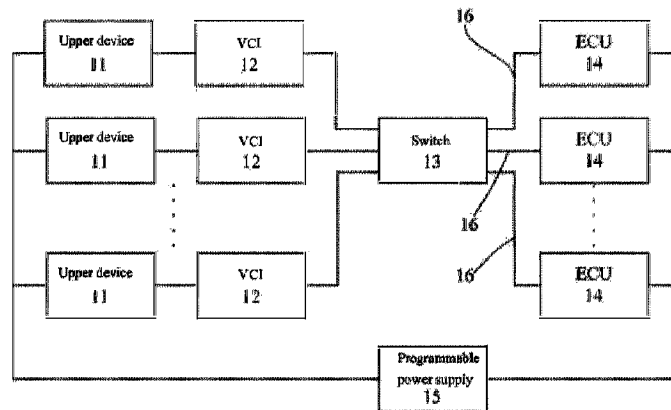




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 (54) Title: CENTRALIZED ECU DEVELOPMENT AND TEST SYSTEM



(57) **Abrégé/Abstract:**

A centralized ECU development and test system, comprising a plurality of upper devices and a plurality of VCIs corresponding to the plurality of upper devices one by one, a switch, centralized ECUs and programmable power supply; the plurality of upper devices are respectively connected to the plurality of VCIs, the plurality of VCIs are connected with the switch, the plurality of ECUs are connected with the switch with cable harnesses, communication ports of the programmable power supply are connected with the plurality of upper devices, and a power supply port of the programmable power supply is connected with power supply ports of the plurality of ECUs. In the present invention, a plurality of ECUs are concentrated and uniformly energized by a programmable power supply, so that the user can communicate the upper device with a target ECU through a corresponding VCI and a switch as desired, and develop and test the target ECU, in this way, a less amount of the cable harnesses are used, which makes it possible to manage uniformly, and a utilization rate of the ECUs is high, while cost thereof is low, in the meantime, it is easy to operate the central ECU development and test system and not liable to make mistakes.

Abstract

A centralized ECU development and test system, comprising a plurality of upper devices and a plurality of VCIs corresponding to the plurality of upper devices one by one, a switch, centralized ECUs and programmable power supply; the plurality of upper devices are respectively connected to the plurality of VCIs, the plurality of VCIs are connected with the switch, the plurality of ECUs are connected with the switch with cable harnesses, communication ports of the programmable power supply are connected with the plurality of upper devices, and a power supply port of the programmable power supply is connected with power supply ports of the plurality of ECUs. In the present invention, a plurality of ECUs are concentrated and uniformly energized by a programmable power supply, so that the user can communicate the upper device with a target ECU through a corresponding VCI and a switch as desired, and develop and test the target ECU, in this way, a less amount of the cable harnesses are used, which makes it possible to manage uniformly, and a utilization rate of the ECUs is high, while cost thereof is low, in the meantime, it is easy to operate the central ECU development and test system and not liable to make mistakes.

CENTRALIZED ECU DEVELOPMENT AND TEST SYSTEM

Technical field

The present invention belongs to the ECU development and test technical field, especially a centralized ECU development and test system.

5 Background technology

To develop and test automotive electronic control units ECUs (Engine Control Unit), a lot of developing and testing personnel are used, with each of them taking care of development and test work for a multitude of ECUs, as a result, in the working area are stacked a lot of ECUs, VCI (Vehicle Connection Interface) and cable harnesses, which are poorly managed and liable to
10 cause electric safety hazards.

Most of existing ECU development and test benches are individual benches, placed on working benches of the technicians, and a lot of cable harnesses are present, which makes it inconvenient to manage canonically and uniformly; an equal amount of ECUs are provided on each of the benches, however, an utilization rate of the repeated provisions is low, and high expenses are
15 generated; in other cases, a plurality of ECUs are placed on a rack at a peripheral area, and when to test a different ECU, the technician goes to the rack and changes the equipment manually, which involves complicated operations and is liable to cause errors.

