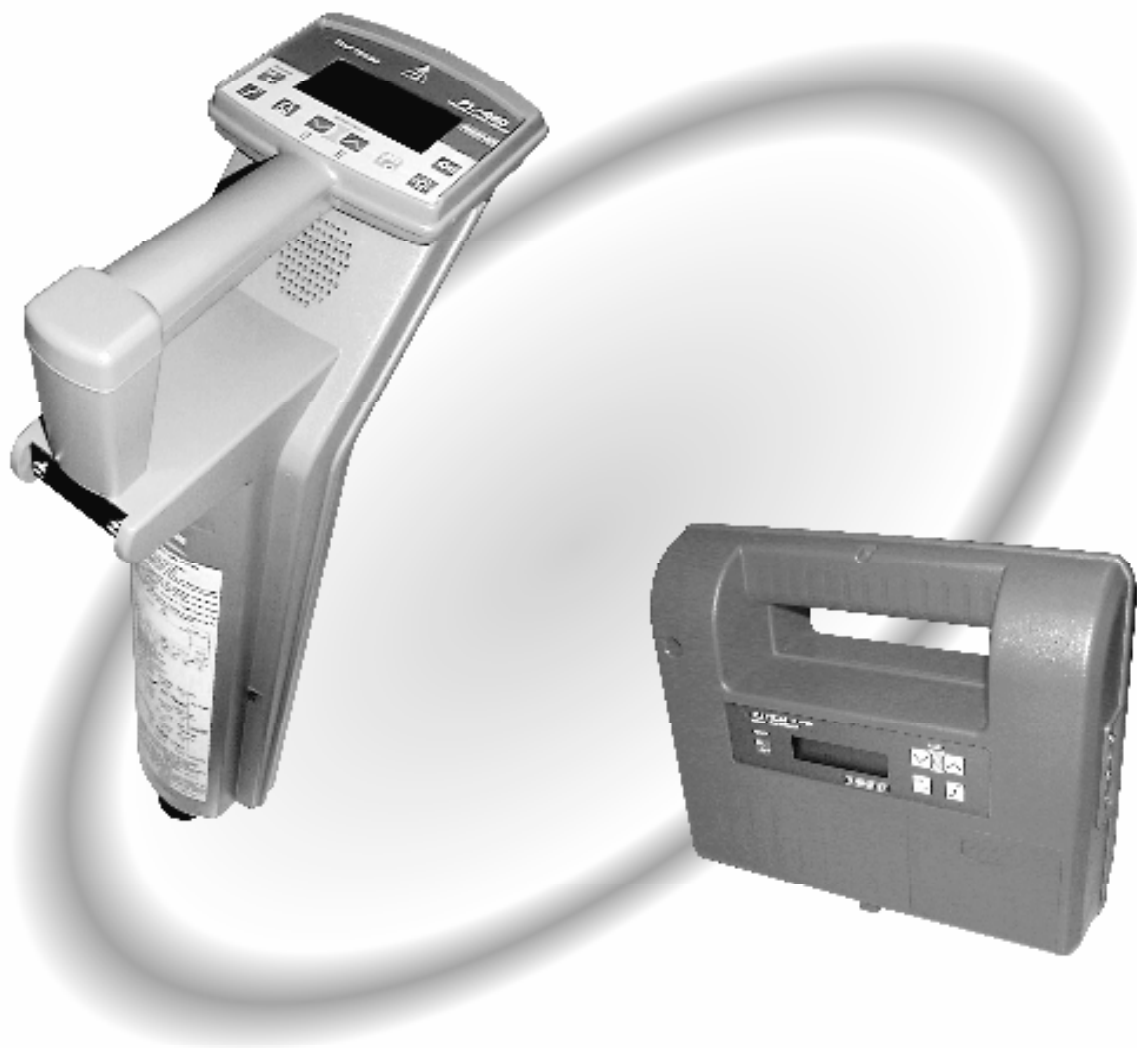


# FUJI METAL PIPE AND CABLE LOCATOR PL-2000

OPERATION MANUAL



instruments for the location of underground utilities and water leaks.

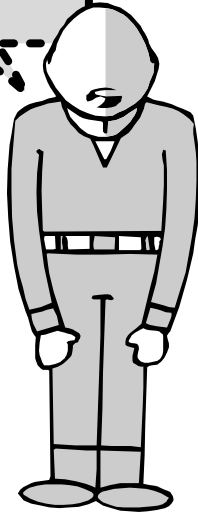
**FUJI TECOM INC.**

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# PREFACE

Thank you  
very much



Thank you very much for your selection of Fuji PL-2000 Metal Pipe Locator in the various Locators distributed in the underground utility locating industry.

So as to have the PL-2000 Locator utilized to satisfy your locating work on site, you are required to read this Instruction Manual not only to know how to operate this Locator but also to prevent a trouble of instrument and an accident on site.

# CAUTIONS

For the safety work on site, you are required to keep the following cautions strictly.

1. Do not utilize the Locator to the other purpose than the work to locate the pipeline and cable buried under the ground.
2. Do not put water or metallic dusts into the Locator Housings so as to prevent troubles of components.
3. Operate the Locator on site by two operators as possible so as to protect the Transmitter from a traffic accident.
4. According to the circumstances in site, increase assistants and take measures to keep the safety in site.
5. Do not operate the Locator in the rain. The Locator Housings are not the structure of water-proof.
6. Do not drop the Locator on the ground. The Locator is not the structure of shock-proof.
7. Do not leave the Locator in the place of high temperature or direct sun rays for many hours. The Locator Housing and Electronic Components are damaged.

# STANDARD INSTRUMENT

Your PL-2000 Locator of standard type consists of the following items.



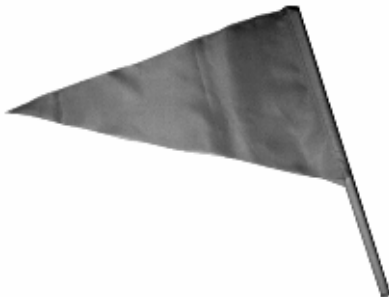
1. **Transmitter Unit** operated by DC 12 Volts (LR20×8 batteries) 2.5 kg.



2. **Receiver Unit** operated by DC 9 Volts (LR6×6 batteries) 2.0 kg.



3. **Grounding Stake** (30cm).



4. **Warning Flag**.



5. **Direct Mode Cable**.



6. **Soft Carrying Bag**.

English Operation Manual is included.

## OPTIONAL ACCESSORIES

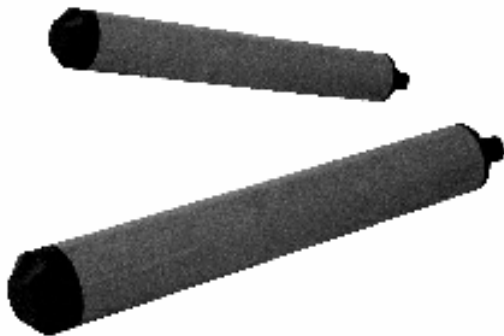
The following accessories are recommended to be used with the PL-2000 Locator so as to utilize the External Coil Mode and the Loop Cable Mode.



- 1. External Coil.**  
It is useful to locate the power cable.



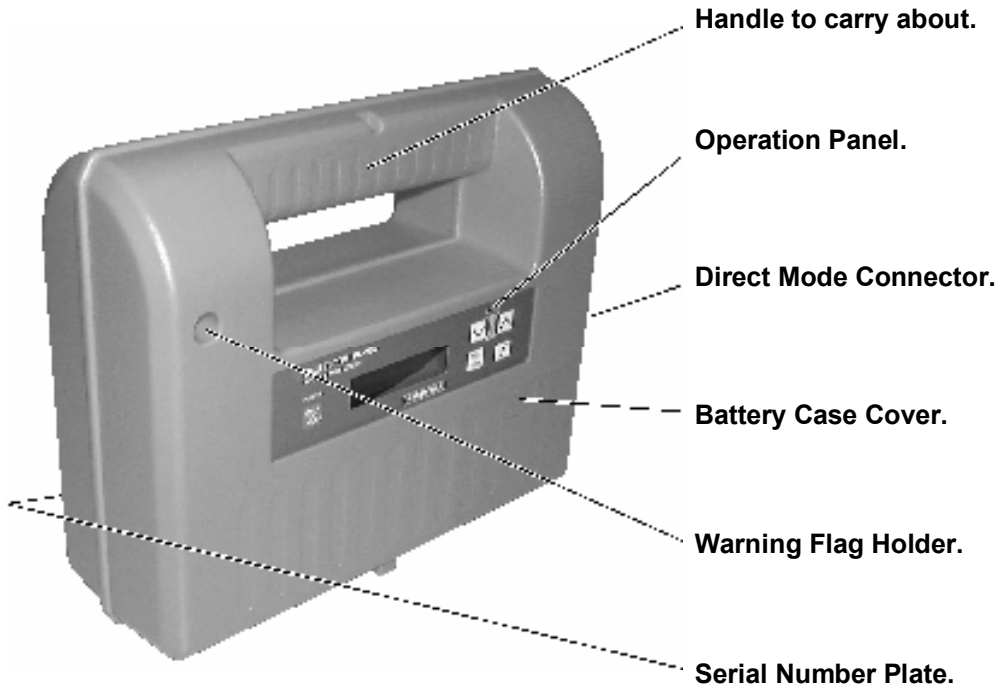
- 2. Cable Drum with 50 meter cable.**  
It is utilized for the Loop Cable Mode.



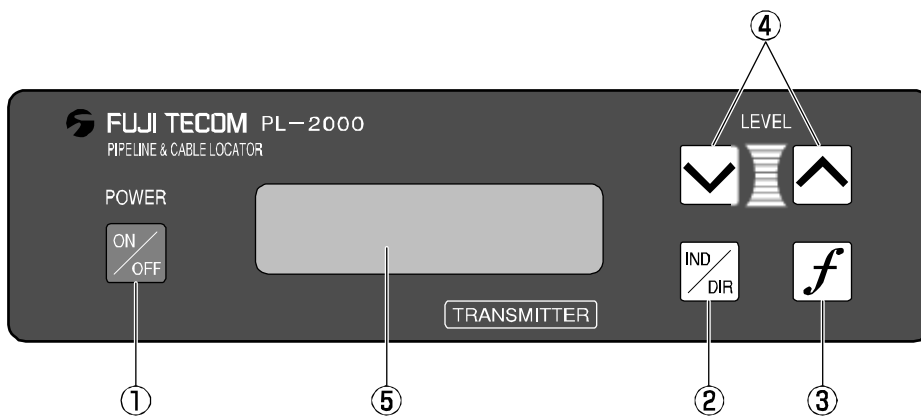
- 3. Sonde (Small or Large)**

# OPERATION OF TRANSMITTER (1)

## ■ Transmitter Unit.



## ■ Operation Panel.



① Power Switch Key.

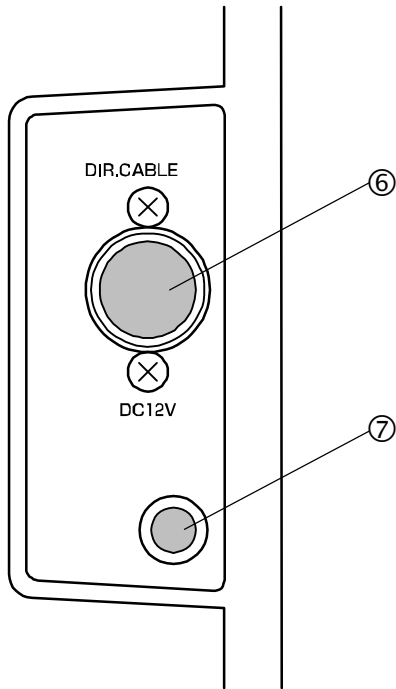
② Mode Selection Key.

③ Frequency Selection Key.

④ Output Power Control Key.

⑤ LCD.

