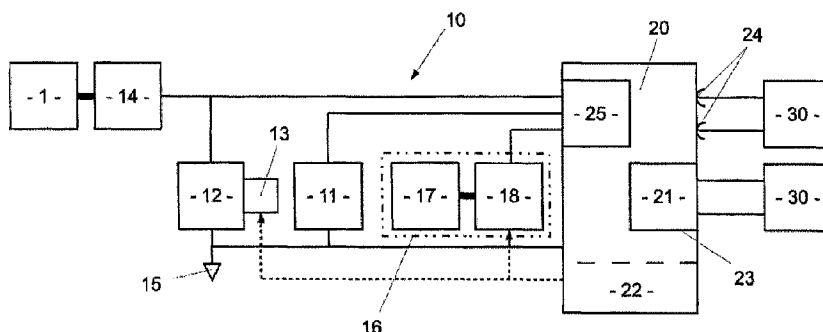




(86) Date de dépôt PCT/PCT Filing Date: 2012/08/20
(87) Date publication PCT/PCT Publication Date: 2013/03/07
(45) Date de délivrance/Issue Date: 2021/02/09
(85) Entrée phase nationale/National Entry: 2014/02/25
(86) N° demande PCT/PCT Application No.: DE 2012/100242
(87) N° publication PCT/PCT Publication No.: 2013/029599
(30) Priorité/Priority: 2011/08/26 (DE10 2011 053 028.2)

(51) Cl.Int./Int.Cl. *F02N 11/12* (2006.01),
F02N 11/14 (2006.01)
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(54) Titre : UNITE D'AIDE AU DEMARRAGE DE VEHICULE, VEHICULE ET PROCEDE POUR FAIRE FONCTIONNER
UNE UNITE D'AIDE AU DEMARRAGE DE VEHICULE
(54) Title: VEHICLE JUMP START UNIT, VEHICLE, AND METHOD FOR OPERATING A VEHICLE JUMP START UNIT



(57) **Abrégé/Abstract:**

The invention relates to a vehicle jump start unit (20) for connecting external electrics (30) to an electrical power supply (10) of a vehicle, wherein a connection module (21), which can be interposed between the vehicle power supply (10) and the external electrics (30) for the adapted connection of the external electrics (30), can be replaceably received in a module receptacle (23). The invention further relates to a vehicle having an electrical power supply (10) and a vehicle jump start unit (20). The invention also relates to a method for operating a vehicle jump start unit (20) for connecting an external electrics (30) to an electrical power supply (10) of a vehicle, wherein a replaceable connection module (21), which can be interposed between the vehicle power supply (10) and the external electrics (30) for the adapted connection of the external electrics (30), can be inserted into a module receptacle (23) of the vehicle jump start unit (20).

Abstract

The invention relates to a vehicle jump start unit (20) for connecting external electrics (30) to an electrical power supply (10) of a vehicle, wherein a connection module (21), which can be interposed between the vehicle power supply (10) and the external electrics (30) for the adapted connection of the external electrics (30), can be replaceably received in a module receptacle (23). The invention further relates to a vehicle having an electrical power supply (10) and a vehicle jump start unit (20). The invention also relates to a method for operating a vehicle jump start unit (20) for connecting an external electrics (30) to an electrical power supply (10) of a vehicle, wherein a replaceable connection module (21), which can be interposed between the vehicle power supply (10) and the external electrics (30) for the adapted connection of the external electrics (30), can be inserted into a module receptacle (23) of the vehicle jump start unit (20).

WO 2013/029599

PCT/DE2012/100242

Vehicle Jump Start Unit, Vehicle, and Method for
Operating a Vehicle Jump Start Unit

The invention relates to a vehicle jump start unit for connecting an external electrical system to an electrical on-board power supply of a vehicle. The invention further relates to a method for operating such a vehicle jump start unit and to a vehicle having an electrical on-board power supply.

In general, vehicles comprise an electrical on-board power supply to which the electrical loads of the vehicle can be connected. Since combustion engines cannot start up independently from a standing position, it is necessary, in the case of such vehicles that are provided with a combustion engine, to provide a starter for starting the engine. Usually electrical starters that are connected to the on-board power supply of the vehicle are used for this purpose.

Often, an on-board power supply energy storage device, for example, an on-board power supply battery, is provided for supplying the starter. If the on-board power supply energy storage device cannot deliver the required electrical power for starting the engine, it is necessary to connect the on-board power supply of the vehicle to an external electrical system, for example, to an external battery or to an on-board power supply of a second vehicle, in order to be able to start the vehicle nevertheless. For this purpose, a vehicle jump start unit, which is designed as a jump start connection, is often provided on such vehicles for connecting the external electrical system.

Such vehicle jump start units have been used entirely successfully in practice; however, the disadvantage here is that the residual energy present in the on-board power supply energy storage device cannot be used, and that it is necessary to connect an external electrical system which is compatible with the on-board power supply. For example, an external electrical system having a voltage that is different from the on-board power supply voltage cannot be used for starting the vehicle.

