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Multi Frequency Locator/Receiver

Manual   GW-2160A

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Introduction

Underground pipeline is an important part of urban infrastructure, urban underground pipelines, including water supply, drainage, gas, heat, telecommunications, electricity, industrial pipelines and other broad categories,Is to play a city function, the material basisto ensure that the city's economic and social health, coordinated development, known as the city's "blood vessels" and "nerves".At the same time, in the process of urban planning, design, construction and management, if there is no complete and accurate underground pipeline information, it will become "blind", and even cause significant losses. In recent years, with the accelerated urbanization process and the rapid development of urban construction, all over the city has increased the underground space, especially the underground pipeline development and utilization, to strengthen the underground pipeline file management.However, due to some underground pipeline construction units, pipeline management units, etc., can not be timely to the urban construction archives management department to send underground pipeline files, resulting in underground pipeline archives information centralized management and query service work can not meet the needs of urban construction and development.Underground pipeline in the convenience of urban life at the same time, but also due to improper construction, disrepair and so there are a lot of security risks, may cause huge losses of personnel and property, and even become the local residents of the "deadline."

November 22, 2013, Shandong Qingdao Sinopec Donghuang oil pipeline leaking crude oil into the municipal drainage culverts, in the formation of confined space within the culvert accumulation of oil and gas explosion occurred. The accident caused 62 people were killed, 136 people were injured, direct economic losses of 751.72 million yuan.

In April 2014, PetroChina Lanzhou Petrochemical Company, a pipeline of oil spills polluted the water supply enterprises of the trench, Veolia Water Group found that the factory benzene content of up to 118 micrograms / liter to 200 micrograms/ liter, far beyond National limit of 10 micrograms / liter, causing the local public to crazy buy mineral water.

Statistics show that from 2009 to 2013, the country directly due to underground pipeline accidents and accidents involving a total of 27 cases, the death toll of 117 people. In summary, the underground pipeline detection and census work is particularly important, so take preventive measures, the accident hidden in the bud.

GW-2160A underground pipeline detector in the case of non-excavation, the underground pipeline, cable, cable for accurate positioning and buried   depth

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measurement, accurate search underground pipe outside the coating damage point, buried cable fault point location.The instrument combines ultra-narrowband filter, Bluetooth wireless communication, GPS positioning, professional data analysis software automatically map, test report automatically generated the most advanced technology, with superior anti-jamming capability, precise positioning and sounding, suitable for underground Metal pipeline detection and inspection line, pipeline management and maintenance, municipal planning and construction, power supply and other departments of the pipeline inspection, pipeline maintenance units is one of the necessary equipment.

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1、GW-2160A pipeline detector features

(1) multi-function

1、 Transmitter function: With the induction method, direct method and clamp method three signal application mode, suitable for different occasions.

2、 Receiver function: used for underground pipes, cable position, direction, depth and tube current measurement.

3、 The left and right positioning arrows indicate the target pipeline position, positioning fast and accurate; front and rear arrows and dB values indicate the location and size of the damage points of the coating.

4、With backlight function, suitable for night use.

5、GPS geolocation function, pipeline to automatic mapping.

6、Professional data analysis software, automatic detection report generated.

7、 GW-2160AE receiver unique features: for failure (pipe failure is the outer coating damage, cable failure is the outer sheath damage) positioning, detection of underground pipeline insulation damage.

8、Current measurement: Measure the current applied by the transmitter to the pipe under test.

9、Multimeter function: measurable output voltage, line voltage, line current, impedance and power. Test the cable continuity and insulation quality before and after cable fault finding.

10、External induction clamp: suitable for testing the cable can not be directly applied to the signal of the place.

(2)High positioning accuracy:

A variety of measurement modes for pipeline positioning (valley mode, peak mode, broad peak mode, peak arrow mode), can verify each other to ensure the accuracy of pipeline positioning.

1、Maximum value method: Peak mode, broad peak mode, peak arrow mode can be used to determine the horizontal component (H_x) or horizontal gradient (ΔH_x) changes, according to its maximum position to locate;

2、 Minimal method: the use of the valley model, by measuring the vertical component (H_z) changes, according to its minimum position to locate.

(3)Multi-Measuring depth method:

With a variety of sounding methods can be arbitrarily optional, and can verify each other.

1、Double - level coil direct reading method;

2、Single - level coil 80% method, 50% method;

3、45 degree method.

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(4)Strong anti-interference

1、Observed parameters: both measured horizontal component (H_x), vertical component (H_z) and can measure the level gradient (ΔH_x).

2、 Transmit power: the transmitter output power of 10W and continuously adjustable, according to the need to choose.

3、   Working frequency:

Transmitter frequency:128Hz、512Hz、1KHz、2KHz、8KHz、33KHz、65KHz、83KHz。

Receiver frequency:radio、50Hz、100Hz、128Hz、512Hz、1KHz、2KHz、8KHz、33KHz、65KHz、83KHz。

According to the target pipeline characteristics (material, structure, depth, length, etc.), the environment to select the appropriate operating frequency.

(5) easy to operate

1、 **Intuitive: the use of graphical display, can continue, real-time display of various parameters and signal strength detection process.**

2、**Auto: Automatically switches to dual-level antenna mode when measuring depth and automatically adjusts the receiver sensitivity to optimize the measurement signal and automatically recovers to the pre-sounding mode.**

(6)Continuous working time is long, the use of low cost

The transmitter is equipped with a large capacity lithium battery pack, a charge, to meet the field to detect a working day power supply needs, and can be recycled, greatly reducing the detection costs.

（7） **Transmitter AC and DC**

Under normal circumstances, if the transmitter battery is sufficient, use the instrument built-in battery pack power supply. If you use the process, the transmitter battery power is low, but the detection task is not completed, you can directly external dedicated power adapter, the instrument can be used normally, without having to wait for the instrument to re-use.

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2、GW-2160A Pipeline Detector Components and Structural Functions

（1）Receiver：

The GW-2160A receiver is used for the measurement of underground pipelines, cable positioning, buried depth of underground pipelines, and tube current measurements. A variety of frequency and mode of operation to meet a variety of environments and a variety of pipeline detection needs.

The GW-2160A receiver is used to locate the target line.

2.1 Receiver function：

on-off key**(1)**

To press the 开 switch on, press the 关 turn off 。 When the receiver is turned on, the receiver automatically shuts down if no function key is pressed during the set auto power off time. If any function key is pressed, the receiver will reset the shutdown time.

F key(2)

Frequency selection key: Select the corresponding detection frequency according to the frequency of the transmitter.　The frequency　of　choice includes radio、50Hz、100Hz、128Hz、512Hz、1KHz、2KHz、8KHz、33KHz、65KHz、83KHz。

Instrument models are different, the frequency configuration is not the same, the specific frequency according to the manufacturer's product specifications to determine.

Mode key(3)

The mode key is used to select the receiver's operating mode for precise positioning of the pipeline. The positioning process is usually measured by the peak method.
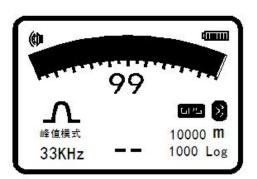
Mapping modes include：

Valley pattern Peak mode

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90dB

外接信号

Wide mode

Peak arrow mode

Power mode: 50Hz power cable can be detected

When there is an external A-frame, you can also select the external signal mode.

Gain

The gain key is used to adjust the gain size, press the to increase the gain, press the key to reduce the gain,In the adjustment process, the display window in the middle of the middle shows the gain size

(16), often press or 3 seconds to start the automatic gain function,At this point the gain number becomes a flashing cursor (as shown on the left), the instrument automatically adjusts the signal strength to about 70% of full scale. The relative intensity of the signal is indicated by the bar graph (8) above the display window and the number (9) below the graph.
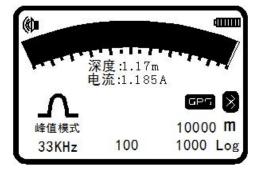
Measure depth / current key（5）

key is used to measure the depth of the measured pipeline buried depth, while measuring the depth of the target in the display of the current value of the pipeline。In the current measurement process, regardless of the original use of which positioning mode, the system automatically switch to the peak mode.The depth measurement unit can be selected from the menu by metric or imperial.

Metric Units: cm , when the depth of

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the pipeline is less than 1 meter.

When the pipeline buried depth is greater than 1 meter, the depth display unit is m.

Inch unit: feet.

Current unit: When the current is greater than 1A, the display current unit is A, when the current is less than 1A, the display current unit is mA.

note:

1 、 *In order to measure the exact depth of the buried value, the receiver must be kept in a position perpendicular to the pipe.*

In order to improve the accuracy of the depth measurement, it is advisable not to proceed in the valley mode during sounding. It is recommended to switch to the wide-peak mode for pipeline depth measurement.

Backlight

Press the backlight key, the display window backlighting, backlight to keep a preset length of the backlight, and then press the backlight button, backlight off.

The backlight time can be set via the backlight menu.

data storage:

Measured current and depth data storage method: After measuring the current value, the pipeline buried in the middle of the display depth and current value.If you need to store data, press the ⊕ key, the detected value is stored in the instrument's memory, the lower right corner of the display that the number of stored data number (12) automatically plus 1.If you do not need to store, then press the button *i* to restore the pipeline positioning status.