# OPERATION OF TRANSMITTER (2)



## ■ Connections.

### ⑥ Direct Mode Connector.

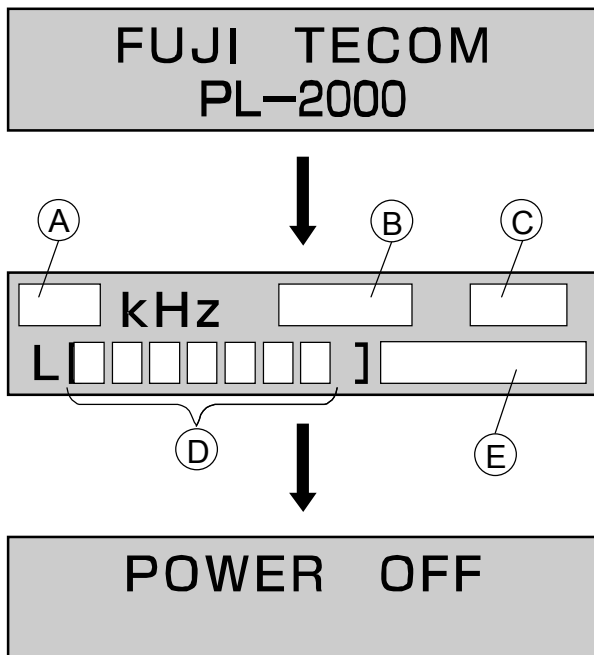
### ⑦ External Power Connector.

When the external power is used, the optional connecting cable is required.

## ■ LCD Display of Transmitter.

The PL-2000 Transmitter displays the following information by the LCD.

Push the Power Switch Key to turn on.



Ⓐ is the display of Frequencies for choice.

Induction Mode : 27kHz or 8kHz.

Direct Mode : 27kHz , 8kHz , 0.5kHz or MIX


MIX means the simultaneous output of 27kHz , 8kHz , and 0.5kHz.

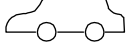
Ⓑ is the display of Output Mode.

IND = Induction Mode.

DIR = Direct Mode.

Ⓒ is the display of power source

















 = Inner Battery Operation.

 = Car Battery Operation.

Ⓓ is the display of Output Power in 8 steps from 0 to 7.

Ⓔ is the display of Output Power of the Direct Mode.

" Power level is weak or ground is weak "

"  ~  ~  ~  ~  ~  ~  ~  ~  ~  ~  ~  ~  ~  ~  ~  ~  ~



## ■ How to cancel the Automatic OFF Function.

When the Automatic OFF Function is working, continue to push the Frequency Selection Key and then push the Power Switch Key.

FUJI TECOM  
PL-2000

The left displays Power Switch ON condition.



Keep on pressing the Frequency Selection Key.



CONTINUOUS

When the Automatic OFF Function is cancelled the message "CONTINUOUS" is displayed.



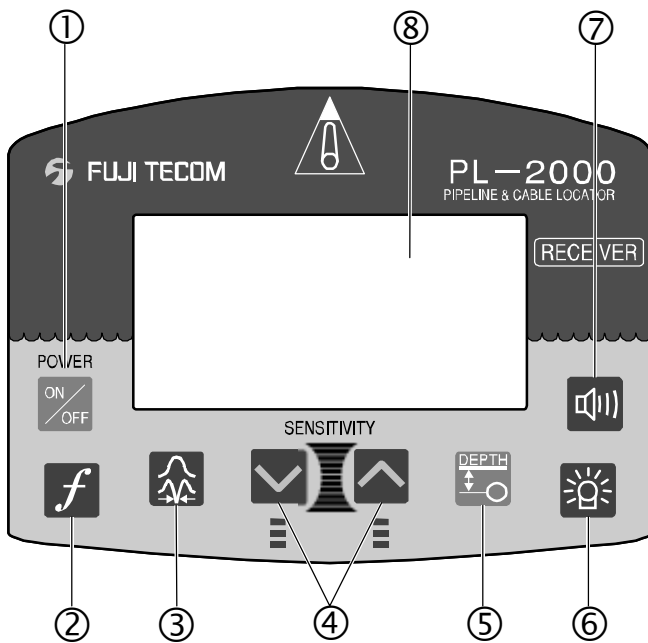
Stop pressing the Frequency Selection Key.

NOTE : When the Transmitter is kept in the condition of the Automatic OFF Function and stored in its Carrying Case or Warehouse, the Automatic OFF Function is continued to the next time of operation.

# OPERATION OF RECEIVER (1)

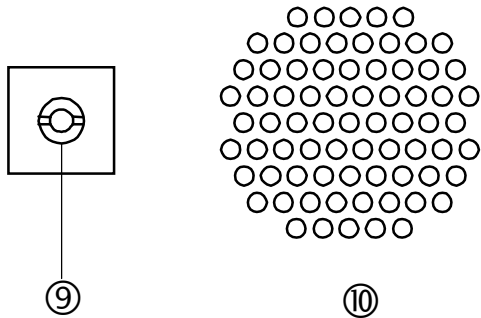


## ■ Receiver Operation Panel.



- ① Power Switch Key.
- ② Frequency Selection Key.
- ③ Mode Selection Key.
- ④ Sensitivity Adjustment Key.
- ⑤ Depth Measurement Key.
- ⑥ Back Light Key.
- ⑦ Sound Volume Control Key.
- ⑧ LCD.

# OPERATION OF RECEIVER (2)



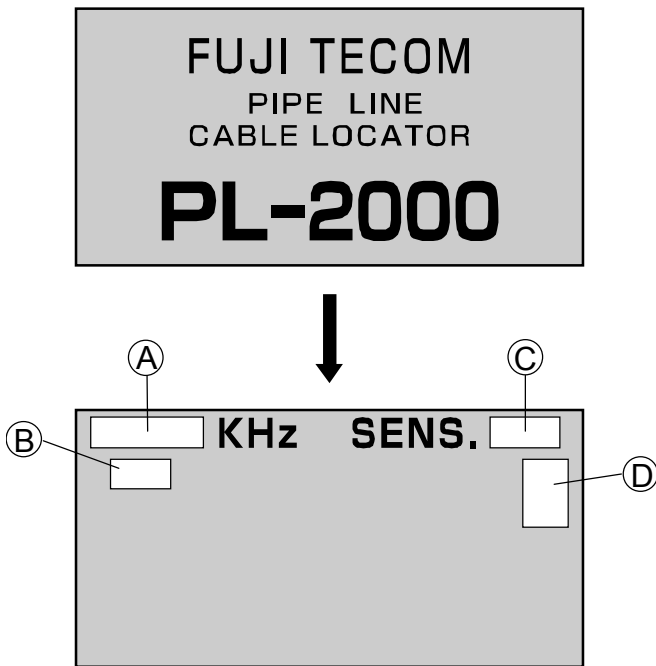
⑨ Headphone Plug Connector located at the back side of Receiver.

⑩ Speaker Net located at the back side of Receiver.

## ■ LCD Display of Receiver.

The PL-2000 Receiver displays the following information by the LCD.

Push the Power Switch Key to turn on. " FUJI TECOM PIPE LINE CABLE LOCATOR PL-2000 " is displayed. It indicates the condition of Power Switch ON.



Ⓐ is the display of Frequencies for choice.  
27kHz or 8kHz or 0.5kHz or RADIO or CABLE.

Ⓑ is the display of Modes for choice.

Maximum Mode = (人)

Minimum Mode = (∩)

Bar Antenna Mode = (BAR)

Sonde Mode = (✍)

Ⓒ is the display of Sensitivity Level to the signal transmitted from the Transmitter.

Ⓓ is the display of the residual battery Power.

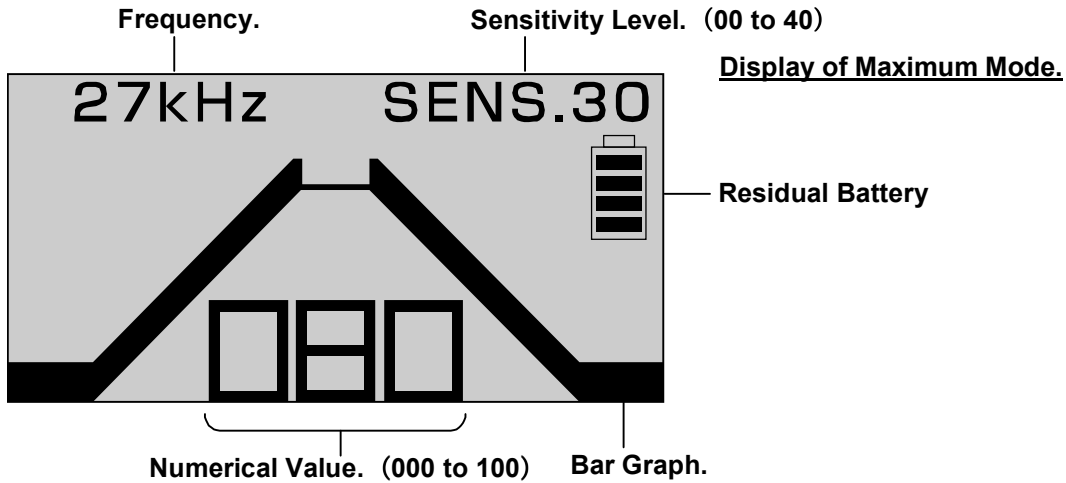


When the Keys are not operated for five minutes, the Automatic OFF Function works and turns OFF the power. The Receiver Unit returns automatically to the condition of non-operation and saves the battery power.

# OPERATION OF RECEIVER (3)

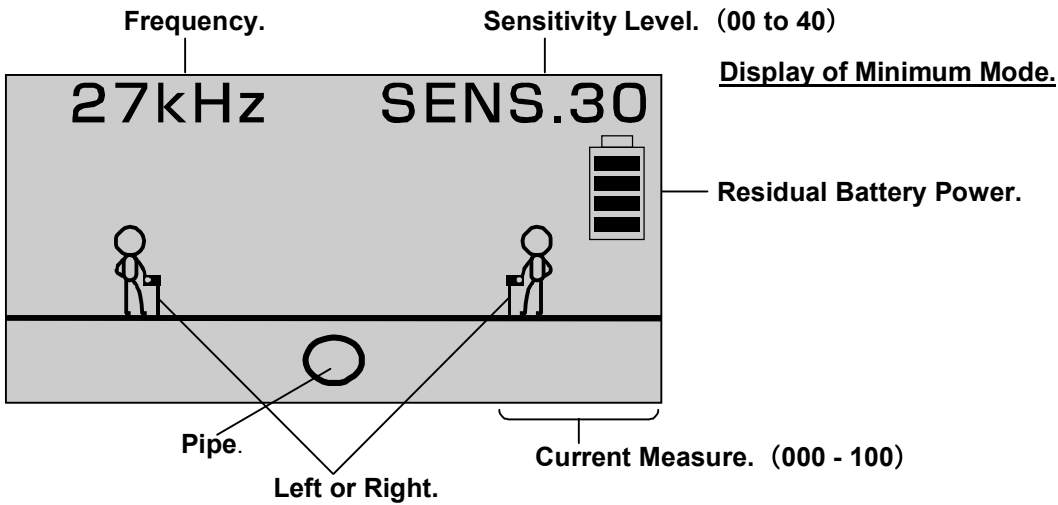
- Mode Displays  
( Maximum Mode, Minimum Mode and Depth Measurement Mode ).

- Maximum Mode.



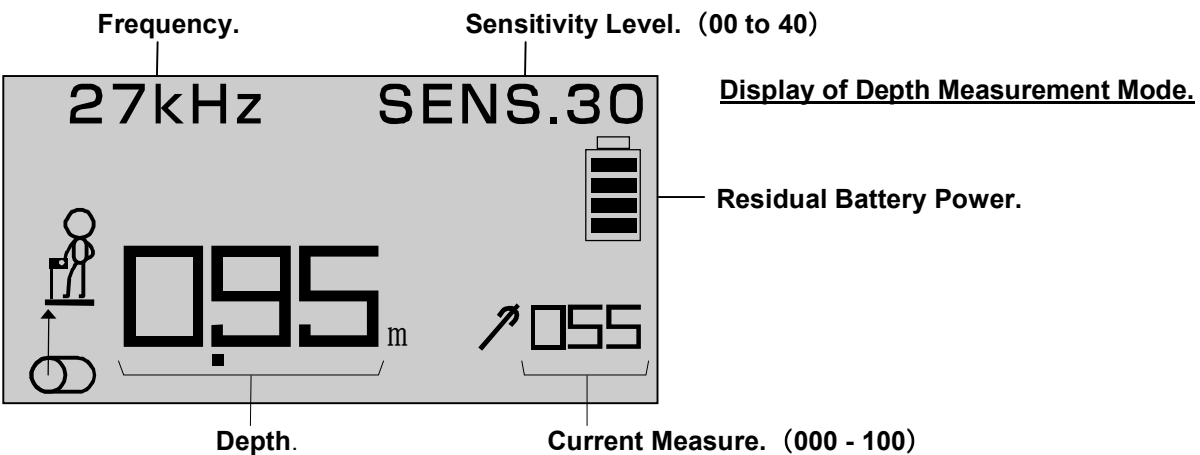
Display of Maximum Mode.

