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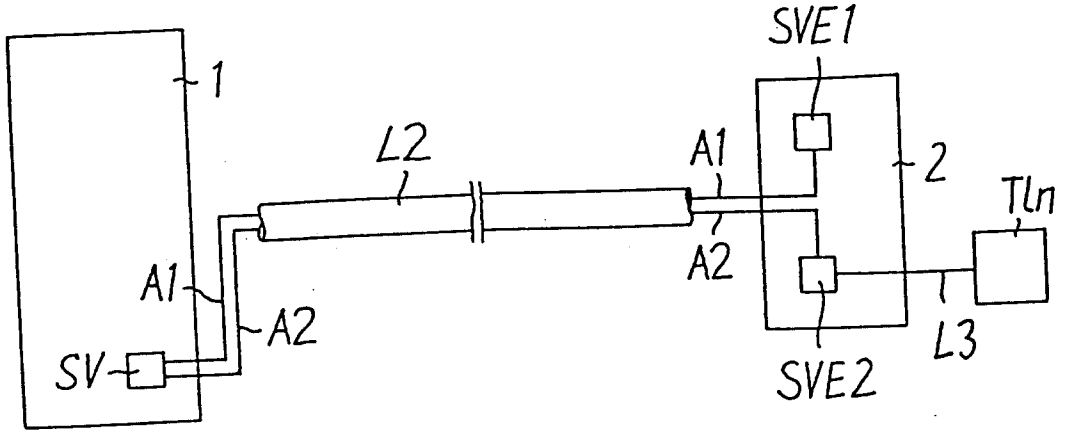
(54) **DISPOSITION POUR TRANSMISSION NUMERIQUE A CONDUCTEUR DE LIGNE**

(54) **ARRANGEMENT FOR LINE-CONDUCTED DIGITAL TELECOMMUNICATION**




(57) An arrangement for line-conducted digital telecommunication between a line termination (1) of a telecommunication network and subscribers (Tln) connected to this network is specified in which at least one subscriber (Tln) equipped with terminals is connected to a network termination (2) via an electrical line (L3), in which the network termination (2) is connected to the line termination (1) via a line (L2) containing metallic conductors and in which the line termination is equipped with a voltage source (SV) for supplying its own power and for supplying power to the network termination (2) and to the terminals of the subscribers (Tln). To increase the operational reliability, two separate power supply units (SVE1, SVE2) are arranged in the network termination (2), one of which is used for feeding the active components of the network termination (2) and the other one of which is used for feeding the terminals of the subscribers (Tln). The two power supply units (SVE1, SVE2) are connected to the voltage source (SV) of the line termination (1) via separate conductors.

## ABSTRACT

Arrangement for line-conducted digital telecommunication

An arrangement for line-conducted digital telecommunication between a line termination (1) of a telecommunication network and subscribers (Tln) connected to this network is specified in which at least one subscriber (Tln) equipped with terminals is connected to a network termination (2) via an electrical line (L3), in which the network termination (2) is connected to the line termination (1) via a line (L2) containing metallic conductors and in which the line termination is equipped with a voltage source (SV) for supplying its own power and for supplying power to the network termination (2) and to the terminals of the subscribers (Tln). To increase the operational reliability, two separate power supply units (SVE1, SVE2) are arranged in the network termination (2), one of which is used for feeding the active components of the network termination (2) and the other one of which is used for feeding the terminals of the

subscribers (Tln). The two power supply units (SVE1, SVE2) are connected to the voltage source (SV) of the line termination (1) via separate conductors.

# Arrangement for line-conducted digital telecommunication

## Description

The invention relates to an arrangement for line-conducted digital telecommunication between a line termination of a telecommunication network and subscribers connected to this network, in which at least one subscriber equipped with terminals is connected to a network termination via an electrical line, in which the network termination is connected to the line termination via a line containing metallic conductors and in which the line termination is equipped with a voltage source for supplying its own power and for supplying power to the network termination and to the terminals of the subscribers (DE 43 43 456 A1).

