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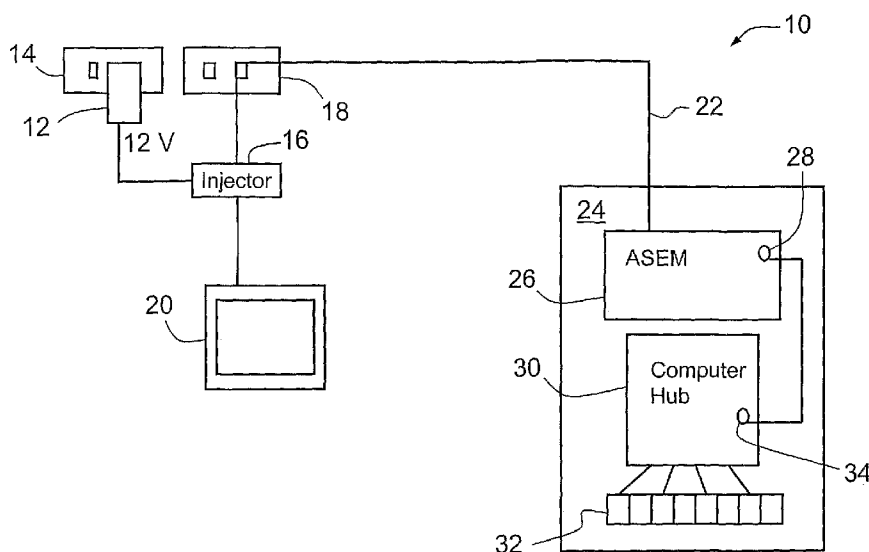
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SYSTEM AND METHOD FOR DISTRIBUTING ELECTRICAL POWER



(57) Abstract: A method and system for distributing electrical power, the system (10, 40, 50) comprising a power injector (16) electrically couplable to a data cable (22, 52) for putting a voltage across the cable (22, 52), a power extractor (26, 42) electrically couplable to the cable (22, 52), and an output (28, 44) electrically coupled to the power extractor (26, 42) and electrically couplable to an electrical device. Some or all electrical power injected into the cable (22, 52) with the power injector (16) can be accessed remotely at the output (28, 44).

## SYSTEM AND METHOD FOR DISTRIBUTING ELECTRICAL POWER

Related Application

This application is based on and claims the benefit of the  
5 filing date of AU appl. no. 2005906518 filed 23 November  
2005, whose content is incorporated herein by reference.

Field of the Invention

The present invention relates to a system and method for  
10 distributing electrical power, of particular but by no  
means exclusive application in either existing or new  
cabling infrastructures in residential or commercial  
environments.

15 Background of the Invention

One existing system is known as POE or "power over  
Ethernet". POE injects a voltage into an Ethernet cable  
for powering a related device at a remote location. A  
standard fixed-line telephone uses essentially this  
20 approach. Some amplifiers have also been powered in this  
way. In all these cases, however, the power is injected  
remotely solely for powering the remote device at the  
other end of that cable and that is sending its data  
signals back through that cable.

25

Any other equipment in such systems must still be located  
where mains power can be made available; this is not  
always so or, if it is, may entail inconvenience or  
excessive cost. In addition, many cabling installers are  
30 not fully licensed electricians and are therefore unable -  
when install new equipment or cabling - to move mains  
power points or install new points to provide power for  
that equipment.

35 Summary of the Invention

The present invention provides, therefore, a system for  
distributing electrical power, comprising:

a power injector electrically couplable to a data  
cable for putting a voltage across the cable;

a power extractor electrically couplable to the data cable; and

an output (such as an output terminal) electrically coupled to the power extractor and  
5 electrically couplable to an electrical device;

wherein some or all electrical power injected into the data cable with the power injector can be accessed at the output.

10 The skilled person will appreciate that some power loss will generally occur in the transmission of the electrical power, so the accessing of all the injected power should be understood to refer to all that is preserved at the  
15 output.

