

1 CANALPHONE COUPLER SYSTEM AND METHOD

2 CROSS-REFERENCE TO RELATED APPLICATIONS

3 **[0001]** This application claims the benefit of co-
4 pending U.S. Provisional Application No. 61/808,996,
5 filed 5 April 2013 (Agent Docket No. JH08(P)). This
6 application and the application identified above include
7 identical inventorship and ownership.

8 BACKGROUND

9 **[0002]** The embodiments relate to the field of
10 canalphones.

11 **[0003]** There are many different types of personal
12 listening devices such as headphones, earbuds,
13 canalphones, and/or the like. Headphones are personal
14 listening devices that are held in close proximity to
15 the ear by some support system. Earbuds are small
16 personal listening devices that are positioned directly
17 in front of the ear canal and are substantially smaller
18 than a person's outer ear. Similarly, canalphones are
19 personal listening devices that are substantially smaller
20 than a person's outer ear, but they differ from earbuds
21 in that they are placed directly in one end of the ear
22 canal. Both earbuds and canalphones are held in
23 positioned by friction between the ear and the device
24 rather than the support system found in most headphones.

25 **[0004]** Canalphones are also referred to as in-ear
26 monitors due to how the canalphone is worn by a listener.
27 In other words, a canalphone housing is worn in the ear
28 of the user and not over and/or around the ear of the

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1 user. Some canalphones also serve as earplugs due to the
2 way the canalphone limits noise external to the
3 canalphone from entering the ear canal.

4 SUMMARY

5 **[0005]** According to an embodiment, a canalphone system
6 may include a canalphone coupler, and four connectors
7 carried by the canalphone coupler of which at least two
8 of the four connectors carry an acoustical signal. The
9 system may also include a mechanical joint that joins the
10 canalphone coupler to a cable where the mechanical joint
11 is assembled and disassembled by a user.

12 **[0006]** The system may further include a locator
13 carried by the mechanical joint that properly positions
14 the four connectors during mating with the cable. One of
15 the four connectors may comprise a ground connector, one
16 of the four connectors may comprise a low connector, and
17 at least two of the four connectors may comprise a mid
18 connector, a high connector, and a microphone connector.

19 **[0007]** The mid connector may be bonded to the high
20 connector. The four connectors may be recessed into the
21 canalphone coupler. The mechanical joint may not rely on
22 any of the four connectors to join the canalphone coupler
23 to the cable.

24 **[0008]** The system may additionally include an
25 attenuator in communication with at least one of the low
26 connector, the mid connector, and the high connector. The
27 attenuator may be added or removed by the user.

28 **[0009]** The attenuator may be adjustable by the user.
29 The attenuator may be adjustable between 0-25 decibels

1 for the low connector, and 0-15 decibels for the mid
2 connector and the high connector.

3 **[0010]** In an alternative embodiment, the system may
4 include a canalphone coupler, and four connectors carried
5 by the canalphone coupler of which at least two of the
6 four connectors carry an acoustical signal, and where one
7 of the four connectors comprises a ground connector, one
8 of the four connectors comprises a low connector, and
9 where at least two of the four connectors comprise a mid
10 connector, a high connector, and a microphone connector.
11 The system may also include a mechanical joint that joins
12 the canalphone coupler to a cable where the mechanical
13 joint is assembled and disassembled by a user. The system
14 may further include an attenuator in communication with
15 at least one of the low connector, the mid connector, and
16 the high connector.

17 **[0011]** Another aspect is a method that may include
18 carrying an acoustical signal with at least two of four
19 connectors carried by a canalphone coupler. The method
20 may also include joining the canalphone coupler to a
21 cable by a mechanical joint that is assembled and
22 disassembled by a user.

23 **[0012]** The method may further include properly
24 positioning the four connectors during mating with the
25 cable via a locator. The method may additionally include
26 connecting an attenuator to at least one of the four
27 connectors. The method may also include making the
28 attenuator adjustable by the user.

29 BRIEF DESCRIPTION OF the DRAWINGS

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1 **[0013]** FIG. 1 is a schematic block diagram of a system
2 in accordance with the embodiments.

3 **[0014]** FIG. 2 is an embodiment of the canalphone
4 coupler of FIG. 1.

5 **[0015]** FIG. 3 is an embodiment of the canalphone
6 coupler of FIG. 1.

7 **[0016]** FIG. 4 is an embodiment of the canalphone
8 coupler of FIG. 1.

9 **[0017]** FIG. 5 is a flowchart illustrating method
10 aspects according to various embodiments.

11 **[0018]** FIG. 6 is a flowchart illustrating method
12 aspects according to the method of FIG. 5.

13 **[0019]** FIG. 7 is a flowchart illustrating method
14 aspects according to the method of FIG. 5.

15 **[0020]** FIG. 8 is a flowchart illustrating method
16 aspects according to the method of FIG. 7.

17 **[0021]** FIG. 9 is an embodiment of the canalphone
18 coupler of FIG. 1.

19 **[0022]** FIGS. 10-12 are female portions of an
20 embodiment of the canalphone coupler of FIG. 1.

21 **[0023]** FIG. 13 is a male portion an embodiment of the
22 canalphone coupler of FIG. 1.

23 **[0024]** FIGS. 14-17 are female portions of an
24 embodiment of the of the canalphone coupler of FIG. 1.

25 **[0025]** FIG. 18 is an embodiment of the canalphone
26 coupler of FIG. 1 before the mechanical joint is engaged.

27 **[0026]** FIGS. 19-21 are male portions of an embodiment
28 of the canalphone coupler of FIG. 1.

1 **[0027]** FIG. 22 is a male portion of an embodiment of
2 the canalphone coupler of FIG. 1.

3 **[0028]** FIG. 23 is a female portion of an embodiment of
4 the canalphone coupler of FIG. 1.

5 **[0029]** FIG. 24 is a female portion of an embodiment of
6 the canalphone coupler of FIG. 1.

7 **[0030]** FIGS. 25-28 are female portions of an
8 embodiment of the canalphone coupler of FIG. 1.

9 **[0031]** FIG. 29-30 is an embodiment of the collar of
10 the mechanical joint of the canalphone coupler of FIG. 1.

11 **[0032]** FIG. 31 is a male portion of an embodiment of
12 the canalphone coupler of FIG. 1.

13 **[0033]** FIG. 32-33 is an embodiment of the collar of
14 the mechanical joint of the canalphone coupler of FIG. 1.

15 DETAILED DESCRIPTION

16 **[0034]** Embodiments will now be described more fully
17 hereinafter with reference to the accompanying drawings,
18 in which preferred embodiments are shown. Like numbers
19 refer to like elements throughout, like numbers with
20 letter suffixes are used to identify similar parts in a
21 single embodiment, and letter suffix lower case n is a
22 variable that indicates an unlimited number of similar
23 elements.

24 **[0035]** With reference now to Fig. 1, a canalphone
25 system 10 is initially described. In one embodiment, the
26 system 10 includes a canalphone coupler 12, and four
27 connectors 14a-14n carried by the canalphone coupler of
28 which at least two of the four connectors carry an
29 acoustical signal. The acoustical signal is analog,

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1 digital, optical, electrical, and/or the like, for
2 example. The four connectors 14a-14n comprise electrical
3 contacts, electrical connectors, optical connectors,
4 audio connectors, and/or the like, for instance. The
5 system 10 also includes a mechanical joint 16 that joins
6 the canalphone coupler 12 to a cable 18 where the
7 mechanical joint is assembled and/or disassembled by a
8 user (not shown). The cable 18 is connected to a
9 canalphone 11 and/or an acoustical signal source 15, for
10 example.

11 **[0036]** The mechanical joint 16 is temporary, semi-
12 permanent (needs a tool and/or more effort to undue than
13 the temporary version), and/or permanent, for instance.
14 The mechanical joint 16 comprises a screw joint, snap fit
15 assembly, retaining ring assembly, annular locks, and/or
16 the like, for example. In one embodiment, the mechanical
17 joint 16 includes a knurled section to aid user assembly
18 and/or disassembly.

19 **[0037]** In one embodiment, the system 10 further
20 includes a locator 20 carried by the mechanical joint 16
21 that properly positions the four connectors 14a-14n
22 during mating with the cable 18. For example, the locator
23 20 comprises a keyed joint, mated splines, a Hirth joint,
24 and/or the like.

25 **[0038]** In one embodiment, one of the four connectors
26 14a-14n comprises a ground connector 14a, one of the four
27 connector comprises a low connector 14b, and at least two
28 of the fours connector comprise a mid connector 14c, a
29 high connector 14d, and a microphone connector 14e. In

1 another embodiment, the low connector 14b carries a low
2 frequency portion of the acoustical signal, the mid
3 connector 14c carries a mid frequency portion of the
4 acoustical signal, the high connector 14d carries a high
5 frequency portion of the acoustical signal, and/or the
6 microphone connector 14e carries the microphone portion
7 of the acoustical signal.

8 **[0039]** In one embodiment, the mid connector 14c is
9 bonded to the high connector 14d. In other words, there
10 is a ground connector 14a, a low connector 14b, a mid
11 connector/high connector 14c/14d, and a microphone
12 connector 14e, for instance. In another embodiment, the
13 four connectors 14a-14n are recessed into the canalphone
14 coupler 12 to aid in protecting the four connectors 14a-
15 14n.

16 **[0040]** In one embodiment, the mechanical joint 16 does
17 not rely on any of the four connector 14a-14n to join the
18 canalphone coupler 12 to the cable 18. Stated another
19 way, the mechanical joint 16 holds the canalphone coupler
20 12 to the cable 18 without any aid from the four
21 connectors 14a-14n. In another embodiment, the four
22 connectors 14a-14n do aid the mechanical joint 16 in
23 holding the canalphone coupler 12 to the cable 18.

24 **[0041]** In one embodiment, the system 10 additionally
25 includes an attenuator 22 in communication with at least
26 one of the low connector 14b, the mid connector 14c, and
27 the high connector 14d. The attenuator 22 is passive,
28 active, balanced, unbalanced, and/or the like, for

1 example. In another embodiment, the attenuator 22 is
2 carried by the canalphone coupler 12 and/or the cable 18.

3 **[0042]** In one embodiment, the attenuator 22 is added
4 or removed by the user. In other words, system 10 works
5 with or without the attenuator 22.

6 **[0043]** In one embodiment, the attenuator is adjustable
7 by the user. For example, the attenuator 22 is adjustable
8 to provide an attenuation of the acoustical signal
9 between 0-25 decibels for the low connector 14b, and 0-15
10 decibels for the mid connector 14c and the high connector
11 14d.

12 **[0044]** In an alternative embodiment, the system 10
13 includes a canalphone coupler 12, and four connectors
14 14a-14n carried by the canalphone coupler of which at
15 least two of the four connectors carry an acoustical
16 signal, and where one of the four connectors comprises a
17 ground connector 14a, one of the four connectors
18 comprises a low connector 14b, and where at least two of
19 the four connectors comprise a mid connector 14c, a high
20 connector 14d, and a microphone connector 14e. The system
21 10 also includes a mechanical joint 16 that joins the
22 canalphone coupler 12 to a cable 18 where the mechanical
23 joint is assembled and disassembled by a user. The system
24 10 further includes an attenuator 22 in communication
25 with at least one of the low connector 14b, the mid
26 connector 14c, and the high connector 14d.

27 **[0045]** Another aspect is a method, which is now
28 described with reference to flowchart 28 of FIG. 5. The
29 method begins at Block 30 and may include carrying an

1 acoustical signal with at least two of four connectors
2 carried by a canalphone coupler at Block 32. The method
3 may also include joining the canalphone coupler to a
4 cable by a mechanical joint that is assembled and
5 disassembled by a user at Block 34. The method ends at
6 Block 36.

7 **[0046]** In another method embodiment, which is now
8 described with reference to flowchart 38 of FIG. 6, the
9 method begins at Block 40. The method may include the
10 steps of FIG. 5 at Blocks 32 and 34. The method may
11 further include properly positioning the four connectors
12 during mating with the cable via a locator at Block 42.
13 The method ends at Block 44.

14 **[0047]** In another method embodiment, which is now
15 described with reference to flowchart 46 of FIG. 7, the
16 method begins at Block 48. The method may include the
17 steps of FIG. 5 at Blocks 32 and 34. The method may
18 additionally include connecting an attenuator to at least
19 one of the four connectors at Block 50. The method ends
20 at Block 52.

21 **[0048]** In another method embodiment, which is now
22 described with reference to flowchart 54 of FIG. 8, the
23 method begins at Block 56. The method may include the
24 steps of FIG. 7 at Blocks 32, 34 and 50. The method may
25 also include making the attenuator adjustable by the user
26 at Block 58. The method ends at Block 60.

27 **[0049]** FIGS. 9-33 are various embodiments of the
28 connector. The numbers cited are millimeters. The male

1 and female portions of the connector are shown as well as
2 such portions joined and/or about to be joined.

3 **[0050]** The terminology used herein is for the purpose
4 of describing particular embodiments only and is not
5 intended to be limiting. As used herein, the singular
6 forms "a", "an" and "the" are intended to include the
7 plural forms as well, unless the context clearly
8 indicates otherwise. It will be further understood that
9 the terms "comprises" and/or "comprising," when used in
10 this specification, specify the presence of stated
11 features, integers, steps, operations, elements, and/or
12 components, but do not preclude the presence or addition
13 of one or more other features, integers, steps,
14 operations, elements, components, and/or groups thereof.
15 It should also be noted that, in some alternative
16 implementations, the functions noted in the block may
17 occur out of the order noted in the figures. For example,
18 two blocks shown in succession may, in fact, be executed
19 substantially concurrently, or the blocks may sometimes
20 be executed in the reverse order, depending upon the
21 functionality involved.

22 **[0051]** The corresponding structures, materials, acts,
23 and equivalents of all means or step plus function
24 elements in the claims below are intended to include any
25 structure, material, or act for performing the function
26 in combination with other claimed elements as
27 specifically claimed. The description of the embodiments
28 has been presented for purposes of illustration and
29 description, but is not intended to be exhaustive or

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1 limited to the embodiments in the form disclosed. Many
2 modifications and variations will be apparent to those of
3 ordinary skill in the art without departing from the
4 scope and spirit of the embodiments. The embodiment was
5 chosen and described in order to best explain the
6 principles of the embodiments and the practical
7 application, and to enable others of ordinary skill in
8 the art to understand the various embodiments with
9 various modifications as are suited to the particular use
10 contemplated.

11 **[0052]** While the preferred embodiment has been
12 described, it will be understood that those skilled in
13 the art, both now and in the future, may make various
14 improvements and enhancements which fall within the scope
15 of the claims which follow. These claims should be
16 construed to maintain the proper protection for the
17 embodiments first described.

18

1 CLAIMS

2

3 What is claimed is:

4

5 1. A system comprising:
6 a canalphone coupler;
7 four connectors carried by the canalphone
8 coupler of which at least two of the four connectors
9 carry an acoustical signal; and
10 a mechanical joint that joins the canalphone
11 coupler to a cable where the mechanical joint is
12 assembled and disassembled by a user.

13

14 2. The system of claim 1 further comprising a
15 locator carried by the mechanical joint that properly
16 positions the four connectors during mating with the
17 cable.

18

19 3. The system of claim 1 wherein one of the
20 four connectors comprises a ground connector, one of the
21 four connectors comprises a low connector; and wherein at
22 least two of the four connectors comprise a mid
23 connector, a high connector, and a microphone connector.

24

25 4. The system of claim 3 wherein the mid
26 connector is bonded to the high connector.

27 5. The system of claim 1 wherein the four
28 connectors are recessed into the canalphone coupler.

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1

2 6. The system of claim 3 further comprising an
3 attenuator in communication with at least one of the low
4 connector, the mid connector, and the high connector.

5

6 7. The system of claim 6 wherein the
7 attenuator is added or removed by the user.

8

9 8. The system of claim 6 wherein the
10 attenuator is adjustable by the user.

11

12 9. The system of claim 8 wherein the
13 attenuator is adjustable between 0-25 decibels for the
14 low connector, and 0-15 decibels for the mid connector
15 and the high connector.

16

17 10. The system of claim 1 wherein the
18 mechanical joint does not rely on any of the four
19 connectors to join the canalphone coupler to the cable.

20

21 11. A system comprising:

22 a canalphone coupler;

23 four connectors carried by the canalphone
24 coupler of which at least two of the four connectors
25 carry an acoustical signal, and where one of the four
26 connectors comprises a ground connector, one of the four
27 connectors comprises a low connector, and where at least
28 two of the four connectors comprise a mid connector, a
29 high connector, and a microphone connector;

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1 a mechanical joint that joins the canalphone
2 coupler to a cable where the mechanical joint is
3 assembled and disassembled by a user; and
4 an attenuator in communication with at least
5 one of the low connector, the mid connector, and the high
6 connector.

7
8 12. The system of claim 11 further comprising
9 a locator carried by the mechanical joint that properly
10 positions the four connectors during mating with the
11 cable.

12
13 13. The system of claim 11 wherein the mid
14 connector is bonded to the high connector.

15
16 14. The system of claim 11 wherein the
17 attenuator is added or removed by the user.

18
19 15. The system of claim 11 wherein the
20 attenuator is adjustable by the user.

21
22 16. The system of claim 11 wherein the
23 mechanical joint does not rely on any of the four
24 connectors to join the canalphone coupler to the cable.

25
26 17. A method comprising:
27 carrying an acoustical signal with at least two
28 of four connectors carried by a canalphone coupler; and

1 joining the canalphone coupler to a cable by a
2 mechanical joint that is assembled and disassembled by a
3 user.

4

5 18. The method of claim 17 further comprising
6 properly positioning the four connectors during mating
7 with the cable via a locator.

8

9 19. The method of claim 17 further comprising
10 connecting an attenuator to at least one of the four
11 connectors.

12

13 20. The method of claim 19 further comprising
14 making the attenuator adjustable by the user.