Jump starting is of increased importance particularly in vehicles that require high availability. For example, in the case of military vehicles, it must be possible to jump start the vehicle even when it is in field use. Usually, in the case of military vehicles, vehicle jump start units having a standardized plug connection are used, by means of which the external electrical system can be connected. Only external electrical systems that comprise a plug connection suitable for connection can be used on such vehicle jump start units. The starting of the vehicle is not possible with an external electrical system that does not have the corresponding plug connection.

Therefore, the problem of the invention is to make it possible to connect an external electrical system even if the external electrical system is not adapted to the on-board power supply and/or to the conditions of the vehicle jump start unit.

In a vehicle jump start unit as mentioned at the start, the problem is solved by a connection module which can be interconnected between the on-board power supply and the external electrical system for an adapted connection of the external electrical system, which can be inserted in an exchangeable manner in a module receptacle.

In order to connect an external electrical system to the vehicle jump start unit, a connection module, which is adapted both to the vehicle jump start unit and also to the external

electrical system, can be inserted into the module receptacle. By means of the connection module, an electrical adaptation of the external electrical system to the on-board power supply and/or a mechanical adaptation to the conditions of the vehicle jump start unit can occur. The connection module is designed to be exchangeable, so that, as needed, a connection module that is adapted to the respective external electrical system can be interconnected between the vehicle jump start unit and the external electrical system.

In some embodiments of the invention, there is provided a vehicle having a vehicle jump start unit for connecting an external electrical system to an electrical on-board power supply of the vehicle, comprising: a connection module, which can be interconnected between the on-board power supply and the external electrical system, is used for the electrically and/or mechanically adapted connection of the external electrical system, and can be received exchangeably in a module receptacle, wherein the external electrical system is designed as an energy source, wherein as additional energy sources are provided a battery of the on-board power supply, and a generator and/or an energy source connected via a jump start connection of the vehicle jump start unit, wherein the generator is connected to the on-board power supply for feeding energy into the on-board power supply, and can be controlled by a control device of the vehicle jump start unit, and wherein one of the energy sources for starting the vehicle is selected by the control device of the vehicle jump start unit.

In some embodiments of the invention, there is provided a method for operating a vehicle jump start unit for connecting an external electrical system to an electrical on-board power supply of a vehicle, wherein an exchangeable connection module, which can be interconnected between the on-board power supply and the external electrical system, is inserted for the electrically and/or mechanically adapted connection of the external electrical system into a module receptacle of the vehicle jump start unit, the external electrical system is designed as an energy source, wherein as additional energy sources are provided a battery of the on-board power supply, and a generator and/or an energy source connected via a jump start connection of the vehicle jump start unit, wherein the generator is connected to the on-board power supply for feeding energy into the on-board power supply, and can be controlled by a control device of the vehicle jump start unit, and wherein one of the energy sources for starting the vehicle is selected by the control device of the vehicle jump start unit.

With a view to the connection of the connection module, it has been found to be

particularly advantageous if an interface arranged in the area of the module receptacle is provided for the electrical connection of the connection module to the on-board power supply at the time of the inserting into the module receptacle. By means of the interface, an automatic connection of the connection module to the vehicle jump start unit at the time of the inserting into the module receptacle can be enabled. The module receptacle can be designed as a plug-in opening into which the connection module can be inserted. At the time of the insertion of the connection module into the module receptacle, an electrical plug connection can be established.

According to an advantageous embodiment of the invention, it is possible to connect, as external electrical system, as desired, an energy source for providing energy for starting the vehicle, and/or a load which can be supplied with energy from the on-board power supply, and/or an energy storage device. By means of the vehicle jump start unit, an auxiliary energy source, for example, an external battery or an external power supply network, can be connected for starting the vehicle, so that energy for starting the vehicle can be inserted from the auxiliary energy source into the on-board power supply of the vehicle. Furthermore, by means of the vehicle jump start unit, an electrical load, which is supplied with energy from the on-board power supply, can be connected to the on-board power supply. In this manner, loads that are not

permanently connected to the vehicle can be briefly supplied with energy. In addition, it is possible to connect, by means of the vehicle jump start unit, an energy storage device to which energy is supplied from the on-board power supply and/or which delivers energy to the on-board power supply.

In order to connect, as needed, one of the different above-mentioned external electrical systems to the on-board power supply of the vehicle, it is preferable to provide several, selectably insertable, connection modules for the adaptation of a respective external electrical system to the on-board power supply. The connection modules can be adapted to a respective external electrical system, so that a respective external electrical system can be adapted by means of a connection module to the on-board power supply or to the vehicle jump start unit.

In order to be able to connect simultaneously several connection modules to the on-board power supply, the vehicle jump start unit can also comprise several module receptacles. Different connection modules can be inserted into the module receptacles, so that several different external electrical systems can be connected to the on-board power supply at the same time.

Below, advantageous embodiments of one or more connection modules are described:

It is advantageous, for example, for a connection module to be designed as an adapter for the form-matched connection of the external electrical system. By means of the connection module, differences in the shape and/or design of the interface between the vehicle jump start unit and the external electrical system can be compensated for. For example, the connection module can be designed as an adapter between an interface of the vehicle jump start unit and an electrical connection for the connection to the external electrical system.