Summary of the invention

Targeting at the foregoing technical problem, the present invention provides a centralized ECU
20 development and test system.

To address the foregoing technical problem, the present invention adopts a following technical solution:

A centralized ECU development and test system, comprising a plurality of upper devices and a plurality of VCIs corresponding to the plurality of upper devices one by one, a switch, centralized
25 ECUs and programmable power supply; the plurality of upper devices are respectively connected to the plurality of VCIs, the plurality of VCIs are connected with the switch, the plurality of ECUs are connected with the switch with cable harnesses, communication ports of the programmable power supply are connected with the plurality of upper devices, and a power supply port of the programmable power supply is connected with power supply ports of the

plurality of ECUs.

In an embodiment, the plurality of upper devices are provided:

To respond to (an) ECU identifier(s) input by a user, and send a first instruction to the programmable power supply, wherein the first instruction contains the ECU identifier(s);

- 5 From a one-to-one corresponding relationship between (a) first port number(s) and (a) second port number(s), know the corresponding second port number(s) by the first port number(s) returned by the programmable power supply, and transmit the second port number(s) to the switch, the second port number(s) is/are (a) port number(s) of the ECU(s) on the switch;

- To respond to an end instruction from the user, send a second instruction to the programmable power supply, and send a third instruction to the switch, wherein the second instruction contains the first port number(s) and the third instruction contains the second port number(s);
- 10

The programmable power supply is provided to:

- Energize corresponding ECU(s) according to the ECU identifier(s) contained in the first instruction, send the first port number(s) of the ECU(s) to the upper device(s), and the first port number(s) is/are (a) port number(s) of the ECU(s) in the programmable power supply;
- 15

Cut power supply as per the second instruction;

The switch is provided to:

- Establish communication access between corresponding ECU(s) and the VCI(s) corresponding to the upper device(s) according to the second port number(s) from the upper device(s);
- 20 Cut the communication access between the corresponding ECU(s) and the VCI(s) according to the third instruction.

In an embodiment, the plurality of ECUs are ECUs of different models, and ECUs of the same model are provided to be more than one;

- Energizing the corresponding ECU(s) based on the ECU identifier(s) contained in the first instruction further comprises:
- 25

The ECU identifier(s) is/are (an) ECU model(s), energizing the ECU(s) of the same model however not yet energized.

In an embodiment, the plurality of ECUs are uniformly provided in an ECU room.

In an embodiment, one end of each of the cable harnesses is provided to be an OBD plug, and the OBD plug connects a CAN bus connector, a K bus connector and a T15 bus connector, another end of the cable harness is a registered jack, and the registered jack is connected with the switch.

- 5 In the present invention, a plurality of ECUs are concentrated, and uniformly energized by a programmable power supply, so that the user can communicate the upper device with a target ECU through a corresponding VCI and a switch as desired, and develop and test the target ECU, in this way, a less amount of the cable harnesses are used, which makes it possible to manage uniformly, and a utilization rate of the ECUs is high, while cost thereof is low, in the meantime, it
10 is easy to operate the central ECU development and test system and not liable to make mistakes.

Definitions

The following definitions are given based on the prior art and the present disclosure.

Upper device:

- 15 In the present invention, the upper device means the upper computer, and the upper computer is a common term that refers to the computer that can directly issue control commands.

Switch: a device for realizing soft link connection with different OBD ports by software configurations;

Programmable power supply:

- 20 A programmable power supply (PPS) is one that allows remote control of its operation through an analog input or digital interface such as RS232 or GPIB. Controlled properties may include voltage, current, and in the case of AC output power supplies, frequency. They are used in a wide variety of applications, including automated equipment testing, crystal growth monitoring, semiconductor fabrication, and x-ray generators.

