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TERMINATION MODULE

Field of the invention

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The invention relates to a termination module.

Background of the invention

10 A termination module, also known as a cross connect block, for use in a telecommunications system is known. The cross connect block allows a subscriber line to be connected to a pair gain system of a telephone network as well as a digital subscriber line (DSL) system. The cross connect block has two rows of conductors that are provided with insulation displacement contacts at either end. The conductors extend from a front
15 side of the block to a rear side of the block to allow for a circuit to be established between wires terminated on the front of the block and wires terminated at the back of the block. As such, a pair of wires from a subscribed line can be terminated upon a rear side of the block, in electrical connection with a pair of wires from a DSL system on a front side of the block.

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The cross connect block also facilitates electrical connection across the block by providing access for electrically conductive components to be inserted between the rows of the conductors, to thereby form connections with additional circuits, such as between the pair gain system and DSL system, via lines terminated at opposite sides of the block. A cross
25 connect block that incorporates the above described functions is described in detail in PCT/AU2008/000980. The disclosure of PCT/AU2008/000980 is incorporated herein in full.

Given the above considerations, it is generally desirable to increase the functionality of
30 known termination modules.

It is generally desirable to overcome or ameliorate one of more of the above described difficulties, or to at least provide a useful alternative.

Summary of the invention

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In accordance with the invention, there is provided a termination module with two rows of termination sites on a front side and two rows of termination sites on a back side, the termination sites being electrically connected by conductors extending from front to back, wherein the conductors have intermediate contacts adapted to receive insertion devices
10 therebetween.

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Preferably, the conductors are formed of first and second elongate conductor parts, arranged in substantially front-to-back alignment, and lateral extension parts that provide the intermediate contacts.

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Preferably, the lateral extension parts include an arm, which projects laterally of the associated conductor part, and an elongate finger which extends in a direction parallel to the conductor parts.

Preferably, each of the elongate conductor parts terminates in an insulation displacement contact configured to fit within an associated termination site.

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Preferably, the termination module has access openings in the back side that align with the intermediate contacts to allow the devices to be inserted therebetween.

Preferably, the access openings are configured to allow the devices to access the intermediate contacts of two adjacent conductors associated with the same row of termination sites.

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Preferably, the devices are over voltage or over current protection devices.

Preferably, each conductor has a further contact projecting from one of the lateral extension parts and accessible through an associated aperture in the front side for electrical coupling with an associated further contact of a conductor in the row opposite

- 5 Preferably, the electrical coupling is via a component inserted through the associated aperture.

Advantageously, the invention increases the functionality of known termination modules.

10 Brief description of the drawings

Preferred embodiments of the invention are described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

- 15 Figure 1 is a side view of a first termination module;
Figure 2 is a front view of the module of Figure 1;
Figure 3 is a top view of the module;
Figure 4 is a perspective view of the contacts used in the termination module;
Figure 5 is a perspective view showing two adjacent sets of contacts;
20 Figure 6 is a side view of the module with a front section removed;
Figure 7 illustrates shielding for contacts of the module;
Figure 8 is a sectional view taken along the line C-C in Figure 2;
Figure 9 is a front view of the module connected to protection devices;
Figure 10 is a cross-sectional view taken along the line D-D shown in Figure 11;
25 Figure 11 is a perspective view of a second termination module;
Figure 12 is a perspective view of the module of Figure 14 with a front section removed.
Figure 13 is a perspective view of contacts used in the module of Figure 15;
Figure 14 is a perspective view of a pair of adjacent contacts;
30 Figure 15 is a front view of the module;
Figure 16 is a cross-sectional view taken along the line E-E shown in Figure 15;

and

Figure 17 is another cross-sectional view with of the module shown in Figure 18 with protection devices fitted.

5 Detailed description of preferred embodiments of the invention

The Termination module 1 shown in Figure 1 includes a front section 2a that defines a front side 3 with raised posts 4, 5 and a recessed channel 6. The back section 2b likewise defines a back side 7 with posts 8 and 9, which define a channel 10 therebetween.

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In Figure 2, the front side 3 is more clearly illustrated wherein the posts 4 are aligned along a first side 11 of the module 1 so as to form a row 12 of termination sites 13 therebetween. A second row 14 of termination sites 13 is provided on the opposite side 15 of the module 1. Each row is divided into ten adjacent pairs of termination sites 13 and an access opening 16 is provided in the channel 6, adjacent each pair.

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In Figure 3, insulation displacement contacts 17a, 17b are clearly illustrated in the termination sites 13 formed in both the front section 2a and back section 2b. A particular pair of contacts 18 may be used, for example, to terminate ends of a twisted pair of wires 19 shown in phantom lines for illustrative purposes. A corresponding pair of wires 20 are also shown for illustrative purposes being terminated in a second pair of contacts 21. Each one of the contacts 17a, 17b are electrically coupled by a separate connection piece 33, as shown in Figure 4.

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25 The conductor 22 is formed of elongate conductor parts 23, 24 which are in substantially end-to-end alignment. Each conductor part 23, 24 has a lateral extension 25, 26 which includes a return portion 27, 28 that extends in an elongate finger 29, 30 which subsequently forms intermediate contacts 31, 32 with connection piece 33.

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30 Two adjacent conductors 22 are illustrated in Figure 5, together with opposed adjacent conductors 40, which connect a corresponding pair of insulation displacement contacts 41

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associated with the row 12 of termination sites 13 on the side 11 of the termination module 1. The conductors 40 likewise electrically connect corresponding insulation displacement contacts 42 at the back side 7 of the module 1.