- Minimum Mode.



Display of Minimum Mode.

- Depth Measurement Mode.



Display of Depth Measurement Mode.

### ■ How to read the Current Measure.

The Current Measure is the expedient value displaying between 000 and 100 converted from the electric current transmitted in the buried pipeline. The value between 000 and 100 can be utilized to know if the PL-2000 Locator could measure the depth of pipeline correctly.

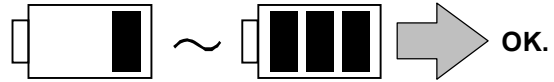
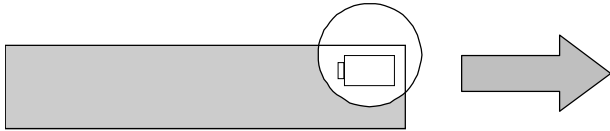
NOTE : The Bar Mode and the Minimum Mode do not measure the depth of pipeline. The Maximum Mode can measure the depth thereof.

# REPLACEMENT OF BATTERY

## 1. Transmitter.

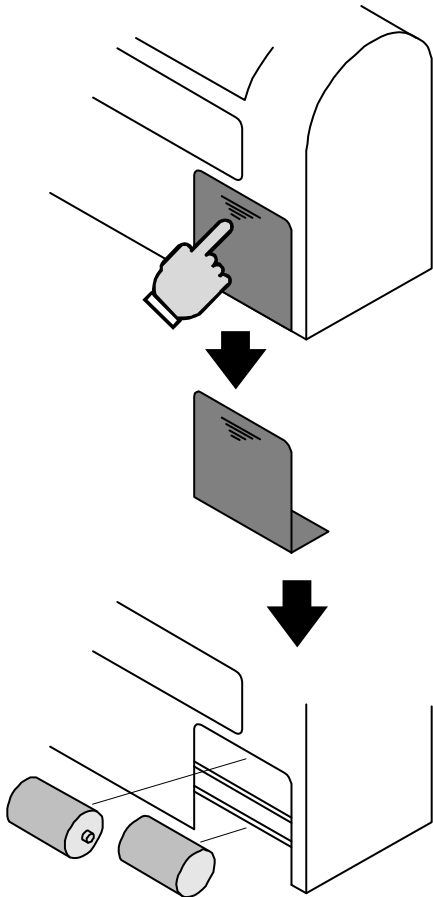
When the battery mark displayed in the LCD is reduced to Zero as shown by the following figures, replace all batteries at the same time.

The residual power is indicated in the LCD.



## ■ How to change the battery.

Push with a finger the nonskid part of Battery Cover and then push the Cover toward the Arrow marked direction.



The Battery Cover can be detached.

NOTE : When the Direct Mode is used, you will have the case that the battery power is reduced suddenly and the Power Switch becomes the OFF. In that case, all batteries are required to replace.  
The residual small power is consumed by the earth of Direct Mode.

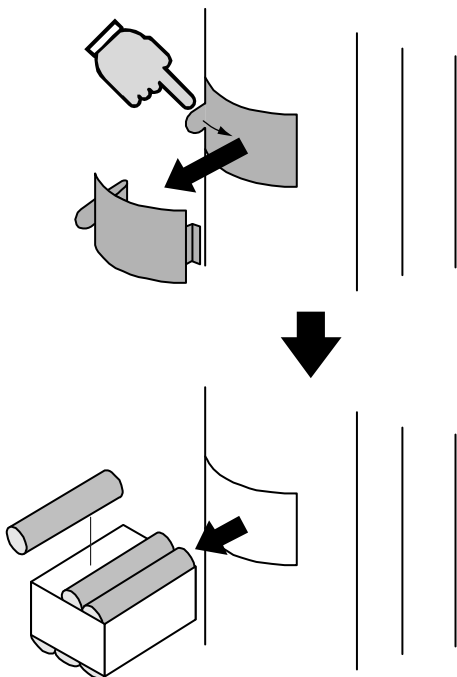
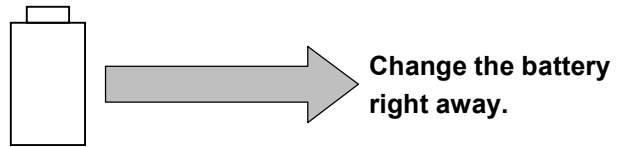
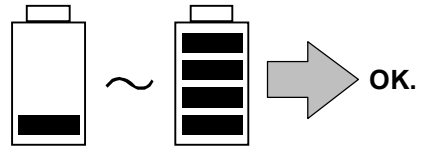
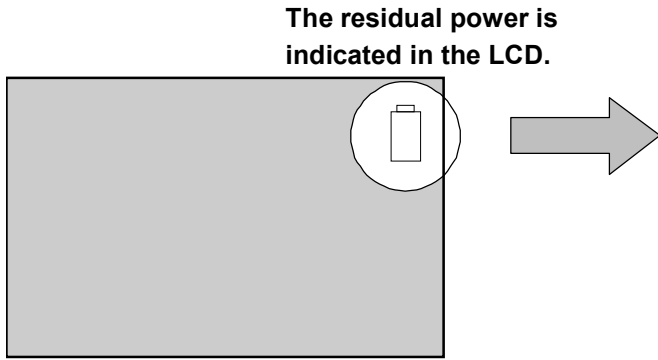
NOTE : Confirm the polarity of battery when the batteries are mounted in the Battery Case.

NOTE : When the Battery Mark was reduced to Zero, the Transmitter becomes the condition of Power OFF automatically.

# REPLACEMENT OF BATTERY

## 2. Receiver.

When the battery mark displayed in the LCD is reduced to Zero as shown by the following figures, replace all batteries at the same time.



### ■ How to change the batteries.

Push the Battery Cover toward the right direction as shown by the small Arrow Mark and detach it toward the large Arrow Mark .

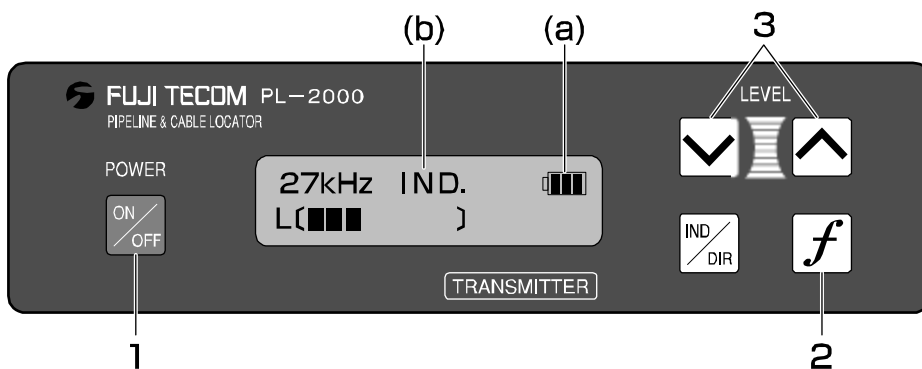
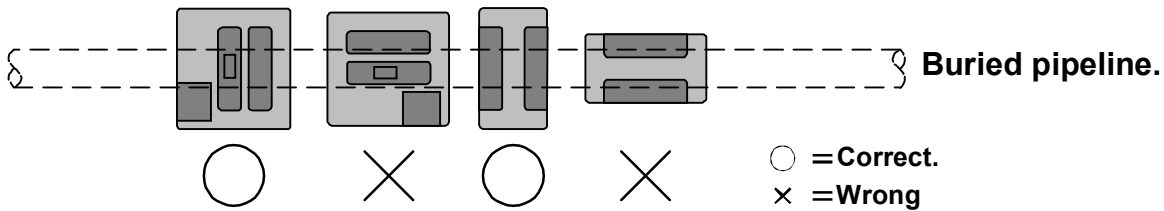
Pull out the Battery Case and replace all batteries.

NOTE : Confirm the polarity of battery when the batteries are mounted in the Battery Case.

NOTE : When the Battery Mark was reduced to Zero, the Receiver becomes the condition of Power OFF automatically.

# HOW TO OPERATE THE TRANSMITTER

- In the induction mode, place the transmitter in the correct position as shown below.



1. Push the Power Switch Key and confirm the following points.
  - ① Check the residual battery power by the indication of (a).
  - ② Confirm the operation mode of IND (Induction Mode) (b).

NOTE : When switching ON again soon after switching OFF, wait for ten seconds before turning ON so as to stabilize the P.C.B.

2. Choose the frequency of 27kHz or 8kHz.  
8kHz is useful to locate the straight and long pipeline.  
27kHz is useful to locate the pipeline in a shorter distance on a normal site.

NOTE : Use properly those two frequencies in accordance with the condition of site.

When the Power Switch is turned on, the frequency of 27kHz is set up automatically.

The frequency of 0.5kHz can be used with the Direct Mode.

3. Adjust the output level.  
When the Power Switch is turned on, the output level is set at maximum.  
The " L " in the LCD shows the output level by 8 steps.



# HOW TO OPERATE THE RECEIVER

## 1. Push the Power Switch Key.

## 2. Choose one of the following modes.

**Maximum Mode :** It is useful to locate the position of pipeline correctly.

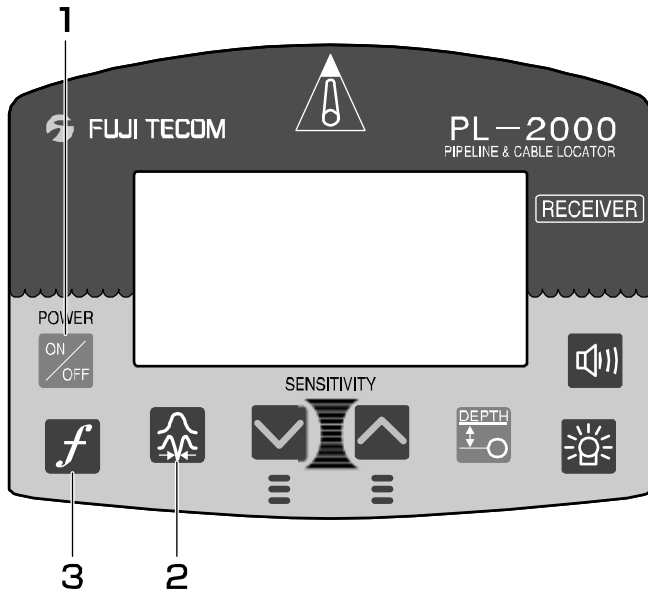
**Minimum Mode :** It is used to go faster by locating the pipeline roughly.

**Bar Mode :** It is utilized to locate the pipeline over a longer distance.

**Sonde Mode :** By use of the Sonde (Probe), the non-metallic pipeline such as the Plastic Pipeline can be located.

## 3. Choose one frequency.

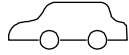

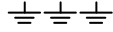
**NOTE :** The same frequency as the one from the Transmitter is required to be used. The different frequency from the Transmitter does not work with the Receiver.



# MESSAGE DISPLAYED ON THE LCD

PL-2000 Transmitter and Receiver display the following message on the LCD.