- 25 Programmable power supplies typically employ an integral microcomputer to control and monitor power supply operation. Power supplies equipped with a computer interface may use proprietary communication protocols or standard protocols and device control languages such as SCPI.

Brief description of the drawings

Figure 1 is a structural diagram showing the present invention;

Figure 2 is a structural diagram showing a cable harness of the present invention;

Figure 3 is an example block diagram of an OBD switch;

Figure 4 is an example of an operational interface being a web page on an engine control unit
5 (ECU) software server;

Figure 5 is an example block diagram of a vehicle connection interface (VCI);

Figure 6 is an example block diagram of an engine control unit (ECU); and

Figure 7 is an example block diagram of a programmable power supply.

Embodiments

10 As shown in figure 1, a centralized ECU development and test system, comprises a plurality of upper devices 11 and a plurality of VCIs 12 one-to-one corresponding with the plurality of upper devices 11, a switch 13, a plurality of ECUs 14 and programmable power supply 15.

The plurality of upper devices 11 are connected with corresponding VCIs 12, the plurality of VCIs 12 are connected with the switch 13, a communication port of the programmable power
15 supply 15 is connected with the plurality of upper devices 11, and a power supply port of the programmable power supply 15 is connected with power supply ports of the plurality of ECUs 14.

In the present invention, the plurality of ECUs are centralized, and energized by the programmable power supply uniformly, so the user can communicate the upper devices with a
20 target ECU by corresponding VCIs and the switch, and develop and test the ECU as desired, in this way, a less amount of the cable harnesses are used, which makes it convenient to manage centrally, and a utilization rate of the ECUs is high while the cost is low, in the meantime, it is easy to operate the central ECU development and test system and not liable to make mistakes with the present system.

25 In the present embodiment, the upper devices 11 can be a computer or a portable intelligent device, the computer can be a desktop computer or a notebook computer, the portable intelligent device can be a mobile phone or a tablet etc.

In the present embodiment, the plurality of ECUs are uniformly provided in an ECU room.

Wherein, as shown in figure 1, one end of each of the cable harnesses is an OBD plug 16a, the OBD plug 16a is connected with a CAN bus connector, a K bus connector, and a T15 bus connector, another end of each of the cable harnesses is a registered jack 16b, and the registered jack 16b is connected with the switch 13.

- 5 Specifically, as shown in figure 2, there are 16 pins in the OBD plug 16a, pin no. 3 and pin no. 6 are connected with line no. 1 and line no. 2 of the registered jack 16b, pin no. 11 and pin no. 14 are connected with line no. 3 and line no. 6 of the registered jack 16b, pin no. 7 is connected with line no. 4 of the registered jack 16b, and line reference numbers of the registered jack 16b can be seen in figure 2, in figure 2, the line reference numbers increase from bottom to up (a side of the registered jack without shrapnel is shown in figure 2, wherein line no. 1 and line no. 8 have been shown).

Specifically, automatic activation, communication and connection of the ECUs has been realized with the upper devices 11, the switch 13 and the programmable power supply 15, and the utilization rate of the ECUs has been further improved, specifically in a following manner:

- 15 The upper devices 11 are provided to:
- a. Respond to the ECU identifier input by a user; send a first command to the programmable power supply 15, wherein the first command contains the ECU identifier.
 - b. Match and get corresponding a second port number by a predetermined relationship between the first port number and the second port number by the first port number returned by the programmable power supply 15, and send the second port number to the switch 13, wherein the second port number is a port number of the ECU in the switch 13.
 - c. Respond to an end instruction from the user, send a second instruction to the programmable power supply 15, send a third instruction to the switch 13, wherein the second instruction contains the first port number and the third instruction contains the second port number.

During actual application circumstances, the user can choose the ECU identifiers in an operation interface of the upper devices 11, wherein the ECU identifiers can be shown to the user in a form of a table, with different ECU identifiers corresponding to different ECUs. Similarly, the user can input an end instruction into the operation interface of the upper devices 11, just like pressing an

end button.

