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73 Owner: NK Networks GmbH, Cologne 51063, Germany 74 Representatives: Dr. Solf & Zapf, patent attorneys, Wuppertal 42103, Germany	
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54 Data transmission cable

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NK Networks GmbH
2 Piccoloministrasse, Cologne 51063, Germany

Data transmission cable

The present invention relates to a data transmission cable consisting of at least n pairs, where n is an even-numbered multiple of 1, of two insulated conductors, a shielding of the pair of conductors consisting of electrically conducting material as well as of an outer cable covering.

Such data transmission cables typically consist of four pairs of two stranded copper wires or cants. These cables serve in particular for use in communication networks that require optimized transmission characteristics, especially a defined wave resistance and low coupling resistance, low damping and low crosstalk. To attain these properties, each of the individual conductor pairs is encased in a shielding of a metal foil or the like. This individual shielding of the conductor pairs results in high manufacturing cost, so that such data transmission cables are relatively expensive.

The problem that is the basis for the present invention, proceeding from the data transmission cable described initially, is to configure it so that the manufacturing costs can be lowered, without the transmission properties, especially in a transmission range from 1 to 100 MHz or 1 to 600 MHz, being impaired as compared to those cables with individually shielded conductor pairs.

According to the invention, this is achieved by the electrical shielding subdividing the cable cross section into at least two shielding sectors, and a conductor pair running in each shielding sector, so that the two conductor pairs are shielded against each other and externally.

Accordingly the invention is based on the fundamental idea that by means of the shielding, the cable cross section is subdivided into sectors in which the conductor pairs run shielded against each other and essentially externally. The invention-specific arrangement of the shielding further makes it possible to use stranding and/or longitudinal reshaping of the conductor pair to apply onto or insert the shielding into the cable. By this means, cost-effective manufacture is made possible in a continuous manufacturing process.

Further advantageous embodiments of the invention are contained in the subordinate claims and are explained using the embodiment examples depicted in the appended drawings. Shown are:

Figure 1 a cross section through an invention-specific data transmission cable

Figure 2 a cross section through an additional embodiment of the transmission cable as per figure 1

Figure 3 a cross section through an additional embodiment of the transmission cable as per figure 2

Figure 4 a cross section through an additional embodiment of an invention-specific transmission cable

Figure 5 a cross section through another embodiment of an invention-specific transmission cable.

In the individual figures 1 to 5, the same parts are provided with the same reference numbers.

An invention-specific data transmission cable depicted in figure 1 has four pairs 1 of insulated, stranded copper conductors 2 or cants. These copper conductors or cants may optionally have a conductor coating made of tin, for example. The effective diameter of these copper conductors or cants especially is 0.4 to 0.66 mm. The copper conductor or cants preferably have an insulation 3 consisting of a thermoplastic, especially polyethylene, cellular polyethylene, foam-skin polyethylene, skin-foam-skin polyethylene, polypropylene or cellular polypropylene. The insulation 3 preferably has walls with thickness ranging from about 0.15 to 0.7 mm. The stranding of pair 1 can consist of a so-called helix stranding or an SZ stranding (alternating right-left stranding). With an SZ stranding of the pairs, preferably the distance of the turnaround point of the stranding direction can be dimensioned so that the transmission frequency corresponding to the turnaround points is above the defined upper frequency limit. An invention-specific data transmission cable is suitable for a maximum transmission frequency of 100 or 600 MHz, especially of 100 or 350 MHz. As an outer mechanical protection, an invention-specific transmission cable has a cable cover 4, which consists of customary thermoplastic cover materials. Especially EMC protective measures can additionally be taken by the application of metal foils and/or shielding plaits below the cable cover,

which, however, is not depicted. The design described above is common to all the embodiment examples of the invention-specific data transmission cable. However, not just four pairs 1 can be provided as depicted, but rather an invention-specific data transmission cable can have only two pairs of stranded conductors. An arbitrary number of n pairs may be present, where n is an even-numbered multiple of 1.

As depicted in figure 1, within the cable cross section an electrical shielding 5 is formed. By this means the cable cross section in the embodiment example depicted is subdivided into four shielding sectors 6 to 9. In each of the shielding sectors 6 to 9, a conductor pair 1 runs so that the conductor pairs are screened off against each other and externally. In the embodiment example depicted, the shielding 5 is formed from two partial shields 11 12 that are independent of each other. Each of these partial shields is assigned to two conductor pairs 1 that are shifted by 90° to each other. In the embodiment example depicted, the two partial shields 11, 12, viewed in the cross section of the cable, have the shape of the letter "6." One of the conductor pairs 1 is placed within the round section 13 and one pair is placed outside this section 13, partially encircled by the arc-shaped end section 14. In the embodiment example depicted, with a configuration of four conductor pairs, the partial shields 11, 12 are placed in rotationally-symmetric fashion within the cable cross section.