Digital transmission technology enables the most varied services to be offered which can be utilized by the subscribers to a telecommunication network. The services comprise, among other things, telephone, telefax, IDN and ISDN (basic and primary multiplex accesses). The local loop of the telecommunication network, i.e. the subscriber line network is of particular significance in this connection. However, other connections of subscribers are also of interest, for example direct connections - so-called point-to-point connections. In all known

"network structures", there is a network termination comprising a power supply unit, to which at least one subscriber is connected with his terminals.

A subscriber line network can be found, for example, in the DE 43 43 456 A1 initially mentioned. The line termination here is constructed as a cable distributor comprising active components. It is connected to an exchange of the telecommunication network via optical and/or electrical cables or lines. The network terminations equipped with active components are designated as terminal boxes. They are connected to the cable distributor via cables or, respectively, lines which at least contain electrical conductors. This makes it possible to supply all active components of the cable distributor itself and of the terminal boxes and the terminals of the subscribers with power centrally from the voltage source of the cable distributor. The terminal boxes and their associated switching units can be installed, for example, in each case in the building of a subscriber or of several subscribers. From there, only short electrical lines then go to the devices of the subscribers. To each subscriber, channels having a transmission rate of, for example, 2 Mbit/s can therefore be plugged and switched through without problems. This arrangement has been successful in practice.

The invention is based on the object of further

increasing the reliability in telecommunication of the arrangement described initially.

This object is achieved, in accordance with the invention, by the fact that

- two separate power supply units are arranged in the network termination, one of which is used for feeding the active components of the network termination and the other one of which is used for feeding the terminals of the subscribers, and
- the two power supply units are connected to the voltage source of the line termination via separate conductors.

In this arrangement, the power supply units of the network termination, on the one hand, and of the subscribers and their terminals, on the other hand, are connected to the central voltage or power source of the line termination independently of one another. As a result, a fault at the subscriber, for example a short circuit, can have no effect on the network termination. The network termination, and thus its transmission hardware still remain operable. Using a management system which is now normally used in telecommunication networks, the fault which has occurred can be detected very rapidly and eliminated within a short period in this manner.

The arrangement is of particular advantage when two or more subscribers are connected to one network termination. A fault occurring at a subscriber can not

only be detected but also located by means of the management system. In this case, too, the fault can be rapidly eliminated.

Illustrative embodiments of the subject matter of the invention are shown in the drawings, in which:

Fig. 1 and 2 show two block diagrams of different arrangements in accordance with the invention in a diagrammatic representation.

Figure 3 shows a detail of the arrangement according to Figure 2 for one subscriber.

In the context of the invention "line termination" is, for example, an exchange of a telecommunication network. The data to be transmitted reach the line termination through higher-level parts of the telecommunication network in one direction or from the connected subscribers in the other direction. The "network termination" is a device to which the subscribers are connected with their terminals. It contains, for example, amplifiers, receiving and transmitting devices, multiplexers and demultiplexers in order to allocate the data to be transmitted to the respective subscriber or in order to combine the data of the subscribers to form one data stream.

Figure 1 shows a section from a telecommunication network for a point-to-point transmission:

A voltage source SV is arranged in a line termination 1 of a telecommunication network. The line

termination 1 can be an exchange of a telecommunication network. The voltage source used can be the 230 V AC mains with or without battery buffering or a sufficiently large battery. A network termination 2 is connected to the line termination 1 via a cable or a line L2 which contains at least two electrical wire pairs A1 and A2. In the network termination 2, transmission hardware comprising active components is present. It amplifies, for example, an optical or electrical input signal, recovers the data contained, converts them into another format, if necessary, and forwards them to the connected subscriber Tln. In the case of a number of subscribers, the data are also allocated to the respective subscriber in the network termination 2. In the opposite direction of transmission, the data of the subscriber or subscribers are forwarded from the network termination 2 to the line termination 1.

The network termination 2 can also contain a management block. It has a power supply unit SVE1 to supply its own power. The SVE1 is connected to the power supply of the line termination 1 via the wire pair A1. A second power supply unit SVE2 of the network termination 2 is connected to the power supply of the line termination 1 via the wire pair A2. The subscriber is connected with his terminals to SVE2. He is connected to network termination 2 via an electrical line L3. Accordingly, network termination 2 and

subscriber are supplied with power separately from one another. The transmission hardware of network termination 2 thus remains operable even if a fault occurs in the area of the subscriber.