The programmable power supply 15 is provided to:

- a. Energize the corresponding ECUs according to the ECU identifiers contained in the first instruction, return the first port numbers of the ECUs to the upper devices 11, wherein the first port number is a port number of the ECU in the programmable power supply.

In an embodiment, the plurality of ECUs are ECUs of different models, and ECUs of the same model are provided to be more than one, correspondingly, in step a, energizing the corresponding ECUs according to the ECU identifiers contained in the first instruction further comprises:

The ECU identifiers are ECU models, energizing the ECUs of the same model however not yet energized.

- b. Cut power supply to the corresponding ECU according to the second instruction to avoid energizing a spare ECU for a long time, and prolong service life thereof, save energy and protect environment.

The switch 13 is provided to:

- a. Establish communication access between the corresponding ECUs and the VCIs corresponding to the upper devices according to the second port numbers from the upper devices 11.
- b. Cut the communication access between the corresponding ECUs and the VCIs according to the third instruction.

However, one of ordinary skill in the art shall understand that, the foregoing embodiments are only intended to explain the present invention, rather than restrict the present invention, all changes and alternations to the foregoing embodiments within spirits and scope of the present invention fall into protection scope of the present invention defined by the claims.

CLAIMS

1. A centralized ECU development and test system, comprising

a plurality of upper devices;

5 a plurality of VCIs corresponding to the plurality of upper devices one by one;

a switch;

a plurality of ECUs; and

a programmable power supply;

wherein the plurality of upper devices are respectively connected to the plurality of VCIs, the

10 plurality of VCIs are connected with the switch, the plurality of ECUs are connected with the switch with cable harnesses, communication ports of the programmable power supply are connected with the plurality of upper devices, and a power supply port of the programmable power supply is connected with power supply ports of the plurality of ECUs.

15

2. The centralized ECU development and test system according to claim 1, characterized in that, the plurality of upper devices are provided:

to respond to (an) ECU identifier(s) input by a user, and send a first instruction to the programmable power supply, wherein the first instruction contains the ECU identifier(s);

20

from a one-to-one corresponding relationship between (a) first port number(s) and (a) second port number(s), know the corresponding second port number(s) by the first port number(s) returned by the programmable power supply, and transmit the second port number(s) to the switch, the second port number(s) is/are (a) port number(s) of the ECU(s) on the switch;

25

to respond to an end instruction from the user, send a second instruction to the programmable power supply, and send a third instruction to the switch, wherein the second instruction contains the first port number(s) and the third instruction contains the second port number(s);

30

the programmable power supply is provided to:
energize corresponding ECU(s) according to the ECU identifier(s) contained in the

first instruction, send the first port number(s) of the ECU(s) to the upper device(s), and the first port number(s) is/are (a) port number(s) of the ECU(s) in the programmable power supply;

cut power supply as per the second instruction;

5 the switch is provided to:

establish communication access between corresponding ECU(s) and the VCI(s) corresponding to the upper device(s) according to the second port number(s) from the upper device(s);

cut the communication access between the corresponding ECU(s) and the VCI(s) according to the third instruction.

10

3. The centralized ECU development and test system according to claim 2, characterized in that, the plurality of ECUs are ECUs of different models, and ECUs of the same model are provided to be more than one;

15 energizing the corresponding ECU(s) based on the ECU identifier(s) contained in the first instruction further comprises:

the ECU identifier(s) is/are (an) ECU model(s), energizing the ECU(s) of the same model however not yet energized.

20 4. The centralized ECU development and test system according to claim 1 or 3, characterized in that, the plurality of ECUs are uniformly provided in an ECU room.

5. The centralized ECU development and test system according to claim 4, characterized in that, one end of each of the cable harnesses is provided to be an OBD plug, and the OBD
25 plug connects a CAN bus connector, a K bus connector and a T15 bus connector, another end of each of the cable harnesses is a registered jack, and the registered jack is connected with the switch.