## 1. Transmitter displays as:-

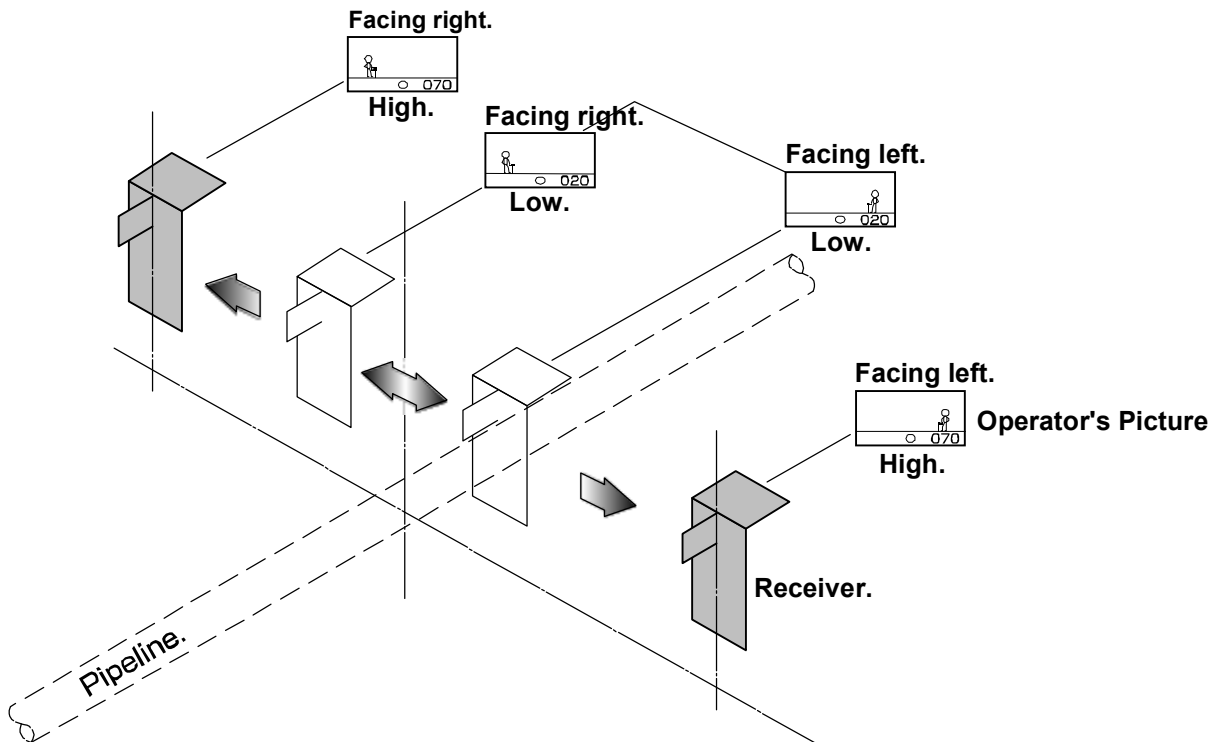
- **CHANGE BATT.** : indicates the time of changing Batteries.
- **OVER CURRENT** : indicates the over-current.  
The automatic adjustment begins to work. When it does not work effectively, turn off the Power Switch.
- **IND.** : Induction Mode.
- **DIR.** : Direct Mode.
-  : indicates the use of Car battery power.
- **POOR**  : indicates the weak output power by the Direct Mode.
-  : indicates the good output power. Three marks are the maximum output power.
- **CONTINUOUS** : indicates the cancellation of " Automatic OFF " function.
- **POWER OFF** : indicates " Power OFF " after the non-operation for one hour or the Power Switch is turned off.

## 2. Receiver displays as:-

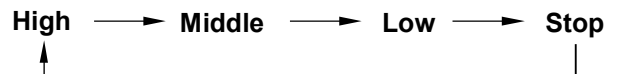
- **OVER SIGNAL** : indicates the gain of signal too much.
- **ERROR DEP** : indicate the depth of pipeline is not measured.
- **FUNCTION NOT AVAILABLE** : indicates the depth measurement was done by the modes which can not measure the depth.
- **NO SIGNAL** : indicates the signal is too weak from the Transmitter.
- **GAIN ERROR** : indicates the unstable condition of the gained signal.
- **PROCESSING** : indicates the time when the automatic adjustment and the depth measurement are under the processing as yet.
- **POWER OFF** : indicates the Power Switch is turned off after the non-operation for five minutes.
- **CHANGE BATT.** : indicates to change the Battery.
- **PRESS ANY KEY** : indicates to change the message display into the operation display with switch key.

# OPERATION ON SITE (1)

## 1. Minimum Mode.



- Hold the Receiver on the place presumed to be upon the buried pipeline. In that case, the Receiver is required to face the same direction as the pipeline.
- Adjust the sensitivity with the Sensitivity Adjustment Keys so that the Sensitivity Level becomes SENS.30 or so.
- Adjust the sound level with the Sound Volume Control Key to the level enough to be listened on site. The sound volume is changed as follows.

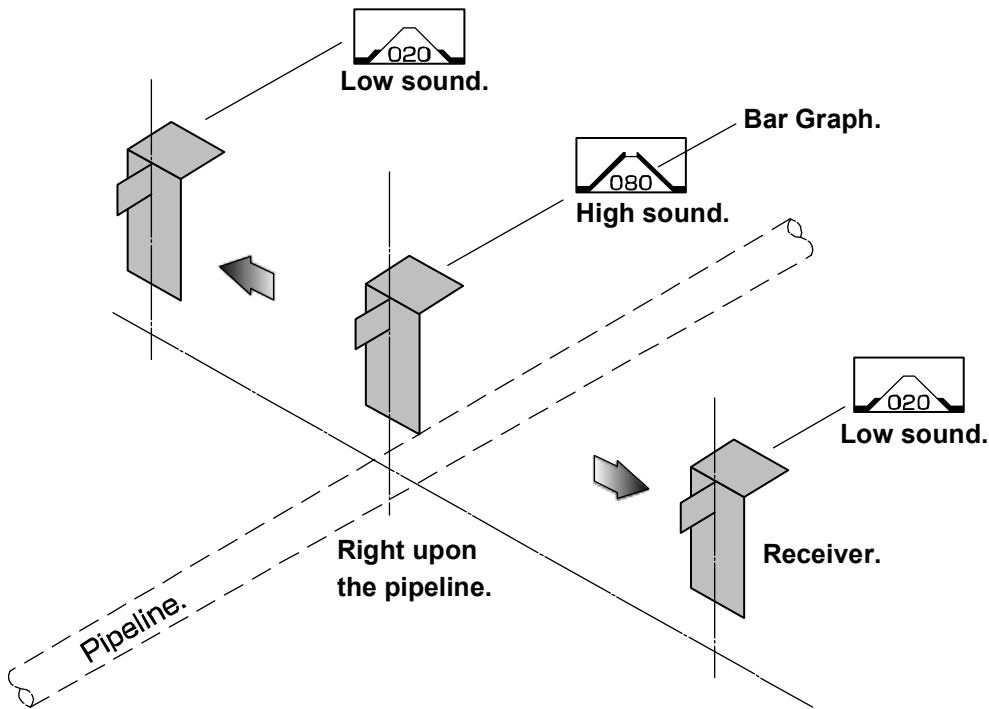


As shown by the above figure, when the Receiver is moved from right to left and left to right upon the buried pipeline, the Sound Level becomes the minimum right upon the pipeline and the Operator's Picture in the LCD indicates the location of pipeline by facing to right or left as shown by the above figures.

When the Operator's Picture is changed unstably, a few pipelines are considered to be buried closely. In that case, the mode should be changed to the Maximum Mode.

NOTE : Minimum Mode can not measure the depth of pipeline.  
Change it to the Maximum Mode.

## 2. Maximum Mode.



The Maximum Mode indicates the location of pipeline by the Bar Graph and the Numerical Value as shown by the above figures.

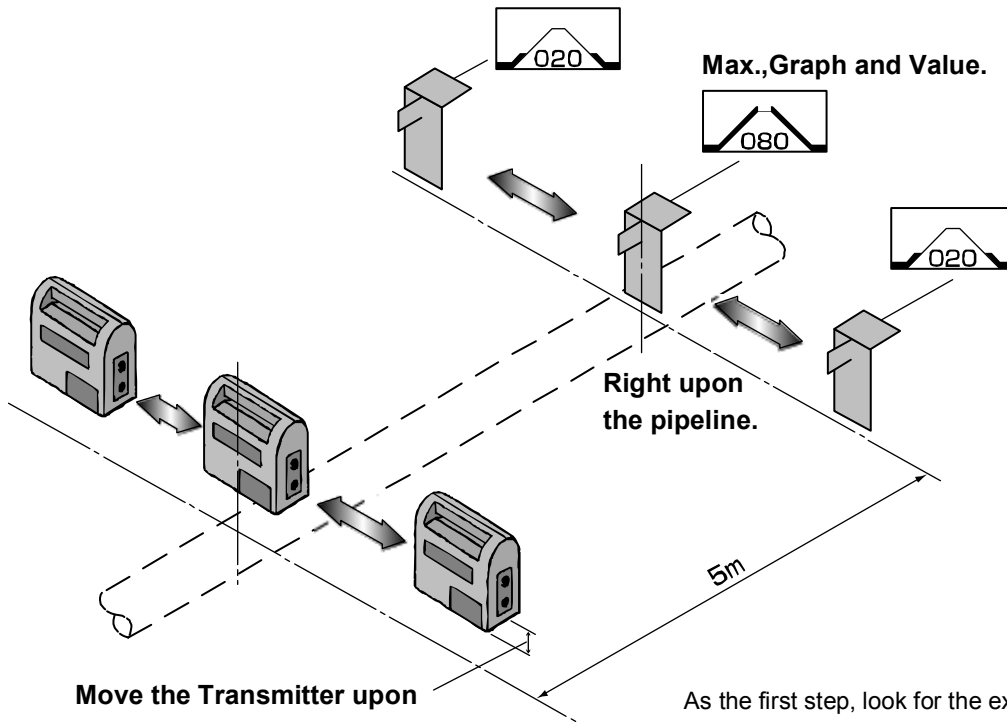
- a) The Bar Graph displayed in the LCD shows the location of pipeline by the maximum Bar Graph as the above figure.

The Numerical Value is in the range from 000 to 100. The Value of 100 is too strong reaction on site. The Value more or less 80 is good enough to know the correct location of pipeline.

- b) When the Bar Graph moves widely, a few pipelines are considered to be buried closely and in parallel. For further details, refer to the explanation of " How to locate the parallel pipeline ".

## 3. Induction Mode.

### ■ Induction Mode.



**Move the Transmitter upon the ground surface by keeping the space of 10 cm or so.**

**Max., Graph and Value.**

**Right upon the pipeline.**

5m

As the first step, look for the exact location of the buried pipeline so as to place the Transmitter right upon the buried pipeline.

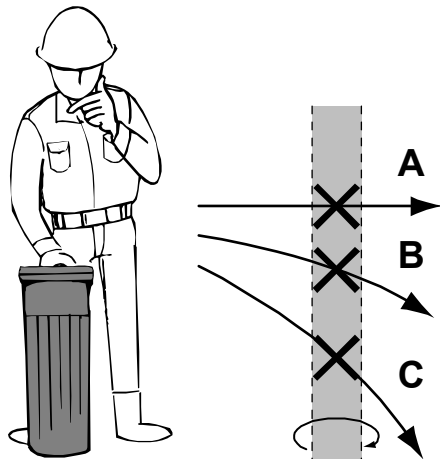
1. Check the residual battery power of Transmitter and Receiver.
2. Confirm if the Transmitter is set up at the IND = Induction Mode.
3. Choose the frequency of Transmitter and Receiver. The frequency of 27kHz is useful to confirm the location of pipeline.
4. Set up the Detection Mode at the Maximum Mode.
5. Adjust the Output Power to the level between 2 and 5 with the Output Power Control Key ④ **Page 5**. The Power Level should be chosen in accordance with the condition of site.
6. Move the Transmitter and the Receiver simultaneously as shown by the above figure.

When the Transmitter and the Receiver have come right upon the buried pipeline, the Receiver will display the maximum Bar Graph and the maximum Numerical Value such as 80. Set up the Transmitter on the ground at the time when the Receiver displayed the maximum Bar Graph and the maximum Numerical Value.

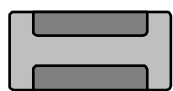
The distance between the Transmitter and the Receiver is required to be kept more than 5 meters.

## ■ Operation by one operator.

In case that the PL-2000 Locator is used by one operator, the Transmitter can be set up by the following way.



**Look for Maximum points as x x x.**



**Move the Transmitter right upon the pipe.**

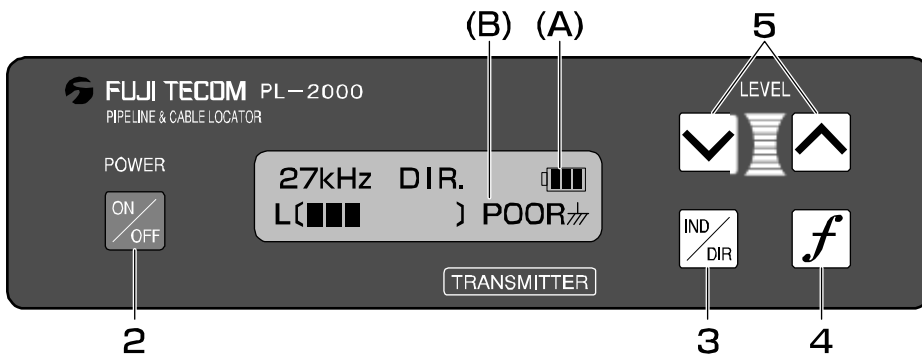
1. Check the residual battery power of Transmitter.
2. Confirm that Transmitter is set up at the IND = Induction Mode.
3. Choose the frequency of Transmitter.  
27KHz is useful to confirm the location of pipeline.
4. Adjust the output power to the level between 2 and 5 with the Output Power Control Key ④ **Page 5**.  
The Power Level should be chosen in accordance with the condition of site.
5. Place the Transmitter on the ground where the pipeline is presumed to be buried.
6. Turn on the Power Switch of Receiver and choose the same frequency as the Transmitter.
7. Take the interval of 5 meters or more between the Transmitter and the Receiver.  
In that case, the Transmitter is required to be faced toward the Receiver as shown by the left figure.
8. Locate the point where the Receiver displays the maximum Bar Graph and Numerical Value as shown by the left figures **(A) (B) (C)**. Those points are the places right upon the buried pipeline.  
The Transmitter is required to be placed on one of the points, **(A) (B) (C)**.

