrams are initiated by transmitting a switchover command for switching over the receiver function from reception and evaluation of ripple-control commands to VERSACOM data telegrams, the switchover command being a DECABIT-coded telegram part.

2. Ripple-control system for carrying out the method according to Claim 1, having at least one transmitting device and a multiplicity of first ripple-control receivers for receiving and for evaluating DECABIT-coded ripple-control telegrams, characterised in that

a) in addition second ripple-control receivers are present, which contain means which, after reception of a DECABIT-coded switchover command, switch over the receiver function to reception and evaluation of a VERSACOM data telegram, and

b) the transmitting device contains means which, after transmission of the DECABIT-coded switchover command, switch over the transmitting device to the transmission of VERSACOM data telegrams, the characters of which are formed from a pulse-pause sequence in the timing code of the DECABIT system.

3. Ripple-control system having at least one ripple-

control receiver according to Claim 2, in which ripple-control commands are transmitted with ripple-control telegrams of the DECABIT system, and in addition data telegrams in accordance with the VERSACOM communications protocol are transmitted for remote parameterisation, characterised in that the ripple-control receiver contains means which, after reception of a switchover command that is transmitted as a DECABIT telegram, switch over the receiver to reception and evaluation of VERSACOM telegrams, in which a character consists of a pulse-pause sequence in the DECABIT timing code in each case.

DATED THIS 17th DAY OF OCTOBER 1991

ABB PATENT GMBH

PATENT ATTORNEYS FOR THE APPLICANT

F.B. RICE & CO

85934/91

Fig.4a

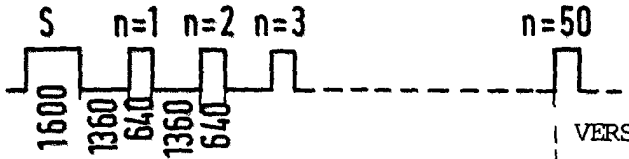

Fig.4b

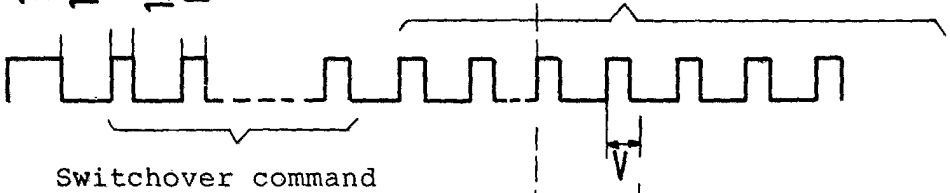

Fig.4c

Fig.5a

Fig.5b

Fig.1

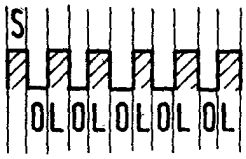

Fig.2

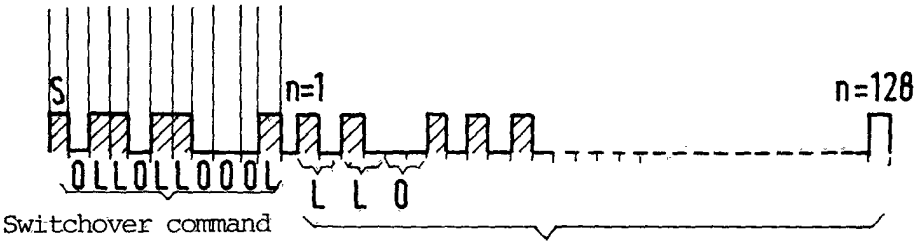

Fig.3