In this context, it is particularly advantageous if a connection module comprises an electrical receptacle for receiving an exchangeable external electrical system, in particular a

battery, an accumulator or a capacitor. The electrical receptacle can be designed as a battery compartment into which the external electrical system can be inserted at least partially, so that the external electrical system can be connected in a few manual work steps. By means of the electrical receptacle, batteries taken from an electrical device, for example, from a flashlight, can be used for starting the vehicle.

In addition, a connection module is preferably designed as a voltage converter for the voltage adaptation between the external electrical system and the on-board power supply. By means of a voltage converter, mutually differing voltages can be adjusted to one another. By means of a voltage converter, the supplying of the on-board power supply with energy from an external electrical system can occur at a voltage that is different from the on-board power supply voltage of the on-board power supply.

In an on-board voltage network designed as a DC voltage network, it is advantageous if a connection module is designed as a rectifier for rectifying an AC voltage of the external electrical system. By means of a rectifier, an external electrical system which has an AC voltage can be used for supplying the on-board power supply. For example, an AC voltage network can be connected by means of the connection module to the vehicle jump start unit. Such an AC voltage network can be a public power grid, which is connected to the on-board power supply in order to start the vehicle or in order to compensate for the discharging of an on-board power supply battery of the on-board power supply in the idle state of the vehicle.

Since external apparatuses, such as a radio transmitter, a pump or electrical tools, for example, are typically designed as AC voltage loads, it has been found, furthermore, to be advantageous if a connection module is designed as an inverter for inversion of a DC voltage of the on-board power supply. By means of an inverter, such loads, which have an AC voltage

connection, can be connected to the on-board power supply. In the case of military vehicles, additional equipment items, such as searchlights, for example, can be supplied by means of the on-board power supply.

Furthermore, it may be necessary to connect DC voltage loads at a voltage that differs from the on-board power supply voltage to the on-board power supply. In this context, it has been found to be advantageous if a connection module is designed as a DC-DC converter. By means of a DC-DC converter, DC voltage loads and/or DC voltage sources and/or DC voltage storage devices can be connected to the on-board power supply. The DC-DC converter here achieves an adaptation of the voltage.

Depending on the type of external electrical system connected to the on-board power supply and/or depending on the type of connection module received in the module receptacle, there can be a difference in the energy flow between the on-board power supply and the external electrical system. For controlling the energy transfer between the on-board power supply and the external electrical system, it can therefore be preferable to provide a control device that is connectable to the connection module. The connection of the external electrical system can be controlled by means of the control device.

Furthermore, the vehicle jump start unit can comprise a jump start connection by means of which an on-board power supply of another vehicle can be connected to the on-board power supply. Via the jump start unit connection, an additional external electrical system can be connected in parallel to the external electrical system connected by means of the connection module. Alternatively, a connection module can be designed in such a way that it is connectable via the jump start connection to the on-board power supply.

An additional subject matter of the invention is a vehicle having an electrical on-board power supply. In such a vehicle, the problem mentioned at the start is solved by providing an above-described vehicle jump start unit. By means of such a vehicle jump start unit, an adaptation of the external electrical system to the on-board power supply of the vehicle can be achieved. An optionally present battery of the on-board power supply can be charged from the external electrical system.

It is advantageous to use a vehicle design wherein the on-board power supply comprises an intermediate storage device, in particular a capacitor, for the temporary storage of the energy provided by the vehicle jump start unit. The intermediate storage device can be charged from the external electrical system by means of the vehicle jump start unit to a level which is sufficient to start the vehicle. Double-layer capacitors, also referred to as "ultra caps" are particularly suitable for use as intermediate storage device.

With a view to supplying the on-board power supply with energy, it has, furthermore, been found to be advantageous if the vehicle comprises a generator which is connected to the on-board power supply for feeding energy into the on-board power supply, and which is controllable by a control device of the vehicle jump start unit. With a generator, an additional auxiliary energy source can be provided for starting the vehicle.

The starting of the vehicle can often present difficulties, particularly in the case of extreme ambient temperatures as often occur in military use. Therefore, the vehicle preferably comprises, in addition to a battery connected to the on-board power supply, a temperature control unit which is used for controlling the temperature of the battery, and which is controllable by a control device of the vehicle jump start unit. By means of the temperature control unit, the battery can be adjusted to a state in which the receiving or storage of energy in the battery is

improved. By means of the control device of the jump start unit, the temperature control of the battery can be synchronized with the energy transfer between the external electrical system and the on-board power supply.

With a view to the method mentioned at the start, the above-mentioned problem is solved in that an exchangeable connection module, which can be interconnected between the on-board power supply and the external electrical system, is inserted for the adapted connection of the external electrical system into a module receptacle of the vehicle jump start unit. As needed, a connection module adapted to the respective external electrical system can be interconnected between the vehicle jump start unit and the external electrical system, and thus an adaptation of the external electrical system to the on-board power supply or to the vehicle jump start unit can be enabled.