The embodiment of an invention-specific data transmission cable as per figure 2 differs from the embodiment

form as per figure 1 in that the round section 13 of the partial shields 11, 12 is completely closed, so that the end area of the round section is in contact with the arc-shaped section 14. The embodiment as per figure 3 of an invention-specific data transmission cable differs from that as per figure 2 in that the round sections 13 of the two partial shields 11, 12 run within the cable cross section in such a way that they touch roughly in the cable center. Here, according to the invention, the two partial shields 11, 12 can be glued.✓

The shielding 5 or the partial shielding 11, 12 preferably consists of metal foils, especially aluminum foils or aluminum foils laminated by plastic. The metal layer preferably is several 10s of μm thick, for example 20 to 60 μm when aluminum is used.

In figure 4, an alternative embodiment form of the partial shielding 11, 12 is depicted. With this, the partial shielding 11, 12, viewed in the cross section of the data transmission cable, has the form of the number "8." The conductor pairs each are found in the two round sections 15 of the partial shieldings 11, 12.

Figure 5 shows an additional alternative embodiment form of an invention-specific data transmission cable. While the two partial shieldings 11, 12 that form a figure "8" viewed in cross section are placed to be rotationally symmetric, in figure 5 a single partial shielding 17 is provided that has a figure "8" form viewed in cross section. This partial shielding 17

with its rounded areas 15 surrounds two conductor pairs 1 that lie opposite each other. In contrast to this, in figures 1 to 4, each of the partial shieldings 11, 12 surrounds conductor pairs that are displaced relative to each other by 90°. The two other conductor pairs in figure 5 are each placed in the gusset areas of the partial shielding 17 and overall the conductor pairs 1 are again surrounded by a circular partial shielding 18.

As is evident from the previous figures 1 to 5, with an invention-specific data transmission cable consisting of four pairs, two partial shieldings 11, 12 or 17, 18 are present, so that overall, viewed over the cable cross section, four shielding sectors are formed. The embodiment as per figure 4 can also be further configured in imitation of the embodiment in figure 3, in such a way that roughly in the cable center, the two partial shieldings 11, 12 in the transition area between the two round sections 15 of each partial shielding are glued to each other.

An invention-specific data transmission cable, as described above, can be manufactured so that the partial shieldings 11, 12 or 17, 18 can be applied together with the stranding of conductor pairs 1 and/or longitudinal reshaping of the conductor pairs 1. Especially with stranding of the conductor pairs in the SZ stranding procedure, the existing laying tools for the partial shieldings 11, 12 can support changing the stranding direction.

The present invention is not limited to the embodiment examples depicted, but rather includes every equivalent embodiment as part of the invention.

NK Networks GmbH
2 Piccoloministrasse, Cologne 51063, Germany

Claims:

1. Data transmission cable consisting of at least n pairs, where n is an even-numbered multiple of 1, of two insulated conductors, with a shielding (15) consisting of electrically conducting material of the pair of conductors (1) as well as of an outer cable sheathing,

characterized in that the electrical shielding (15) subdivides the cable cross section into at least two shielding sectors, and in each shielding sector a conductor pair (1) runs, so that the two conductor pairs (1) are shielded against each other and externally.

2. Data transmission cable according to claim 1,

characterized in that four conductor pairs (1) are placed symmetric to each other in the cable cross section, and that the shielding consists of two independent partial shieldings (11, 12), of which each partial shielding (11, 12) is assigned to two conductor pairs (1), so that four shielding sectors (6, 7, 8, 9) are formed.

3. Data transmission cable according to claim 1 or 2,

characterized in that the electrical shielding (15) or partial shielding (11, 12), viewed in the cross section of the cable, forms the shape of the number "6," whereby one conductor pair (1)

is placed within the round section (13) and one conductor pair outside this section (13) is partially surrounded by the arc-shaped section (14).

4. Data transmission cable according to claim 3,
characterized in that two partial shieldings (11, 12), forming the number "6" as viewed in cross section, are provided, whereby the two partial shieldings (11, 12) are placed rotationally symmetric to each other, and each partial shielding is assigned to two conductor pairs that are displaced by 90° to each other.