Store the data browsing: press the *i* key and ⊕ key for 3 seconds, enter the storage data browsing interface, including: frequency, serial number, dot pitch, depth, current and so on. Data browsing can be done by pressing the ⊕ and ⊖ keys.Press the *i* key again to exit the data view mode. If you do not press any key, it will automatically resume the pipeline positioning status after 20 seconds.

If the stored measurements can be overwritten,such as the data has been stored at 10 groups, but found or suspected third group of data problems,as long as the return to the third group of data measurement points, re-measurement of the depth of current,press the ⊕ or ⊖ key to select the data number 3 to be overwritten, then press the key to store the depth and current and overwrite the original group 3 data.

Note: Only 1000 data of the same frequency can be saved. After switching the

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different detection frequencies, if you need to store the data, you must delete the data of the different frequencies that have been stored before storing the new frequency data.

Example: the instrument has been stored 128Hz data 100 groups, and now change the measurement frequency of 512Hz, need to store 512Hz data, the measurement is completed, press the key storage, the prompt "128Hz has been stored 100 data, whether to delete" If you need to delete the key after 5 seconds to delete, re-store 512Hz data.

2.2Receiver display window

Battery indication (7)

Receiver The upper right corner of the display has a battery symbol that indicates how much battery power is. When the battery loss is no longer available, a flashing battery symbol is displayed indicating that the built-in battery of the instrument needs to be charged. Under normal circumstances, the machine used in the high-performance lithium battery pack, fully charged for the receiver to work more than 10 hours.

Receiver charging time, as long as the charger's circular plug into the receiver's charging jack, the other end of the 220V power supply，charger indicator light red, fully charged after the charge indicator light turns green.

Relative signal strength（8、9）

The bar graph above the display window indicates the relative intensity of the signal, and the size of the signal is shown below the bar graph. The relative intensity can be adjusted by the ➕ ➖ key,In the process of adjustment, display the middle of the window with the middle of 0-100 to show the receiver's gain size. When the signal source is strong, it is necessary to adjust the gain. When the signal source is weak, it needs to adjust the gain. When normal detection, it is necessary to adjust the signal strength to about 70% of the full scale.

GPS Bluetooth status indication（10）

When the GPS Bluetooth module receives the satellite signal and successfully connects to the Bluetooth, the flag is lit. When the GPS Bluetooth module can not receive the satellite signal, the flag is grayed out when the Bluetooth connection is not successful (as shown below).

GPS Bluetooth function according to different specifications model configuration configuration, the specific configuration see the manufacturer product specifications.

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Point distance indication（11）

10000 m
1000 Log

When the GPS is successfully connected and the satellite signal is received, the detection data saves the distance between the two measuring points and displays it in real time. If the GPS Bluetooth module is not configured, there is no dotted display.

Store the data serial number（12）

The measured data is saved, the number is automatically incremented by 1, and the number of the stored data is the number of stored data.

Speaker indication（13）

The speaker indicator indicates the level of the speaker sound, the sound is divided into high, medium, low, off, when the speaker sound is off, the speaker indicator is not displayed, the speaker volume through the corresponding menu settings.

Detection mode indication（14）

Use the ⬅ key to select the probing mode (valley mode, peak mode, wide peak mode, peak arrow mode). Press the ⬅ once to select a different detection mode and display it in the display window.
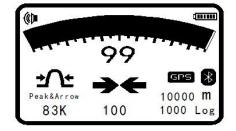
Frequency indication（15）

Use the frequency keys to select the desired detection frequency and display it in the display window.

Gain size indication（16）

Display the lower side of the window with the number 0-100 to show the receiver's gain size. When the signal source is strong, it is necessary to adjust the gain. When the signal source is weak, it needs to adjust the gain. When normal detection, it is necessary to adjust the signal strength to about 70% of the full scale.
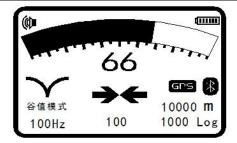
Left / right arrows

When using the valley mode or the peak arrow mode to detect the pipeline position, the left and right arrows indicate that the pipeline position can be traced quickly. When the instrument deviates from the left side of the pipeline, the right arrow indicates the right side of the pipe line position. When the instrument deviates from the right side of the pipeline, the left arrow indicates the left side of the pipe line position.

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Anti-layer damage point indicator arrow

When testing damage points or cable failure points, use the arrows to indicate the location of the coating (as shown below). When the A-frame is located behind the point of the fault, the forward arrow indicates that the point of failure is in front of the A-frame. When the A-frame is in front of the point of failure, the rear arrow indicates that the point of failure is on the A-frame rear.

A frame access status

In the case where the receiver is connected to the A-frame, ![key] key can also select the external signal of the attachment to work, ie whether to use the A-frame. When the A-frame is inserted, the corresponding symbol is displayed in the window. A frame is used to detect the damage point of the coating and shows the size of the damage point dB.

Other positioning methods:

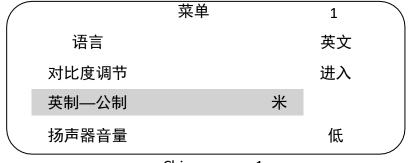Detection of power line 50Hz signal, CPS signal (cathodic protection current signal), radio signal detection.

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2.3Receiver parameter settings

The parameters of the receiver settings using the menu, fast and convenient.

Enter the menu: long press   for 3 seconds to enter the menu settings

interface. Press the   or   key to move the cursor, press the   key, enter

the second submenu or set the relevant parameters,   press the   key from the
second sub-menu to return to the main menu.The menu is divided into two pages,
the interface and settable parameters are as follows:

```
            菜单              1
   语言                      英文
   对比度调节                 进入
   英制—公制          米
   扬声器音量                 低
```

Chinese menu1

```
            Menu              1
   Language                Chinese
   Contrast control         Entry
   British—Metric            meter
   Speaker Volume           Low
```

English menu1

```
            菜单              2
   背光               15S
   自动关机            10 分钟
   蓝牙配对            进入
   蓝牙搜索            启用
```

Chinese menu2

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Menu	2
Backlight	15S
Automatic Shut	10min
Bluetooth Pairing	Entry
Search For Bluetooth	Using

English menu2

Language setting: The cursor lights up the "Language" menu, press the [key] key, the language in the "Chinese" and "English" between the cycle switch.

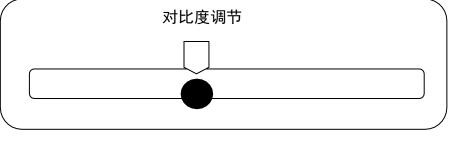Contrast adjustment: Move the cursor [+] [–] to the "Contrast adjustment" menu by pressing the [key] key to enter the contrast adjustment menu.When the contrast ratio of the display is moderate, the contrast adjuster is in the middle position, the contrast is enhanced when the [+] key is pressed, the scale moves to the right, the contrast is continuously enhanced when t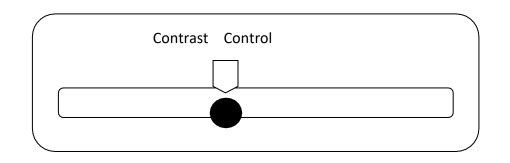he [+] key is pressed continuously, the contrast is weakened when the [–] key is pressed, the scale moves to the left, Continuous weakening. Press the [i] key to return to the main menu and exit the "Contrast adjustment" setting.

对比度调节

Chinese interface

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Contrast   Control

English interface

Unit of measurement settings: Move the ⊞ ▽ to the "English - Metric"

menu by pressing the ⬦ key, and the unit of measurement is cycled between

metric (m) and inch (feet).

Metric menu:

菜单	1
语言	中文
对比度调节	进入
英制—公制	米
扬声器音量	低

Chinese interface

Menu	1
Language	Chinese
Contrast control	Entry
British—Metric	meter
Speaker Volume	Low

English interface

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English menu:

菜单	1
语言	中文
对比度调节	进入
英制—公制	英尺
扬声器音量	低

Chinese interface

Menu	1
Language	Chinese
Contrast control	Entry
British—Metric	Feet
Speaker Volume	Low

English interface

Speaker Volume Settings: Press the ▲ ▼ **key to move the cursor to the "Speaker Volume" menu, press the button** ↵ **to cycle through the speaker volume (high, medium, low, off four).**

菜单	1
语言	中文
对比度调节	进入
英制—公制	英尺
扬声器音量	低

Chinese interface

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Menu	1
Language	Chinese
Contrast control	Entry
British—Metric	Feet
Speaker Volume	Low

English interface

Backlight time setting: Press the key to move the cursor ▲ ▼ **to the "Backlight" menu, press** ↵ **key, cycle to set the backlight time: 5S → 15S → 30S → 1m → light → off → 5S.**

菜单	2
背光	15S
自动关机	10 分钟
蓝牙配对	进入
蓝牙搜索	启用

Chinese interface

Menu	2
Backlight	15S
Automatic Shut	10min
Bluetooth Pairing	Entry
Search For Bluetooth	Using

English interface

Auto off time setting: Press ▲ ▼ **key to move the cursor to the "Auto Power**

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Off" menu, press the ⬆ key, cycle to set the automatic shutdown time: 30 minutes → 10 minutes → 5 minutes → never → 30 minutes.