With a view to starting the engine, it has been found to be advantageous if the external electrical system is designed as an energy source, and if a battery of the on-board power supply is provided as an additional energy source, wherein an energy source for starting the vehicle is selected by means of a control device of the vehicle jump start unit. Data regarding the energy available in the external electrical system and/or in the battery of the on-board power supply can be supplied to the control device. If the performance capacity of the battery of the on-board power supply falls below a predetermined threshold, then, in order to start the vehicle, the external electrical system can be selected as energy source. If the performance capacity of the battery of the on-board power supply is above the predetermined threshold, the vehicle can be started from the battery of the on-board power supply.

In this context, it is advantageous, furthermore, if, as additional energy source, a generator and/or an energy source connected via a jump start connection of the vehicle jump start

unit is provided, by means of which an energy source is selected by the control unit. The control unit can select an energy source from several energy sources in order to start the vehicle.

In addition to the above-described advantageous embodiments of the method, it is also possible to use, in the method according to the invention, the advantageous embodiments described in the context of the vehicle jump start unit and the vehicle.

Additional advantages and details of the vehicle jump start unit according to the invention, of the vehicle and of the method are described below in reference to the appended drawings by means of several embodiment examples. Herein

Figure 1 shows the structure of a vehicle in a diagrammatic representation;

Figure 2a shows a vehicle jump start unit in a diagrammatic representation;

Figure 2b shows the vehicle jump start unit of Figure 2a with a connection module in a diagrammatic representation, and

Figure 3 shows an additional design of a vehicle jump start unit in a diagrammatic front view.

In Figure 1, a military vehicle with a combustion engine 1 is represented. In order to start the engine 1, an electrical starter 14 which is coupled mechanically to the engine 1 is provided, and which is connected to an on-board power supply 10 of the vehicle, which is designed as an electrical DC voltage network. The on-board power supply 10 has an on-board power supply battery 12 as energy source, which delivers, as needed, the energy required for starting the engine 1 to the starter 14. Additional components of the on-board power supply 10 are an intermediate storage device 11 designed as a double-layer capacitor and an auxiliary current generator 16, which can be optionally connected as desired by means of a switching unit 25 to a

vehicle jump start unit 20 described below. Further details on the components 11, 16 are provided below.

If the energy stored in the on-board power supply battery 12 is not sufficient to start the engine 1, then the vehicle can be started by means of a vehicle jump start unit 20 according to the invention connected to the on-board power supply 10. The vehicle jump start unit 20, in a military vehicle, is mounted in the manner of an added part. The vehicle jump start unit 20 is carried along in the vehicle at all times, so as to be able to jump start the engine 1 in the case of a failure of the on-board power supply 10 or of the on-board power supply battery 12. Furthermore, the charge state of the on-board power supply battery 12 of the military vehicle can be maintained, for example, during a longer lasting transport, on another land vehicle, sea vehicle or aircraft, or by storage by means of the vehicle jump start unit 20. By means of the vehicle jump start unit 20, an external electrical system 30 designed as an energy source can be connected to the on-board power supply 10. In order to enable the adaptation of the external electrical system 30 to the on-board power supply 10 or to the conditions of the vehicle jump start unit 20, several connection modules 21 are provided, which can be interconnected between the on-board power supply 10 and the external electrical system 30. The connection modules 21, which have designs that differ from one another, can be interconnected as needed between the on-board power supply 10 and the external electrical system 30.

By means of the connection modules 21, external electrical systems 30 with electrical parameters that are different from those of the on-board power supply 10, for example, with a voltage that is different from an on-board power supply voltage of the on-board power supply 10, can be connected with adaptation to the on-board power supply 10. For this purpose, the respective connection module 21 can be received in a module receptacle 23 of the vehicle jump

start unit 20. The module receptacle 23 of the vehicle jump start unit 20 in that regard forms an interface that is permanently connected to the vehicle, between the on-board power supply 10 and the respective connection module 21 received in the module receptacle 23. As can be seen in the representation in Figures 2a and 2b, the module receptacle 23 of the vehicle jump start unit 20 is designed like a module well in which a connection module 21 having an outer contour adapted to the inner contour of the module receptacle 23 can be received. In the area of the module receptacle 23, furthermore, an interface, which is not shown in the figures, is provided for the electrical connection of the connection module 21 to the on-board power supply 10. The interface is arranged in such a manner on the inner contour of the module receptacle 23 that the connection module 21, at the time of inserting into the module receptacle 23, is connected automatically via a plug connection to the vehicle jump start unit 20.

The connection module 21 represented in Figure 2b is designed as an adapter, by means of which a form-matched connection of the external electrical system 30 is enabled. Therefore, it is not necessary for the external electrical system 30 itself to have a shape or an interface suitable for the connection to the vehicle jump start unit 20. In particular, the vehicle jump start unit 20 and the respective external electrical system 30 can have different interfaces, which are adapted by means of the connection module 21 in the manner of an adapter.

Below, different connection modules 21 are described, which are suitable for connecting different external electrical systems 30. These connection modules 21 are suitable for the interconnection between the on-board power supply 10 and a predetermined external electrical system 30.