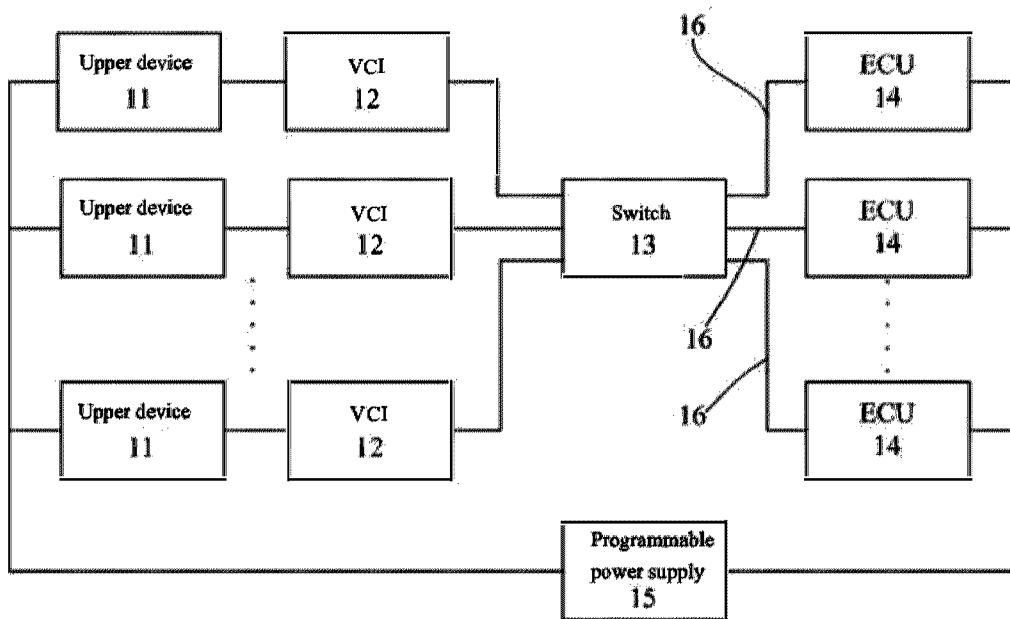


FIG. 1

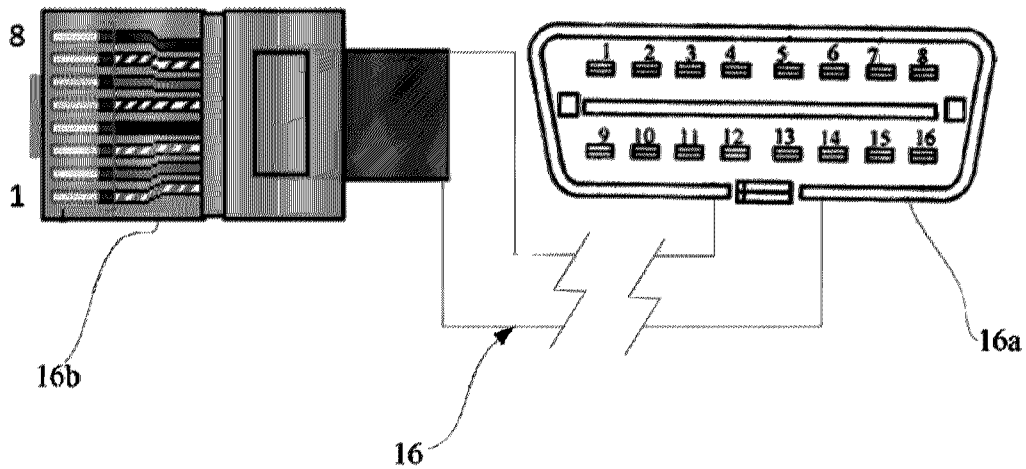


FIG. 2