菜单	2
背光	15S
自动关机	10 分钟
蓝牙配对	进入
蓝牙搜索	启用

Chinese interface

Menu	2
Backlight	15S
Automatic Shut	10min
Bluetooth Pairing	Entry
Search For Bluetooth	Using

English interface

Bluetooth Pairing: Move the cursor ➕ ➖ to the "Bluetooth Pairing" menu by pressing the ⬆ key to enter the Bluetooth Pairing Status.

菜单	2
背光	15S
自动关机	10 分钟
蓝牙配对	进入
蓝牙搜索	启用

Chinese interface

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Menu	2
Backlight	15S
Automatic Shut	10min
Bluetooth Pairing	Entry
Search For Bluetooth	Using

English interface

蓝牙配对

搜索……

Chinese interface

Bluetooth Pairing

Searching……

English interface

Bluetooth pairing success: through the ⊕ ⊖ key to move the cursor to the "HOLUX_M-1200", press the button to confirm, the receiver and GPS Bluetooth module to establish a Bluetooth connection, the monitor Bluetooth icon is lit, the receiver can receive GPS data through Bluetooth, press the *i* key to return to the main menu.

蓝牙配对

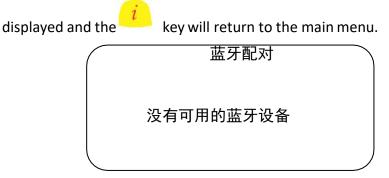Nokia N70

TOK

HOLUX_M-1200

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Chinese interface

Bluetooth Pairing

Nokia N70

TOK

HOLUX_M-1200

English interface

If no matching Bluetooth device is found, "No Bluetooth device is available" will be

displayed and the   key will return to the main menu.

蓝牙配对

没有可用的蓝牙设备

Chinese interface

Bluetooth Pairing

Without Bluetooth equipment available

English interface

Bluetooth enabled: Press the [+] [−] **key to move the cursor to the "Bluetooth**

Search" menu, press the button [↵] **to set the Bluetooth enabled or off. In   order**

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to ensure successful Bluetooth pairing, you must enable Bluetooth, or search for Bluetooth devices.

菜单	2
背光	15S
自动关机	10 分钟
蓝牙配对	进入
蓝牙搜索	启用

Chinese interface

Menu	2
Backlight	15S
Automatic Shut	10min
Bluetooth Pairing	Entry
Search For Bluetooth	Using

English interface

菜单	2
背光	15S
自动关机	10 分钟
蓝牙配对	进入
蓝牙搜索	关闭

Chinese interface

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Menu	2
Backlight	15S
Automatic Shut	10min
Bluetooth Pairing	Entry
Search For Bluetooth	Forbidden

English interface

1000 Log is the number of data saved, range: 0-1000, serial number from 0, up to save 1000 sets of data; 10000m is the distance from the distance, range: 0-10000m; Bluetooth GPS function is real-time to receive GPS data and through Bluetooth communication mode will be real-time GPS data automatically transmitted to the receiver. The receiver calculates the real time point distance between the current measuring point and the previous measuring point according to the latitude and longitude of the two points and displays the real time dot pitch on the receiver.

When the ▲+ key data is stored, the real time point of the current measuring point and the GPS latitude and longitude data are stored in the receiver memory together with the measured data.

(2)transmitter

The GW-2160A transmitter is used to apply a signal of the selected specific frequency to the target line, and the signal can be applied by the direct connection method and the induction method. Transmitter has a large power, measuring distance, automatic impedance matching, automatic measurement of pipeline grounding resistance and so on.

The panel diagram is as follows: GW-2160A transmitter panel has a total of seven touch keyboard, two lights and a liquid crystal display. See below.
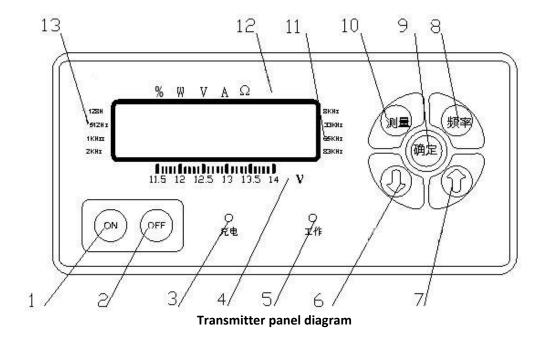**Keyboard Description：**

ON　OFF　**Switch key: for opening or closing the transmitter Power.**

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Power adjustment key: adjust the transmitter output power (output power is divided into ten files adjustable).

Transmitter panel diagram

1and2、power button;；3、charging indicator；4、Power supply voltage indication；5、work signal light；6and7、Power adjustment key；8、Frequency key；9、OK key；10、Measurement key；11、Operating frequency indication；12、Transmitter output parameter indication；13、Can detect the two levels of damage at the point of damage。

Frequency key：Select the operating frequency of the transmitter：128Hz、512Hz、1KHz、2KHz、8KHz、33KHz、65KHz、83KHz。

Measure key: Press the measurement key to select the output parameters of the instrument: output power percentage, output power, output voltage, output current, output impedance.
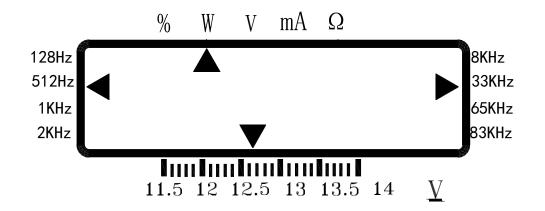
OK key: When setting the frequency of the signal to be applied, press the OK key again to change the transmitter output frequency immediately. If the key is not pressed after the frequency selection, wait for 5 seconds. The instrument will automatically confirm the selected Frequency of.

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显示器介绍：

%   W   V   mA   Ω

128Hz		8KHz
512Hz	◄ ▲ ►	33KHz
1KHz		65KHz
2KHz	▼	83KHz

11.5   12   12.5   13   13.5   14   V

Display diagram

工作频率：When the frequency of the transmitter is selected, the corresponding

triangular indicator light is on, and the frequency is 128Hz, 512Hz, 1KHz, 2KHz, 8KHz, 33KHz, 65KHz, 83KHz (according to different specifications, the frequency is not the same , See the manufacturer's specifications).

电源电压：The bottom line of the display shows the level of the supply voltage, and

the triangular indicator corresponding to the supply voltage is used to indicate the level of the power supply. When the supply voltage falls below 11.5 volts, the battery must be charged.

输出参数：The top line of the display shows the output parameters of the

transmitter. The first indicator indicates the percentage of the output power in the sense mode. The second indicator indicates the output power,the third light indicates the output voltage, the fourth point Light indicates the output current, and the fourth light indicates the output impedance.

显示窗口：The display is eight digits, the first, two, three, four are used to display the

measured value, that is, the transmitter output parameters (output power, output voltage, output current, output impedance), the seventh, eight display output (0 stall -10), the output stall is 0 stall-9 stalls, only the seventh bit shows the relevant value, the output reaches 10 stalls, the seventh bit shows 1, the eighth bit shows 0.

(3)The battery of the instrument is charged

When the transmitter battery voltage is too low, you need to charge it, you must

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first turn off the instrument (if the instrument is turned on, do not charge the battery, but can work), and then the power adapter hole hole into the instrument Power plug, insert one end of the power cord into the plug socket of the adapter, insert the 220V power supply at the other end, observe the charging indicator of the transmitter. When the charging is normal, the charging indicator light should be red and the charging will be stopped automatically , The power adapter light turns green.

Receiver charging, as long as the charger's circular plug into the receiver's charging jack, the other end of the 220V power supply, charger indicator light red, fully charged after the charge indicator light turns green.

3、GW-2160A Pipeline detector technicalparameters

（1）Receiver

Positioning accuracy: ± 5% of depth

Depth measurement accuracy: ± 5% of depth (no adjacent line interference)

Current measurement accuracy: ± 5% of actual current

Depth measurement range: <6 m

Working mode: valley method, peak method, broad peak method, peak arrow method

Operating frequency: radio, 50Hz, 100Hz, 128Hz, 512Hz, 1KHz, 2KHz, 8KHz, 33KHz, 65KHz, 83KHz (operating frequency according to product specifications and different specifications)

Working temperature: -20 ℃ ~ +50 ℃

Battery: 7.4V lithium battery Dimensions:

595mm × 136mm ×238mm Weight:

1.6Kg (including battery) **(2)transmitter**

Output power: 10W

Operating frequency: 128Hz, 512Hz, 1KHz, 2KHz, 8KHz, 33KHz, 65KHz, 83KHz

(The operating frequency according to the product specifications and different specifications slightly different)

Working mode: direct connection, induction and clamp three modes of automatic conversion

Battery: 14.8V built-in lithium battery pack

Working temperature: -20 ℃ ~ +50 ℃

Dimensions: 348mm × 228mm × 84mm

Weight: 2.5Kg (including battery)

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4、GW-2160A Pipeline detector main accessories configuration(A)

standard configuration

GW-2160A receiver one;

GW-2160A transmitter one;

Direct connection signal line one;

One of the sensor clamps;

Two output lines;

Grounding rods two;

Two chargers;

Connect a magnet;

220V power cord one;

A manual;

Instrument box (or package) one.