Figures 2 and 3 show an area of an access network having a number of subscribers. Identical parts as in Figure 1 are provided with the same reference symbols. A cable distributor KVZ is connected to the exchange VST of a telecommunication network - it corresponds to the line termination 1 in Figure 1 - via a line L1 which contains optical and/or electrical transmission elements. In the cable distributor, which is equipped with active electrically operating components as active cable distributor, a channel scheduler KK is located which has at least two outputs for the connection of network terminations which are here called "terminal boxes EVZ". The outputs of the channel scheduler are conducted to line terminations LT. The cable distributor is in each case connected to the terminal box via line L2 which contains at least electrical conductors. It can also be additionally equipped with optical waveguides. The cable distributor is also equipped with the voltage source SV for supplying its electrical components.

In the terminal boxes, lines L2 are connected to line terminations LT. The terminal boxes, too, are equipped with active electrically operating components as active terminal boxes. They have in each case a

channel scheduler KE which has at least two outputs for connecting subscribers. In addition, switching units SU which are connected to the channel scheduler KE are allocated to the terminal boxes. To each switching unit, a subscriber is connected via an electrical line L3. In the illustrative embodiment shown, three subscribers per terminal box are drawn. At least one subscriber should be connected to a terminal box. However, it can also be more than three subscribers. The switching units are allocated to the terminal boxes. They can be spatially combined with these. However, it is also possible to arrange the switching units directly at the subscribers and to connect them to the channel scheduler via electrical lines. A switching unit converts the data coming from the terminal box into a service-specific signal which can be, for example, an analog voice band signal or a digital signal in the form of the $S_0$ interface.

The main function of a terminal box is the network termination of the subscriber line L2. As already mentioned, this can contain both optical and electrical conductors for signal transmission. The terminal box amplifies the optical or electrical input signal, recovers the data contained and distributes them to the connected switching units. In addition, the terminal box can again contain a management block which handles both the monitoring of the terminal box and of the switching unit and the setting of the channel

scheduler. The two power supply units SVE1 and SVE2 are also arranged in the terminal box.

The L2 contain at least the two electrical wire pairs A1 and A2 which are connected to the power supply of the cable distributor. The connection of these wire pairs is not shown in greater detail in the drawings and neither is a connection of the transmission elements of L2 to the active components of cable distributor and terminal box. Figure 3 shows the part of L2 essential for the present arrangement enlarged. Accordingly, the two electrical wire pairs A1 and A2 are connected to the power supply in the cable distributor. Both wire pairs A1 and A2 in each case lead to a terminal box. The wire pair A1 is there connected directly to the central power supply unit SVE1 of the terminal box whilst the wire pair A2 is connected to the power supply unit SVE2 of the switching units and thus ensures that these are supplied with power.

Terminal box, on the one hand, and switching units, on the other hand, are thus connected to the power supply of the cable distributor over separate paths. Even if, for example, all switching units of a terminal box fail due to a short circuit, the terminal box remains operable, i.e. the transmission hardware in this part of the telecommunication network is retained. This also applies to other faults such as, for example, in the case of a module fault in the switching unit

(increased power consumption up to a short circuit) or in the case of a planning-related overload, e.g. transgression of the planned maximum coincidence factor. The fault which has occurred at the switching units can therefore be rapidly detected and located via the management system of the telecommunication network. It is then eliminated as rapidly as possible.

It is possible both to transmit the data together with the power feeding by the power supply units SVE1 and SVE2 via the wire pairs A1 and A2, and separately, for example via optical fibers. In the case of data transmission via the electrical wires, it is also possible to transmit the data via only one wire pair or distributed over both wire pairs A1 and A2.

To be able to utilize excess energy of the SVE1 or the SVE2, a switch, which is to be operated as a function of voltage, can be attached between SVE1 and SVE2, by means of which switch, if necessary, an electrically conductive connection is established between the two power supply units. Excess energy is then supplied to the other power supply unit in each case. A corresponding switch can be, for example, a controllable power source.