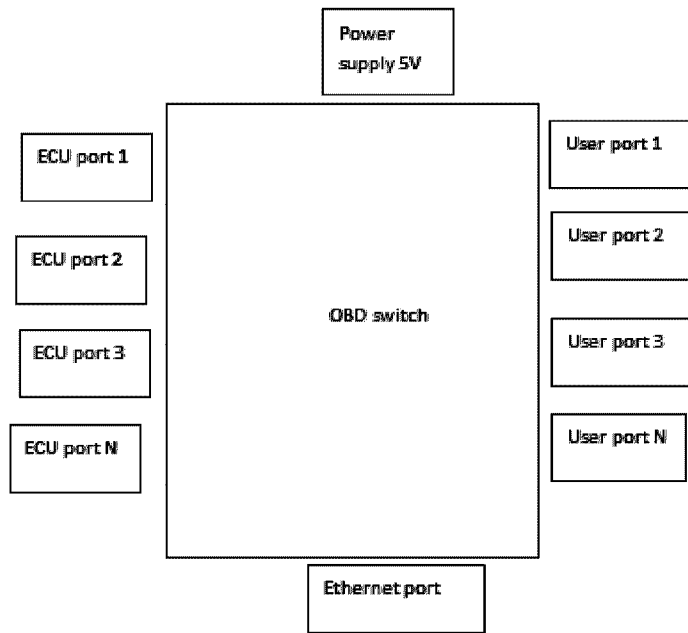


FIG. 3

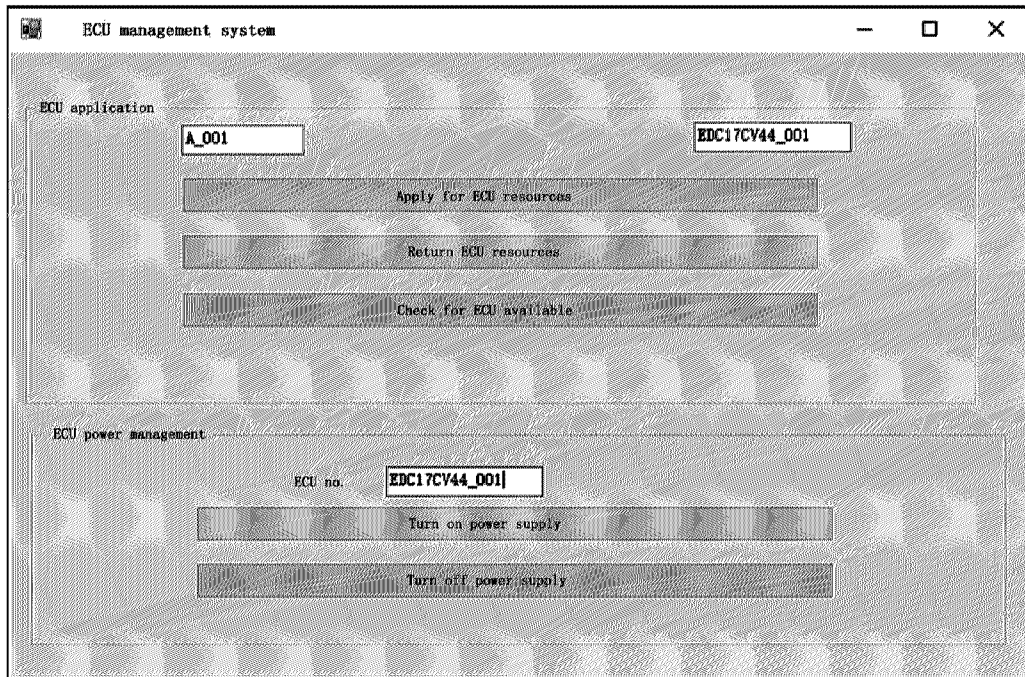


FIG. 4

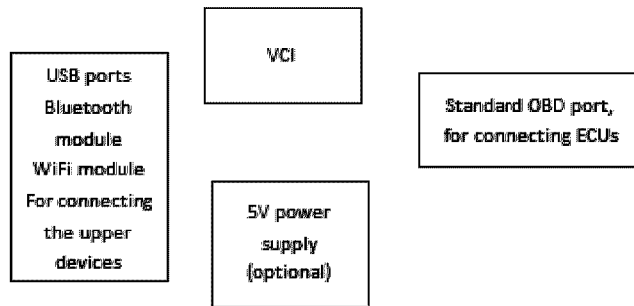