(2) Options (GW-2160AE type configuration):

A frame;

5、Check the instrument before the measurement

Before using the GW-2160A Pipeline Detector Receiver and Transmitter, make regular inspections to ensure that the battery is fully charged and the instrument is functioning properly. If you have any of the following conditions, please solve the problem before using the instrument.

（一）**Receiver check：**

1、**Battery check：** Press the power button to check the battery charge. If the battery is fully charged, it is displayedIn the battery symbol five solid lines all show, when the battery symbol is only a solid line is lit, the battery symbol flashes, said the lack of electricity, need to be fully charged after use.

The battery is fully charged and can be used;

The battery is low and needs to be charged.

2 、 **Work frequency method Check:**Press the frequency key to select the operating frequency of 50Hz, adjust the sensitivity, from 1 meter away from the GW-2160A receiver pointing to the fluorescent lamp, open the fluorescent lamp should hear a strong signal, the monitor will have a strong display.

3 、 **Induction method work check:**Choose a place without interference， the transmitter in the normal direction on the ground, open the transmitter, adjust the output power percentage and frequency. Then connect the receiver (about 5 meters from the transmitter) to the transmitter and keep the same frequency as the

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transmitter. When the sensitivity is adjusted to be large enough, the receiver should have a signal response.

4、 **Clamp method**：When the external clamp is inserted into the transmitter output interface Press the key, the transmitter automatically selects the frequency of 33KHz, clamps the clamp on the target pipeline, adjusts the transmitter power. Turn on the receiver, select the frequency of 33KHz, along the pipeline routing receiver should have a signal response.

Note: Induction method can only choose 65KHz and 83KHz two frequencies, no direct signal output line or clamp inserted, the instrument automatically select the sensor mode, in the sensor mode, the frequency can only choose 65KHz and 83KHz two; You can choose a frequency of 33KHz, when the clamp access to the instrument, the instrument automatically select the frequency of 33KHz, do not need to choose the frequency of the use of clamps.

When using the induction method or clamp method, the instrument display shows the percentage of output power, and the top of the line corresponds to the triangle lit.

Three frequency output power percentage correspondence table

shift	33KHz	83KHz	65KHz	Remarks
0	0%	0%	0%	Sensing frequency 65KHz maximum 7 files. 33KHz and 83KHz maximum 9 files.
1	10%	10%	10%	
2	20%	20%	25%	
3	30%	30%	40%	
4	40%	40%	55%	
5	50%	50%	70%	
6	60%	60%	85%	
7	70%	70%	100%	
8	85%	85%	—	
9	100%	100%	—	

(2)Transmitter check；

Transmitter main check battery power: open the transmitter, observe the monitor battery power indicator light, if the battery voltage indicates less than 11V, you need to charge the battery, fully charged and then use.**(3)Measurement Depth Function Check:** Select an area without metal structure and other probing lines, place an insulated cable or wire larger than 20 meters on the ground, connect it to the ground bar or connect it directly to the ground, Line of the red line (black line ground), and the output line into the transmitter output jack. Turn on the transmitter, adjust the output signal, and use the GW-2160A receiver to measure the depth at a known height above the long wire. At this point the receiver is placed vertically above the wire, the middle of the long wire, that is, 10 meters from the transmitter. The depth is measured at different heights, and the results are compared to the
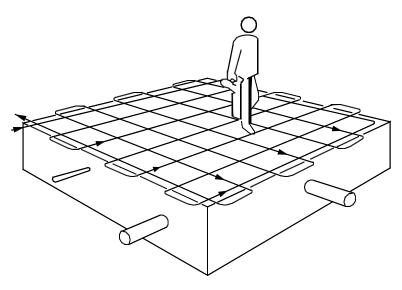
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known heights, and the depth can be calibrated (note that if there is a metal object nearby it will affect its accuracy).

Pipeline detection method

Transmit the signal and apply the operation

GW-2160A underground pipeline detector field source has two kinds of passive and active source work. The passive source mode of operation is used to search for an unknown power cable in a zone or an underground pipe to which a cathodic protection signal is applied and a metal line capable of sensing a radio frequency. The active source mode of operation is used to track and locate the pipeline signals in the area.

1、**The working way of Passive source:**

Passive source technology frequency diagram

1）**Passive frequency method**work mode does not require a transmitter.It can search for an unknown area within the power cable. Open the receiver, select the receiver operating frequency of 50Hz, adjust the gain to get a suitable reading and select the maximum or minimum method to grid search in a region back and forth search. Carry the receiver smoothly, so that the fuselage surface and the direction of movement into a straight line and as far as possible through the pipeline at right angles, not arc swing, because it will produce some misleading signals. When the receiver responds with an abnormality,it immediately stops and precisely positions the pipeline and marks it.Traces and marks are also required for a pipeline that pierces the search area.

2）**The passive source cathodic protection current (CPS) signal method** does not require a transmitter to operate, it can search for an unknown area within the application of the external current cathodic protection of the underground metal pipe. Open the receiver, select the receiver operating frequency CPS, use the same

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method and the frequency method.

3）Radio frequency detection mode: radio frequency detection mode, mainly used to be able to sense the radio frequency of metal pipeline detection.

2、**The worng way of Active source**

Active source way is to send a specific frequency of the signal sent to the pipeline, and then the receiver to locate and track the pipeline. Using the active source method can accurately locate the pipeline, tracking, sounding, but also on the underground pipeline coating damage points to accurately locate and determine the size of the damage point of the coating.

GW-2160A underground pipeline detector transmitter signal application methods are two: direct method and induction method. Direct method is the ideal way to track the pipeline, the induction method is to find the region the most convenient way to underground pipeline. The specific methods are described below

(1)Direct method：

The transmitter is connected directly to the pipeline and produces the strongest signal in the pipeline. This method should be preferred in the probing pipeline. It is suitable for continuous tracking and positioning of various underground pipelines, positioning, sounding, high precision.

1) **Wiring:** Turn off the transmitter and insert the connecting wire into the transmitter output socket. The red wire clip is connected to the target line (if the power cable must be de-energized). If it can not be connected directly, it can be used. Pipe, and then clamp the magnet can be connected, if necessary, to clear the corrosive joints, to ensure a good electrical connection. The other black wire is connected to the ground point, which should be far away from the target line and at right angles to the possible direction of the target pipeline. Be careful not to route the ground wire across other underground pipelines to prevent signals from being sensed on non-target pipelines. If there is no ready-made grounding point, you can use the grounding rod, the grounding rod into the ground, the black fish folder connected to the grounding rod. If the ground is relatively dry can pour water to improve the grounding effect. If possible, the grounding point should not be less than 5 meters from the transmitter.

2) **parameter settings.** Open the transmitter, the display shows the selected frequency, transmitter power and output parameters. , According to the frequency required for measurement, by frequency key selection. Press the frequency key, the frequency triangle in the 128Hz, 512Hz, 1KHz, 2KHZ, 8KHz, 33KHz, 65KHz, 83KHz cycle between the light, lit the corresponding frequency of the triangle is the selected frequency. The display window indicates the corresponding parameters (including output power, output voltage, output current and ground resistance) according to the triangle indicator, and the parameter display is selected with the measuring keys.

3)**Grounding resistance check.**The transmitter has a multimeter function that automatically detects the ground resistance. Select the output parameters to the Ω file, the grounding resistance will be displayed in the display, if the grounding

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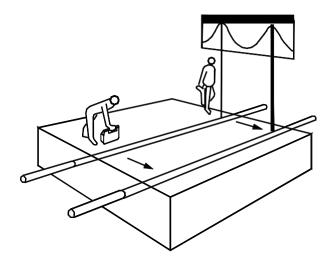E-mail: salesmanager@grewin-tech.com

resistance is too large, you must re-select the ground point or add water at the ground to reduce the grounding resistance. Because if the grounding resistance is too large, the power of the instrument can not be increased.

Note: Be sure to connect the wires before the transmitter is switched on. If the detection of underground cable using direct method must first cut off the cable power switch.

(2)Induction method:

When the operator can not directly apply the transmitter signal to the target pipeline, the induction method can be used. There is a transmitter coil in the transmitter, when the transmitter is turned on, the transmitter coil can directly sense the signal to the transmitter below the pipeline, with the receiver can receive the underground pipeline generated by the electromagnetic field. The method is easy to use and does not need to be connected to the target pipeline, but the method signal is also sensed to adjacent non-target pipelines, and a portion of the energy loss of the signal attenuates the induced signal in the surrounding soil.

The sensing method can not apply a signal to a pipe under a metal manhole or a reinforced concrete pavement because the signal will be shielded by metal covers or steel bars. The sensing method can not be used to apply signals to well-insulated pipelines unless the terminals are well grounded at both ends of the pipeline.

Sensing method

1)**Send and receive distance:**The transmitter will be fired at the same time to its upper space and the lower part of the pipeline at the same time to send the signal, so the receiver closer to the transmitter from the place to receive the probe, you may receive the transmitter field source signal, in order to distinguish the receiver in the pipeline positioning Whether the transmitter is moving to one side by one or two meters, and if the anomaly detected from the receiver is also moving, it means that the distance between the receiver and the transmitter is too close to receive the

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detected signal As the source of the launch site. Another method is to direct the receiver directly to the transmitter, then if the receiver is abnormal or increase, then the receiver receives the transmitter field signal, if this happens should increase the transmission and reception distance or Reduce transmitter power, and reduce receiver sensitivity.