Patent claims

1. An arrangement for line-conducted digital telecommunication between a line termination of a telecommunication network and subscribers connected to this network, in which at least one subscriber equipped with terminals is connected to a network termination via an electrical line, in which the network termination is connected to the line termination via a line containing metallic conductors and in which the line termination is equipped with a voltage source for supplying its own power and for supplying power to the network termination and to the terminals of the subscribers, wherein

- two separate power supply units (SVE1, SVE2) are arranged in the network termination (2), one of which is used for feeding the active components of the network termination (2) and the other one of which is used for feeding the terminals of the subscribers (Tln) and
- the two power supply units (SVE1, SVE2) are connected to the voltage source (SV) of the line termination (1) via separate conductors.

2. The arrangement as claimed in claim 1, wherein, between the two power supply units (SVE1, SVE2) of the network termination (2), a switch, which is to be operated as a function of voltage, is arranged by means of which excess energy of one power supply unit can be supplied to the other one in each case.

3. The arrangement as claimed in claim 1 or 2, in which at least one cable distributor having active components is connected as line termination to the exchange, in which at least two terminal boxes having active components are connected to the cable distributor as network terminations via lines containing metallic conductors, wherein

- at least two switching units (SU) are allocated to each terminal box (EVZ), at least one subscriber (Tln) being connected with his terminals to each switching unit (SU) via an electrical line (L3),
- the voltage source (SV) is arranged in the cable distributor (KVZ) and the two power supply units (SVE1, SVE2) are in each case allocated to the terminal box (EVZ), on the one hand, and to the switching units (SU), on the other hand.

