Huazheng®

HZ-501A
Cable Fault Location System

Huazheng Electric Manufacturing(Baoding) Co.,Ltd

Contents

I.Power Cable Categories & Analysis of Cable Fault

1.Power Cable Categories

1.1 By rated power.

Low voltage cable : 6KV rated or below

Middle& High power cable:6KV & above,35KV below.

High Voltage Power cable : 66KV & above rated cable.

1.2 By Power cable insulation dielectric materials

Oil immersed paper dielectric： MV or HV Cable

Non drip paper dielectric cable：MV or HV Cable

(XLPE)Dielectric power cable：MV or HV Cable

Other rubber dielectric cable：MV & HV Cable or LV Cable

Oil filled cable：HV Power Cable

1.3 By construction

No external metal shielding layer of the cable：LV Cable

outer metal shielding layer of the cable：HV &HV Cable.

Mental inner sheath cable：HV Cable

2.Power Cable Fault Categories & The Fault Analysis

2.1 Power Cable Fault categories

By the fault part:

Joint fault；host cable fault

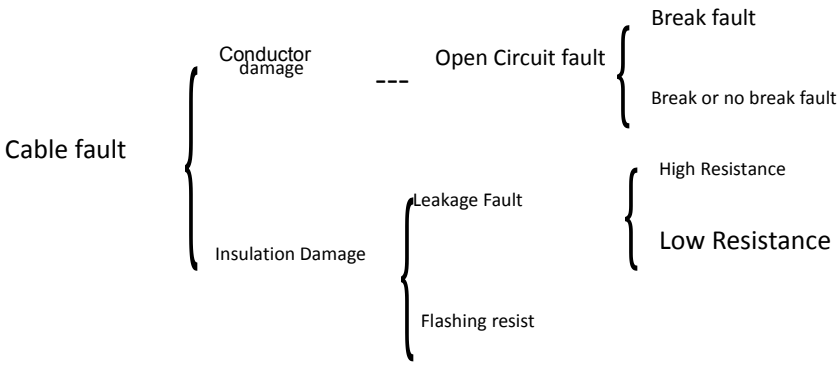
By Performance form：

Closed fault; exposed fault。

By structure：

Main insulation fault；Inner & outer sheath fault.

By The traveling wave measuring principle：



2.2 Analysis of cable fault

The open circuit fault: if the cable insulation is normal, and that the conductor cannot normally convey

Voltage can be considered as the open circuit fault, such as wire or wires seem to break or the non

Breaking and core existing a larger line resistance and core fracture. General simple open circuit fault rarely seen,

Mainly to coexist with low resistance or high fault resistance

Low resistance fault: if the insulation damage of the cable, can directly use the testing method of low voltage pulse of one class phase or phase to earth fault, called the leakage of low resistance fault, Low resistance fault. The general resistance value is less than a hundred ohm. If the resistance value is zero, it is called short circuit fault, which is a special case of low resistance fault

Leakage of high impedance fault: if the cable insulating medium has been damaged and fixed channel resistance, but the fault cannot be directly used cable fault tester by "low pressure pulse measurement method" called leakage of high fault resistance, the resistance is usually in the hundreds of ohms or more. When the DC leakage voltage test is done on the spot, the leakage current value increases continuously with the increase of the DC voltage, and exceeds the standard value of the cable itself. Leakage of high resistance and low resistance fault are relatively described and there is no distinctive difference between them.

The flashover of high resistance fault: The flashover of high resistance fault in cable pre test voltage range, when the cable pre test voltage is applied to a certain value,

the leakage current value of cable suddenly increased, which greatly exceeds the value of the subjects required cable standard value, this type of failure is called flashover of high resistance fault. Although the cable insulation is damaged, it has not formed a fixed resistance channel。

2.3 Discrimination method of fault characteristics of power cable

Three of fault characteristics of power cable:

（1） Judged by MΩmeter ,multi meter. ；

（2） Judged by cable pre-testing result;

（3） Judged by HZ-501A power cable pre-locator

Under normal circumstances, low resistance, open circuit fault can be directly judged by the Ohm meter or HZ-501A Power cable flashover instrument impulse testing wave.

2.4 Power cable fault testing program.

By applying the HZ-501A flashover instrument to locate the cable fault following procedures are generally required:

(1)Analyze the cable fault characteristics and learn about the cable rated voltage and the insulation materials.

（2）Using the HZ-501A Power cable Flashover instrument's impulse method to detect the cable length, and also to calibrate the radio wave speed in the fault cable.

（3）By selecting the suitable testing method, applying the HZ-501A Power cable flashover instrument to pre-locate the cable fault.

（4）to pin point the power cable fault precisely, include the underground cable route, depth and the fault point locating.

（5）Applying the tolerances analysis method to the cable fault testing results(measuring tolerances 、 transferring speed tolerances 、 judgments tolerances 、 instrument tolerances)。

3.The Main Specification Index of System

1) The single chip operational platform, touch-screen operational method:

2）System functions：Fault distance measurement、Fault locating、transmission speed test、fault resistance、Power cable route tracing、buried depth detection etc；

3）Detecting method：Low voltage impulse、Flash over method、Audio frequency method、Acoustic magnetic synchronous method、Valley value method、Peak method、Electromagnetic induction etc；

4）Display control：Flashover instrument：8inchesindustrialgrade LCD ,Battery inside，can workfor6 hours continually； others are Pointer table display；

5）Detection range：testing distance：30km，detection depth：2-5m；

6）Measurement accuracy：Pre-testing tolerances：±10m（absolute value）or 1%（relative value），Precisely detecting tolerances：±0.2m（Locating、route、depth）；

7）sampling frequencies： 80MHz、40MHz、20MHz、10MHz

8）sampling method：automatic continuous sampling， no any discharging wave form can be left out absolutely.

9）low voltage impulse：0.05/0.1/0.2/0.5/1/2/8uS，seven

10）Output power：Route power：100W、Impact power：0～400W

11）Impact high voltage：0～35kV

12）short circuit current：0～320mA

13）Burn through power：0～1225J

II.Able Fault Pre-locator

Measure the power cable of different sections, different media of various materials, Coaxial cable, Street light cables and short circuit, open circuit short line fault of the low resistivity underground wire. Superior cable management system, automatically generate test reports.

1.Parameter Summary

1. 12” industrial-grade computer control, Touch screen LCD display.
2. XP operation system, Super cable management system and automatic generate testing report.
3. With test distance and speed functions.
4. 100MHZ sampling frequency, the minimum resolution is 0.5 m (100 m/us);
5. Automatic continuous sampling, will never miss any discharge waveform;
6. Measuring method: flashover sampling and Low voltage impulse method
7. Pulse margin: 100Vp-p , pulse width:0.1 or 2us
8. Impulse width: 0.1uS and 2uS
9. Measuring distance : Smax: 60km Smin:15km
10. Accuracy:±1%

(**DL/T849.1-2004 provide not exceeding ±(1%L+20)m, “L” is length of cable)**

11. Power supply: built in 12 v / 10 ah dc power supply, can continuous work for 4 hours

2.Panel Display

1.display： Industrial- grade touch screen

2.terminal：Test site safety earthed

3.Q9：Test input waveforms；

4.Indicator light: the light lights when the machine is normal;

5.standard USB：can wire card externally and USB communication；

6.Charging power supply: AC 220V, 50Hz;

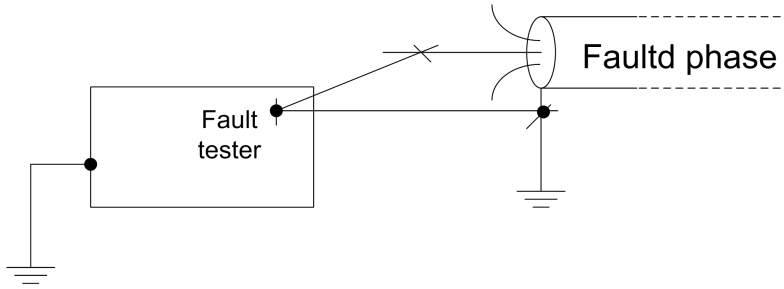
7.Displacement: adjusting knob displacement when collecting waveforms, changing baseline level of the collected waveforms;

8. Amplitude: collecting waveforms by adjusting the amplitude knob to change the size of the amplitude of the collected waveforms;

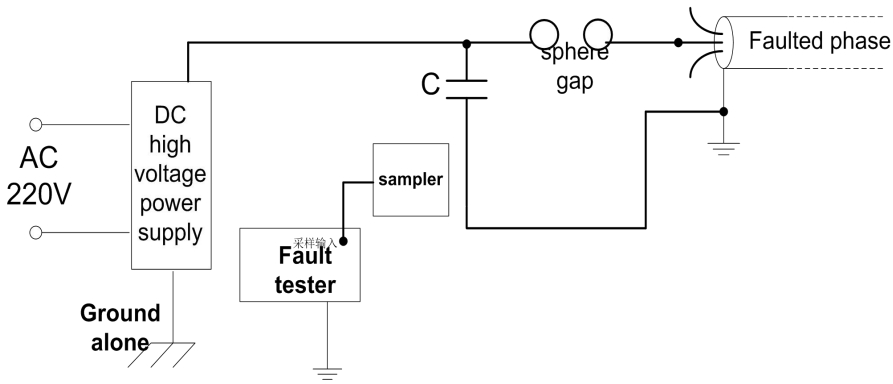
9. Reset: Click to reset the lower machine