2)**Place the transmitter:**The transmitter placed in the target pipeline "just above", the transmitter placed as far as possible in line with the direction of the pipeline, the only way to make the pipeline to produce a good induction signal.

Transmitter placement diagram

3)**Launch frequency selection**：High-frequency signals are most susceptible to other pipelines, often using high-frequency when sensing signals. The high frequency signal will sense all the pipelines, so the induction method is the best way to find underground pipelines instead of tracking the pipeline. For the pipeline to track the direct effect of the method is ideal.

General principles of frequency selection:

For high resistance pipelines (eg communication cables, pipes with corrosive pipes and cast iron pipes) use the frequency of 83K, it must also be noted that the higher the frequency, the more easily accessible to other pipelines, and the shorter the signal propagation distance;

For the general pipeline and cable detection, the use of 65K frequency, the frequency of transmission distance is far, it will not induce too many signals to other pipelines, suitable for long-distance tracking of the pipeline.

4)**Transmit power selection:** The transmit power selection should be such that the power of the applied signal is kept at a minimum level that meets the operational requirements and that the increased output power should be such that a clear anomaly signal is detected on the pipeline to be probed. If the output power is too high, it will make the adjacent pipeline more signals, so that the identification of the target pipeline more difficult, and will waste the battery energy of the transmitter. So the transmitter power selection should be appropriate.

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（3）**Clamp method**：The biggest difference between the clamp method and the induction method is the use of an external clamp to apply the transmitter signal to the target line without the need for an inductive coil inside the transmitter. Use and direct connection method is basically the same.

Receive detection

GW-2160A Underground Pipeline Detector The receiver is used to position, deepen and measure the current in the target pipeline.

The position, direction, and depth of the target pipeline can be detected by the receiver when the signal of the transmitter is successfully applied to the target line. Location and depth of the underground pipeline is the most important information, so the pipeline positioning and depth is the underground pipeline detection work in the most important part.

1、Pipeline positioning

When detecting the position of the target pipeline with the receiver, it is necessary to pay attention to the factors that may interfere with the positioning accuracy at any time, to prevent the transmitter signal from being coupled to the adjacent pipeline, so that the detection result is deviated.

(1)Preparations:

1) Check the power supply voltage: turn on the receiver, check the battery voltage, the need for power before the need to fully charge after use.

2)Frequency selection: Press the frequency key to set the receiver frequency at the desired frequency. If the active source mode is used, the receiver should be at the same frequency as the transmitter.

3)Sensitivity setting：Adjust the up or down key to increase or decrease the receiver gain so that the bar reading is at 60-80% of the entire range.

4)Operating mode selection: press the mode key, according to the need to select the appropriate mode of operation. GW-2160A pipeline detector receiver provides peak mode, wide-peak mode, broad-arrow mode and valley mode four detection modes.
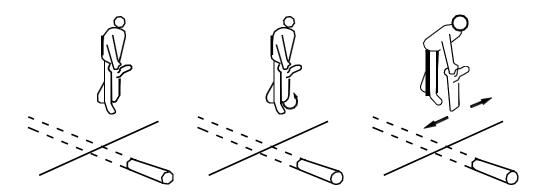
(2)Peak (max) method

The peak response mode uses a single horizontal antenna (wide) or bi-level antenna to receive the horizontal component of the target pipeline signal, and the receiver responds most directly above the target pipeline. The single-level antenna wide-band mode is used to locate deeper pipelines, with the highest signal sensitivity. When the receiver is directly above the detected pipeline, the signal strength is the largest, the response range is wide, the positioning accuracy is lower than other methods. The double-level antenna peak method has a steeper peak response than the single-level antenna wide-peak mode, the measurement position is relatively accurate and the signal strength is weak. When the receiver is above the positioning pipeline, the signal strength reaches its peak.

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Detection of peak method

First of all, the target pipeline to be positioned to keep the receiver and the ground is generally perpendicular to the receiver body and the width of the transmitter at the transmitter, if the signal is directly connected to the target pipeline, the transmitter as the center, to 5-10 meters Radius (if the induction method, the radius is greater than 20 meters) around the transmitter for circular travel, adjust the sensitivity, so that the receiver to maintain a certain static signal.

The method of positioning the pipeline by the peak method

Move the receiver back and forth gently on both sides in the presence of a peak response, find the exact location of the peak response and mark it, which is the location of the target pipeline.

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Use the peak method to locate the pipeline precisely: When the peak response point is found, do not move the receiver, turn the receiver in place, stop when the response is maximum, keep the receiver vertical ground, move the receiver around the pipeline , The largest place to respond is the location of the target pipeline.

At the top of the target line, the receiver is connected so that the receiver body width is perpendicular to the pipeline and the sensitivity is adjusted so that the bar reading is between 60-80% of the entire range. Leaving the transmitter, while moving the receiver around the middle of the middle of the peak on both sides of the situation is that the probe detectors walk in the pipeline directly above, so that the pipeline can be long-distance tracking.

(3) Valley (minimal) method

The valley (minimum) value response mode uses a vertical antenna to receive the vertical component of the target pipeline, and the receiver receives a minimum response directly above the target pipeline. Valley (very small) value method positioning intuitive, fast, but susceptible to interference, poor accuracy. Mainly used to quickly track the accuracy of the pipeline and verify the response of the peak method. The use of the valley (minimum) method can speed up the tracking of the pipeline speed, can hold the receiver at any angle, because the zero value does not depend on the direction of the pipeline. When walking along the pipeline, the receiver can get the minimum value and the sound is the smallest when the pipeline is above it. When the receiver is moved left and right, the bar reading will increase to a peak and the sound will increase. Therefore, observe the zero value response and the peak response on both sides of the pipeline during the detection process.

Zero value method Schematic diagram

When using the valley (very small) value response mode to detect the target pipeline, it should periodically switch to the peak response mode in order to verify the exact location of the target pipeline. Using the peak mode for fixed positioning and marking, and then switch to the zero value response mode, in the pipeline valley (minimum) value of the location of the mark, if the peak response tag and the valley

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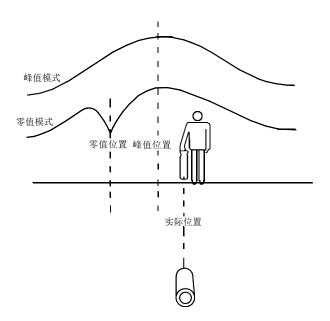**E-mail: salesmanager@grewin-tech.com**

(minimum) value of the response mark the same location, then It can be considered that the point positioning is accurate. If the two are not consistent, then the fixed-point positioning can be considered inaccurate, the actual location of the target pipeline should be close to the location of the peak response.

(4) **Peak arrow mode**

The peak arrow mode uses both a vertical antenna and two water antennas, while receiving the vertical and horizontal components of the target line. The receiver gets the maximum value above the target line and has a left and right arrow response. When the maximum value and arrow direction of the same position, you can think that the point of positioning is accurate. If the two are not consistent, then the fixed-point positioning can be considered inaccurate, the actual location of the target pipeline should be close to the location of the peak response. With this method to detect no need to detect the peak and valley during the cycle of the switch, the operation more simple and quick.

峰值模式

零值模式

零值位置 峰值位置

实际位置

Comparison of zero value and peak method

During the detection process, the receiver's reading will gradually decrease as the distance between the receiver and the transmitter increases, and it is necessary to hold the rising key to adjust the sensitivity to compensate for the attenuation of the signal. If the receiver reading is suddenly reduced, stop at once and re-detect the position of the pipeline at the drop of the reading, increase the sensitivity, round the radius to 2 m.

Possible reasons are as follows:

Pipeline suddenly deepened, can improve the sensitivity to continue to detect.

There may be a "T" -shaped branch, and the pipeline may also change direction, check whether more than one tube carries the signal in the circle. If the pipeline is

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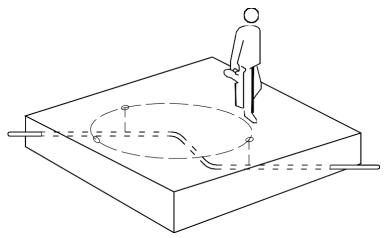E-mail: salesmanager@grewin-tech.com

more than one, measure the distance from the intersection of 4-5 meters per place of the response of each pipeline, the strongest response to the main line, weak for the "T" -shaped line, this is because the signal is always selected long or large pipeline For the better earth circuit, which is very useful for detecting the main line and the branch line.

The signal completely disappeared, may be the end of the pipeline, it may be a metal pipeline into a plastic pipeline, it may be piping from a metal plate or cover through, over the lid, continue to detect.

When the signal is gradually reduced, and sometimes improve the sensitivity of the pipeline signal or not detected, then you can take the transmitter, the signal added to the last point, the pipeline can continue to detect.

(1). If the signal becomes blurred, the signal distribution is very wide. Pipes may be in the bar net, the reinforcement network to absorb and radiation signals, this time the receiver can be increased by 0.5m, the sensitivity will be minimized, which will still be able to receive the signal without being affected by concrete in the shallow steel radiation signal and Can continue to detect.