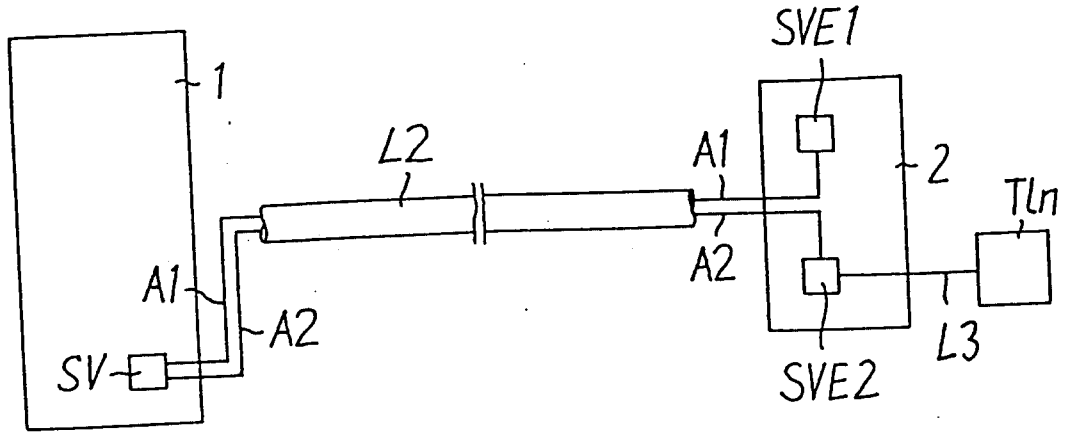

SVE1
1
L2
A1
2
Tln
A2
A1
A2
SV
L3
SVE2

Fig. 1

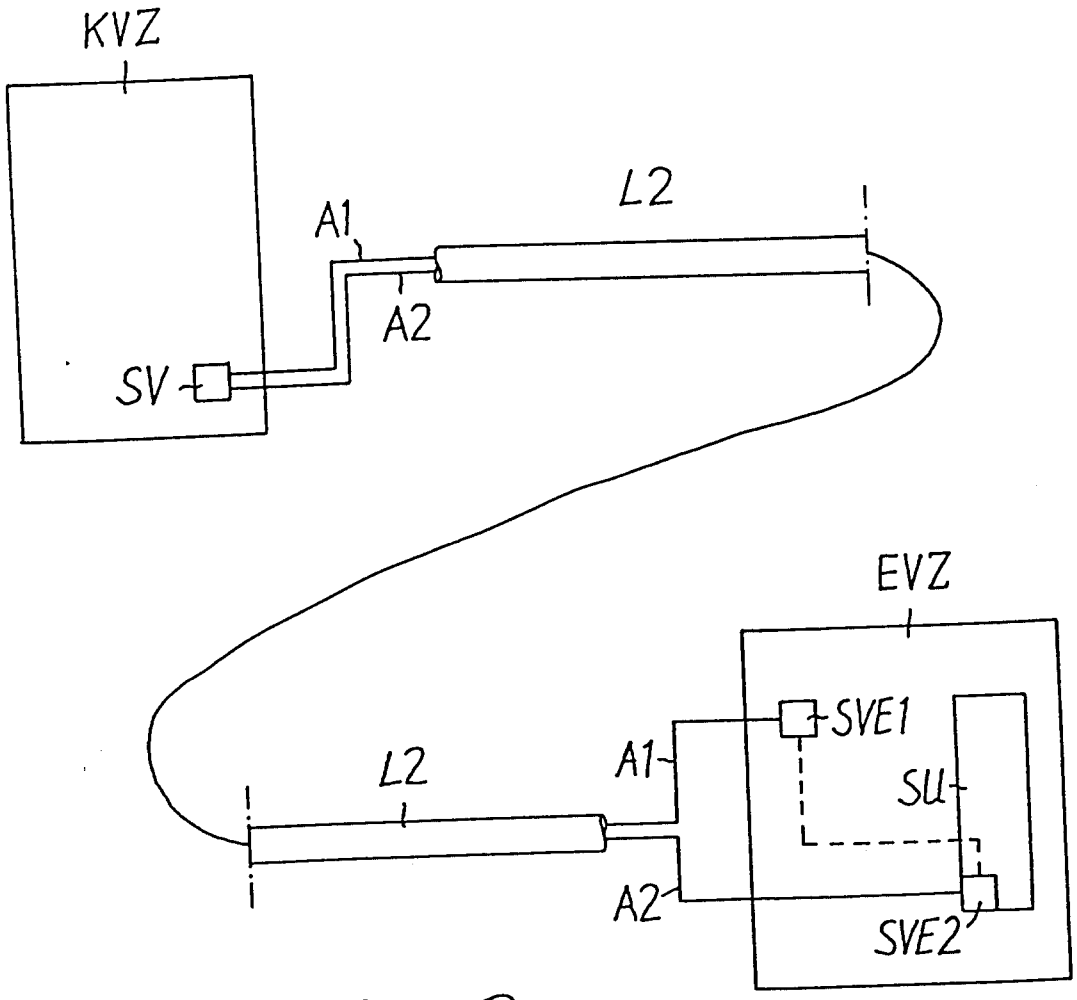
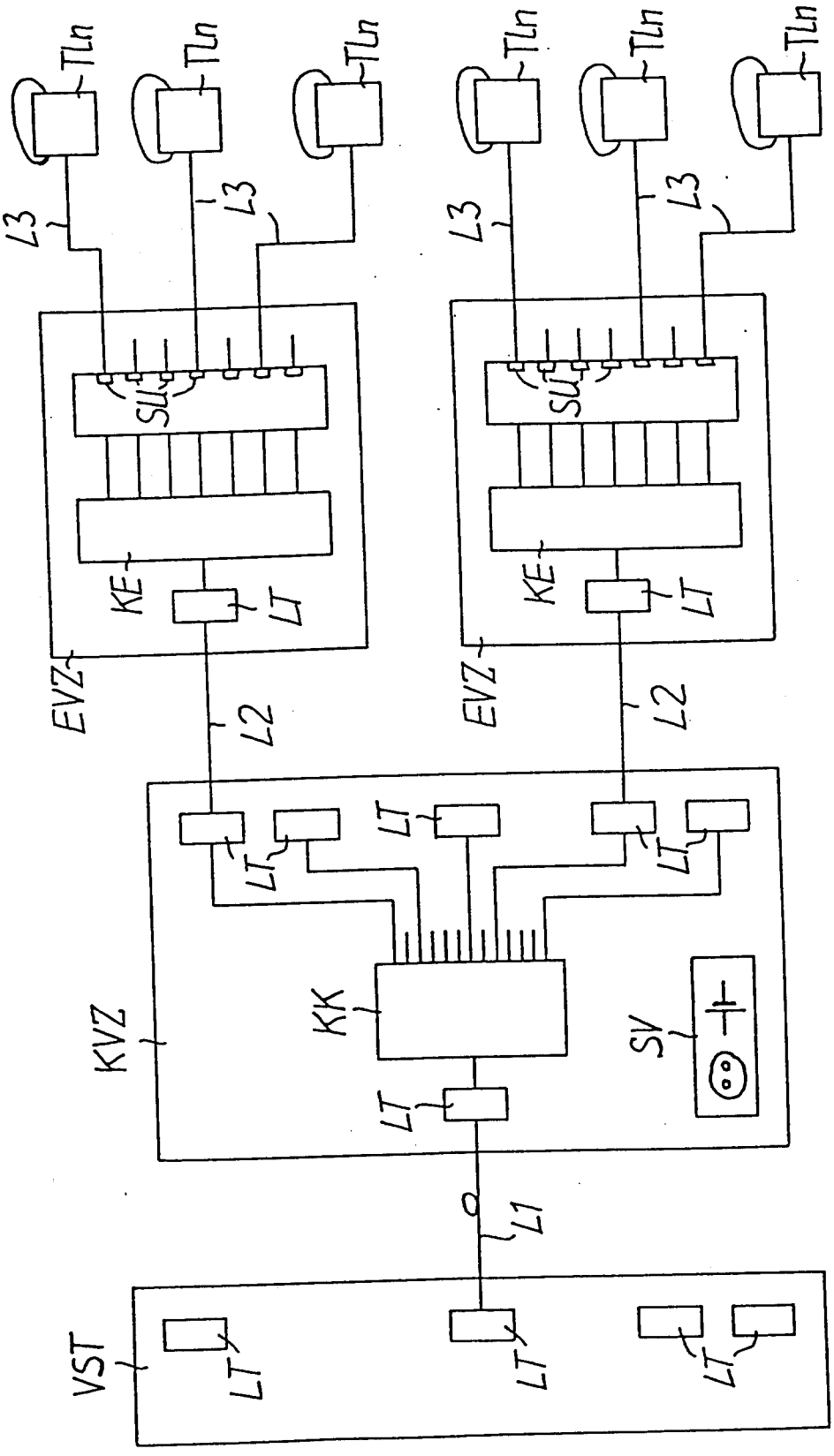