A connection module 21 of the vehicle jump start unit 20 comprises an electrical receptacle for receiving an exchangeable external electrical system 30 which is designed as a

battery. The electrical receptacle is designed like a battery compartment, in which several batteries can be received. Alternatively, the connection module 21 can also be designed for receiving accumulators and/or capacitors. The external electrical system 30 received in the connection module can be charged from the on-board power supply 10. Furthermore, by means of the connection module 21, energy for starting the engine can be fed into the on-board power supply 10 from the external electrical system 30. For example, a battery removed from a flashlight that has been taken along in the vehicle can be inserted into the electrical receptacle of the connection module 21, in order to feed the energy contained in the battery into the on-board power supply.

Additional connection modules 21 are designed as voltage converters, so that a voltage adaptation between the external electrical system 30 and the on-board power supply 10 can occur. Thus, the vehicle jump start unit 20 comprises a connection module 21 which is designed as a rectifier. By means of the rectifier, an AC voltage of an external electrical system 30, for example, of a public AC voltage network having an AC voltage between 110 V and 400 V, can be transformed into a DC voltage adapted to the voltage of the on-board power supply 10, so that it is possible to feed energy from the AC voltage network into the on-board power supply 10 of the vehicle in order to start the engine. This can be necessary, for example, in order to start the vehicle engine 1 by means of the starter 14 or in order to maintain the charge of the on-board battery network 12 when the vehicle is in the idle state.

Furthermore, a connection module 21 is provided that is designed as an inverter. By means of an inverter, the DC voltage of the on-board power supply 10 can be transformed into an AC voltage. By means of a connection module 21 designed as an inverter, an external electrical

system 30 designed as an AC voltage load, for example, an alternating current motor, can be connected to the on-board power supply 10.

As an additional module, the vehicle jump start unit 20 comprises a connection module 21 which is designed as a DC-DC converter. By means of a DC-DC converter, the on-board power supply 10 can be connected to an external electrical system 30, which is suitable for connecting to a DC voltage network. By means of the DC-DC converter, any differences in the DC voltage of the on-board power supply 10 and of the external electrical system 30 can be adapted to one another, so that energy can be transferred from the on-board power supply 10 to the external electrical system 30 or from the external electrical system 30 into the on-board power supply. By means of the connection module 21 designed as a DC-DC converter, an energy storage device, for example, a battery having an operating voltage that is different from the on-board power supply voltage can be connected to the on-board power supply 10. Furthermore, by means of this connection module, it is possible to connect external on-board power supplies, which have a voltage of 12 V or 24 V, for example, to the vehicle on-board power supply.

The above-described connection modules 21 each have mutually differing functionalities. Therefore, it is not necessary to integrate all the functionalities of all these connection modules 21 in the vehicle jump start unit 20, as a result of which the space taken up by the vehicle jump start unit is reduced. Instead, as needed, a connection module 21 having the respective required function can be inserted into the module receptacle 23.

In addition, an external electrical system 30 can be connected to the on-board power supply by means of a jump start connection 24 of the vehicle jump start unit 20.

Furthermore, Figure 1 shows that the vehicle jump start unit 20 comprises a control device 22 connectable to the connection module 21, by means of which the energy transfer

between the external electrical system 30 and the on-board power supply 10 is controlled using the connection module 21 of the vehicle jump start unit 20.

Depending on the type of connection module 21 inserted into the module receptacle 23, different processes can be controlled by the control device 22: if a connection module 21 is connected for the connection of an energy source 30, then the provision of energy from the energy source 30 for the on-board power supply 10 can be regulated and/or controlled. In the case of a connection module 21 which is designed for the connection of an electrical load 30, the provision of energy from the on-board power supply 10 for the load 30 connected by means of the connection module 21 can be regulated and/or controlled by means of the control device 22. If a connection module 21 is received in the module receptacle 23 for the connection of an energy storage device 30, then the control unit can control both the processes during the charging of the energy storage device 30 from the on-board power supply 10 and also the processes during the delivery of energy from the energy storage device 30 to the on-board power supply 10.

The control device 22 is connected, furthermore, to a temperature control unit 13 for the temperature control of the on-board power supply battery 12. By means of the temperature control unit 13, the cooling and/or heating of the on-board power supply battery 12 can occur, so that the on-board power supply battery 12 can be kept in a predetermined operating state independently of the respective existing ambient temperature. On the on-board power supply battery 12 or the temperature control unit 13, sensors, which are not represented in the figure, are arranged for measuring the temperature, the voltage and other parameters; said sensors are also connected to the control device 22 of the vehicle jump start unit 20. The values measured via the sensors are used as input values for the control and/or regulation of the temperature control of the on-board power supply battery 12 by means of the control device 22.

In addition, the control device 22 is connected to the auxiliary current generator 16. The auxiliary current generator 16 comprises an auxiliary engine 17 designed as a combustion engine, as well as an electric machine 18 connected mechanically to the auxiliary engine 17, which can be operated as a generator or as a motor. In order to start the auxiliary engine 17, the electric machine 18 is driven by an engine, in the process of which it starts the auxiliary engine 17 in the manner of an auxiliary engine starter. When the auxiliary engine 17 is running, the electric machine 18 is operated as a generator, which is connected to the on-board power supply 10. By means of the electric machine 18 of the auxiliary current generator 16, additional energy can be fed into the on-board power supply 10. The starting of the auxiliary engine 17 by means of the electric machine 18 as well as the feeding of energy by means of the electric machine 18 into the on-board power supply 10 is controllable by means of the control device 22. In an alternative design of the auxiliary current generator 16, it is possible to provide, in addition to the auxiliary engine 17, a respective generator mechanically coupled to the auxiliary engine 17, and an electrical starter.