(See the various circumstances see Figure a ~ Figure e)

Figure a   Pipeline Depth Detection Schematic

Figure b   Design of "T" Pipeline

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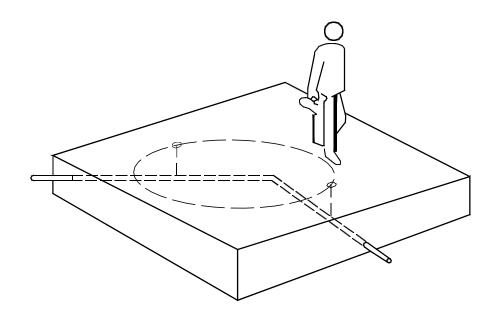**E-mail: salesmanager@grewin-tech.com**
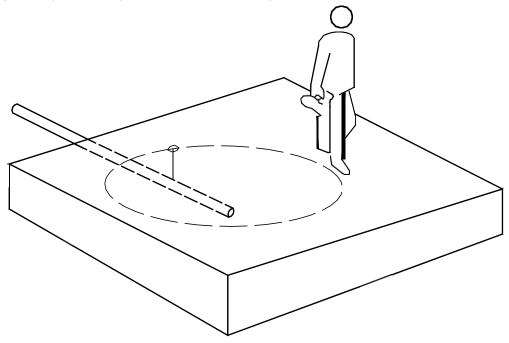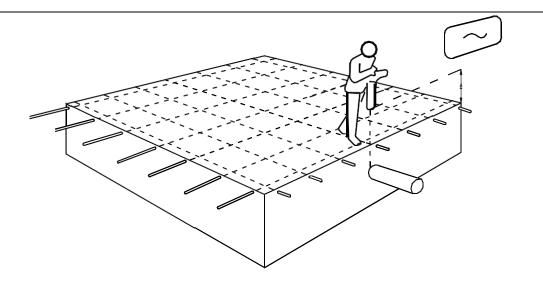
Figure c Pipeline change direction detection diagram

Figure d Schematic diagram of the end of the pipeline

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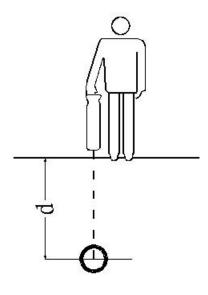E-mail: salesmanager@grewin-tech.com

Figure e Schematic diagram of pipe underneath

Pipeline Depth Measurement Schematic diagram

2. Depth measurement.

GW-2160A pipeline detector receiver can measure the target pipeline depth, commonly used methods are direct reading method, 80% method and 45 degrees method.

(1)Direct reading method: direct reading method to measure the depth of the range is: 4.5cm-6m, when more than the range or the signal is not normal, the receiver display error message.

Before the sounding of the receiver with the peak method and the minimum (zero) value of the target pipeline for precise positioning, if the two positions are not

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consistent, then there is interference exists, the need to select the peak signal and the minimum (zero) value signal Consistent place for depth measurement.

The receiver on the pipeline directly above the body surface and the pipelineat right angles and perpendicular to the ground,

It is best not to choose in the vertical antenna mode, press the _i_ key, the receiver automatically adjust the gain, gain adjustment is completed, the display shows: test, about 5 seconds after the display will show the depth of the target pipeline and tube current , And then press the button _i_ to automatically restore the working state before the depth of sounding.

Sounding must have a good quality signal applied to the target line, when the button _i_ is pressed, the receiver will automatically adjust the sensitivity to the best. If the receiver receives the signal is too weak, the display shows the signal is too weak, press the button _i_ to restore the working state before the depth.

Direct reading method of sounding method is simple, but the correct results need to read certain conditions, otherwise the measurement accuracy is not high, or even get the wrong results. One of the conditions for applying direct-line sounding is the precise positioning of the pipeline, that is, the peak method and the valley method to determine the target pipeline position to be basically the same, generally should be less than 20 cm, otherwise the error will be great.

The depth measurement is the distance from the bottom of the receiver to the center of the target line, not the distance to the top of the pipeline. This is not to be overlooked when the target pipe diameter is large.

If there is doubt about the depth measurement results, the receiver can be measured 0.5 meters above the ground again, if the measured value is increased   by 0.5 meters, then the depth of the measurement results are correct.

If the condition is appropriate, the depth measurement accuracy can reach 5% of the pipeline depth, but the operator does not know whether the depth condition is always appropriate, so the following techniques should be used to check some readings:

Check whether the pipeline is straight, at least in the range of 5 meters on both sides of the measuring point should be straight.

Check the signal within 10 meters is relatively stable, if the stability of the original measurement points on both sides and then select a number of points for depth measurement.

Check whether there is a jamming line with a coupling signal in the range of 4 meters from the target line 3 to 4, which is the most common cause of the error in the depth measurement. The strong signal in the adjacent pipeline may cause a depth measurement of 50% error.

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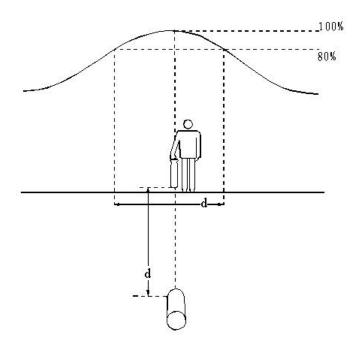E-mail: salesmanager@grewin-tech.com

The depth of the point at which the depth is minimized is the most accurate at several points that are slightly offset from the pipeline position, and the position indicated by the location is the most accurate.

（2）**80% sounding method.**

Place the receiver on the ground directly above the target line and perpendicular to the ground, select the single horizontal antenna peak mode of operation, adjust the sensitivity, adjust the reading to a suitable value, and then move the receiver in the vertical direction of the pipeline until the monitor The reading drops to 80% of the reading above the pipeline. Mark these two points and measure the distance between them, this distance is equal to the depth of the target pipeline buried.
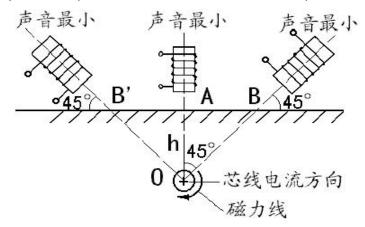
(4)45sounding method.

First, accurately measure the position and direction of the target pipeline, switch the working mode of the receiver to the zero value method, place the bottom of the receiver on the ground above the pipe at the depth measurement point, adjust the receiver body to make it The ground is at an angle of 45 degrees and moves the receiver in a direction perpendicular to the direction of the pipeline. When the received signal is the minimum, the receiver is marked with the ground on the ground, and the distance between the mark and the measuring point For the buried depth of the pipeline.

Several of the above-mentioned depth measurement methods are often used to verify the accuracy of the depth measurement in the detection process, of which
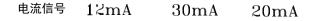
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80% is most commonly used, especially in the complex pipe network measurement depth is more accurate, 45 degrees measurement need to master the receiver body With the ground level. Direct reading depth method in the complex environment, the use of precision error, more suitable for long-distance single-pipe buried soil depth measurement.

3, **current measurement.**

The GW-2160A Underground Pipeline Detector also measures the size of the current on the target line compared to conventional pipelines, which helps the operator to better identify the target pipeline. In a pipeline-intensive area, the receiver may detect a stronger signal on the pipeline than on the target line because it is deeper than the target pipeline. At this time it is difficult to accurately distinguish between the target pipeline and the interfering pipeline if it is measured only on the basis of the signal strength. With the current measurement function it is possible to effectively differentiate between the target and non-target pipelines, and the largest (not the strongest signal) of the current measurement data is the target line to which the transmitter signal is applied (see Figure f). The measuring current can also provide useful information about the tee and elbow, which performs the current measurement main line behind the tee as the length of the assembly attracts more current, which can help determine the main line and branch line (see Figure g).
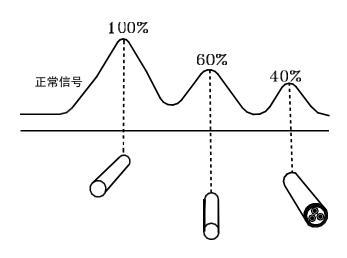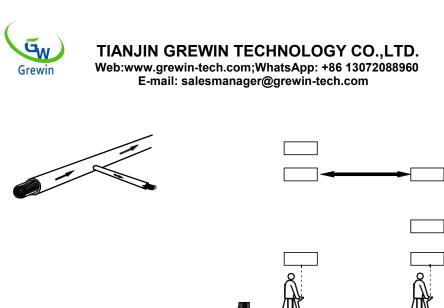
电流信号   12mA   30mA   20mA

Figure f Current measurement diagram

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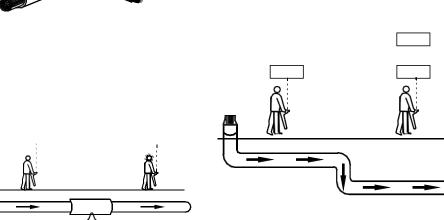**E-mail: salesmanager@grewin-tech.com**

Figure g shows the current measurement at the tee and elbow

The principle of current measurement: the transmitter to the target pipeline to impose a current signal, with the distance from the transmitter increases, the intensity of the current will gradually decrease, the degree of attenuation due to pipeline type and soil may be. But for a certain type of pipeline, the attenuation of the current will remain stable without sudden drop or change. Sudden changes in the current indicate that the pipeline or its condition has changed. (See Figure h)
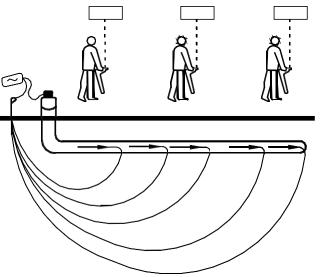
Figure h Schematic diagram of current measurement

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Current measurement method: current measurement method and sounding method exactly the same, and the size of the current in the depth of the time will be detected and displayed in the display.