5. Data transmission cable according to claim 3 or 4,
characterized in that the round section (13) of the partial shielding (11, 12) is closed within itself.

6. Data transmission cable according to claim 4 or 5,
characterized in that the two partial shieldings (11, 12) are connected with each other in the area of the round section (13), and glued in particular.

7. Data transmission cable according to one of claims 1 or 2,
characterized in that the shielding (5) or the partial shielding (11, 12) has a figure "8" shape viewed in the cross section of the cable, and the conductor pairs (1) run within the two round sections (15).

8. Data transmission cable according to claim 7,

characterized in that two partial shieldings in the form of a figure "8" are placed rotationally symmetrically within the cable cross section and in the round sections (15) each partial shielding, the conductor pairs (1) run displaced by 90°.

9. Data transmission cable according to claim 7,
characterized in that a partial shielding (17) is configured as a number "8" viewed in cross section, and in the round section (15) of partial shielding (17), two conductor pairs (1) displaced from each other by 180°, and the two other conductor pairs (1) run in the gusset areas (19) as well as being placed within the circumference of a circular partial shielding (18).

10. Data transmission cable according to one or more of claims 1 to 9,
characterized in that the shielding (5) or the partial shielding (11, 12; 17, 18) consists of metal foils, especially aluminum foils or plastic-coated aluminum foils.

11. Data transmission cable according to one or more of claims 1 to 10,
characterized in that the conductor pairs (1) are stranded to form helixes or are SZ-like.

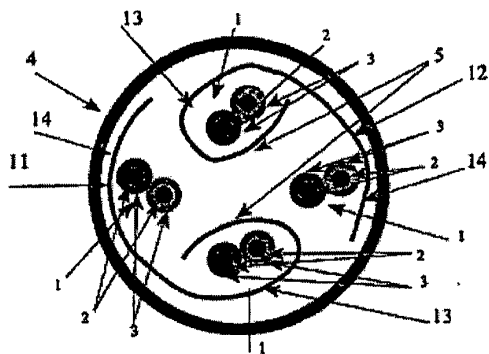


Figure 1

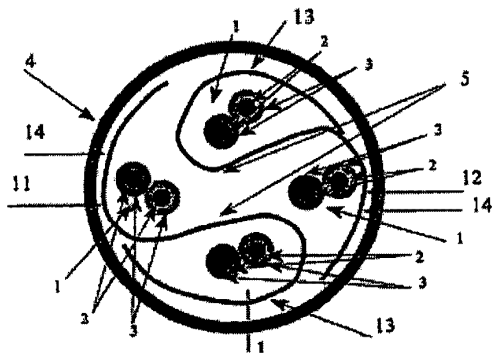


Figure 2

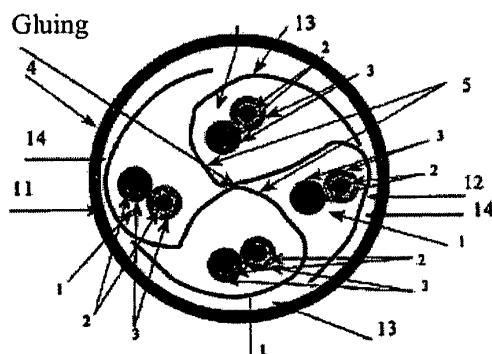


Figure 3

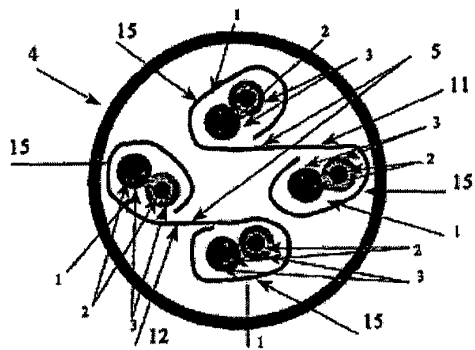


Figure 4

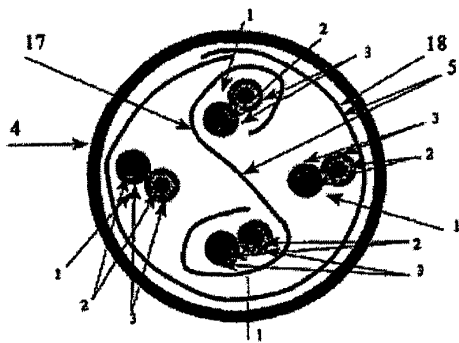


Figure 5