The voltage extractor and output may be provided as an integral unit, or in an amplifier, or both.

Thus, by using the electrical conductors in an existing  
20 cable, any device can be powered by injecting voltage and then extracting that voltage at the location of the device from an amplifier module (such as where mains power is not easily accessible). The invention is thus envisaged to be of particular value in locations that are suitable for the  
25 installation of such electrical devices that require electrical power but unsuitable or inconvenient for the provision of mains power (or where the devices cannot be powered efficiently or adequately by battery). Devices  
30 can be powered whether connected to the cabling or not.

A cabling system can thus be installed fully without consideration of the provision or location of mains power.

The extractor may be located inside a cabling cabinet,  
35 thereby allowing remote powering of devices within the cabinet. This embodiment has several advantages. Firstly, such cabinets are often limited in available space and this embodiment frees up space that would otherwise be used by power transformers. Secondly,  
40 commonly there are regulations imposed by Certification

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- Authorities as to the proximity of mains cable to low voltage (e.g. data and telephone) equipment or cables; this embodiment extracts low voltage in the cabinet, thereby conforming to such regulations. Thirdly, the performance of high speed data transfer/ RF signals can be affected by close proximity to electrical transformers; the extracted low voltage in the cabinet does not produce such interference.
- Even if the power is not required to power any modules within that cabling infrastructure, the power can be extracted to power other unrelated devices located at a remote position from the point of injection
- Essentially any type of electrical cable can be used.

The extractor can be either part of the device, as a part of the cabling system or it can be a separate unit.

- The invention uses the power for either additional system equipment not directly related to the cable signal, or where there is no system equipment involved, the extracted voltage can be used to power devices unrelated to the signal in the cable.
- The invention also provides a power extractor as described above. In another aspect, the invention provides a power injector as described above. In still another aspect, the invention provides a method of distributing electrical power as described above.

#### Brief Description of the Drawing

- In order that the invention may be more clearly ascertained, embodiments will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a schematic view of a power

distribution system according to a first embodiment of the present invention;

Figure 2 is a schematic view of a power distribution system according to a second embodiment of the present invention; and

Figure 3 is a schematic view of a power distribution system according to a third embodiment of the present invention.

#### 10 Detail Description of the Embodiments

Figure 1 is a schematic view of a power distribution system 10 according to a first embodiment of the present invention. In this embodiment, as is described in detail below, a coaxial cable is run to a structured cabling  
15 cabinet (SCC) that contains an extractor located in an Amplified Splitter Extractor Module (ASEM).

Thus, referring to figure 1, the system includes a low voltage 2 Amp transformer 12 (plugged into a mains socket  
20 14). The 2 Amp power rating on the transformer 12 is required to power devices (such as the Amplified Splitter Extractor Module (ASEM) described below), and converts the mains 240/110V AC to low voltage (in this embodiment, 12 V DC). The low voltage output is then connected to a Power  
25 Injector Unit (PIU) 16. The PIU 16 has two connectors (both in the form of "coaxial cable sockets"): a first connector for coupling the PIU 16 to a coaxial cable wall socket 18 and a second connector for coupling the PIU 16 to an optional device which, in this embodiment, is in the  
30 form of a television 20. The PIU 16 applies the low voltage from the output of the transformer 12 to the conductors of the first connector. The PIU 16 blocks the coupling of the low voltage to its second connector so that television 20 is protected from this low voltage.

35

The PIU 16 is connected from its first connector to the coaxial cable wall socket 18. An installed coaxial cable

- 5 -

22 couples the coaxial cable wall socket 18 to a Structured Cabling Cabinet (SCC) 24, for transmitting radio-frequency (RF) signals therebetween. The PIU 16 allows the RF signals to travel from the SCC 24 to the television 20 without interference and with little or no signal loss. The PIU 16 is, in this embodiment, a stand-alone unit but it could alternatively be incorporated into other devices (such as an RF modulator).