5 Figure 6 illustrates the module 1 with the front section 2a removed to reveal the contacts 17a and 41 of the conductors 22 and 40, together with the associated intermediate contacts 31. Shielding 43 is also illustrated. The shielding 43 is more clearly illustrated in Figures 6 and 7 and is included for the purpose of minimising interference and cross talk between adjacent pairs 34 of conductors 22.

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Referring now to Figure 8, the module 1 is shown in cross-section with the intermediate contacts 31, 32 registered with access openings 16 to electrically connect with plugs 44 of insertion devices 45 as illustrated in Figures 9 and 10. The devices may be over-voltage or over-current protection devices 45 and, although shown inserted from the back side 9 to engage with contacts 32, may instead be inserted through similar openings 16 formed in the front side 3, for connection with contacts 31. The over voltage and over current devices 45 are generally known and are not described here in further detail.

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A second example of a termination module 50 is shown in Figure 11. The module 50 is similar in many respects to the module 1 and like parts are denoted with like reference numerals.

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Figure 12 shows a back section 2b with the front section 2a removed to reveal shielding 43 between adjacent pairs of conductors 34.

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As particularly shown in Figure 13, the conductors 22, 40 are similar to those of the terminal module 1 insofar as they serve to connect insulation displacement contacts 17a, 17b and 41, 42 in a front-to-back direction " D_{FB} ". The conductors 22 and 40 are likewise formed of two elongate conductor parts which are generally aligned, together with lateral extension parts 25, 26. However, the lateral extension parts 25, 26 are formed in two opposing elongate fingers 54, 55 which extend substantially parallel to the elongate

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conductor parts 23, 24 to form intermediate contacts 56, 57. The lateral extension 25 includes a further contact 58 which extends in a direction opposite to the contacts 56, 57. As shown in Figure 13, opposed conductors 22, 40 are arranged as mirror images so that the contact 58 of each conductor 22, 40 faces towards the other. Figure 14 illustrates a pair
5 of adjacent conductors 22 with a corresponding pair of conductors 40 arranged opposite.

Turning now to Figures 15 and 16, a back view of the module 50 is shown as including only a single central opening 59 associated with adjacent pairs of conductors 22, 40. The single opening 59 is arranged to align with the contacts 58 positioned within the front
10 section 2a of the module 50. As such, the contacts 58 are positioned to receive a component inserted through the opening 59 to allow for selective connection between the contacts 58, as required. The contacts 56 are positioned in alignment with openings 16 formed in the back section 2b of the module 50, to receive, for example, over-current or over-voltage protection devices 45 as illustrated in Figure 17.

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As may be appreciated from the above, the invention provides a termination module 1, 50 which has conductors which extend in a front-to-back direction of the module together with intermediate contacts, as well as additional contacts between conductors on opposed sides of the module. The module 1, 50 thereby provides increased functionality to allow
20 insertion devices such as over-voltage or over-current protection devices to be electrically connected into the module from either one or both of the front side and back sides of the module.

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LIST OF PARTS

	1	Termination module
	2a	Front section of termination module
5	2b	Back section of termination module
	3	Front side of termination module
	4	Post
	5	Post
	6	Recessed channel
10	7	Back side of termination module
	8	Post
	9	Post
	10	Channel
	11	First side of the termination module
15	12	Row
	13	Termination sites
	14	Row
	15	opposite site of the termination module
	16	Access opening
20	17a	Insulation displacement contact
	17b	Insulation displacement contact
	18	Pair of insulation displacement contacts
	19	Twisted pair of insulated conductors
	20	Twisted pair of insulated conductors
25	21	Pair of insulation displacement contacts
	22	Conductor
	23	Elongate conductor part
	24	Elongate conductor part
	25	Lateral extension
30	26	Lateral extension
	27	Return portion

	28	Return portion
	29	Elongate finger
	30	Elongate finger
	31	Intermediate contact
5	32	Intermediate contact
	33	Connection piece
	34	Pair of conductors
	40	Conductor
	41	Insulation displacement contact
10	42	Insulation displacement contact
	43	Shielding
	44	Plug
	45	Over voltage/current protector
	50	Termination module
15	54	Elongate finger
	55	Elongate finger
	56	Intermediate contact
	57	Intermediate contact
	58	Further contact
20	59	Central opening

Claims defining the invention

1. A termination module with two rows of termination sites on a front side and two rows of termination sites on a back side, the termination sites being electrically
5 connected by conductors extending from front to back, wherein the conductors have intermediate contacts adapted to receive insertion devices therebetween.
2. The termination module claimed in claim 1, wherein the conductors are formed of first and second elongate conductor parts, arranged in substantially front-to-back
10 alignment, and lateral extension parts that provide the intermediate contacts.
3. The termination module claimed in claim 2, wherein the lateral extension parts include an arm, which projects laterally of the associated conductor part, and an elongate finger which extends in a direction parallel to the conductor parts.
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4. The termination module claimed in claim 3, wherein each of the elongate conductor parts terminates in an insulation displacement contact configured to fit within an associated termination site.
- 20 5. The termination module claimed in any one of claims 1 to 4, including access openings in the back side that align with the intermediate contacts to allow the devices to be inserted therebetween.
6. The termination module claimed in claim 5, wherein the access openings are
25 configured to allow the devices to access the intermediate contacts of two adjacent conductors associated with the same row of termination sites.
7. The termination module claimed in claim 6, wherein the devices are over voltage or over current protection devices.
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8. The termination module claimed in any one of claims 2 to 7, wherein each

conductor has a further contact projecting from one of the lateral extension parts and accessible through an associated aperture in the front side for electrical coupling with an associated further contact of a conductor in the row opposite.

- 5 9. The termination module claimed in claim 8, wherein the electrical coupling is via a component inserted through the associated aperture.