10. Power switch: turn on the power supply;

3.On-site Wiring



Low voltage impulse testing



III.Software Specification

1.System Operation Environment

1.1 minimum preparation of system operation

Window system 512 internal storage 10G disk

1.2 support software

1>net framework4.0（dotNetFx40_Client_x86_x64.exe）

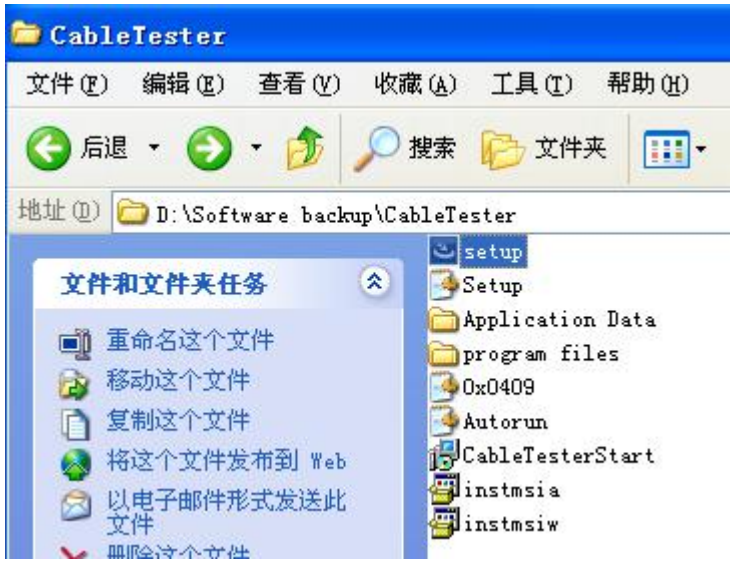
2>office 2003/2007

3>pdf reader

4>QQ communication software

2.Install and Unload of System

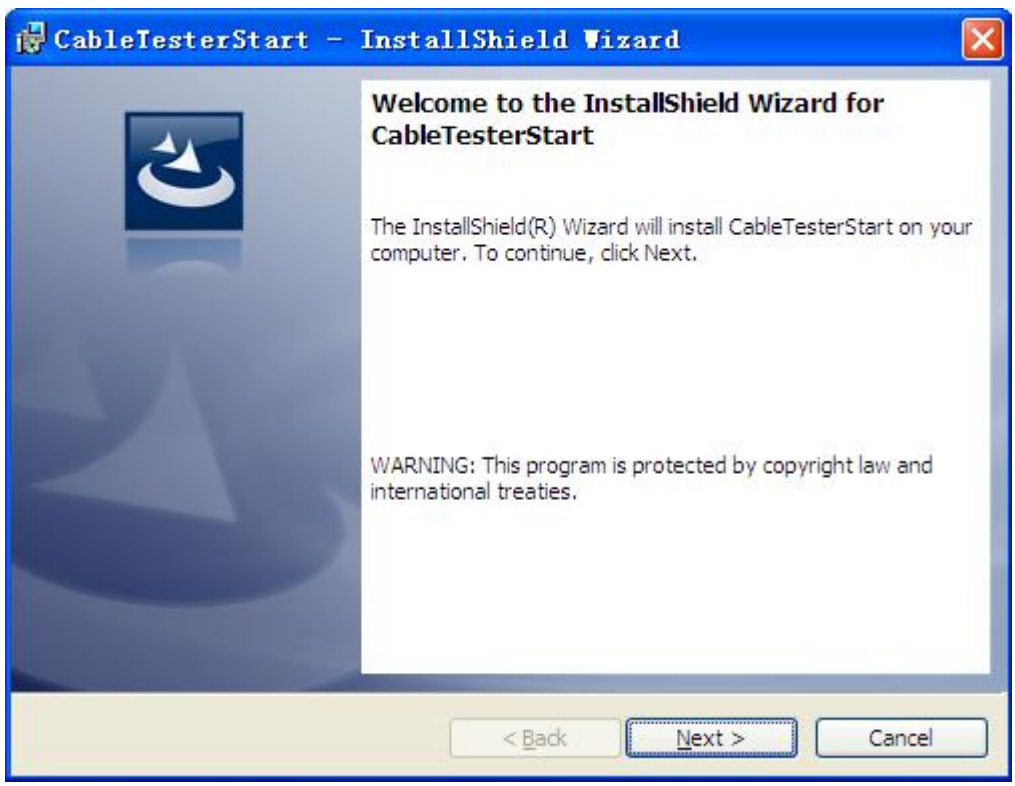
Install document summary of system



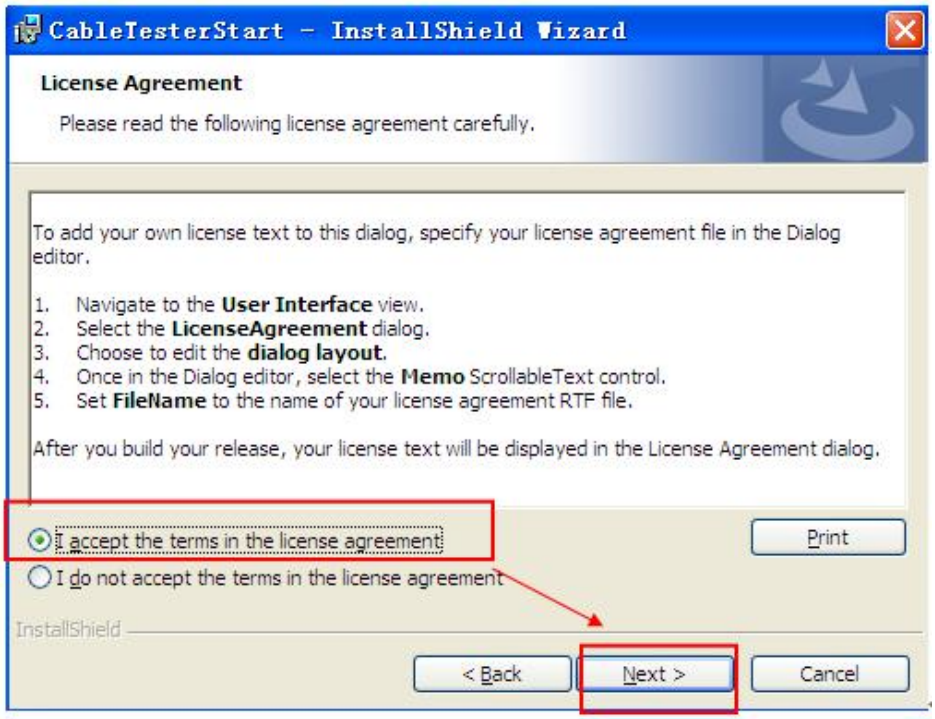
2.1 Start-up install procedure

1> The system will point out mention framework 4.0 (dotNetFax40_Client_x64.exe) If without net framework 4.0,

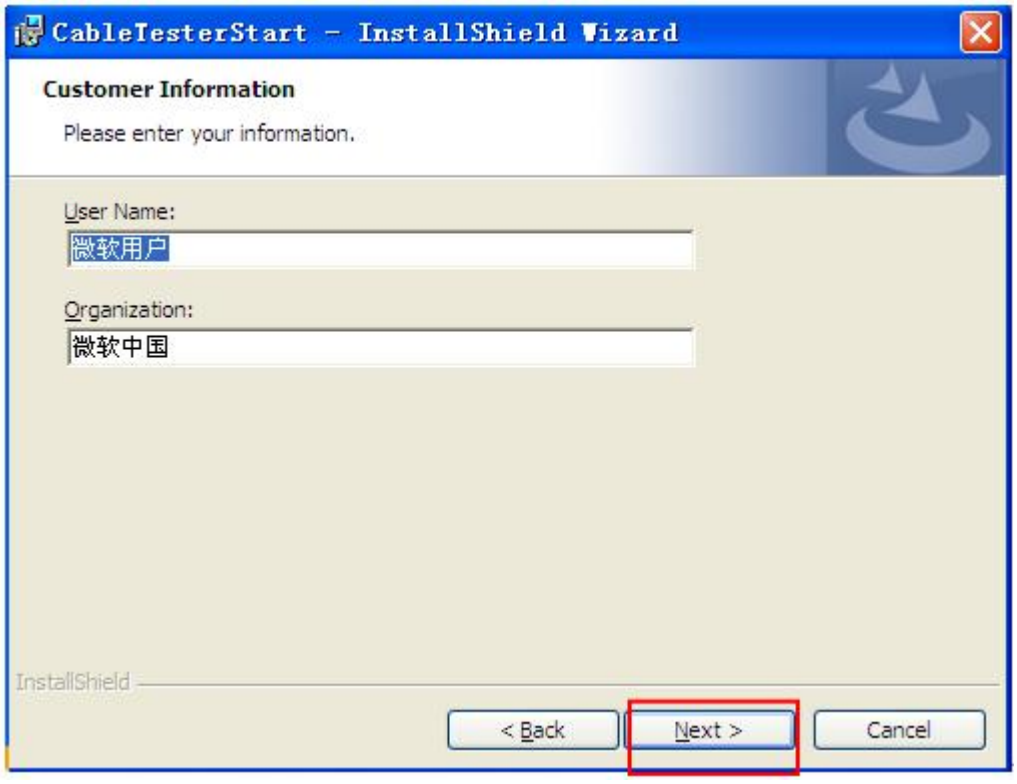
2> Click “setup.exe” start-up installation