On the basis of the above-described vehicle, the processes during the connection of an external electrical system 30 to the electrical on-board network 10 of the vehicle will be described in greater detail below.

First, an exchangeable connection module 21, which is suitable for the connection of the external electrical system 30, is inserted into the module receptacle 23 of the vehicle jump start unit 20 by plugging in. During the inserting into the module receptacle, the connection module 21 is automatically connected to the plug connection arranged within the module receptacle 23, and thus it establishes an electrical connection to the on-board power supply 10. In addition, the connection module 21 is connected via an additional plug connection arranged within the module

receptacle 23 to the control device 22 of the vehicle jump start unit 20. The control device 22 recognizes the plugged-in connection module 21 and it is adjusted to an operating mode that is adapted to the type of the connection module 21.

If, in addition to the generator 18 and the on-board power supply battery 12, an external electrical system 30 designed as an external energy source is connected by means of the connection module 21 to the on-board power supply 10, then, by means of the control device 22, an energy source 12, 18, 30 suitable for starting the vehicle can be selected. For this purpose, the control device determines by means of appropriate sensors a voltage drop of the energy sources 12, 18, 30 at the time of the connection of a load and it selects the energy source 12, 18, 30 which has the lowest voltage drop.

For example, if the external energy source 30 is selected, then, first, the intermediate device 11 of the on-board power supply 10, which is designed as a double-layer capacitor, is charged from the external energy source 30. After the charging of the double-layer capacitor 11, the starter 14 can then start the engine 1, in that the starter 14 removes the energy required for the starting within a brief time from the double-layer capacitor 11. At the time of the start-up of the engine 1, a current that is relatively high in comparison to the previous charging process is flowing in the on-board power supply 10. If the external energy source 30 as well as the connection module 21 interconnected between the external energy source 30 and the on-board power supply 10 is suitable for delivering the high current required for starting the engine 1, the start-up can also occur without charging the intermediate storage device 11, directly from the external energy source 30.

Figure 3 shows a front view of an alternative embodiment of the vehicle jump start unit 20 according to the invention. In addition to the module receptacle 23, the vehicle jump start unit

20 comprises a control panel 25 for the manual operation of the vehicle jump start unit 20 as well as two jump start connections 24. The jump start connections are designed as standardized plug connections according to the Defense Equipment Standard 96917. Via the jump start connections 24, such external electrical system systems 30 that are provided with a corresponding plug connection can be connected to the vehicle jump start unit 20. Furthermore, it is possible to establish, via the jump start connections 24, a connection to the connection module 21, module which comprises a corresponding plug connection. In this manner, connection modules 21, which can indeed be received in the module receptacle 23, but with which no connection can be established via the plug connection arranged in the module receptacle, can nevertheless be connected electrically to the vehicle jump start unit 20.

The above-described vehicle jump start units 20 comprise a module receptacle 23, in which connection modules 21, which can be interconnected between the on-board power supply 10 and the external electrical system 30, can be received in an exchangeable manner. By means of the respective connection module 21 received in the module receptacle 23, an electrical adaptation of the external electrical system 30 to the on-board power supply 10 and/or a mechanical adaptation to the conditions of the vehicle jump start unit 20 can occur.

Reference numerals:

- 1 Engine
- 10 On-board power supply
- 11 Intermediate storage device
- 12 On-board power supply battery
- 13 Temperature control unit
- 14 Starter
- 15 Ground potential
- 16 Auxiliary current generator
- 17 Auxiliary engine
- 18 Electric machine
- 20 Vehicle jump start unit
- 21 Connection module
- 22 Control device
- 23 Module receptacle
- 24 Jump start connection
- 25 Switching unit
- 30 External electrical system

CLAIMS:

1. Vehicle having a vehicle jump start unit for connecting an external electrical system to an electrical on-board power supply of the vehicle, comprising:
a connection module, which
 - can be interconnected between the on-board power supply and the external electrical system,
 - is used for the electrically and/or mechanically adapted connection of the external electrical system, and
 - can be received exchangeably in a module receptacle,wherein the external electrical system is designed as an energy source,
wherein as additional energy sources are provided
 - a battery of the on-board power supply, and
 - a generator and/or an energy source connected via a jump start connection of the vehicle jump start unit, wherein the generator
 - is connected to the on-board power supply for feeding energy into the on-board power supply, and
 - can be controlled by a control device of the vehicle jump start unit,and wherein one of the energy sources for starting the vehicle is selected by the control device of the vehicle jump start unit.
2. Vehicle according to claim 1, further comprising an interface arranged in the area of the module receptacle for the electrical connection of the connection module to the on-board power supply at the time of the inserting into the module receptacle.
3. Vehicle according to claim 1 or 2, wherein, as the external electrical system one can connect
 - an energy source for the provision of energy for starting the vehicle, or
 - a load, which is supplied with energy from the on-board power supply, or
 - an energy storage device.