From the coaxial cable wall socket 18, the installed coaxial cable 22 couples the low voltage from the PIU 16 along its length to the remotely located SCC 24. The installed coaxial cable 22 is then terminated within the SCC 24 onto an Amplified Splitter Extractor Module (ASEM) 26. The ASEM 26 uses the low voltage from the conductors of the coaxial cable 22 to power its circuitry. The ASEM 26 couples the low voltage from the PIU 16 to an Output Terminal 28 which provides a 12 V DC output and allows other modules/products located in the SCC 24 or in its proximity to draw upon this low voltage as a power source. The ASEM 26 can either have a single output or multiple outputs with the same or varying power voltages. The ASEM 26 can either provide the voltage in the form that it was transmitted from the PIU 16, or it can include circuitry to transform the power to a different working voltage prior to making it available at the Output Terminal 28. The SCC 24 includes, in this embodiment, a computer hub 30 connected to a data patch panel 32; the computer hub 30 is connected - by means of its DC input 34 - to Output Terminal 28 and powered therefrom.

Figure 2 is a schematic view of a power distribution system 40 according to a second embodiment of the present invention. In this embodiment, described below, a coaxial cable is run to a structured cabling cabinet (SCC) that contains a stand-alone Extractor. System 40 is similar to system 10 of figure 1, and like reference numerals have

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been used to identify like features.

Unlike system 10 of figure 1, however, the installed coaxial cable 22 couples the low voltage along its length to the remotely located SCC 24', where it is terminated - within the SCC - onto a stand-alone Extractor Module (EM) 42. The Extractor Module 42 couples the low voltage to an Output Terminal 44 which allows other modules/products located in the SCC 24' to use the low voltage as a power source. The Extractor Module 42 can either pass on the voltage in the form that it was transmitted from the PIU 16, and may optionally include circuitry to reformat the power to a different working voltage prior to making it available at the Output Terminal. The Extractor Module 42 can either have a single output or multiple outputs with the same or varying power voltages. The SCC 24' includes a computer hub 30 connected to a data patch panel 32: the computer hub 30 is connected - by means of its DC input 34 - to Output Terminal 44 and powered therefrom.

The Extractor Module 42 can either then connect directly to an output of an antenna or directly to an output of a passive splitter within the SCC 24' or - as in this embodiment - directly to an output of an RF Passive Amplifier Module 46 to transmit RF signals to the coaxial cable wall socket (or sockets) 18. The Extractor Module 42 is in this way behaving as an in-line extractor.

Figure 3 is a schematic view of a power distribution system 50 according to a third embodiment of the present invention. In this embodiment, described below, a twisted pair cable is run to a structured cabling cabinet (SCC) that contains a stand-alone Extractor. System 50 is similar to system 10 of figure 1 and system 40 of figure 2, and like reference numerals have been used to identify like features.

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Unlike like system 10 of figure 1, however, in this embodiment a twisted pair cable 52 transmits signals and couples the voltage of the injector 16 and extractor 42 (instead of a coaxial cable). Hence, a multi-pair cable outlet 58 replaces the coaxial cable wall socket of previous embodiments. The connectors of the PIU 16 are thus, in this embodiment, "twisted pair cable sockets" rather than, as in previous embodiments, "coaxial cable sockets".

10

Instead of television 20, the system 50 includes an optional device is in the form of a computer 60, though this could be in the form of any other device that uses twisted pair cable (such as a telephone). The PIU 16 blocks the coupling of the low voltage to this optional device.

The PIU 16 is then connected from its first connector to the twisted pair wall socket 58. From the twisted pair wall socket 58, the installed twisted pair cable 52 couples the low voltage to the remotely located SCC 24". The installed twisted pair cable 52 is terminated within the SCC 24" onto Extractor Module (EM) 42. The Extractor Module 42 couples the low voltage to its Output Terminal 44 which allows other modules/products located in the SCC 24" or in its proximity to draw upon this low voltage as a power source. As previously, the Extractor Module 42 can either provide the voltage in the form that it was transmitted from the PIU 16, or it can include circuitry to reformat the power to a different working voltage prior to making it available at the Output Terminal. The Extractor Module 42 can either have a single output or multiple outputs with the same or varying power voltages.