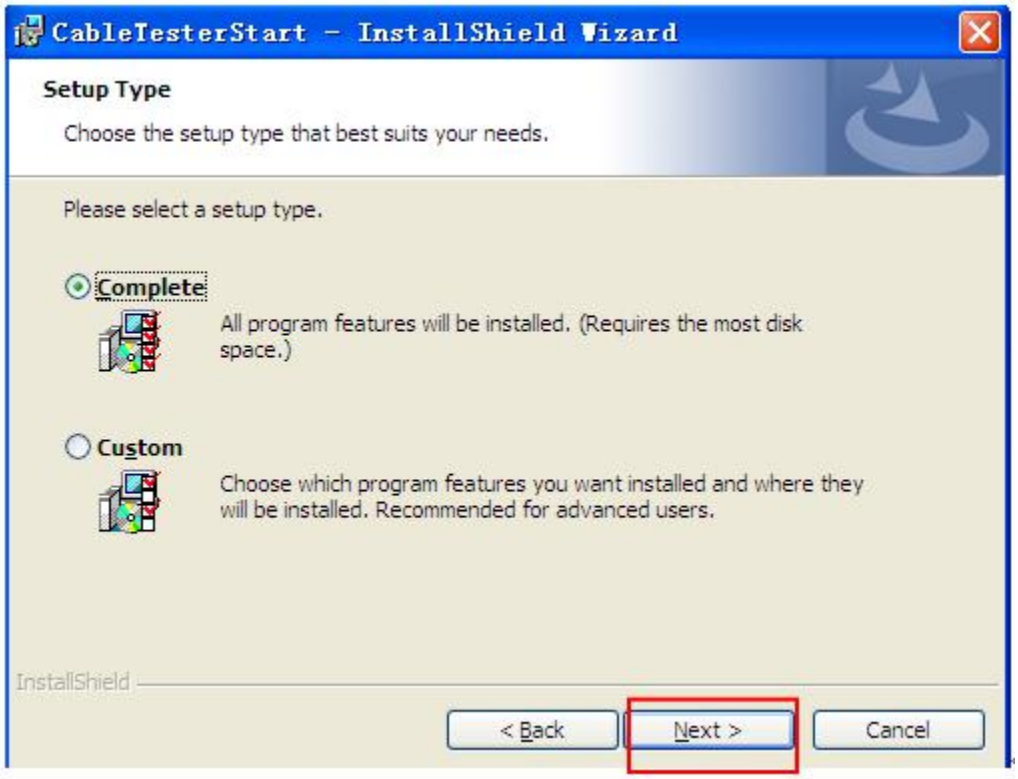


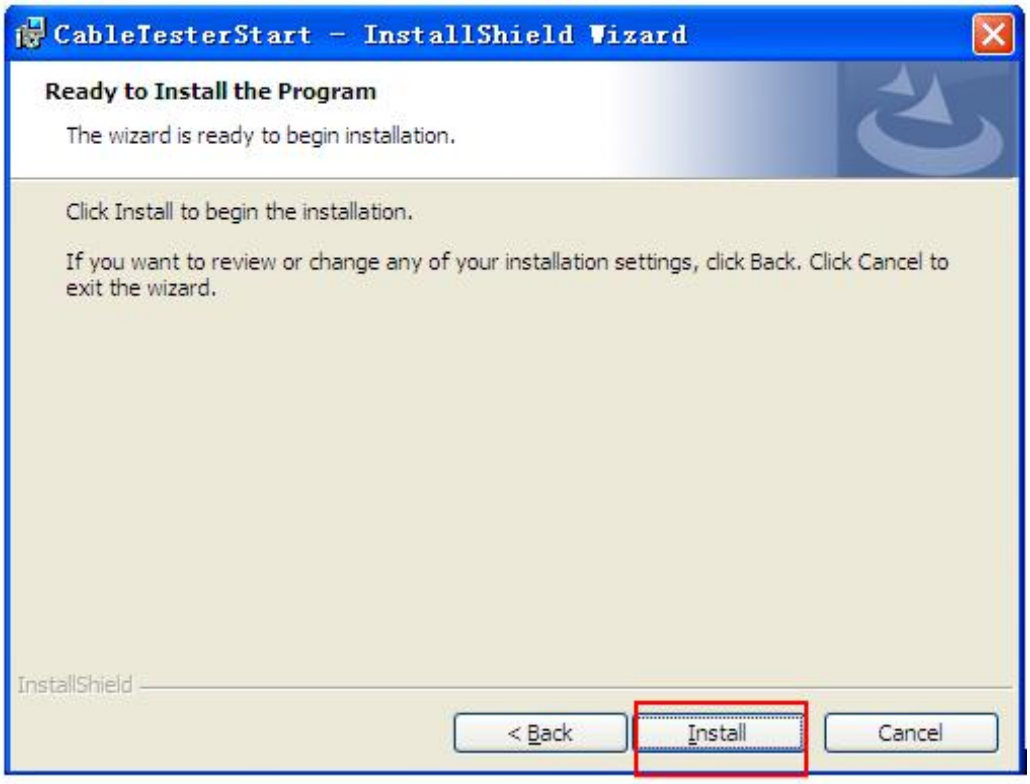
3> Click “next step”, select “accept terms of permit agreement”

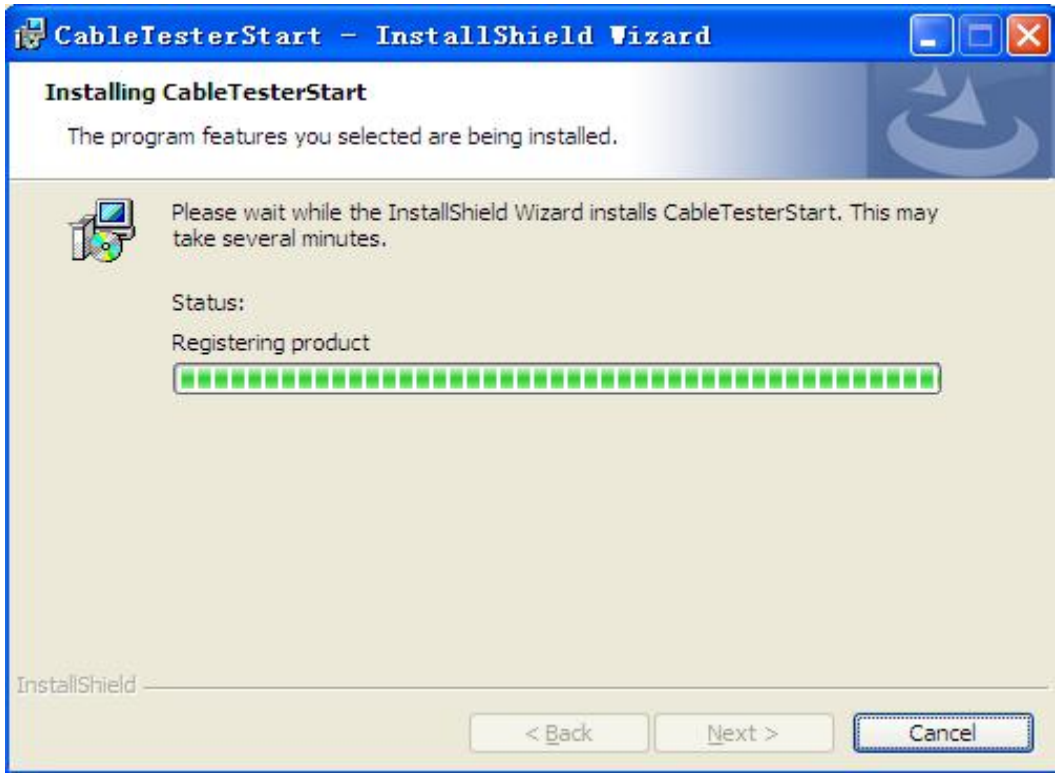


4> Continue “next step”, waiting for installation when displaying “being installed”

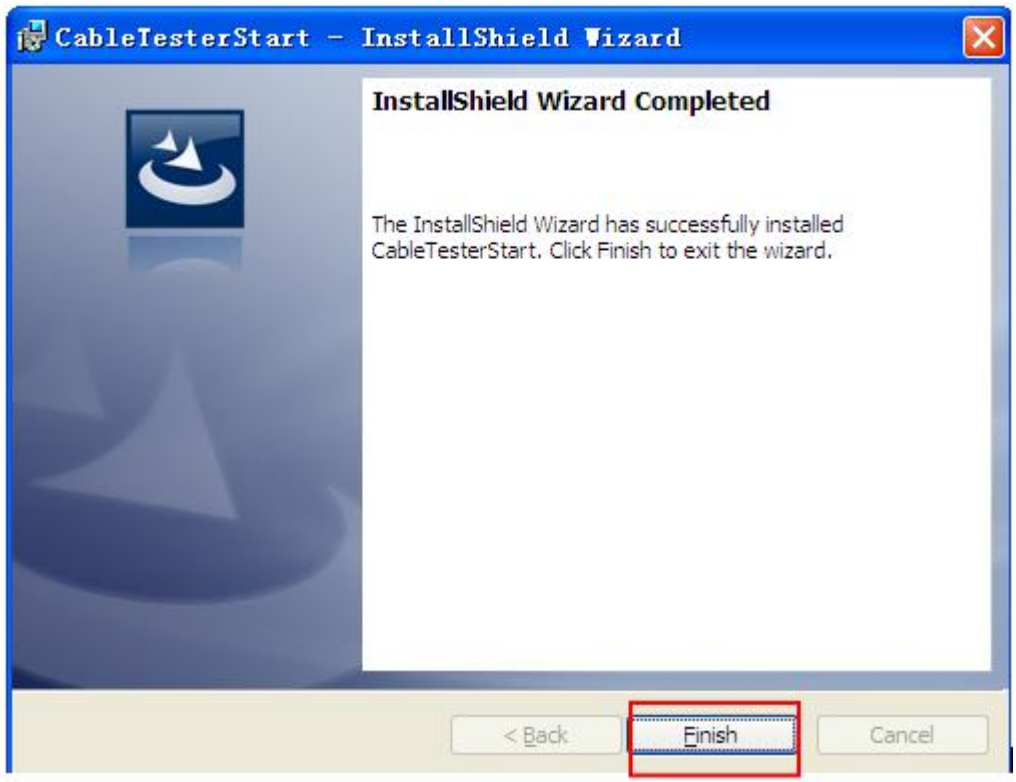



CableTesterStart - InstallShield Wizard
Setup Type
Choose the setup type that best suits your needs.
Please select a setup type.
Complete
All program features will be installed. (Requires the most disk space.)
Custom
Choose which program features you want installed and where they will be installed. Recommended for advanced users.
InstallShield
< Back
Next >
Cancel


CableTesterStart - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel



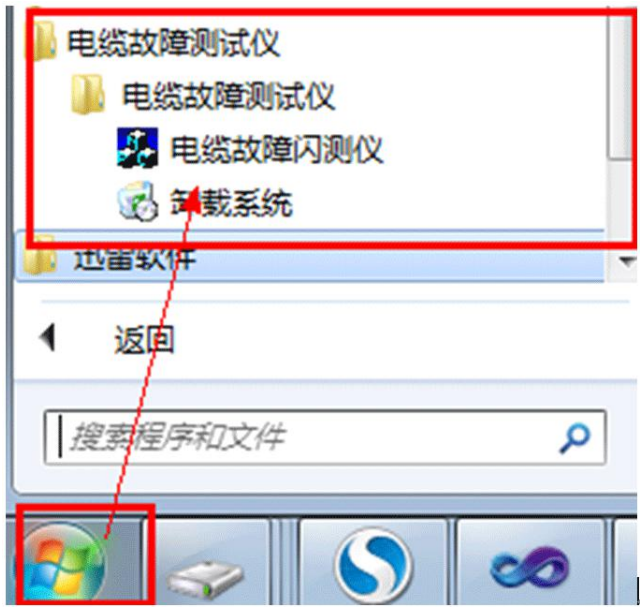
5> System installed successful



6> Now displaying shortcut key of “power cable pre-fault locator” on desktop, as below drawing:

2.2 Unload system

1> Click windows system to start-up, seek out “cable fault pre-locator” in “procedure”, as below drawing:



2> Click “Start-Control panel”, so finish unload.