NOTE : The Transmitter is required to face the direction of pipeline in keeping the right angle.

# OPERATION ON SITE (5)

## 4. Direct Mode.

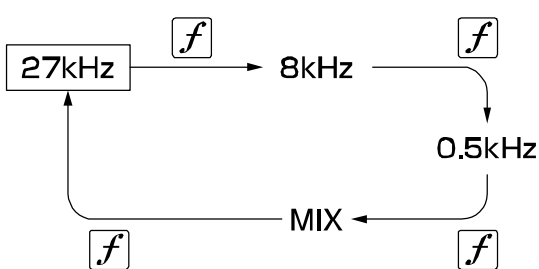
1. The Red cable is connected with the exposed part of pipeline.  
The Black cable is connected with the Grounding stake.



2. Turn on the Power Switch (2). When the Power Confirm the residual battery power (A).

3. Set up the output mode at DIR = Direct Mode.

NOTE : The sound " Tick " by operating the Mode Selecting Key (3) and the Frequency Selecting Key (4) indicate the change of Mode and Frequency.



**27kHz is chosen automatically when the Power Switch is turned on.**

4. Choose the frequency  $f$  (4) from 27kHz, 8kHz, 0.5kHz and MIX.
  - 8kHz is useful to locate the straight pipeline over a longer distance.
  - 27kHz is useful to locate the pipeline in a shorter distance on a normal site.
  - 0.5kHz is useful to locate the straight pipeline over an extremely long distance.
  - MIX is the simultaneous output mode of 27kHz, 8kHz and 0.5kHz.

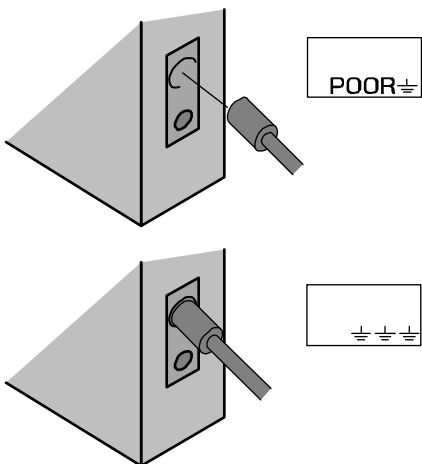
In order to save battery power, set to one of the 3 frequencies after the choice of the best frequency for the site.

5. Set up the Output Level with the Key (5) shown by the above figure.

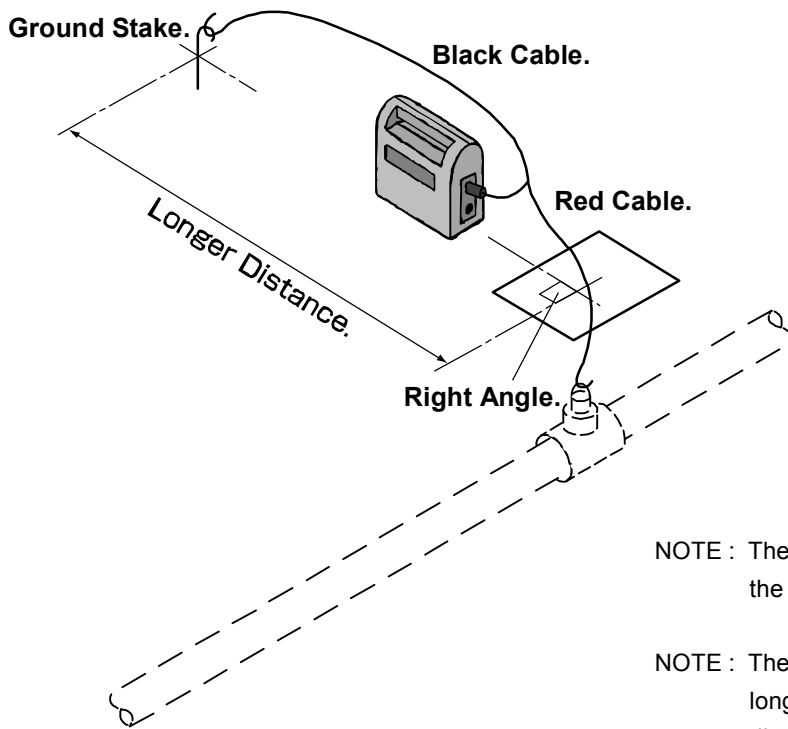
6. Confirm the Output Level by connecting the Direct Mode Cable to the Transmitter in the following way.

- When the Direct Mode Cable is disconnected, the mark POOR ≡ is displayed in the LCD (B).
- When the Direct Mode Cable is connected well, the mark "≡ ~ ≡ ≡ ≡" is displayed in the LCD (B).

NOTE : When the mark POOR ≡ is displayed, the Ground Stake is sometimes in a wrong condition. Check it.



## ■ How to set up the Transmitter.



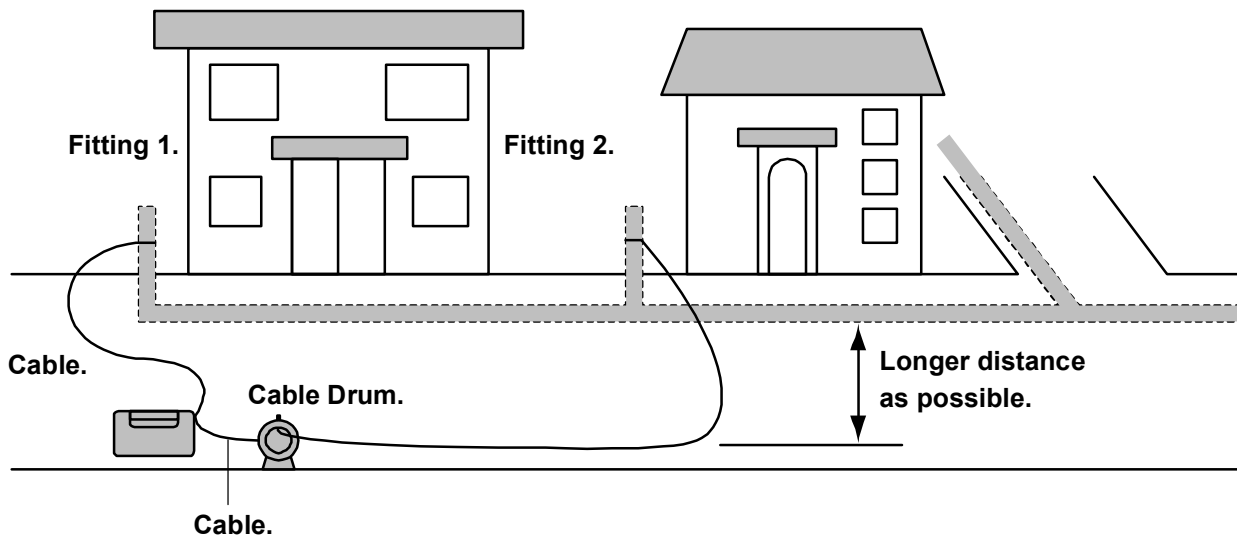
NOTE : The grounding point is required to face the direction of the pipeline by keeping the right angle.

NOTE : The Ground Stake should be set up with keeping as long distance as possible from the pipeline for a long distance locating.



## 5. Loop Mode.

### ■ How to set up the Transmitter.



NOTE : The Loop Mode needs the optional Cable Drum with 50 meter cable as shown by the above figure.

In the site where there are the parallel pipelines or telephone cables, the Loop Mode is useful to locate only one pipeline which is required to be located. In that case, the optional Cable Drum is required.

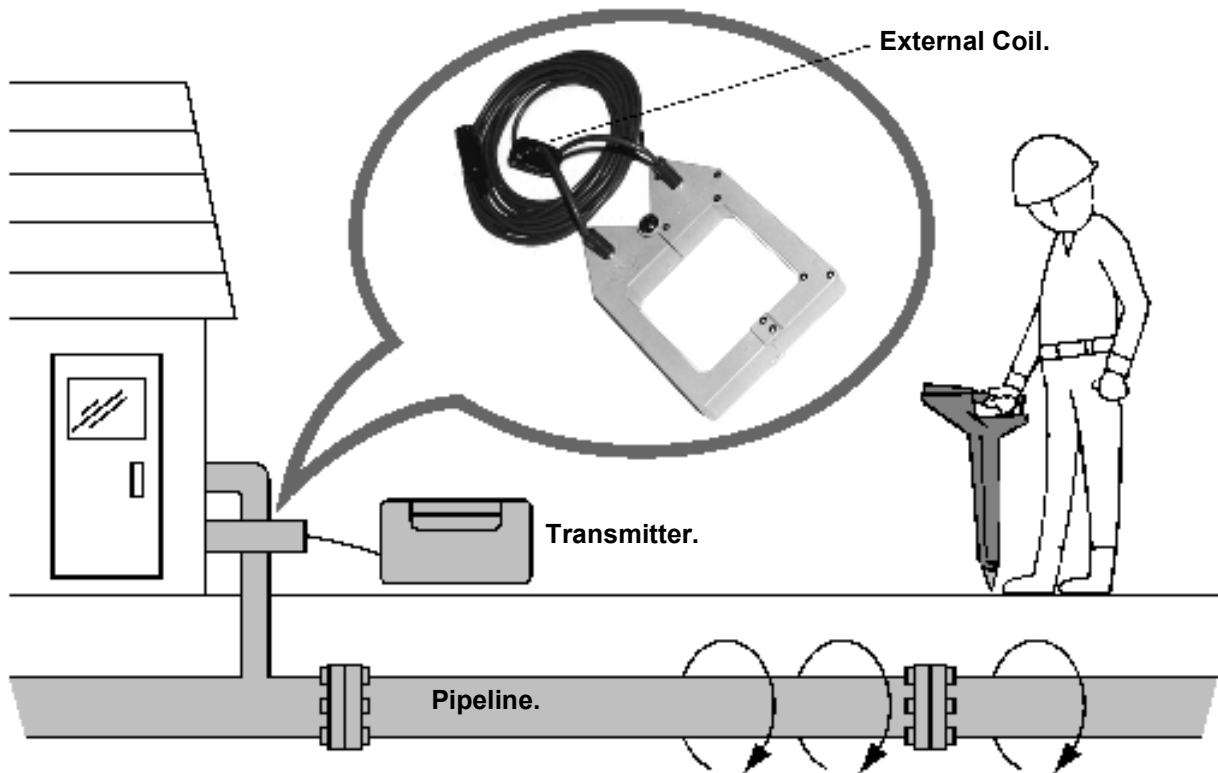
1. Look for the two Pipe Fittings as shown by the above figure and connect the Transmitter by use of the Direct Mode Cable and the Cable Drum with 50 meter cable.
2. Locate the buried pipeline with the Receiver between the two Fittings (1) and (2).

NOTE : The Pipelines out of the Fittings can not be located by use of the Loop Mode.

NOTE : The Transmitter should be set up by keeping a longer distance to the pipeline which is required to be located.

## 6. External Coil Mode.

### ■ How to set up the Transmitter.



NOTE : The External Coil Mode needs the optional External Coil as shown by the above figure.

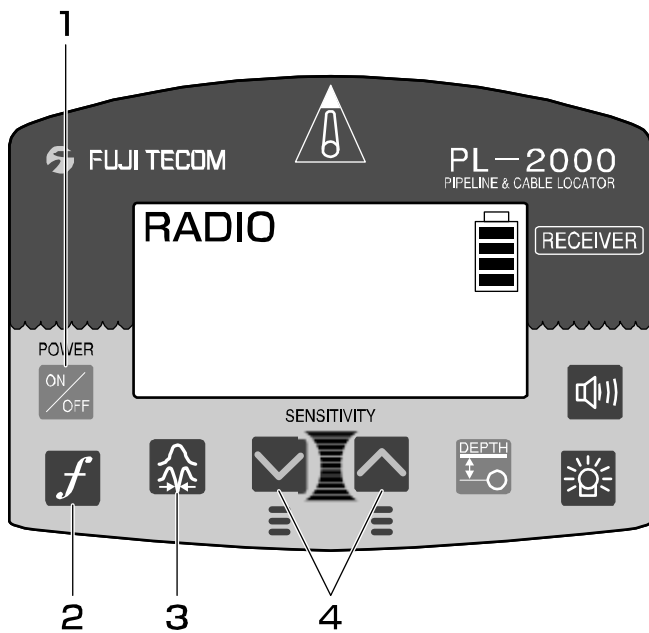
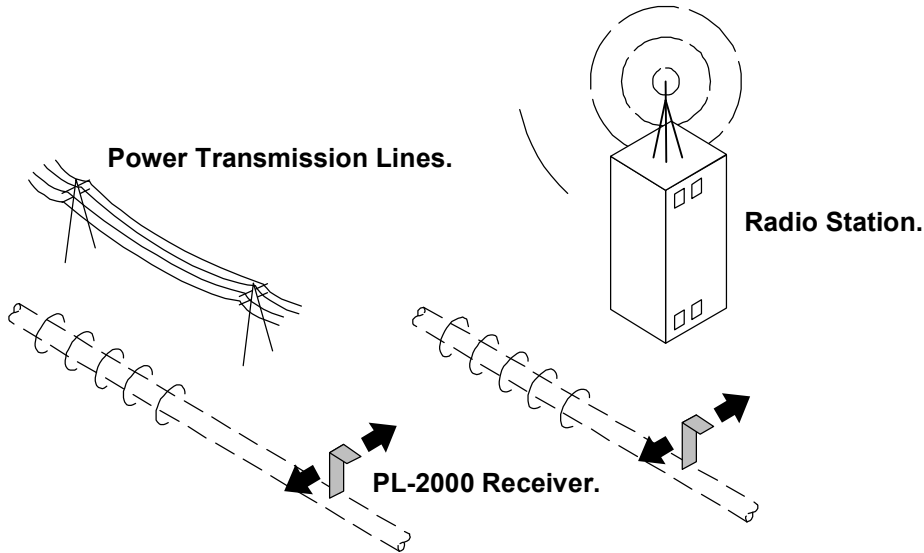
1. The External Coil Mode is useful to locate a short Branch Pipeline, Power Cable and Telephone Cable.
2. Clamp the External Coil on the pipeline or cable as shown by the above figure.

NOTE : When the External Coil is clamped on the power cable, wear the Rubber Gloves to avoid the electric shock.

3. The Transmitter is operated in the same way as the case of Direct Mode. 27kHz is used for the External Coil Mode.

## 7. Radio Mode.

The Radio Mode does not need the Transmitter. The electric wave of the power transmission line or the radio station often induces the magnetic field on the buried pipeline. PL-2000 Receiver can locate the pipeline by use of the magnetic field induced on the pipeline.

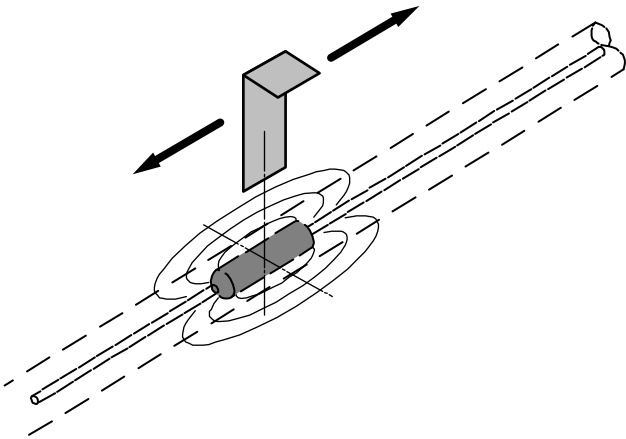


1. Push the Power Switch Key and confirm the battery power by the indicator in the LCD.
2. Push the Frequency Selection Key and choose the Radio Mode displayed in the LCD.
3. Set up the Maximum Mode with the Mode Selection Key.
4. Adjust the sensitivity with the Sensitivity Adjustment Key.

NOTE : The depth of pipeline can not be measured by the Radio Mode.

## 8. Sonde Mode.

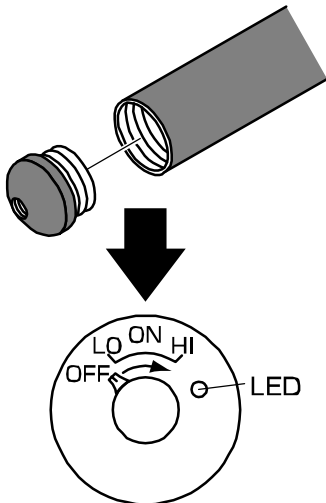
When the non-metallic pipeline such as the plastic pipeline and the asbestos cement pipeline is required to be located, the Sonde is pulled into the pipeline by use of a wire as shown by the following figure.



1. Push the Power Switch Key (1) and check the battery power displayed, in the LCD.
2. Choose the Sonde Mode with the Mode Selection Key (3).

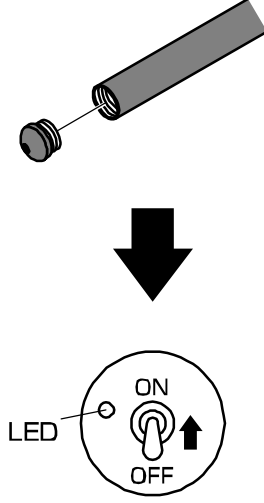
NOTE : The Receiver is required to be faced in parallel to the pipeline as shown by the above figure.  
The Receiver is moved to the directions of Arrow mark in accordance with the movement of Sonde.

### Large Sonde.



**Detectable Depth**  
: 3.5 meters by LO (Low).  
5 meters by HI (High).

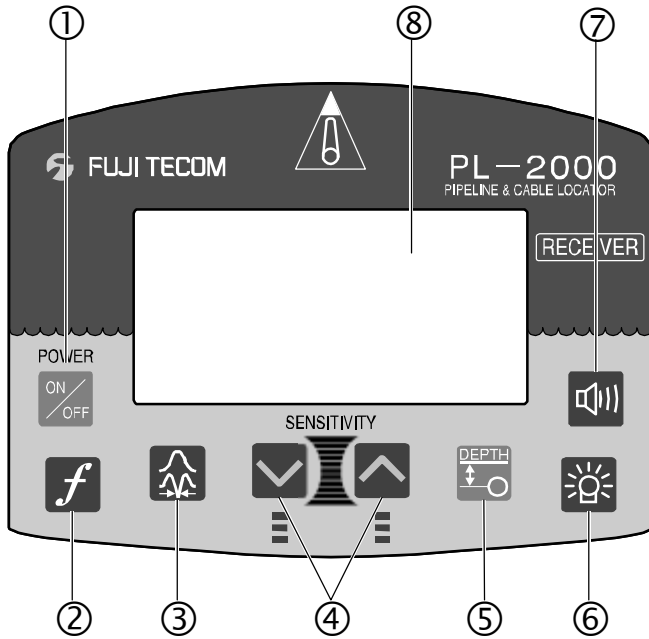
### Small Sonde.



**Detectable Depth**  
: 3.5 meters.

NOTE : The Transmitter is not used in the Sonde Mode.

NOTE : The LED turns on and off while the batteries still have the power to operate the Sonde.



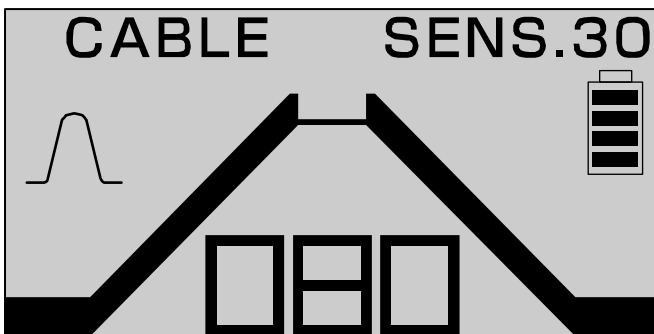
## 9. Live Cable Mode.

The live cable mode does not require the use of the transmitter. Detection in this mode requires only the receiver operated in the following manner.

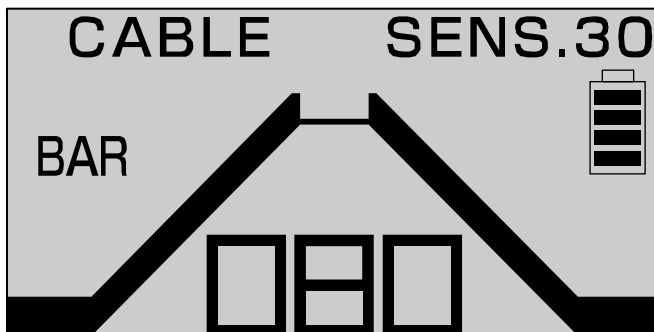
1. Push the Power Switch Key ① and confirm that the residual battery power is enough to operate the receiver.
2. Push the Frequency Selection Key ② and choose the Live Cable Mode displayed in the LCD.
3. Choose the Maximum Mode or Bar Mode with the Mode Selection Key ③.

NOTE : In the case of the Bar Mode, the sensitivity improves compared with the Maximum Mode, but peak indication becomes gradual.

Display of Maximum Mode



Display of Bar Mode



# OPERATION ON SITE (11)

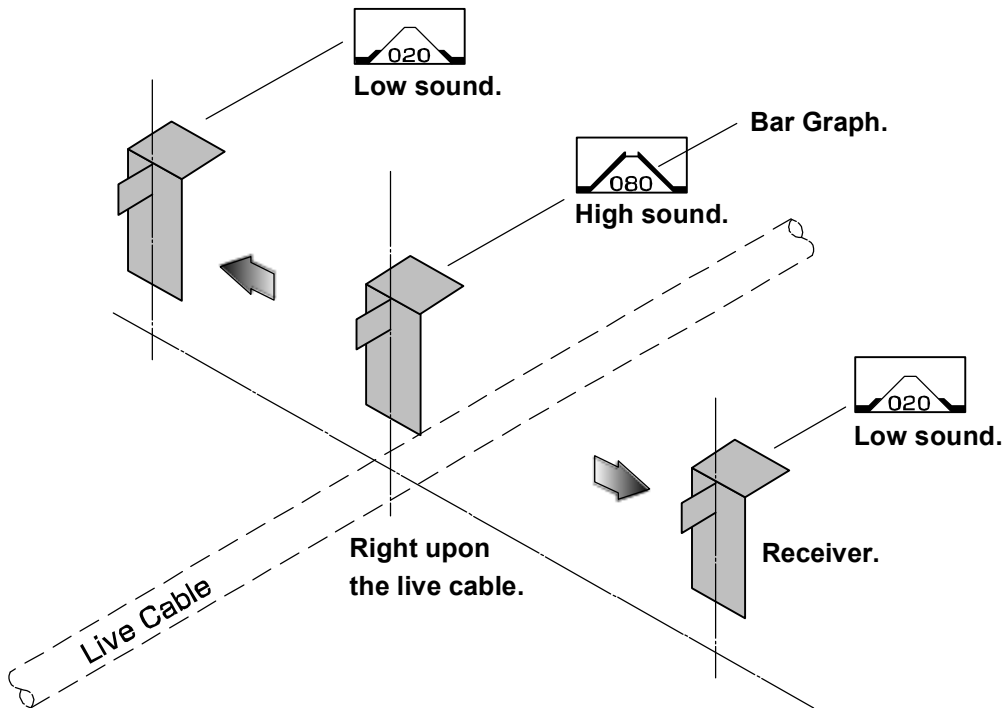
4. Locate the live cable with the method shown in the following figure.

The bar Graph in the LCD shows the location of live cable by the maximum Bar Graph as shown in the figure.

The Numerical Value is in the range from 000 to 100. The Value of 100 is too strong reaction on site. The Value more or less 80 is good enough to know the correct location of live cable.

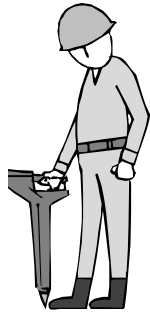
NOTE : The PL-2000 will not detect a DC power cable in the Live Cable Mode. Also, if there is no current flowing in the line for a 50/60 Hz AC power cable, the PL-2000 will not detect the line. Sometimes twisted pair power cables cannot be detected due to the cancellation effect of the separate fields of the cable.

NOTE : Never touch a power cable with a conductive material, either directly or indirectly.

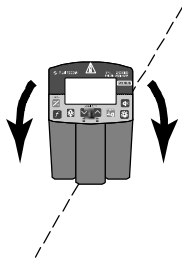


# OPERATION ON SITE (12)

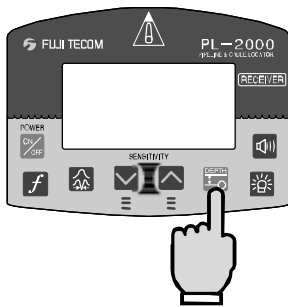
## ■ How to measure the depth.



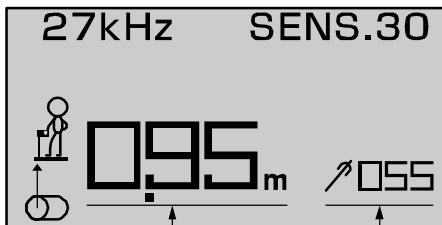
(A)



(B)



(C)



Depth.

Current Measure.  
(000 - 100)

(D)

1. Set up the Transmitter as explained at the OPERATION ON SITE (3) and operate it in the same way as the Induction Mode.
2. Choose the Maximum Mode with the mode selection key of receiver (The Sonde Mode does not need the Transmitter).
3. As shown by the figure (A), hold the Receiver on the ground and turn the Receiver as shown by the Arrow marks in the figure (B) so as to obtain the maximum Bar Graph in the LCD.
4. Push the Depth measurement key ① shown in the figure (C). The depth is displayed in the LCD as shown by the figure (D).

NOTE : Do not move the receiver until the depth is displayed.

The figure (D) displays : -

- 0.95m = The depth of pipeline.
- 27kHz = The frequency used for this operation.
- SENS.30 = Sensitivity level between 00 and 40.
- 055 = Current Measure between 000 and 100.

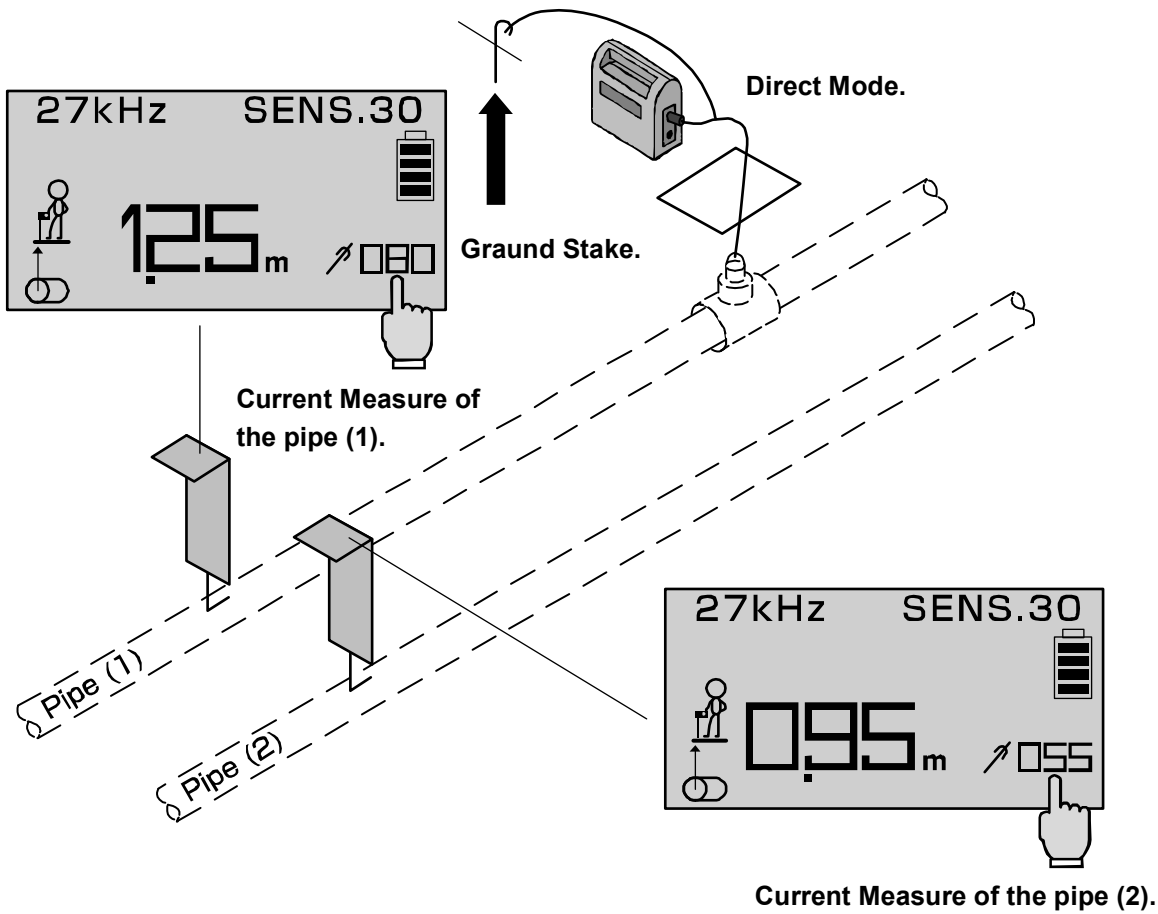
NOTE : (1) The Minimum Mode and the Bar Mode do not measure the depth.

(2) In case the message, TX POWER DOWN, is displayed in the LCD, decrease the output power from the transmitter with the Output Power Control Key.

(3) Keep the span of 30 meters or more between the transmitter and receiver in order to avoid erroneous depth reading when operating the PL-2000 at the maximum output level in the induction mode.

## OPERATION ON SITE (13)

### ■ How to measure the depth of parallel pipes.



When the depth of pipeline is measured, the depth in meter and the value by Current Measure are displayed in the LCD.

When the depth of two pipelines is measured as shown by the above figure, the above example shows the depth of 1.25 meter and the Current Measure of 080 which are displayed in the LCD. The larger value of Current Measure means the correct depth of the pipeline (1).

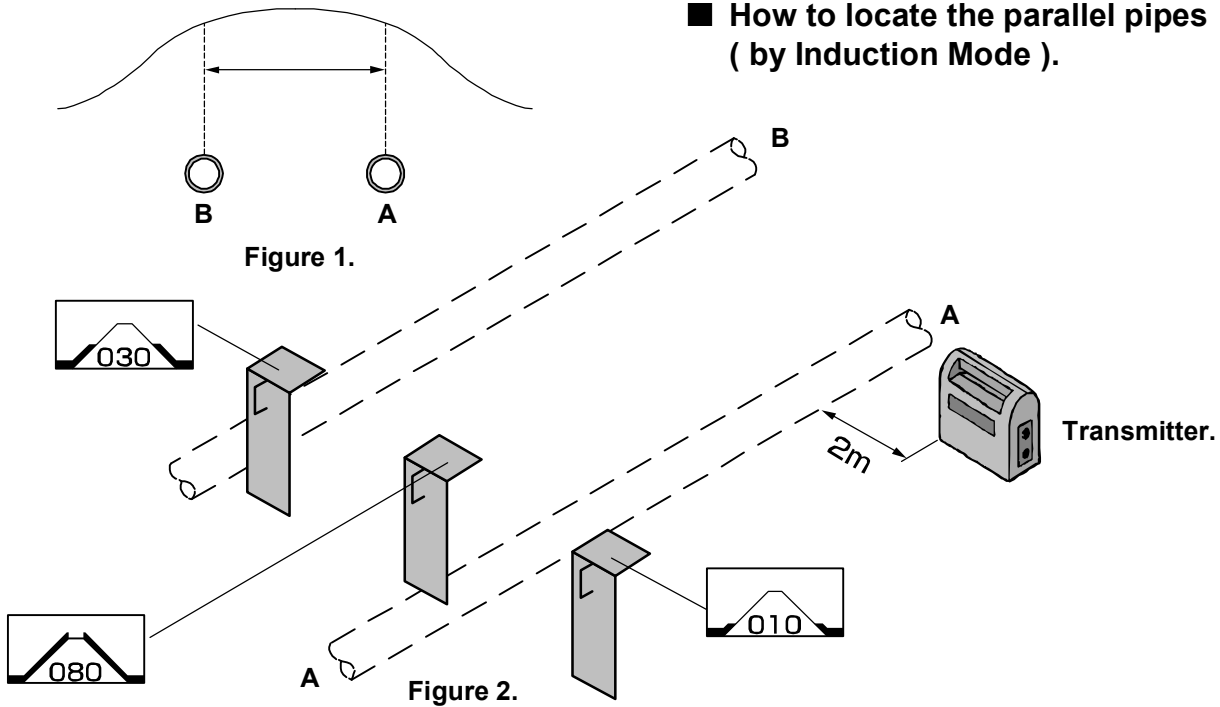
NOTE : In the above example, the location of Transmitter is important. When the depth of pipeline (1) in the parallel pipelines is measured, the Transmitter is required to be set up at the place out of pipelines even if it is the Direct Mode.

NOTE : The Ground Stake is required to be located as far as possible from the pipeline (1) as shown by the above figure.



# APPLICATION (1)

## ■ How to locate the parallel pipes ( by Induction Mode ).



NOTE : When the parallel pipelines are located, the Direct Mode should be utilized as possible.

NOTE : The Minimum Mode is used to locate the parallel pipelines roughly and fast.

## ■ By the Induction Mode.

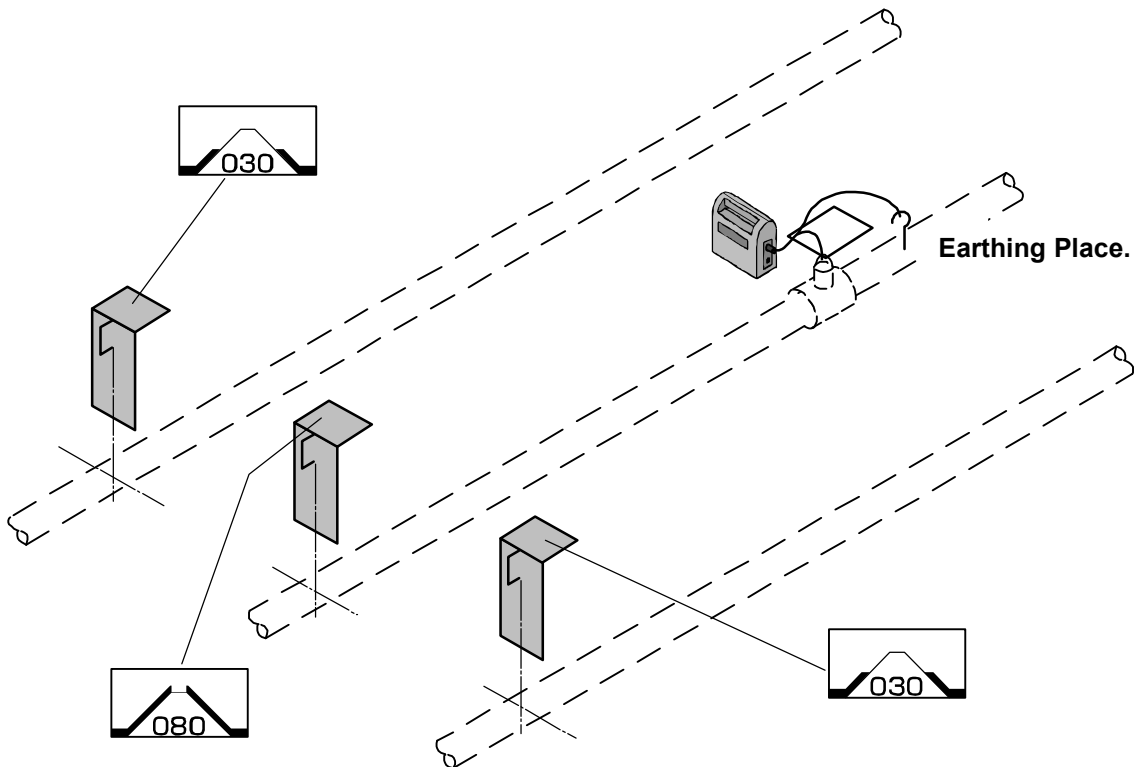
As shown by the above figure 1, the Maximum Bar Graph and the Maximum Numerical Value are continued between the points (A) and (B). In that case, the two pipelines (A) and (B) are required to be located one by one.