35 The SCC 24" also includes, in this embodiment, a computer hub 30: the computer hub 30 is connected - by means of its DC input 34 - to Output Terminal 44 and powered therefrom.



In this embodiment, the Extractor Module 42 is connected directly to a socket on a data patch panel 32 so that data signals can be transmitted to the twisted pair cable wall socket (or sockets) 58. The Extractor Module 42 is in this way behaving as an in-line Extractor. In this embodiment, the Extractor Module 42 is connected to a data patch panel, however, it can connect to any device distributing signals to wall sockets along the twisted pair cable 52.

Modifications within the scope of the invention may be readily effected by those skilled in the art. It is to be understood, therefore, that this invention is not limited to the particular embodiments described by way of example hereinabove.

In the preceding description of the invention, except where the context requires otherwise owing to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

Further, any reference herein to prior art is not intended to imply that such prior art forms or formed a part of the common general knowledge.

## CLAIMS:

1. A system for distributing electrical power,  
comprising:
  - 5 a power injector electrically couplable to a data  
cable for putting a voltage across said cable;
  - a power extractor electrically couplable to said  
data cable; and
  - an output electrically coupled to said power  
10 extractor and electrically couplable to an electrical  
device;
  - wherein some or all electrical power injected  
into said data cable with said power injector can be  
accessed remotely at said output.
- 15 2. A system as claimed in claim 1, wherein said voltage  
extractor and said output are provided as an integral  
unit.
- 20 3. A system as claimed in claim 1, wherein said voltage  
extractor and said output are provided in an amplifier.
4. A system as claimed in claim 1, wherein said extractor  
is located inside a cabling cabinet, to allow powering of  
25 devices within said cabinet.
5. A system as claimed in claim 1, wherein said extractor  
is a part of said device.
- 30 6. A system as claimed in claim 1, wherein said extractor  
is a part of a cabling system.
7. A system as claimed in claim 1, wherein said power  
injector has a plurality of connectors, including a first  
35 connector for coupling said power injector to said data  
cable and a second connector couplable to a further  
electrical device, whereby said further electrical device

can be powered by said power injector.

8. A power extractor for use with a power injector that is electrically couplable to a data cable, said power  
5 injector being adapted for putting a voltage across said cable, said power extractor comprising:

an output electrically couplable to an electrical device;

- 10 wherein said power extractor is electrically couplable to said data cable such that some or all electrical power injected into said data cable with said power injector can be accessed remotely at said output of said power extractor.

- 15 9. A power injector for use with a power extractor that is electrically couplable to a data cable, wherein said power injector is adapted to put a voltage across said data cable and thereby electrical inject power into said data cable, such that some or all of said electrical power  
20 can be accessed remotely at an output of said power extractor.

10. A method of distributing electrical power, comprising:

- 25 putting a voltage across a data cable to inject electrical power into said data cable; and

extracting some or all of said power at a location remote from where said power is injected into said data cable.

30

11. A method as claimed in claim 10, including electrically coupling a power injector to said data cable to put a voltage across said data cable and thereby inject power into said data cable.

35

12. A method as claimed in claim 10, including extracting some or all of said power with a power extractor

electrically coupled to said data cable.