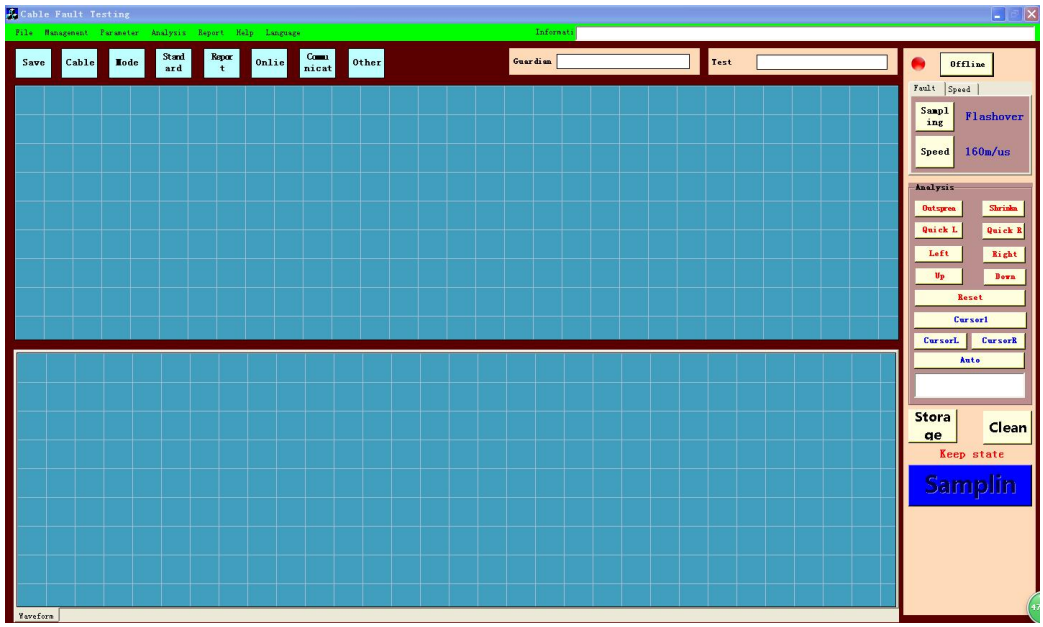

Administrator
Internet
360安全浏览器
电子邮件
Outlook Express
强力卸载电脑上的软件
Windows Media Player
CableTester
腾讯QQ
Adobe Reader X
记事本
所有程序(P)
我的文档
我最近的文档(D)
图片收藏
我的电脑
网上邻居
控制面板(C)
网络连接
打印机和传真
运行(R)...
注销(L)
关闭计算机(U)
开始

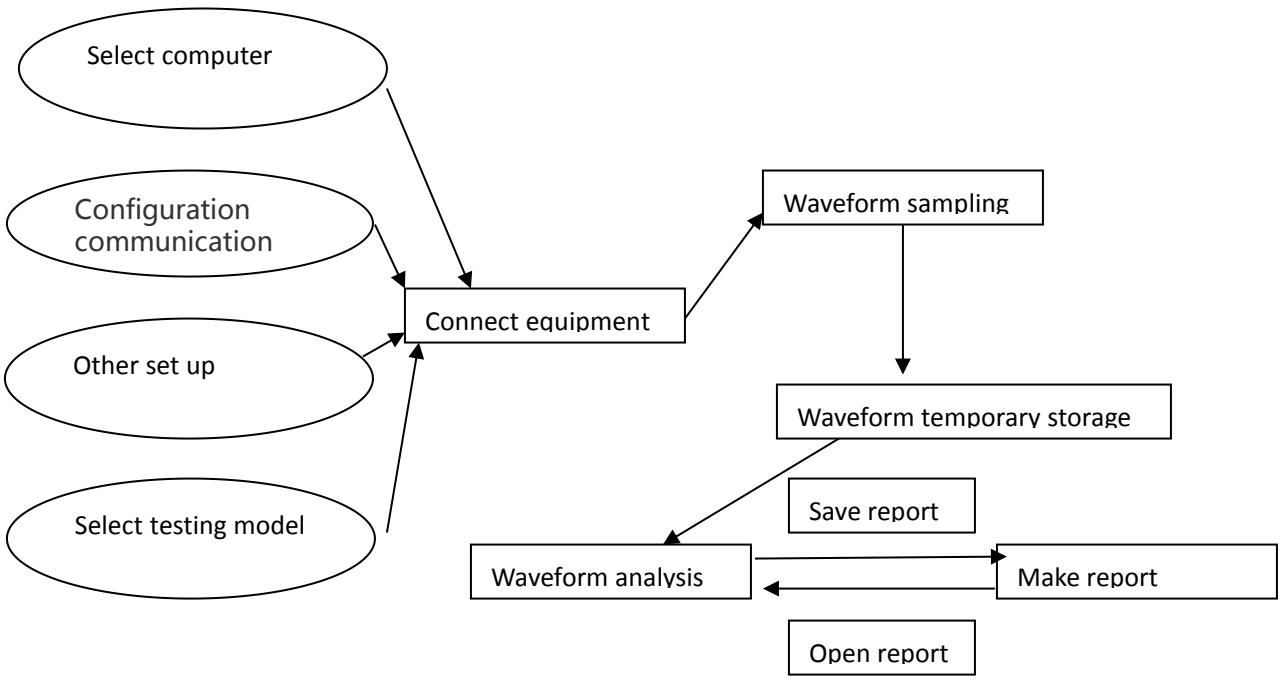

控制面板
文件(F) 编辑(E) 查看(V) 收藏(A) 工具(T) 帮助(H)
后退 搜索 文件夹
地址(D) 控制面板
转到
控制面板
切换到经典视图
请参阅
Windows Update
帮助和支持
其它控制面板选项
选择一个类别
外观和主题
打印机和其它硬件
网络和 Internet 连接
用户帐户
添加/删除程序
日期、时间、语言和区域设置
声音、语音和音频设备
辅助功能选项
性能和维护
安全中心
我的电脑

3.Start-up System

1> Double click shortcut key of “cable fault pre-locator” on desktop, then start-up procedure.

4.Chapter and Program of System





5 Introduction of Function

5.1 File operation

5.1.1 Import file

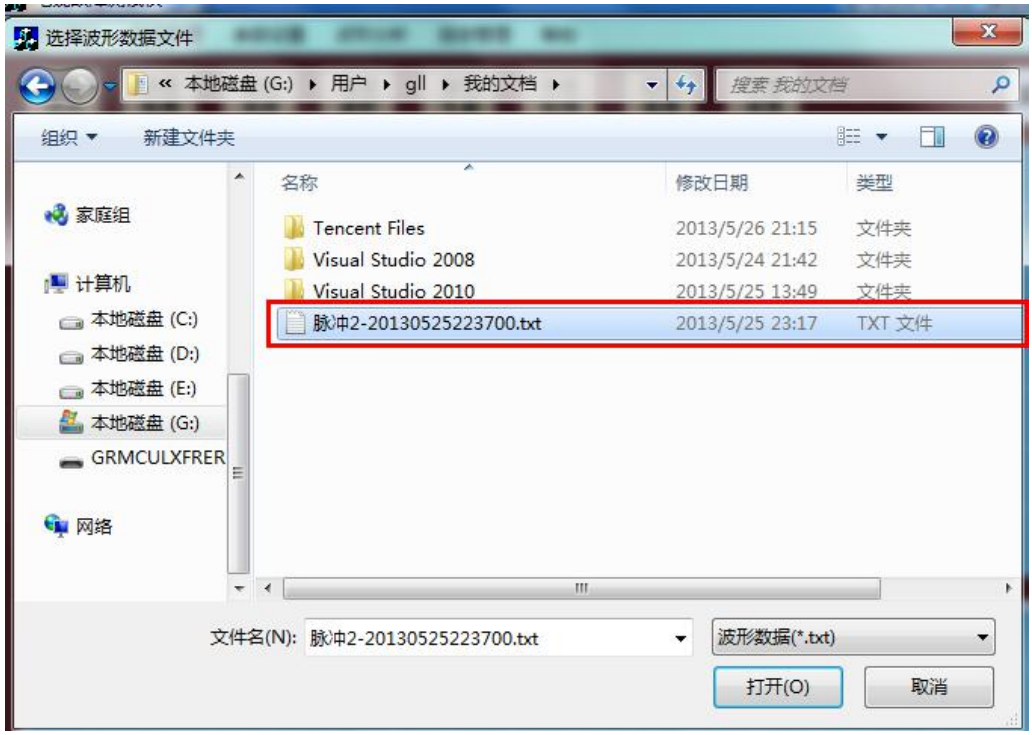
Import file of other data base to being system database, data base file imported must be same as presented data base structure.