Signal sensing to adjacent pipelines will reduce the accuracy of the measurement. If the measured reading is suspicious, search for a nearby area and check for pipelines with other radiation signals nearby. If other signals cause interference, perform depth / current measurements at other points of the pipeline.

on-site detection of the general procedure

1.Pre - exploration data preparation and field study.

The GW-2160A Underground Pipeline Detector locates all buried metal pipes and cables in a zone. Therefore, the information on the depth and location of the pipeline detected by the GW-2160A underground pipeline detector will help to predict the distribution of the underground pipe network before the construction of the new project. Before using the pipeline analyzer, it should first collect the underground ("Urban underground pipeline project archives management approach" since May 1, 2005 has been implemented, the city underground pipeline related archives information can be to the local urban construction archives consultation), although sometimes this information is not very reliable Or accurate, but it can also provide some of the pipeline within the area of the situation, and look at the scene: covers, lights and all instructions to have a direct pipeline and cable signs should be taken into account.
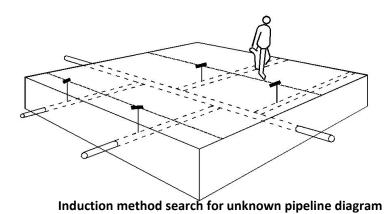
2.Grid frequency scanning.

The GW-2160A receiver is capable of testing the frequency of the 50 Hz power cable, which can quickly detect the location and direction of the underground power cable in the area under test and do not require the use of a transmitter.

Press the receiver frequency frequency key, select the 50Hz frequency and select an operating mode, the working mode for the peak method to illustrate the detection method: adjust the sensitivity, so that the signal reading in the receiver bar graph full scale of 60-80% The grid-like route sweeps the area to be detected, and the direction of the receiver is consistent with the direction of the pipeline and is at right angles to the pipeline that may be measured. When the receiver response increases, it indicates that there is a pipeline, where it is stopped, the pipeline is precisely positioned, and the position of the pipeline is marked, traces the pipeline until it leaves the area to be searched, and then returns to continue the network scan in the area The

Mark each of the pipeline locations with signal responses and then track the portion of the pipeline outside the area and mark it.

3.Sensing method search.

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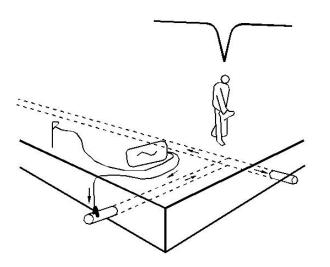**Induction method search for unknown pipeline diagram**

Inductive search is the most reliable technique for detecting unknown pipelines. This search method requires a transmitter, a receiver, and two detectors. This search method is called "two-person search method". Before starting the search, determine where you want to search for the area and the direction through which the pipeline passes. Turn on the transmitter, select the working mode for the sensing mode and select the same frequency. One detector operates the transmitter and the other detects the receiver. The signal can be detected by applying a signal to the pipeline when the transmitter passes the pipeline and then the receiver 20 meters upstream or downstream of the transmitter. The direction of the transmitter is consistent with the direction of the estimated pipeline. The second person follows the starting position of the receiver in the area to be searched, and the direction of the antenna of the receiver remains perpendicular to the direction of the possible underground pipeline. The receiver is tuned to the highest sensitivity of the transmitter signal that will not receive directly from the air. When the direction of the transmitter and the receiver remains correct, the two operators move forward in parallel. The operator of the receiver moves the receiver forward and backward while moving forward. The transmitter applies a signal to the pipe directly below and the signal is detected by the receiver. The position of the peak detected at the receiver is marked on the ground. Repeat the search in other directions where there may be pipelines.

Search by induction can detect passive pipelines and other pipelines that do not have an inductive 50Hz signal.

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Sensing skills:

Maintain the distance from the transmitter, in the sensor mode, the transmitter in addition to the target pipeline to send a signal, but also to the air to send a signal, which may give the transmitter near the detection work caused by interference. To check that the receiver is detecting a signal from a pipeline, rather than a signal that is emitted directly from the transmitter, move the transmitter one or two meters, and if the pipeline is moving, this indicates that the receiver is too close to the transmitter. Another way to check whether the receiver has received the transmitter signal is to point the receiver to the transmitter. If the receiver's response size is constant or increased, the receiver receives a transmitter signal that is transmitted directly from the air. In this case, the transmitter output power is reduced and the sensitivity of the receiver is reduced. The receiver may also leave the transmitter 25 to 30 meters. Do not place the transmitter on the cover as this will prevent the signal from being applied to the target line.

4. pipeline tracking, fixed positioning and depth measurement.
The transmitter signal is applied to the location of the buried pipe or cable for access. Such as: containers, valves, lights, etc., to track the part of the pipeline outside the area and mark.

For those pipelines that need to be probed, they can be tracked until they reach the covers, lights and fire hydrants on the ground, then the transmitter signals are applied and then returned from these locations to track the pipelines until they return to the area.

The key points and feature points of each pipeline in the area are sent to the location and the depth measurement, and the relevant pipeline data and the detection result are recorded at each detection point, and then the recorded data are sorted and the area is drawn Of the pipeline distribution.

commonly used pipeline detection techniques

1.T-tube detection.

Once the pipeline has been tracked and marked, the receiver can be traced again along the pipeline, but this time it is about 1 meter away from the side of the pipeline that has been stuck, Pipeline parallel. The signal (or signal is small) from the main line is not detected, but the response to the branch will be noticeable.

The most reliable way to locate a branch is to apply the transmitter signal to the end of the branch. This signal will flow from the branch to the main line, and then flow to both sides of the main line. The fuselage surface is at right angles to the main

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line and the signal is traced along the main line. The receiver will have a zero value response above the T-shaped pipe joint. The position of the zero value is the exact position of the T-shaped pipe joint.

2、Parallel pipeline detection.

In parallel pipelines, parallel pipelines are a common phenomenon. In pipelines-intensive areas, receivers often receive interfering signals from adjacent pipelines, which can cause difficulties and impacts on the identification and tracking of target pipelines Positioning depth accuracy. So we must use some methods in our work to minimize the impact of adjacent parallel pipeline coupling signals.

First of all, in the pipeline-intensive areas as far as possible not to use the induction method, and direct connection method to the target pipeline to apply the transmitter signal. In addition, a lower transmitter frequency can be selected to reduce the coupling capability of the signal. In this case, the peak response mode should be used, using 80% method sounding, which can reduce the deviation.

In general, the receiver's response to the target pipeline should be greater than the adjacent pipeline, with the receiver's response to be able to identify and track the target pipeline. However, if the adjacent pipeline is closer to the surface, the receiver's response to the adjacent pipeline may exceed the target line. The target pipeline can not be identified and tracked only from the receiver's response. At this point we need to measure the target pipeline and the signal on the adjacent pipeline and compare the current, with the maximum current value of the pipeline is the application of the transmitter signal target pipeline.

If there are several parallel pipelines and can not be directly connected to the transmitter, you can press the pipeline signal method for each pipeline to detect. First, the entire region is searched by means of induction to find the number, general position and direction of the pipeline in the area, and mark on the ground. Then place the transmitter flat on the ground and keep it as much as possible in the direction of the underground pipeline and ensure that the pipeline is just below the transmitter so that the signal below the transmitter is zero, but other lines can be detected, moving along the pipeline The transmitter continues to detect and mark the pipeline position. Finally, the first line is tracked outside the search area until the target pipeline can be precisely positioned.

3、Deepening Pipeline Detection.

If the signal detected by the receiver suddenly becomes smaller during the probing process, it may be that the target pipeline is branched or the pipeline becomes darker. According to the T-type pipeline to detect the way to determine whether there is a branch pipeline, if there is no branch pipeline may be the pipeline suddenly deepened, then should immediately stop, and then re-track the monitor response to the sharp decline in the location of the pipeline High sensitivity to the signal response drop point for the center, to 2 meters distance for the radius for circular arc detection.

4、Interference signal processing.

The signal that is sensed from the target pipeline to the adjacent pipeline is the

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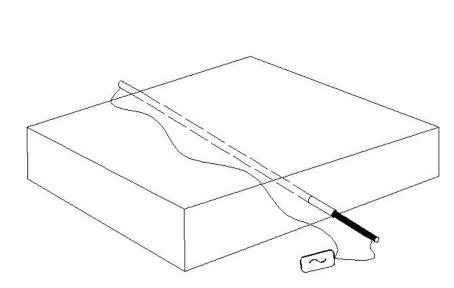E-mail: salesmanager@grewin-tech.com

most common problem in pipeline detection, which may cause the location or depth of the target pipeline to be inaccurate or to detect erroneous pipelines. In many cases a certain degree of induction is inevitable, but through field testing experience can be used to reduce the degree of induction, so as to improve the reliability of detection.