13. A method as claimed in claim 10, including electrically coupling an electrical output to said data  
5 cable, said electrical output being electrically couplable to an electrical device, whereby some or all of said electrical power injected into said data cable can be accessed remotely at said output.
- 10 14. A method as claimed in claim 10, wherein said power injector has a plurality of connectors, and said method further comprises electrically coupling said power injector to said data cable with a first of said  
15 connectors, and electrically coupling said power injector to an electrical device with a second of said connectors.
15. A system for distributing electrical power, comprising:
- a power injector electrically couplable to a data  
20 cable for putting a voltage across said cable;
  - a power extractor electrically couplable to said data cable; and
  - an output electrically coupled to said power extractor and electrically couplable to an electrical  
25 device, provided with said voltage extractor in an integral unit in an amplifier;
- wherein some or all electrical power injected into said data cable with said power injector can be accessed remotely at said output.
- 30 16. A method of distributing electrical power, comprising:
- electrically coupling a power injector to a data cable to put a voltage across said data cable;
  - 35 putting a voltage across a data cable with said power injector and thereby inject electrical power into said data cable; and

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extracting some or all of said power at a location remote from where said power is injected into said data cable with a power extractor electrically coupled to said data cable;

5 electrically coupling an electrical output to said power extractor, said electrical output being electrically couplable to an electrical device;

whereby some or all of said electrical power injected into said data cable can be accessed remotely at  
10 said electrical output.