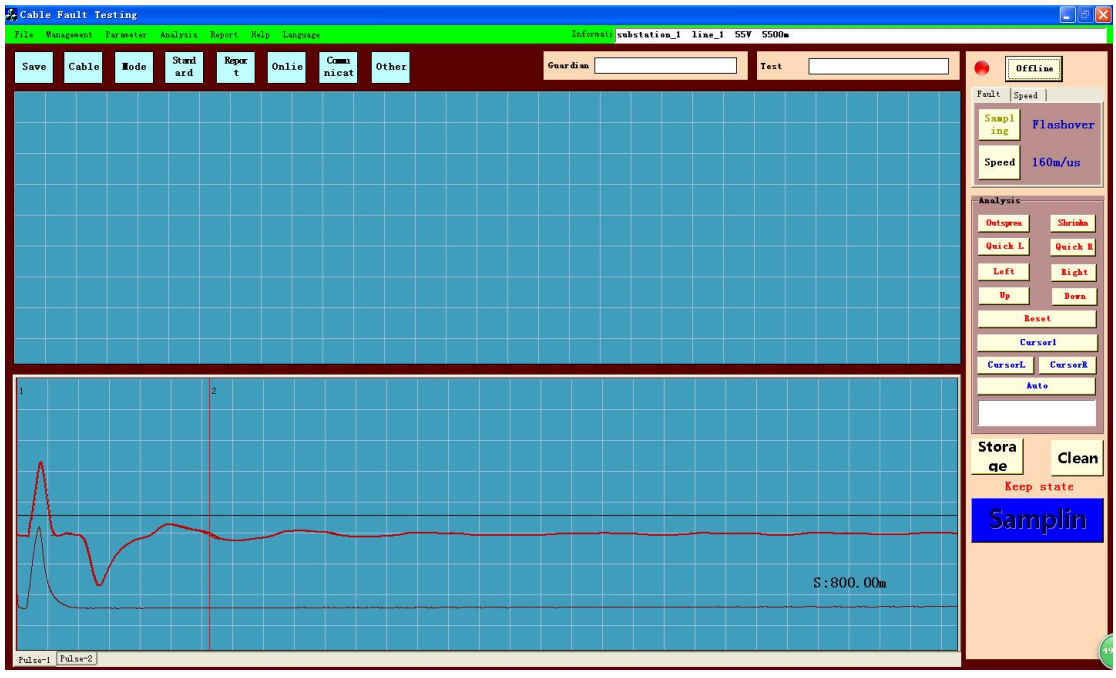
5.1.2 Export file

Export system database file to specified directory

5.1.3 Open waveform

Opening waveform with file format in system, select opening and looking over waveform in “waveform temporary storage”, as below drawing:





1. Data file be saved with txt file format, with displaying of hexadecimal
2. In data file, the first hexadecimal indicate waveform model, 01 indicate flashover, 02 indicate impulse 1, 03 indicate impulse 2, following closely waveform data.

3. One file save one waveform data only.

4. Waveform chart opened can be analyzed in “temporary storage area of waveform”

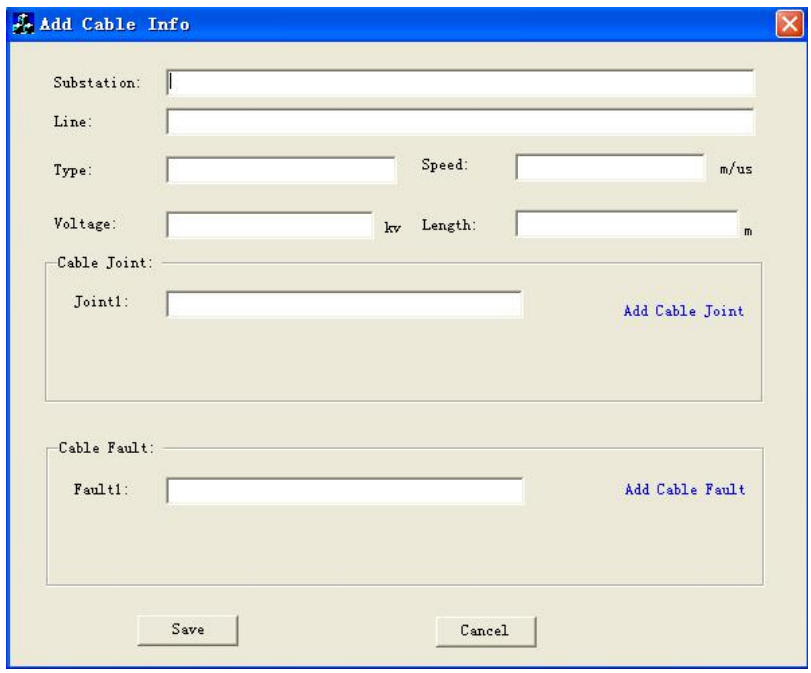
5.1.4Exit

Exit system

5.2 Managing of cable

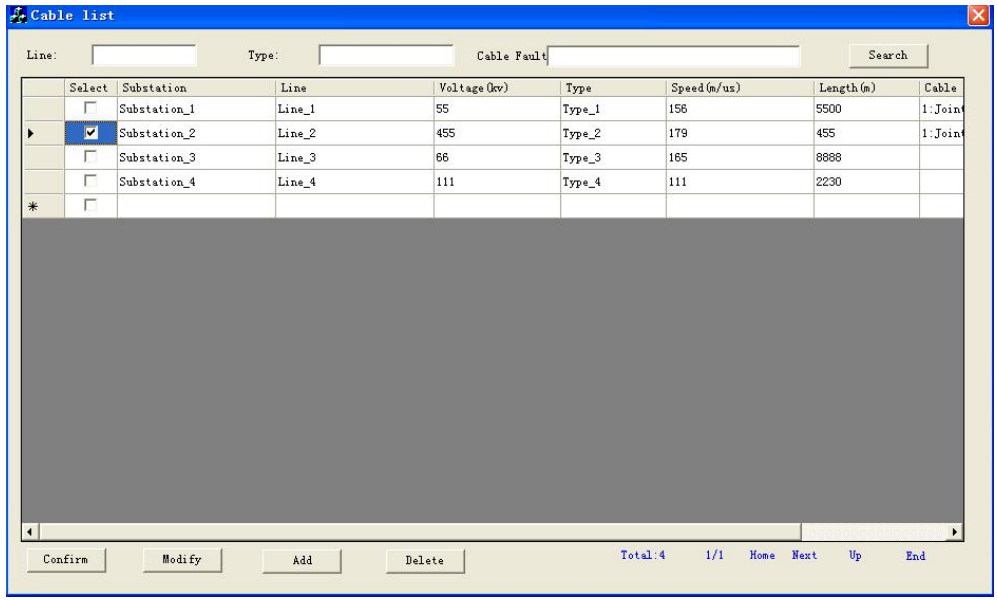
5.2.1.Add cable

Click “add cable” bottom in menu of “managing of cable”, popping newly add interface, click “save” after finishing filling out”. Cable information including power station name, circuit name, cable model, cable dielectric, circuit voltage, overall length of cable, cable connect, cable fault. Multiple add is available for the newly add bottom of cable connect and cable fault.



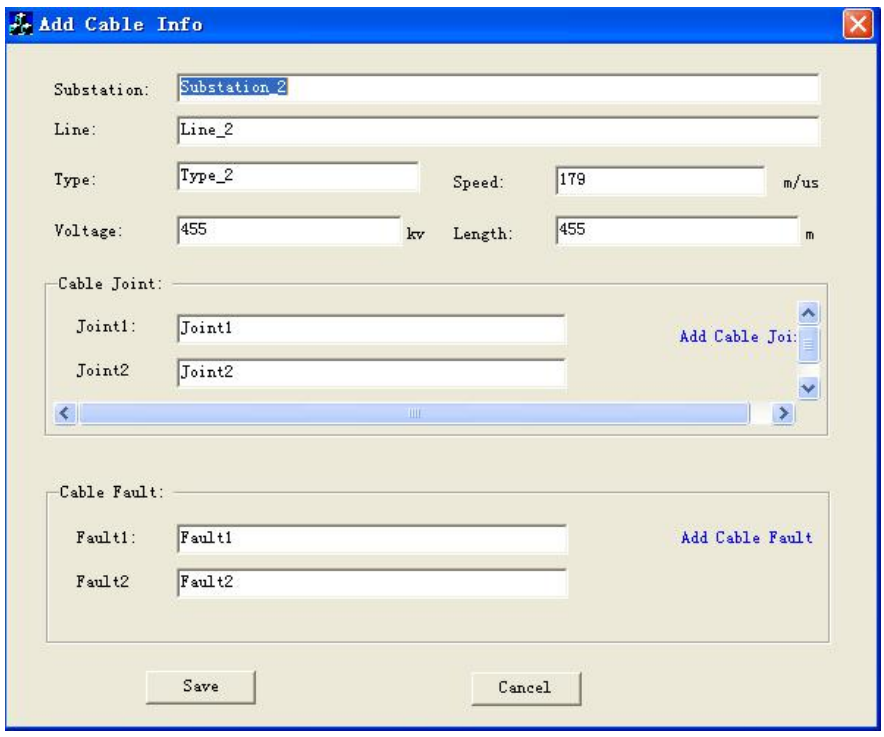
5.2.2 Cable listing

Click “cable listing” in menu of “managing of cable”, inquiring cable information according to circuit name、cable connect and cable fault.



5.2.3 Revise cable

Open “cable listing”, selecting one information of cable to revising only. System will be point out “please select one cable to revising” if you select multiple cable information.



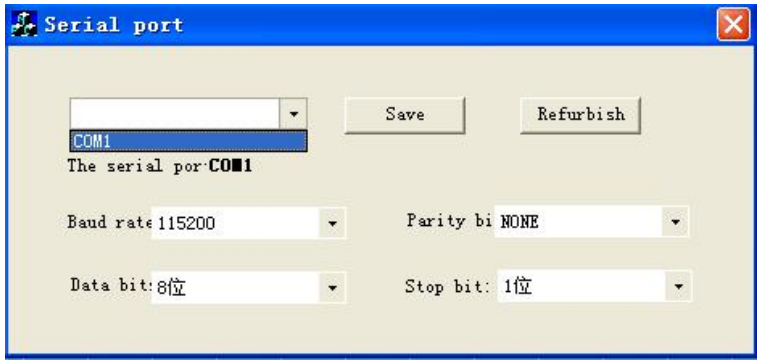
5.2.4 Delete cable

Open “cable listing”, selecting one or more information of cable to delete, this operation will delete all information about cable, including test report.

5.3 Set parameter

5.3.1Set communication

Select present communication serial port, set serial port parameter, e.g. baud rate、parity bit、data bit、stop bit. As below drawing:



Notice: it will be take effect on the next re-connect under connect state.