FIG. 5

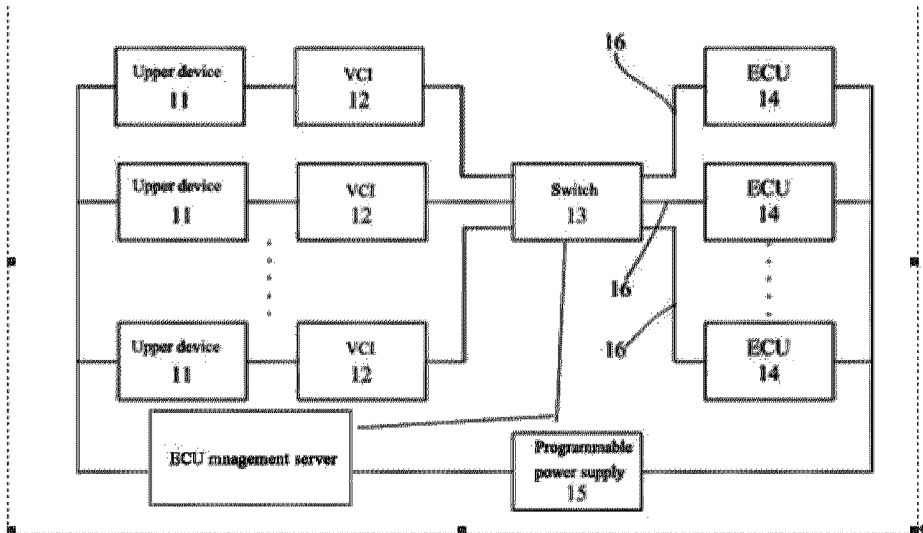


FIG. 6

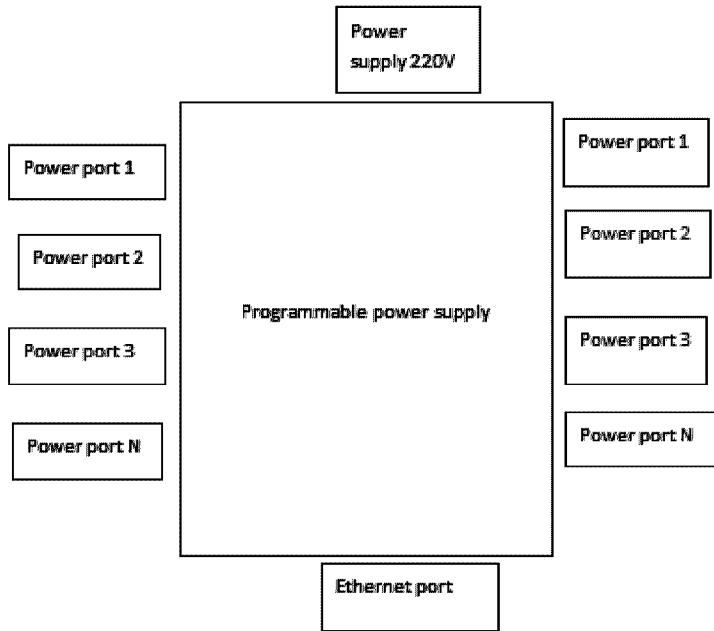


FIG. 7