1/2

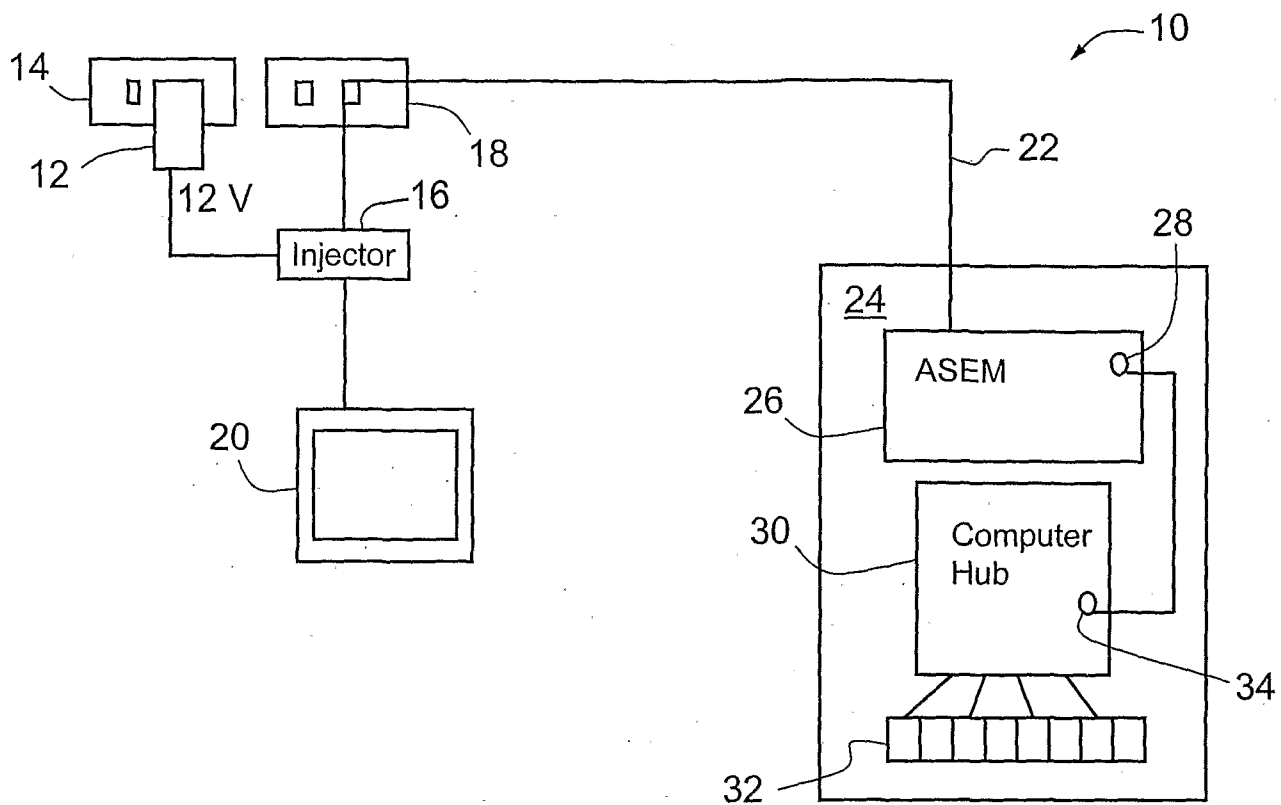


Figure 1

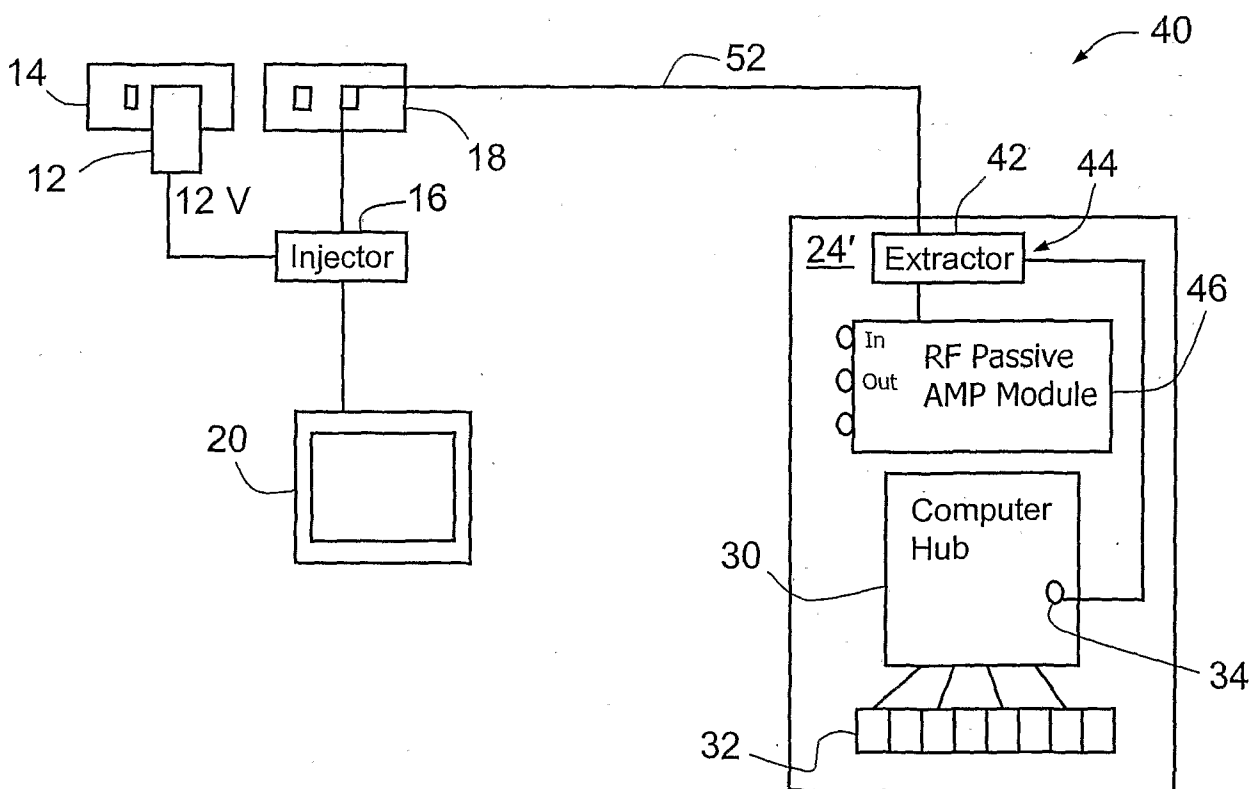


Figure 2

2/2

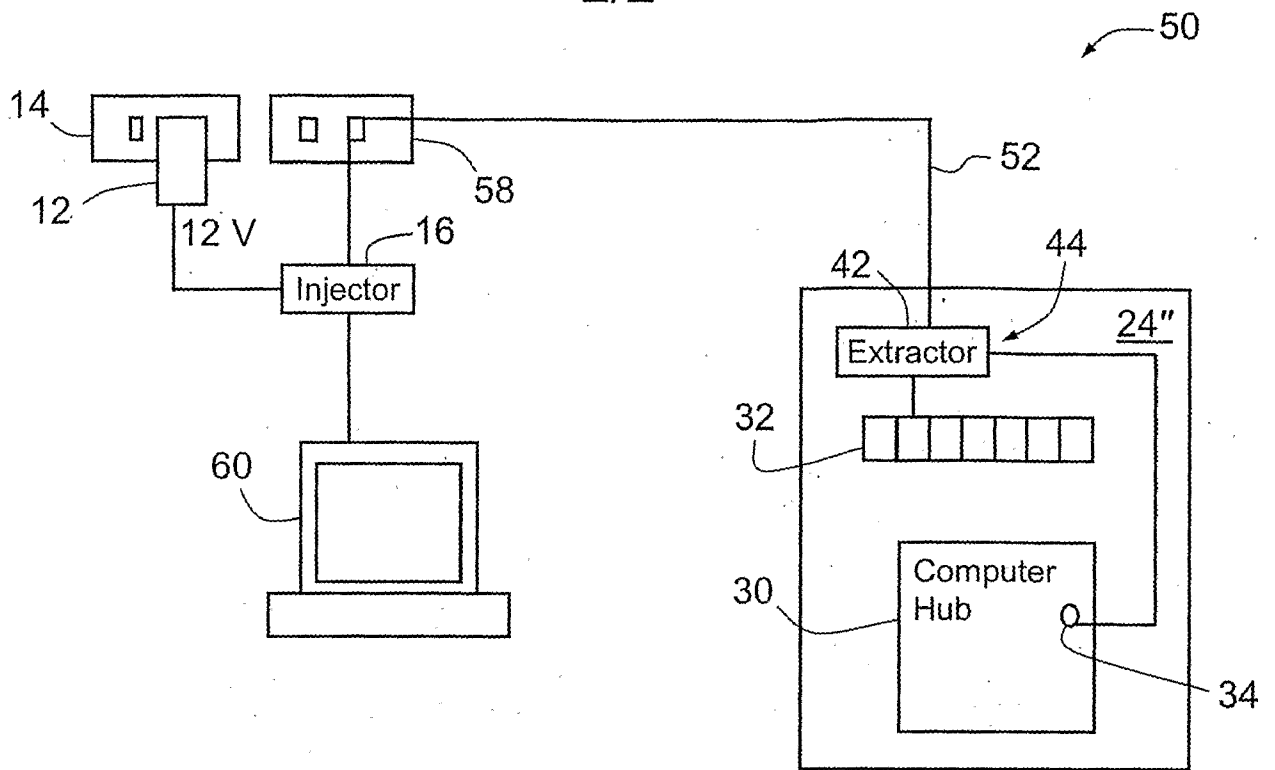


Figure 3

## INTERNATIONAL SEARCH REPORT

 International application No.  
**PCT/AU2006/001765**

## A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

**G06F 1/26 (2006.01)**

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI with keywords power, electric+, coupl+, inject+, extract+, adapt+, communication, line, network, coax+, split+

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6909943 B2 (LEHR ET AL) 21 June 2005 See whole document	1 – 16
X	US 2005/0245254 A1 (HALL) 3 November 2005 See whole document	1 – 16
X	US 6329906 B1 (FISHER ET AL) 11 December 2001 See whole document	1 – 16

☒ Further documents are listed in the continuation of Box C
 ☒ See patent family annex
 

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search <b>30 January 2007</b>	Date of mailing of the international search report <b>05 FEB 2007</b>
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized officer  <b>J.W. THOMSON</b> Telephone No : (02) 6283 2214



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2006/001765

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2006/001765

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/AU2006/001765**

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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX