

Claims

1. A non-clamping method for identification of target dead underground power cable, the method comprising:
- 5 forming a complete circuit by connecting a transmitter to two of a plurality of conductors of a target dead power cable at a first end thereof;
- short-circuiting and grounding the plurality of conductors at a second end of the target dead power cable;
- injecting an audio frequency current signal from the transmitter into the
- 10 complete circuit for generating an audio frequency magnetic flux signal on a surface of the target dead power cable;
- within a pit which at least partially exposes a plurality of underground power cables:
- detecting a first audio frequency magnetic flux signal on a surface of a
- 15 random first one of the underground power cables;
- detecting a second plurality of audio frequency magnetic flux signals on respective surfaces of some of the underground power cables being spatially-adjacent to the first one of the underground power cables;
- identifying the first one of the underground power cables as the target
- 20 dead power cable if a peak amplitude of the first audio frequency magnetic flux signal as displayed on a display device exceeds any peak amplitude of the second plurality of audio frequency magnetic flux signals as displayed on the display device by more than about 50%.
- 25 2. The method of claim 1, further comprising:
- before detecting a first audio frequency magnetic flux signal on a surface of a random first one of the underground power cables, performing a complete circuit verification on the two of the plurality of conductors of the target dead power cable.
- 30 3. The method of any of claims 1 to 2, wherein detecting a first audio frequency magnetic flux signal further includes:
- broadcasting the detected first audio frequency magnetic flux signal over a speaker.

4. The method of claim 3, wherein detecting a first audio frequency magnetic flux signal further includes:

controlling a volume output of the speaker without affecting the peak amplitude of the first audio frequency magnetic flux signal being displayed on the display device.

5. The method of any of claims 1 to 4, wherein the first audio frequency magnetic flux signal and the second plurality of audio frequency magnetic flux signals have substantially same frequency as the injected audio frequency current signal.

6. The method of any of claims 1 to 5, wherein the injected audio frequency magnetic flux signal is encoded with a shared key which is exclusively stored in the transmitter and a receiver paired therewith,

wherein detecting a first audio frequency magnetic flux signal further includes:

extracting a first decoded key from the first audio frequency magnetic flux signal,

if the first decoded key matches the shared key, displaying an amplitude of the first audio frequency magnetic flux signal on the display device, and

if the first decoded key does not match the shared key, presenting a notification.

wherein detecting a second plurality of audio frequency magnetic flux signals further includes:

extracting a second decoded key from each of the second plurality of audio frequency magnetic flux signals,

if the second decoded key matches the shared key, displaying an amplitude of the corresponding one of the second audio frequency magnetic flux signals on the display device, and

if the second decoded key does not match the shared key, presenting the notification.

7. The method of claim 6, wherein presenting the notification includes at least one of displaying an error indication on the display device and inactivating the display device.

8. The method of any of claims 1 to 5, wherein detecting a first audio frequency magnetic flux signal further includes:

longitudinally running a pick-up coil along a first lengthwise position on the surface of the first cable,

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wherein detecting a second plurality of audio frequency magnetic flux signals further includes:

longitudinally running the pick-up coil along a plurality of second lengthwise positions on the respective surfaces of the some of the underground power cables being spatially-adjacent to the first one of the underground power cables.

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9. The method of claim 8, wherein the pick-up coil is geometrically centred on an arc-shaped magnetic shield.

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10. The method of any of claims 1 to 9, further comprising:

grounding an armour of the target dead power cable at the first and the second end thereof.

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11. A receiver for identification of target dead underground power cable, the receiver comprising:

an amplifier circuitry configured to amplify a picked-up signal by a user-adjustable gain;

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a by-passable switched capacitor analogue ultra-narrow bandpass filter configured to filter an output of the amplifier circuitry;

a gain calibrator circuitry configured to calibrate an output of the by-passable switched capacitor analogue ultra-narrow bandpass filter to form a normalised signal level;

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a speaker circuitry configured to broadcast an output of the gain calibrator circuitry;

a micro-controller unit (MCU) having an Analogue Digital Converter (ADC) configured to digitise the output of the gain calibrator circuitry;

a display circuitry configured to receive an output of the MCU to provide a visual indication thereof on a display device, wherein a displayed magnitude of the visual indication is correlated to an amplitude of an audio frequency magnetic flux signal comprised in the picked-up signal.

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12. The receiver of claim 11, wherein the receiver further comprises a volume controller coupled to the speaker circuitry for adjusting a volume output of a speaker, wherein the volume controller being decoupled from the display circuitry to prevent the volume controller from adjusting the visual indication.

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13. The receiver of any of claims 11 and 12, further comprising:

a pick-up coil configured to provide the picked-up signal to the amplifier circuitry.

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14. The receiver of claim 13, wherein the pick-up coil is geometrically centred on an arc-shaped magnetic shield.

15. The receiver of any of claims 11 to 14, further comprising:

a memory circuitry configured to store a shared key which is exclusive to the receiver and the transmitter paired therewith,
wherein the MCU is configured to extract a decoded key from the output of the gain calibrator circuitry, compare the decoded key against the shared key stored in the memory circuitry, present a notification if the decoded key does not match the shared key.

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16. The receiver of claim 15, wherein the MCU is further configured to present the notification by at least one of presenting an error indication on the display device and inactivating the display device.

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17. The receiver of any of claims 11 to 15, wherein the ADC is further configured to digitise the output of the gain calibrator circuitry based on a plurality of piecewise linear sensitivity relationships.

18. A transmitter for identification of target dead underground power cable, the transmitter comprising:

a micro-controller unit (MCU) having an audio signal generator configured to generate an audio frequency voltage signal;

5 a current selector circuitry configured to preset a peak pulse amplitude;

a constant peak current source circuitry configured to convert the audio frequency voltage signal into an audio frequency current signal having the preset peak pulse amplitude;

10 an output protection circuitry electrically coupled between the constant peak current source circuitry and a pair of output terminals, and configured to prevent over-current and over-voltage damage to the transmitter, wherein the pair of output terminals are configured to inject the audio frequency current signal into a pair of conductors of a target dead power cable.

15 19. The transmitter of claim 18, further comprising:

a sensing circuitry configured to ascertain a presence of complete circuit in the pair of conductors of the target dead power cable; and

a display circuitry configured to present a result based on the ascertained presence of complete circuit in the pair of conductors of the target dead power cable.

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20. The transmitter of any of claims 18 to 19, further comprising:

a memory circuitry configured to store a shared key which is exclusive to the receiver and the transmitter paired therewith, wherein the MCU is configured to encode the shared key into the audio frequency voltage signal.

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21. A system for cable identification, the system comprising:

a transmitter according to any of claims 18 to 20; and

a receiver according to any of claims 11 to 17, wherein the audio frequency magnetic flux signal comprised in the picked-up signal is detected from the target
30 dead power cable.