

Connection Device for Switching Electrical Signals

This invention concerns the field of electrotechnical applications, with particular regard to the reception and switching of electrical signals (normally low voltage) used for the transmission of data, pictures, sound, etc.

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These signals are currently sent to several primary offtakes with multiple contacts: although these offtakes each have at least four pairs of contacts, usually only one of these pairs is used, and from these there is only one outgoing pair (known popularly as <doublts>) of conductor wires carrying a given input signal. The pairs of wires which lead, as stated, to the primary offtakes are then connected to a multiple terminal connection element (plug or point).

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In current practice, four of these primary offtakes are used, with a total of eight conductor wires leading, as mentioned, to a connection plug or point with eight terminals.

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The latter is then connected to a further offtake or plug, respectively, with an equivalent number of terminals, from which a further eight cables lead, forming four doublets each of which is then connected to a single offtake, which can be termed the secondary offtake to distinguish it from the aforementioned primary offtakes, and this acts as an outgoing offtake to utilize the signals which reach it.

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From the description given thus far, it can be seen that to switch just four incoming signals, a total of eight offtakes with eight terminals has to be used (four for incoming signals and four for outgoing signals) connected by means of connection components with eight poles.

In addition, once one of the secondary offtakes for the

outgoing signals is connected such that it can receive a given signal received as an incoming signal by one of the said primary offtakes, this situation remains locked virtually permanently under the effects of time constraints.

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Finally, in order to reduce the disadvantages of this signal switching and receiving system, modifications are made to the connecting offtake/plug pairs, setting pairs of terminals in electrical contact which lead to different <doublets> in a predetermined mode, different from those in the original arrangement, by means of electrical <bridges> or similar devices.

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In addition, both the aforementioned primary and secondary offtakes are under-used, with many of the contact terminals not connected to any signal.

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To eliminate the disadvantages described above, the inventor of this invention has devised a connection device for the reception or switching of electrical signals which, as well as comprising the component parts described previously and corresponding to the state of the art, is characterised by the fact that it also includes a means of selective, reversible connection of pairs of contact terminals on the multiple outgoing offtake, or plug respectively, with the same number of pairs of terminals as the said primary offtakes to which the said pairs of conductors carrying incoming signals lead, and a means of selective, reversible connection of pairs of contact terminals on the said outgoing multiple offtake or plug, respectively, to which the outgoing conductors lead and the same number of pairs of contacts on the said secondary multiple contact offtakes for utilisation of the signals.

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A description is now given of a preferred example of

construction of the device as per the invention, in which reference is also made to the attached drawings which show:

Figure 1, the wiring diagram of the part of the device comprising four primary offtakes and an incoming connecting plug or point with sets of switches;

Figure 2, the wiring diagram of the part of the device comprising four secondary offtakes and an outgoing connecting plug or point that can be connected to the said incoming connecting plug or point, and a further set of switches;

Figure 3, the summary diagram comprising the two wiring layouts in Figures 1 and 2 connected to each other by means of a connector element.

Looking at Figure 1, there are four primary offtakes A1, A2, A3 and A4, with eight conductors leading to each of these (designed to form four doublets carrying an equivalent number of electrical signals) which can be connected selectively and reversibly to a connector element (plug or point) C1 by means of four sets of multiple switches SW1, SW2, SW3, SW4 with multi-function contacts, is arranged, for example, in such a way as to connect different conductor wires depending on whether these are actuated (<On> position) or not (<Off> position).

Other types of component, such as switches and/or diverters with sliding contacts or similar can be used for this purpose.

In the abovementioned Figure 1, for example, the contact terminal 1 of the incoming plug C1 can be connected selectively and reversibly to contact 1 of the primary offtake A1, or contact 4 of the primary offtake A2, or to

contact 3 of the latter. This is achieved by actuating in different ways the various switches (8 in the figure), forming part of the switch set SW1.

5 A similar operation can likewise be carried out for all the remaining contacts of the primary offtakes, connecting them in a predetermined manner to the terminals on plug C1 by means of the other switch sets SW2, SW3 and SW4.

10 In Figure 2 again, the same operation can be applied, connecting the contact terminals of the plug C12 in a predetermined sequence and mode, to the various contacts on the secondary outgoing offtakes A12, A22, A32, A42 by selective actuation of the switches forming the switch sets
15 SW12, SW22, SW32 and SW42.

For example, by connecting, as shown in the Figures, terminal 1 of the multiple plug C12 with contact 4 of the secondary offtake A22 (connecting switch 2 of set SW12 and
20 disconnecting switches 1 and 3), this connects contact 4, by means of the multiple plug C1, with contact 1 of the primary offtake A1, or with one of the contacts 3 or 4 of the primary offtake A2, depending on how the connection was configured in line with the preceding part of the explanation.

25 This provides a connection device for switching and receiving signals that is flexible in application, economic in cost and swift and easy to actuate, thus achieving the stated purpose of the invention.

30 The terminals of all the primary and secondary offtakes can also thus be fully utilised.

35 As already stated, the switches described thus far can be substituted with other types, for example with sliding

contacts, or with diverters or change-over switches more suited to the different design requirements.

5 Figure 3 shows a complete wiring diagram of the device described, consisting of two parts as shown in Figures 1 and 2, interconnected by means of the plug C1/offtake C12 pair.

10 Any construction that differs from the examples described so far, which are not limitative or binding, but is attributable to the concepts expressed in the attached claims, shall nonetheless be deemed to be covered by the protection granted by this application for patent.

15 The different conductors connecting the primary or secondary offtakes to the respective plugs and points can of course be joined to form sections of connecting and linking cable, or assembled in other ways.

**CLAIMS**

1. Connection device (1) for switching and receiving low voltage electrical signals, comprising:

5 (a) a set of primary offtakes (A1, A2, A3, A4) with multiple contacts, with at least one pair of conductors carrying an incoming signal leading to each of these;

10 (b) a multiple incoming plug or point (C1) fitted with contact terminals equivalent in number to the said conductors carrying the incoming signals, which are connected to the said terminals;

15 (c) a multiple outgoing plug or point (C12) designed to be connected to the said incoming multiple plug or point (C1) respectively and with an equivalent number of contact terminals;

20 (d) the same number of outgoing conductors as there are contact terminals on the said outgoing plug or point (C12) forming pairs each carrying an outgoing signal, each conductor being connected to one of these terminals;

25 (e) a series of secondary offtakes with multiple contacts (A12, A22, A32, A42) for utilisation of the signals, with at least one of the said pairs of outgoing conductors carrying an outgoing signal leading to each of these;

30 characterized by the fact that it also includes a means (SW1, SW2, SW3, SW4, Ti) of selective, reversible connection of pairs of contact terminals on the said plug or multiple incoming offtake (C1) respectively with the same number of pairs of terminals as the said primary offtakes (A1, A2, A3, A4) to which the said pairs of conductors carrying incoming



signals lead, and a means (SW12, SW22, SW32, SW42, Qi) of selective, reversible connection of pairs of contact terminals on the said offtake or multiple outgoing plug (C12) respectively, to which the said outgoing conductors lead and the same number of pairs of contacts as the said secondary multiple-contact offtakes (A12, A22, A32, A42) for utilisation of the signal.

2. A device according to Claim 1 in which all the pairs of conductors carrying an incoming signal are joined together in a single cable, termed the incoming cable.

3. A device according to one of Claims 1 or 2, in which all the pairs of conductors carrying an outgoing signal are joined together in one cable, termed the outgoing cable.

4. A device according to one of Claims 1 to 3 in which the said means of selective, reversible connection of pairs of contact terminals consists of sets of switches (SW1, SW2, SW3, SW4 and SW12, SW22, SW32, SW42) with multi-function contacts and/or diverters and sections of electrical circuit (Ti, Qi) which connect these electrically to the various contact terminals of the component parts of the device itself.