KVZ
L2
A1
A2
SV
EVZ
SVE1
L2
A1
SU
A2
SVE2

Fig. 3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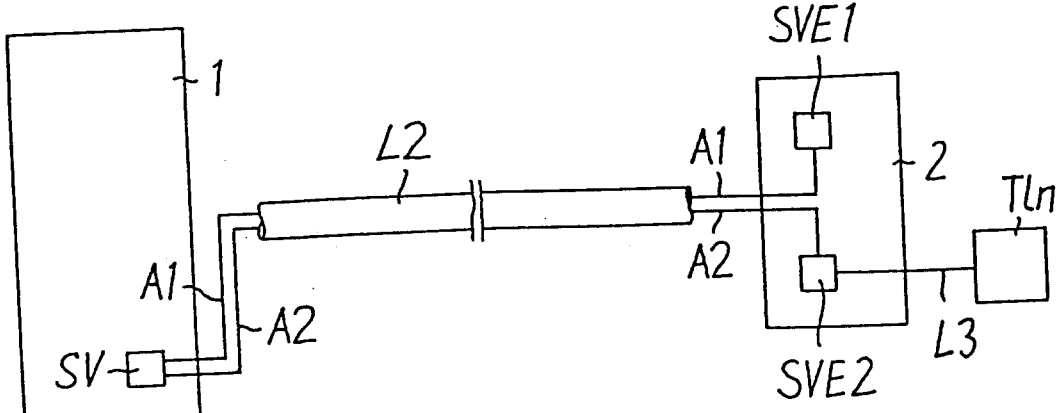
LT
LT

Fig. 2


1
L2
A1
A2
SV
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