1. Set up the Transmitter at the outside of the pipeline (A) by keeping the distance of 2 meters or so to the pipeline (A) as shown by the above figure.
2. Move the Receiver from the outside of the pipeline (A) toward the pipeline (B). The Bar Graph and the Numerical Value will be changed as the above example. The point of the Maximum Bar Graph and the Maximum Numerical Value of 080 is the location of the pipeline (A).
3. When the pipeline (B) is located, move the Transmitter at the outside of the pipeline (B).

NOTE : In case that there are a few parallel pipelines in a shorter interval, The Induction Mode can locate only the two pipelines at both ends of parallel pipelines.

## APPLICATION (2)

### ■ How to locate the parallel pipelines ( by Direct Mode ).

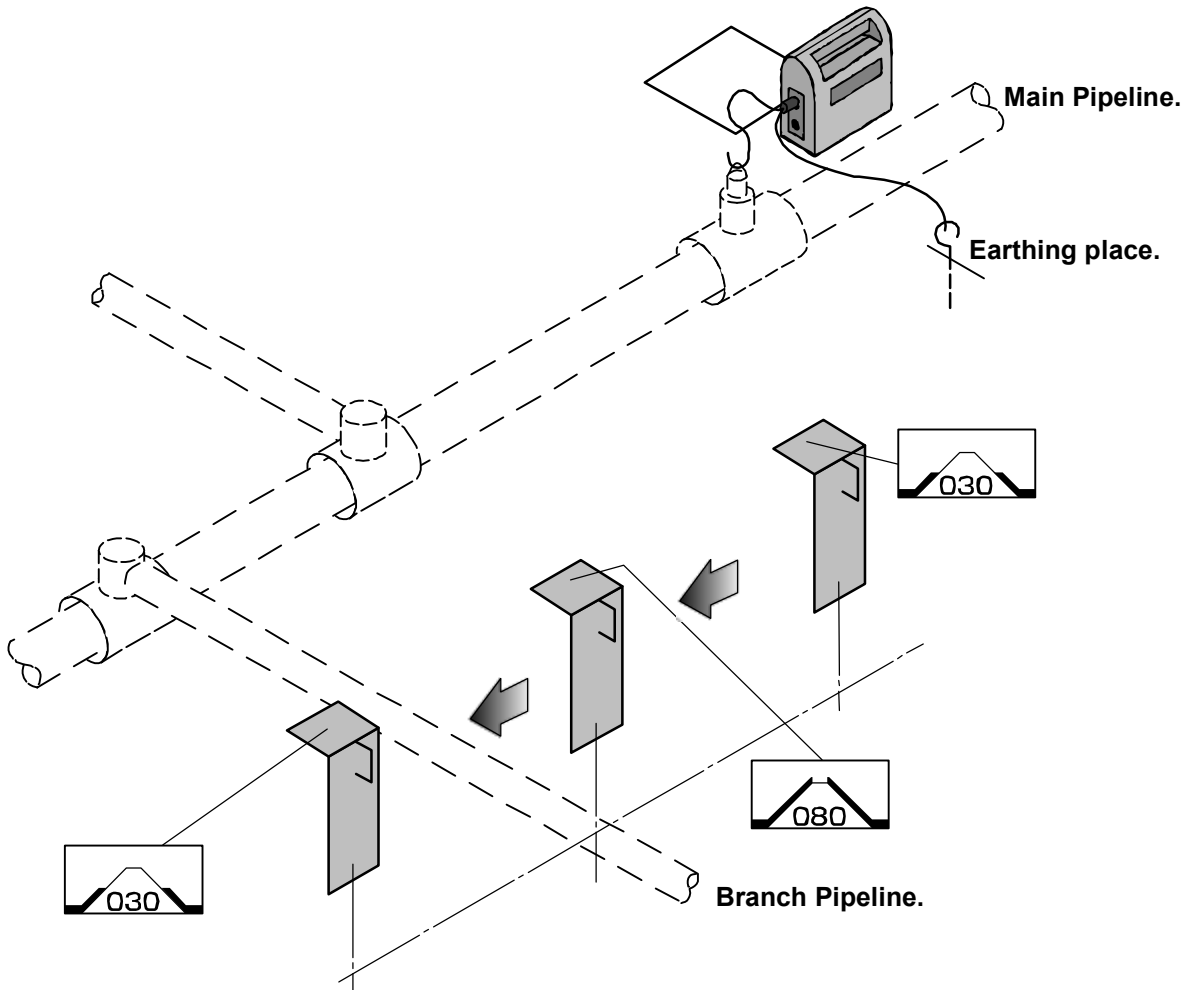


1. Look for the pipe fittings exposed on the ground surface.
2. The earth place should be near the pipeline required to be located.

NOTE : The locating distance of pipeline is not long in this case. Therefore the pipe fittings should be looked for and utilized as many as possible on site.

## APPLICATION (3)

### ■ How to locate the branch pipeline ( by Direct Mode ).



1. Use the Direct Mode.
2. The earth place is required to be located at the same side as the branch pipeline which is located as shown by the above figure.
3. The Receiver is required to face the main pipeline by keeping the interval by 1 meter or so.
4. Move the Receiver to the direction shown by the large Arrow marks as shown by the above figure.
5. When the Receiver has come right upon the buried branch pipeline, the Bar Graph and the Numerical Value become larger as shown by the above figure.

NOTE : In case of locating a branch pipe, use the frequency of 27kHz.

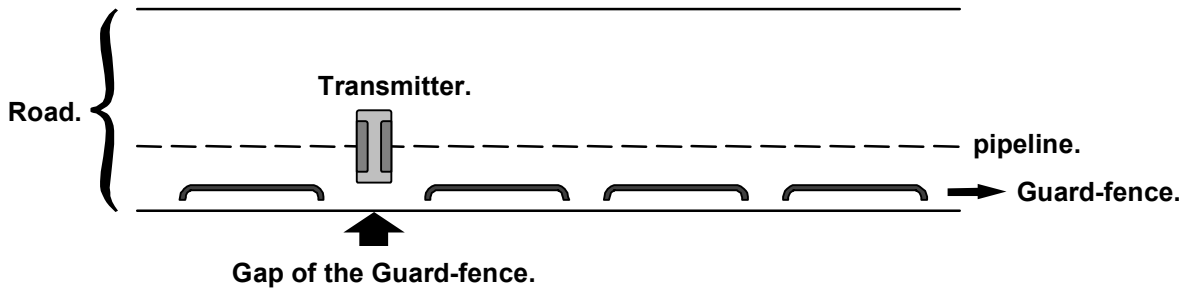
NOTE : The Maximum Mode should be used in this work.



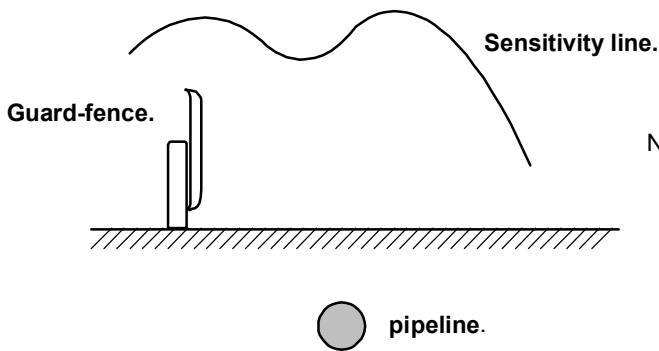
# APPLICATION (5)

## ■ How to locate the pipeline near the metallic guard-fence.

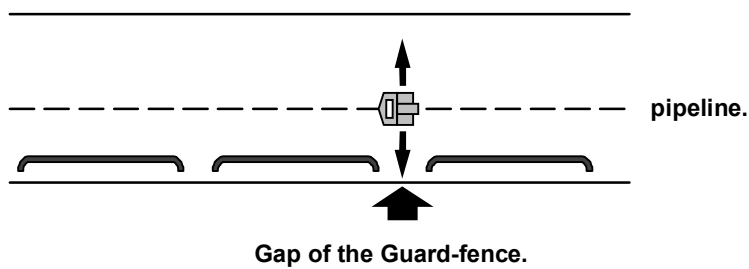
NOTE : The Direct Mode is used so as to minimize the influence of the external magnetic field.  
However in case that the Direct Mode can not be utilized on site, use the Induction Mode in the following way.



NOTE : The Transmitter is required to be placed in the Gap of the Guard-fence as shown by the above figure.



NOTE : The sensitivity to the buried pipeline becomes just like the left figure.



NOTE : So as to obtain the better results, the Receiver is suggested to be operated at the place of larger gap of the Guard-fence.

## **1. Maximum Mode.**

The Maximum Mode is useful so as to obtain a higher accuracy in locating and measuring the depth of buried pipeline. The Differential Antenna Mode is used for this Maximum Mode.

## **2. Minimum Mode.**

The Minimum Mode can locate the buried pipeline quickly but its locating accuracy becomes roughly.

## **3. Bar Mode.**

The Bar Mode can locate the pipeline over a longer distance from the Transmitter. The locating accuracy is reduced in a longer distance due to the reduced input signal.


NOTE : The Bar Mode can not measure the depth of pipeline.

## **4. Selection of Frequency.**

The 27kHz is utilized in the ordinary site.

The 8kHz and 0.5kHz are utilized to locate a long and straight pipeline.

## **5. Depth Measurement.**

When the depth to the buried pipeline is measured, avoid the electric noise caused by Cars. When the Depth Measurement Key  Page 8 is pushed, avoid the time of Car traffic in site.

# TROUBLE SHOOTING (1)

When the PL-2000 Locator has a trouble to locate the buried pipeline, check or confirm the following matters.

## 1. When the power is not turned on.

- a) Check if the batteries have been mounted in the Battery Case.

When the PL-2000 Locator is stored for many days, all batteries are required to be dismounted from the Battery Case.

- b) Check the residual battery power displayed in the LCD.  
When there is no residual power, change all batteries right away.

- c) Check the polarity of battery mounted in the Battery Case.  
The right polarity of battery is shown in the Battery Case.

## 2. When the Receiver does not receive the signal from the Transmitter.

- a) Confirm if the battery is mounted in the Transmitter and if the Power Switch of Transmitter is turned on.

- b) Confirm if the same frequency is used with the Receiver and the Transmitter.

The different frequencies do not work between the Receiver and the Transmitter.

### 3. When the sensitivity of Receiver is weak.

- a) In proportion to the longer distance between the Receiver and the Transmitter, the signal from the Transmitter is weakened. The weak signal influences to measure the depth of pipeline. In that case, move the Transmitter toward the place nearer the Receiver.
- b) Do not set up the Transmitter on the iron plate such as the Manhole Cover. The Transmitter in case of the Induction Mode can not induce the magnetic field in the buried pipeline.
- c) Confirm if the Transmitter is placed on the ground in the right angle to the direction of pipeline. Otherwise the Transmitter can not induce the secondary magnetic field in the buried pipeline.
- d) Confirm if the Ground Stake is placed to work for earth effectively.

### 4. When the pipeline is not located.

- a) Confirm if the insulating material is used as the Joint of pipeline. The insulating Joint does not transmit the magnetic field to the next pipeline.
- b) Confirm the material of pipeline in reference to the Pipeline Map. The Plastic Pipelines are not located with the Metal Pipe Locators.

### 5. When the depth of pipeline can not be measured.

- 1) Confirm the mode of Transmitter. The Minimum Mode, Bar Mode, Radio Mode and Live Cable Mode can not measure the depth of pipeline.



# WARRANTY

Fuji warranty period is one year (12 months) after the day when you have purchased the PL-2000 Metal Pipe and Cable Locator from a Fuji distributor.

The Warranty Card attached to each PL-2000 Locator is needed for having the maintenance service in the future. You are required to keep it so long as you can utilize the PL-2000 in your detection work.

When your PL-2000 Locator is malfunctioned during your ordinary use or handling, you can have it repaired at free of charge within the warranty period.

You are suggested to send the malfunctioned PL-2000 Locator to a Fuji distributor without delay within the warranty period. In that case, you are suggested to mention the defective condition in details in writing preferably for having it repaired within a shorter period and a cheaper charge.

After the warranty period, we or our distributor take the liberty to require the expense incurred to repair your PL-2000 Locator.