4. Vehicle according to any one of claims 1 to 3, further comprising several connection modules, which can be received, for the adaptation of a respective external electrical system to the on-board power supply.
5. Vehicle according to any one of claims 1 to 4, wherein the connection module is designed as an adapter for the form-matched connection of the external electrical system.
6. Vehicle according to any one of claims 1 to 5, wherein the connection module comprises an electrical receptacle for receiving an exchangeable external electrical system.
7. Vehicle according to claim 6, wherein the exchangeable external electrical system comprises a battery, an accumulator or a capacitor.
8. Vehicle according to any one of claims 1 to 7, wherein the connection module is designed as a voltage converter for the voltage adaptation between the external electrical system and the on-board power supply.
9. Vehicle according to any one of claims 1 to 8, wherein the connection module is designed as a rectifier for the rectification of an AC voltage of the external electrical system.
10. Vehicle according to any one of claims 1 to 9, wherein the connection module is designed as an inverter for the conversion of a DC voltage of the on-board power supply.
11. Vehicle according to any one of claims 1 to 10, wherein the connection module is designed as a DC-DC converter.
12. Vehicle according to any one of claims 1 to 11, wherein the control device is connectable to the connection module, for controlling the energy transfer between the on-board power supply and the external electrical system.

13. Vehicle according to any one of claims 1 to 12, wherein by means of the jump start connection an on-board power supply of another vehicle can be connected to the on-board power supply.
14. Vehicle according to any one of claims 1 to 13, wherein the on-board power supply comprises an intermediate storage device for the temporary storage of the energy provided by the vehicle jump start unit.
15. Vehicle according to claim 14, wherein the intermediate storage device comprises a capacitor.
16. Vehicle according to any one of claims 1 to 15, further comprising a temperature control unit for the temperature control of the battery, which is controllable by the control device of the vehicle jump start unit.
17. Method for operating a vehicle jump start unit for connecting an external electrical system to an electrical on-board power supply of a vehicle,
wherein an exchangeable connection module, which can be interconnected between the on-board power supply and the external electrical system, is inserted for the electrically and/or mechanically adapted connection of the external electrical system into a module receptacle of the vehicle jump start unit,
the external electrical system is designed as an energy source,
wherein as additional energy sources are provided
 - a battery of the on-board power supply, and
 - a generator and/or an energy source connected via a jump start connection of the vehicle jump start unit, wherein the generator
 - is connected to the on-board power supply for feeding energy into the on-board power supply, and
 - can be controlled by a control device of the vehicle jump start unit,and wherein one of the energy sources for starting the vehicle is selected by the control device of the vehicle jump start unit.