5.3.2 Select model

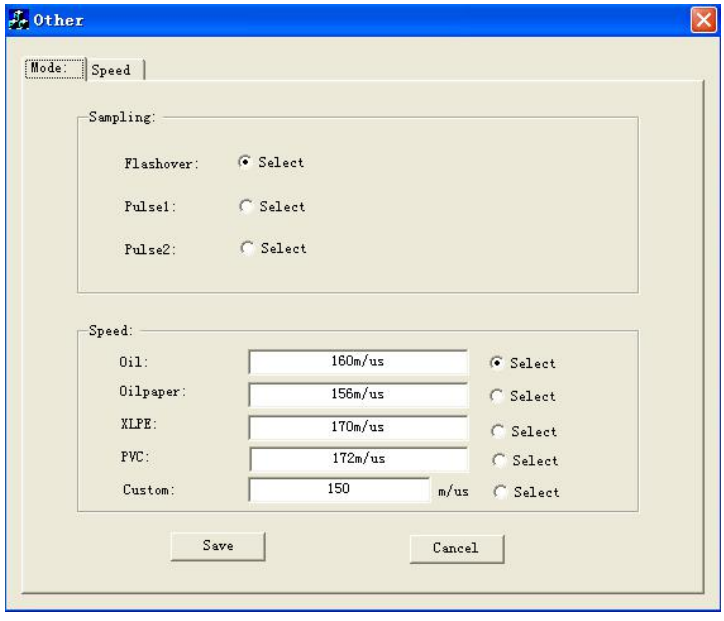
1. Select model of menu or short cut key

a> fault testing

Select sampling model: flashover、impulse 1、impulse 2

160,156,170,172m/us。

Select dielectric: 160, 156, 170, 172m/us. You can set dielectric by yourself(m/us)



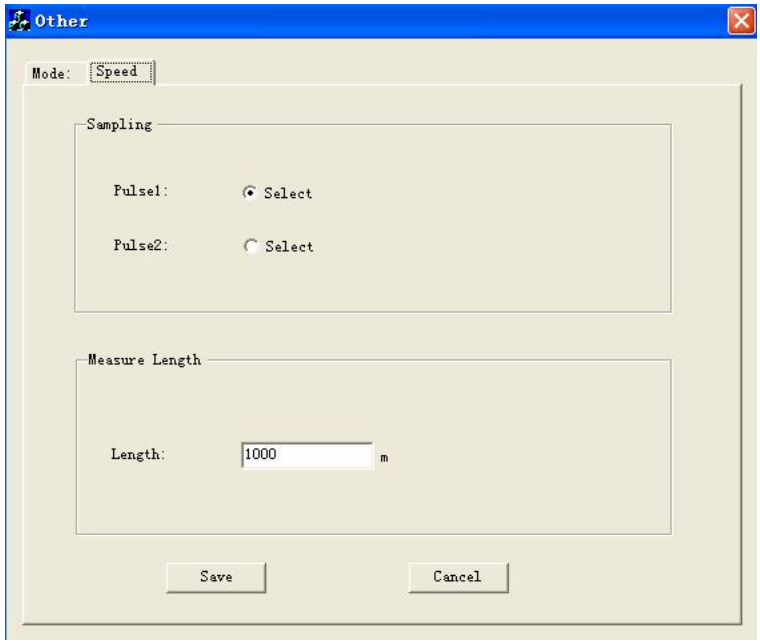
Notice: it cannot be mutual switched between cable test and speed test, and it cannot be mutual switched between flashover sampling and impulse sampling

under connect state.

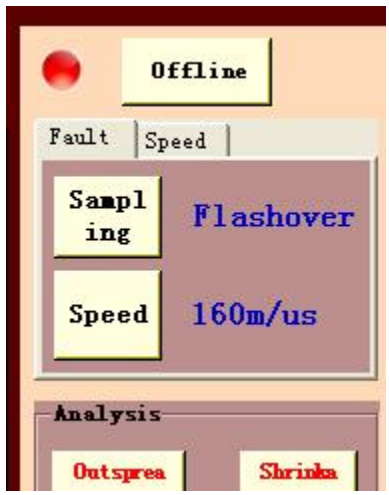
b>speed test

Select model of sampling mode: impulse 1、impulse 2.

User custom overall length of cable(Unite: m)



2、Select test model、cable dielectric、cable overall length via main interface, user can custom cable dielectric.



5.3.3 Select data base

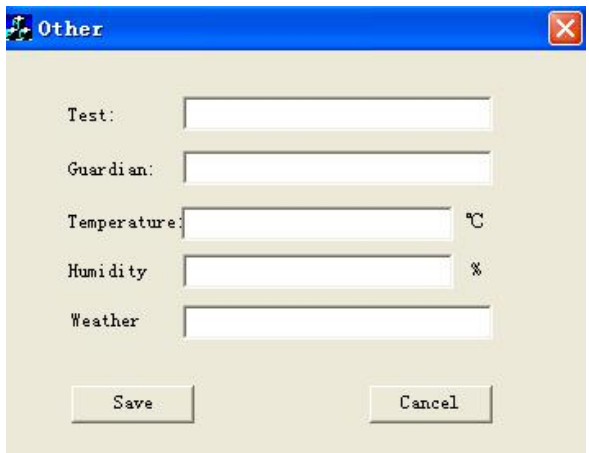
1. System provided one acquiescent data, you can use it at first working.

2. Select other data base file if user looking over or save the test result to the other data base file.

Notice: Chart Structure of the data base file must be full same as acquiescent data base structure, otherwise cannot operate.

5.3.4 The other set

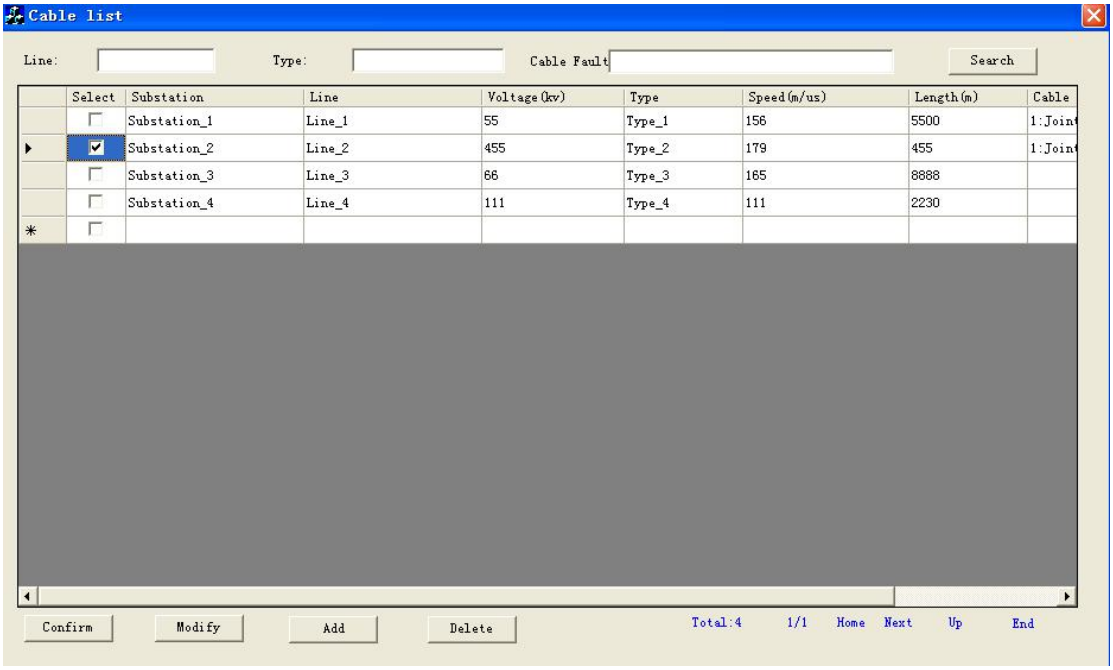
User can set present test person、monitoring person、temperature、humidity and weather regime during testing cable, and those information will be saved to data base to inquiring conveniently.



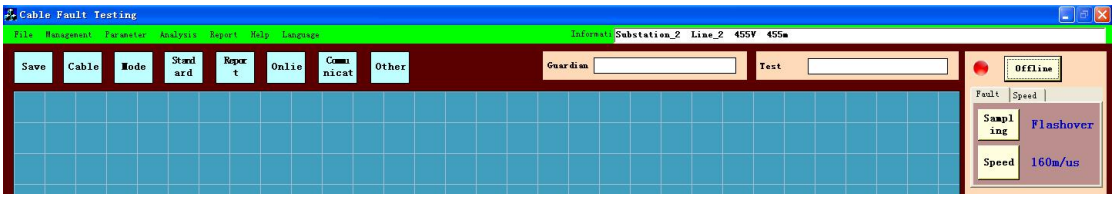
5.4 Waveform sampling and analysis

5.4.1 Select cable

1. Click “select cable”, then pop cable listing, selecting one cable information, click “confirm”. As below drawing:



2.The following drawing will be displayed in the system after confirming.



5.4.2 Select communication serial port

See 5.3.1

5.4.3 Other set

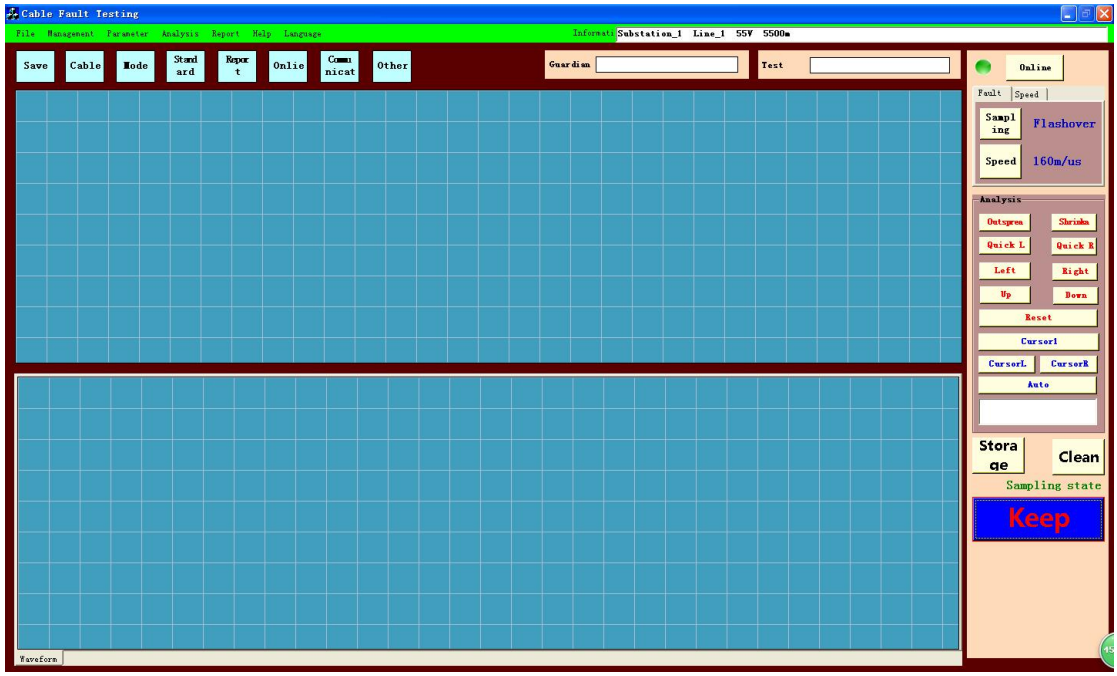
See 5.3.4

5.4.4 Select model

See 5.3.2

5.4.5 online test

After be all set, click “off-line state” of main interface. Pop prompt message if user didn’t select cable or serial port information. It will be displayed “online state” after connection success, the pattern being green, and “sampling” button displayed available mode. As below drawing:



5.4.6 sampling data

Click “sampling” button in interface, transmit sample order to the next stating according present selected sampling mode. This moment “sampling” button be changed to “keep”, which be indicated sampling mode, and then appearing waveform chart in sampling area.

5.4.7Changing over sampling mode

1、If user select “flashover sampling”, so cannot changing to “impulse sampling”, user should be sampling “keep”, and then changing to “impulse sampling”

2、If user select “impulse 1” or “impulse 2”, here “impulse 1” and “impulse 2”be mutual changed only.

5.4.8Temporary storage waveform

1、According to waveform chart of sampling area, click “temporary storage” key, and save waveform to temporary storage area to analyzing. If flashover sampling mode at present, so waveform mark of temporary storage area should be “flashover_1”, “flashover_2”… and so on.

2、It can be temporary saved 10 waveforms at most, the present waveform will be replaced if sampling modes ran up to 10 waveforms

3、Under sampling mode, click right key wilfully to open or close waveform, the waveform opened will be comparative analysis with present waveform under every mark.

5.4.9 Clear up waveform

If user no need waveform of the present mark, so click “clear up” key of main interface to clear up present waveform. If present mode is “flashover sampling mode”, the waveform in mark of “temporary storage area” being “impulse waveform”, so it will be indicate “present flashover model will cannot clear up waveform, close only.

5.4.10 Waveform analysis

1、Working out distance and speed between cursors 1 and cursors 2 in waveform chart.

2、User can real time observe the changing of distance or speed between cursors 1 and cursors 2.

3、User can amplifying or reduce waveform via mouse wheel, both sides be amplified or reduced at the same time around present place of mouse.

4、Click right key to “close waveform”

5、Click right key to “clear up waveform”, continue “temporary storage” the next waveform.

6、Click right key to open or close waveform of flashover or impulse.

7、Click “amplify or reduce” key to amplify or reduce waveform. Begin the first point, turn right to amplify waveform, turn left to reduce waveform.

8、Use can move right and left present waveform by “quick left” “quick right” “left shift”

“right shift”

9、User can move up and down present waveform by “up shift” “down shift”

10、Click “reset waveform” to check waveform chart of presented “temporary storage”

11、Click “cursor 1” and “cursor 2”to change operation, user can fine tuning presented cursors by “cursor left” and “cursor right”

12、Click “automatic analysis” key, locating one cursor to the lowest wave bottom of present effective coverage, and then locating the other cursor to one cross point since waveform to up intersect with baseline.

5.4.11 Saved waveform

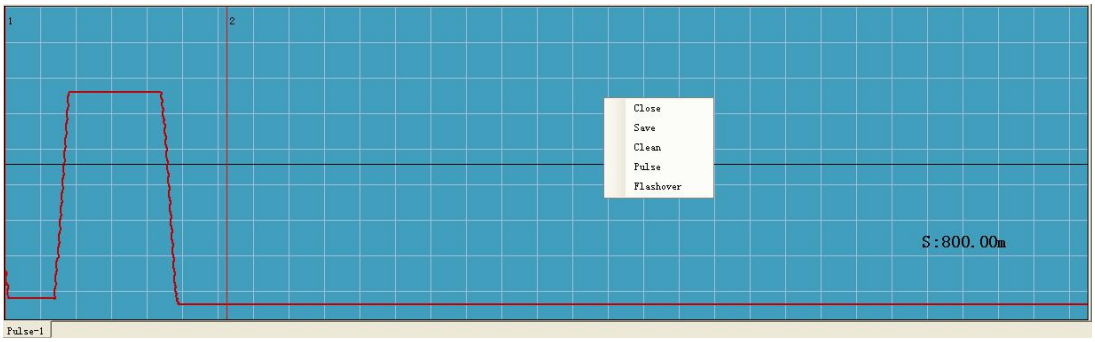
1. Data file be saved with txt format, displayed with hexadecimal

2. At the first hexadecimal of data file indicate waveform mode, 01 indicate flashover、02 indicate impulse 1、03 indicate impulse 2, waveform data following close.

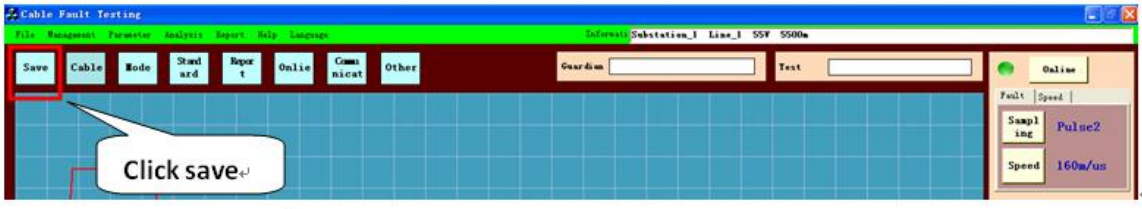
3. One file saved only waveform data only.

4. There are two saving waveform mode

1> Click right key of “waveform temporary storage” area to “save waveform”



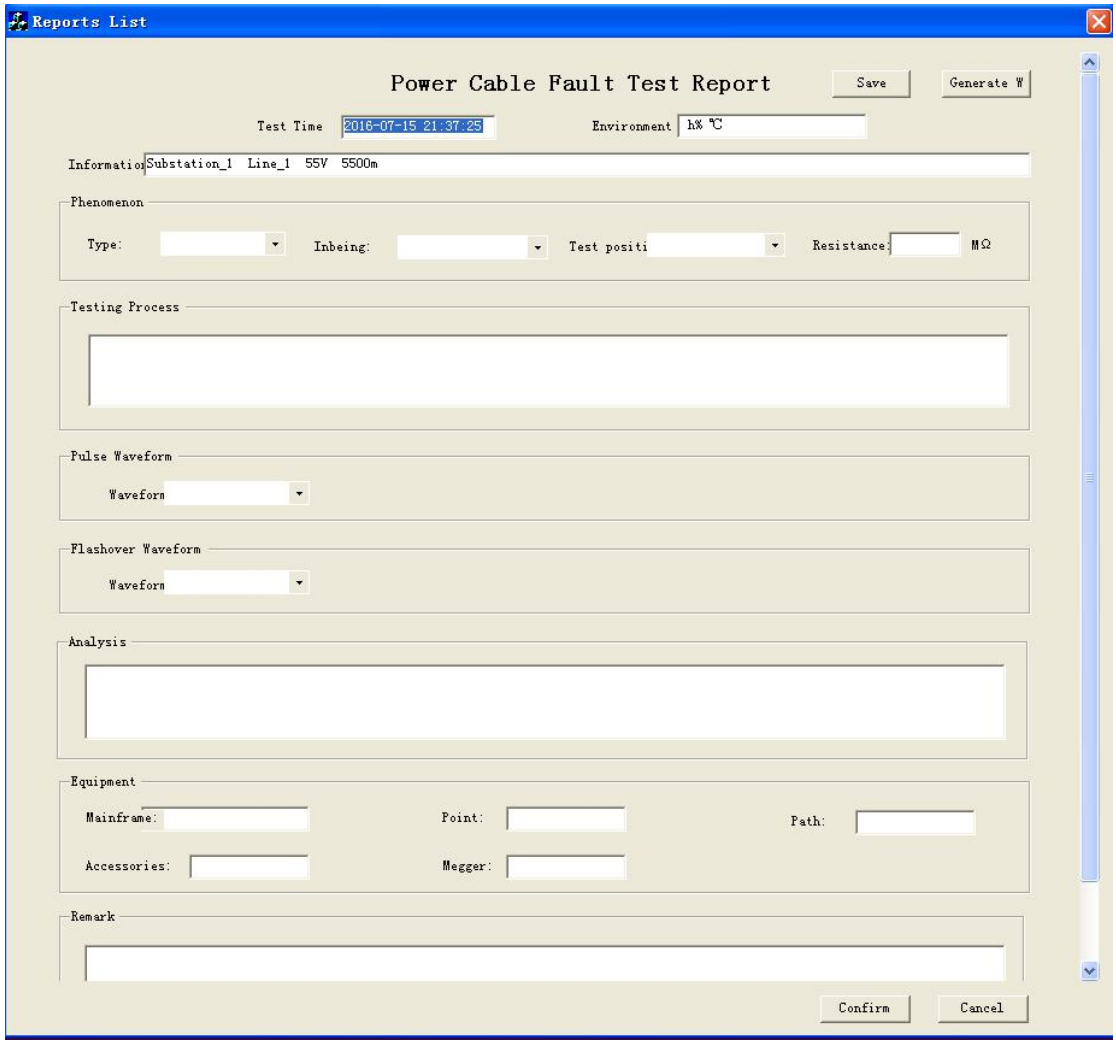
2> Click short cut key to “save waveform”



5.4.12 Save test report

After finish testing, click “making report” key, and open save interface, the system will

tacitly approve to show test time、test environment、basic information of cable in interface. The other information will be filled out according to actual demand.



Notice:

1. For impulse fault waveform and flashover waveform, user can select waveform chart according to present analysis result, the waveform chart will be saved to world file with picture format.