Try to avoid using the induction method to apply the signal. Because the use of induction signals may be sensed on multiple underground pipelines.

To determine the location of the underground pipeline is relatively close to each other, from the pipeline where the simple start to the underground pipeline complex place to detect, rather than from the underground pipeline complex place to start detection. For example, if the building concentrates water pipes, gas pipelines, cables, etc., signals should be applied from valves or other access points other than buildings, and signals should not be signaled from buildings.

If possible, use a lower frequency signal to reduce the proximity of the adjacent line.

If the signal is returned to the transmitter via another line, a double-ended connection can be used to bypass the ground return. Because of the use of a single-ended connection method, the ground loop signal is returned to the transmitter through other pipelines, which may be stronger than the target pipeline signal because the target pipeline is deeper than the pipeline carrying the signal or the loop line is better than the target pipeline, At this time the target pipeline detection will be a problem. If both ends of the pipeline have access points, the use of a double-ended connection method to connect the transmitter is a pipeline-intensive conditions to identify the target pipeline the most effective way. The specific operation is as follows:
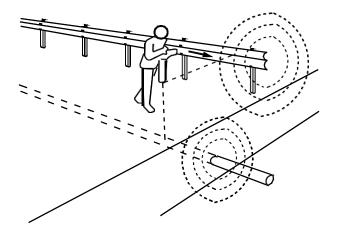
Connect the transmitter to an access point to the target pipeline where the ground of the transmitter is connected to another access point of the target pipeline via a long wire. This does not require grounding to form a complete loop, the long pipeline should be away from the target pipeline may be.

5、Some Problems in Cable Detection. Some Problems in Cable Detection.

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Before applying the transmitter signal, it is necessary to disassemble the common connector on the cable so that it can track the target cable. If you want to track all cables from the transfer box, the transmitter can be operated in a sensing mode, placed on one side of the transfer box and aligned with the cable to be tracked.
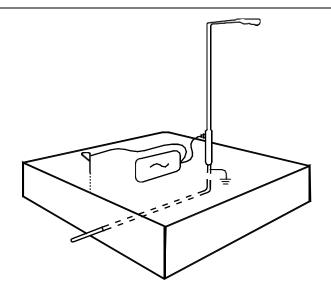

Detecting a schematic view of the cable fence

In order for the transmitter signal to transmit a sufficiently far distance, it is necessary to remove the ground connection of the cable.

If there is a ring in the ground, the cable will reduce the response on the cable path. In this case, you should return to the response point before the increase in the search range, the receiver will be able to determine the cable in addition to the smallest of all the ring.

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A schematic view of the cable detection lights

Most of the cable glands in the receiver will show a peak pulse signal, field detection experience and understanding of the actual situation can determine whether the peak pulse signal indicates a transfer box.

The cable is usually buried directly on the road outside the metal fence on the road, the signal will be coupled to the metal fence. Because the metal fence is close to the antenna at the bottom of the receiver, tracking becomes difficult. Then the receiver, so that the lower part of the body antenna and metal fence flat, the problem can be resolved.

The transmitter signal is almost as effective as the metal shield of the lighting cable itself, since the metal shield of the lighting cable is generally connected to the metal column.

For cables from wooden poles, cement poles or lighting columns, the transmitter can be placed in an induction mode and applied to the pole at right angles to the earth to apply a signal.

6、Some Problems in the Process of Detecting Cast Iron Pipeline.

The GW-2160A underground pipeline detector can be used to search for steel pipes and cast iron pipes with spaced-apart interfaces.

Some cast iron gas pipes and tap water pipes have insulated connectors that can be used to apply the transmitter signal to the gas meter or water meter. Use a jumper to turn the insulated gasket bypass (use a connecting magnet on both sides of the insulating gasket to ensure that the connecting magnet But also to connect the two connecting magnets with wires), so as to ensure a reliable circuit for the cast iron pipes entering the house.

If you want to locate the pipe on the roadside or road pavement, connect the transmitter to the valve with the single-ended connection method and connect   the

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grounding wire to the metal frame of the valve box. Make sure that the connecting magnet is in good contact with the pipe. If necessary, remove paint and rust before connecting.

Sometimes there may be some insulation on the pipeline, the transmitter should be in the back of each joint pipeline re-enter and use a higher signal frequency, so that the detection by paragraph, until the detection of the entire pipeline.

Combining the above methods is generally successful in tracking cast iron pipes.

Fault location (GW-2160AE has the function)

Fault location is to detect the underground pipeline insulation damage (pipe failure is the outer coating damage, cable failure is the outer sheath damage). When a faulty point is present, a part of the signal will be returned to the GW-2160AE via the ground bar via the fault point. The A-frame can be used for fault location of the underground pipeline. Specific steps:

●Frequency selection: A-frame to find the underground pipeline   coating damage point, it is recommended to choose 128Hz and 512Hz two frequencies.

●Target Pipeline Location: Use the receiver to locate the target pipeline and determine the approximate area of the fault. If there is an abnormal signal loss when the pipeline is tracked, it may be that some of the signal is leaked from the insulation to the earth.

● Fault detection line connection: Insert the fault detection cable or the A-frame cable into the receiver input jack.
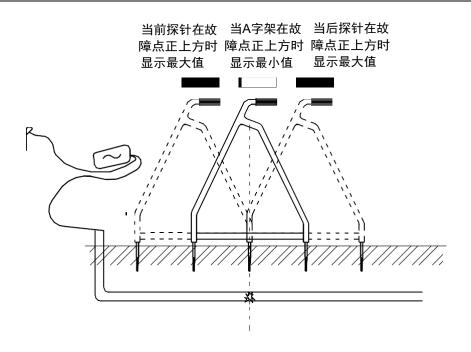
● Receiver mode setting: adjust the receiver mode key, select the external signal mode.

●A way to locate the pipeline fault point:
Through the GW-2160AE underground pipeline detector receiver can detect the value of the flow through the A-frame, through the potential reading changes can be found in the buried pipeline to the ground insulation (steel pipe outside the coating, the cable jacket) failure.
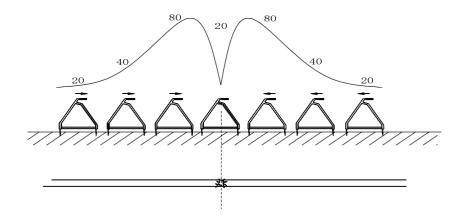
When using the A-frame along the pipeline, insert the A-frame every three or four steps. As you get closer to the point of failure, the receiver signal readings will increase, and you need to adjust the gain to reduce the receiver's sensitivity. If the signal starts to increase, the detection speed should be appropriately slowed down and carefully examined every minute on the ground to prevent ignoring the point of failure. The receiver's reading will continue to be increasing until there is a probe across the point of failure. When the fault point is located between the two pins the current will decrease the reading close to zero. Adjust the gain so that the reading remains at a large value while moving the A-frame, moving about 30 cm each time until a minimum reading is made. At this point, the fault point is located between the A-frame two probes.

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当前探针在故　当A字架在故　当后探针在故
障点正上方时　障点正上方时　障点正上方时
　显示最大值　　显示最小值　　显示最大值

A frame on the pipeline fault point positioning diagram

　　If you can not determine the position of the pipeline during the search for a fault, you need to press the mode key to change the working mode to a single horizontal coil, a bi-level coil or a vertical coil mode to precisely target the target line. After positioning is complete, press the mode key again, select the external signal mode, continue to find the fault point.

A frame reading diagram

As can be seen from the figure above: When the A-frame is close to the point of failure, the horizontal signal of the receiver will gradually increase (the reading in the
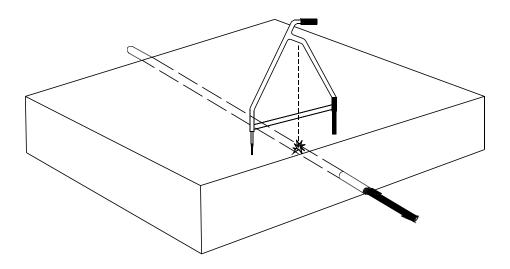
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figure is only a diagram showing the change of the signal size as the detection position is different).

When you need to pinpoint the fault point, turn the A frame to the exact location where the fault point is found when you are perpendicular to the cable. At this time the position of the A-frame is the top of the fault point.

If the cable in the cement, asphalt pavement below, you can use a special signal pick up the probe, can effectively solve the other instruments can not be in the cement, asphalt pavement detection problems. If necessary, you can use water to wet the road. This will be better.

Use A frame to locate the fault point accurately

Technical terms

This manual uses a number of terms, which are explained as follows:

Active Source Signal: Signed and applied to the pipeline with the SENNR Series Pipeline Transmitter.

Passive source frequency signal: the power cable naturally generated 50Hz signal.

CPS signal: cathodic protection current signal.

Pipeline: A continuous underground metal pipe, cable, or other conductor capable of conducting current.

Target pipeline: refers to the pipeline exploration project needs to detect the pipeline.

Positioning: Determine the position of the target pipeline at the ground level according to the result of the pipeline meter.

Response: The receiver detection signal is indicated in its display or speaker. By adjusting the sensitivity of the receiver, you can change the response of a signal.

Search: Use the receiver to search for all target pipelines within a region.