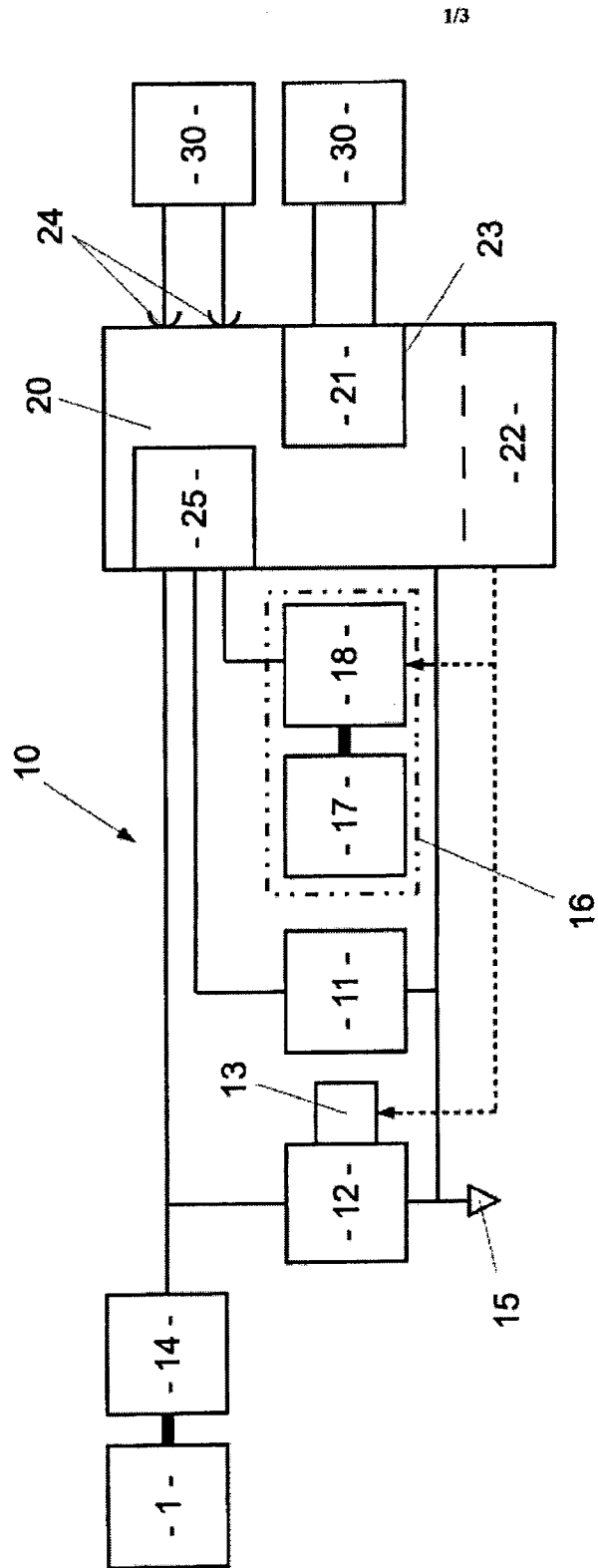


Fig. 1

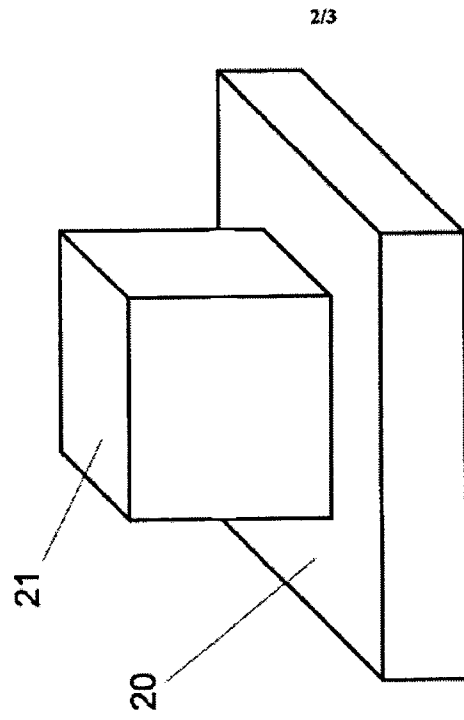


Fig. 2b

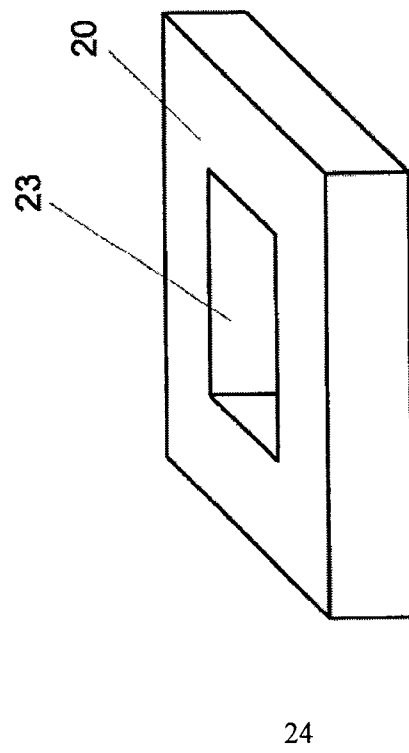


Fig. 2a

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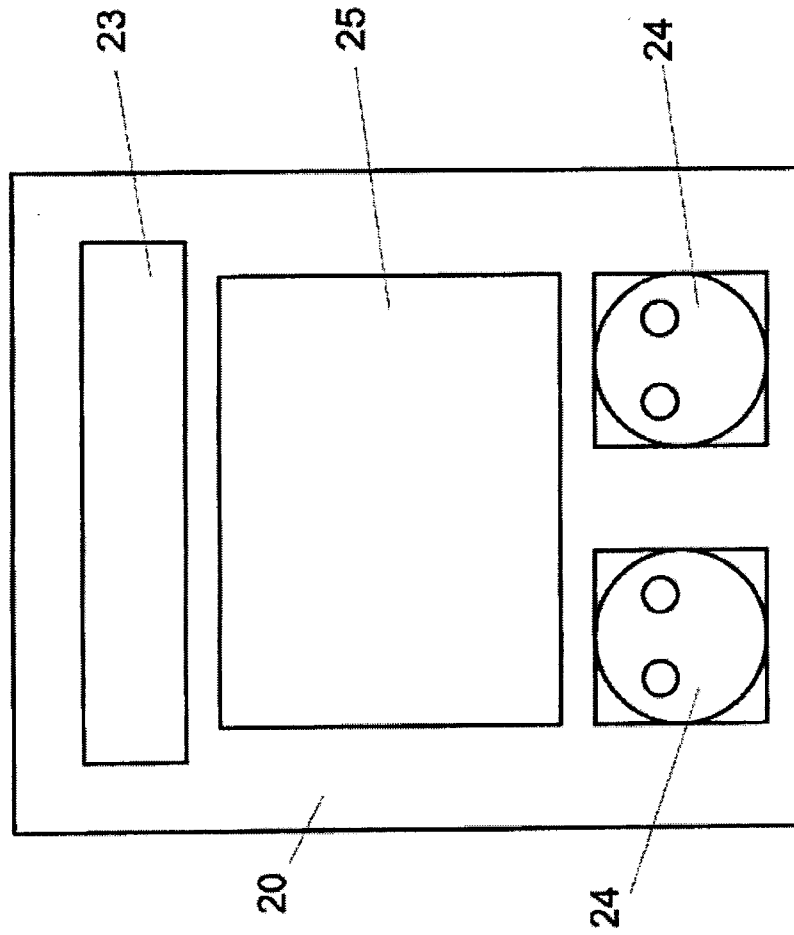


Fig. 3