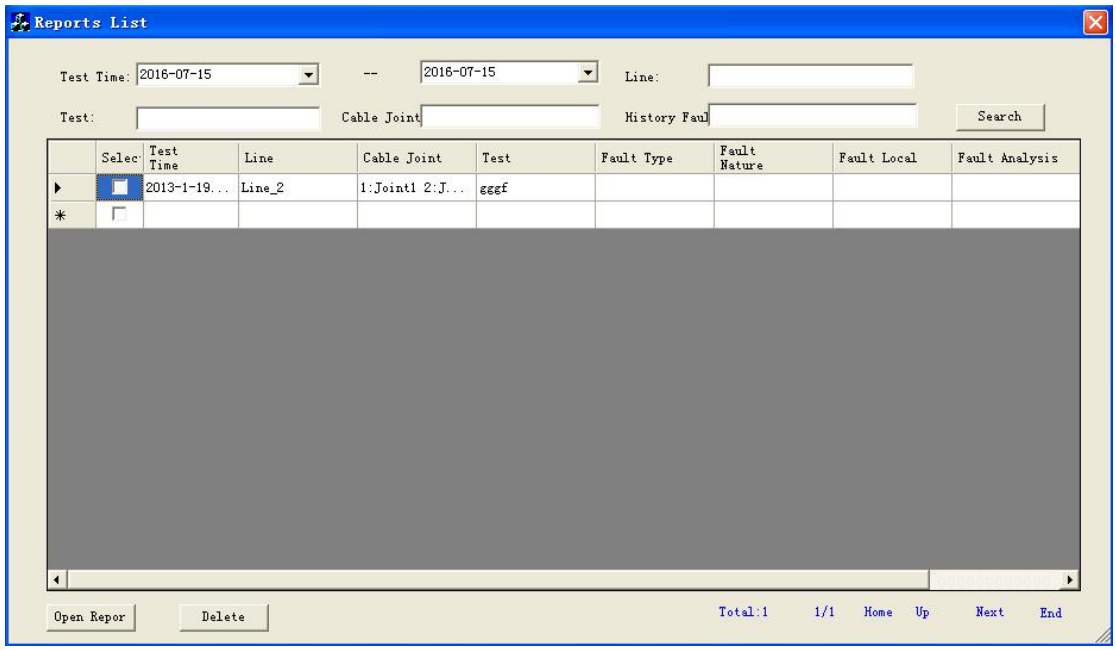
2. After saving success, use can find out the fault analysis from report information and cable information.

5.5 Report managing

5.5.1 Report listing

User inquire it according to test time range、circuit name、test staff、cable connect、history fault. User can check present record data of test report according to report listing, with 15

records every page, click “home page”、 “previous page” 、 “next page” 、 “last page” to check page report.

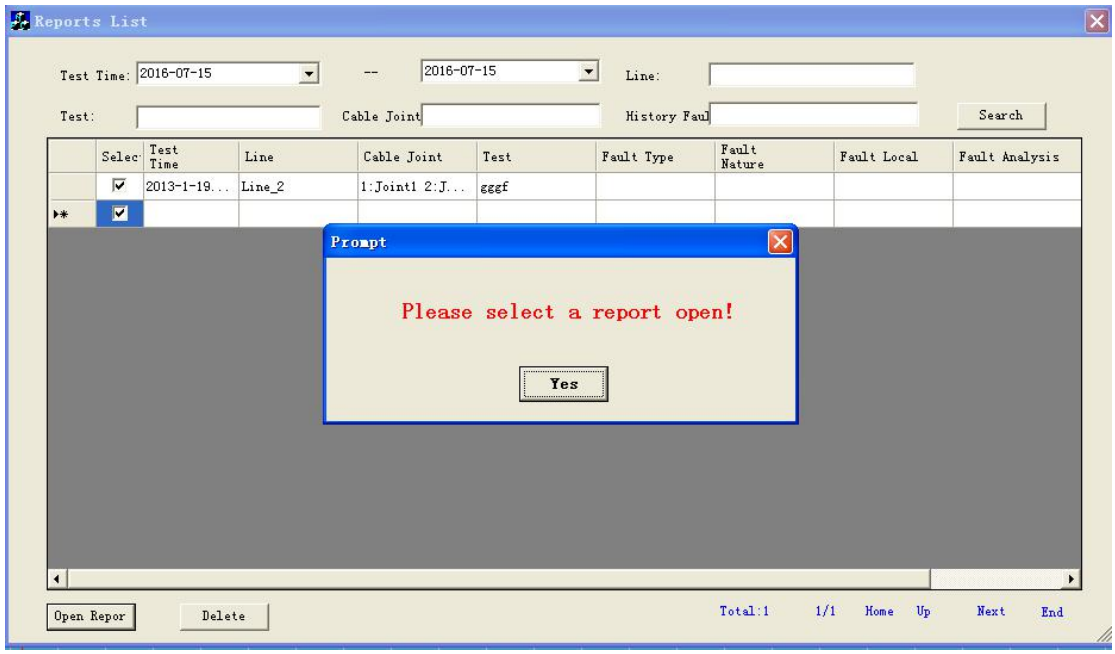


5.5.2 Delete report

Select one or multiple records to delete, the system indicate “delete success” after finishing delete.

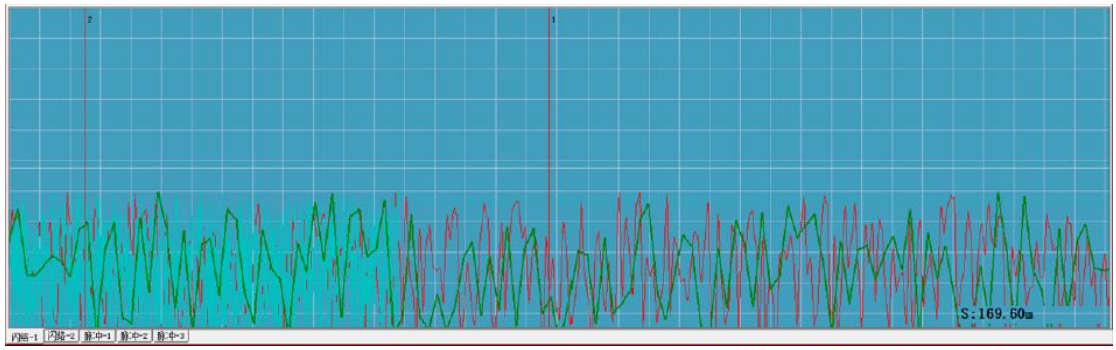
5.5.3 Look over history report

1、Open report listing, select one report to open, the system will indicate “select one report to open” if user select multiple report.

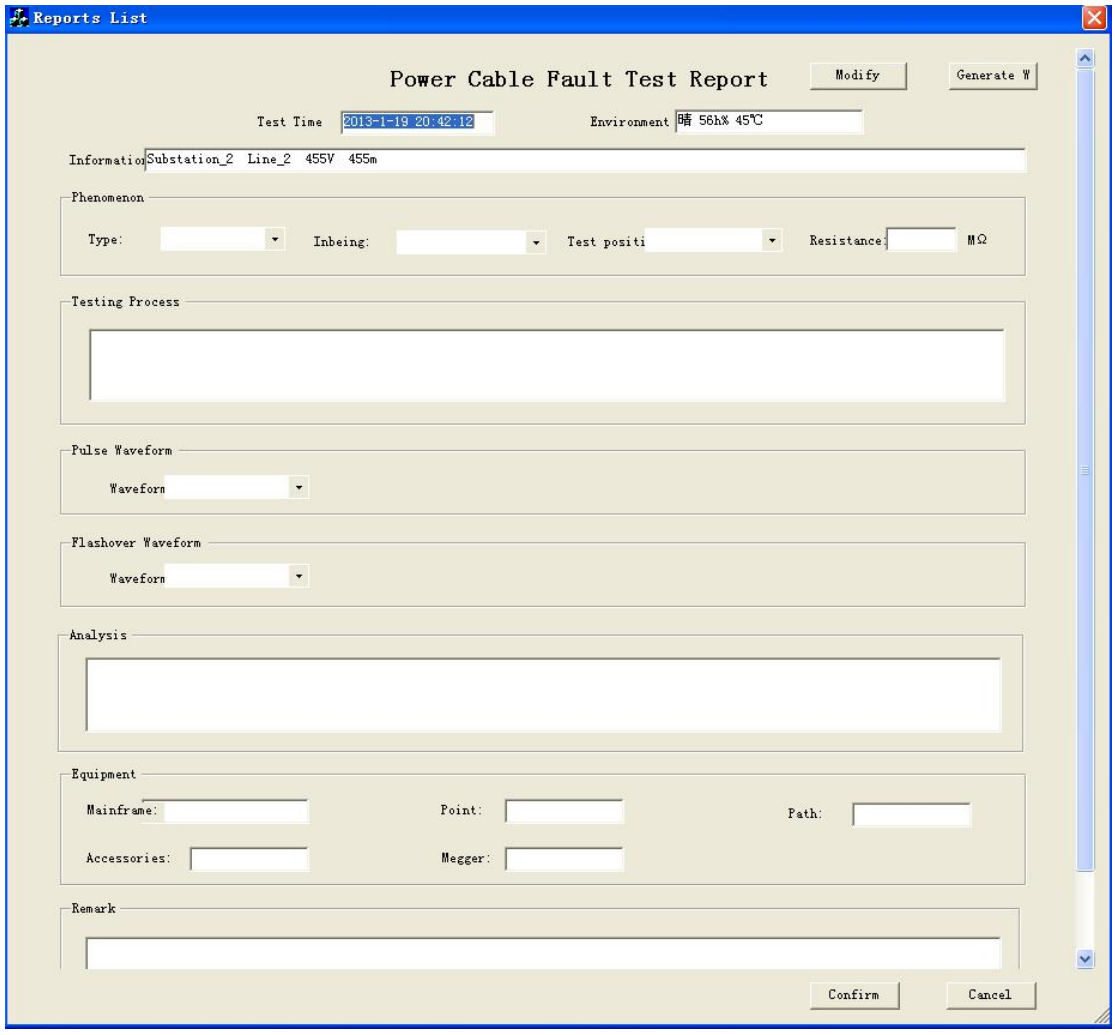


Notice: the report can be opened under off-line state only.

2、After selecting one report to open, it will indicate all of waveforms in area of "waveform temporary storage", and all of waveforms consistent with before saving. It will indicate " without available waveform chart" if there are not waveform charts



3、After finishing analysis, user can click "save report" to revise or make world doc.



5.6 Expert online

In the process of testing, the test personnel can communicate with expert by QQ, analyzing waveform online.

5.7 Waveform case and standard waveform

In the process of testing, test personnel can open waveform case or standard waveform to comparative analyzing with present sampling waveform, and locating fault quickly.

5.8 About cable

User can look over introduce information of cable in menu of "help".

5.9 Instruction

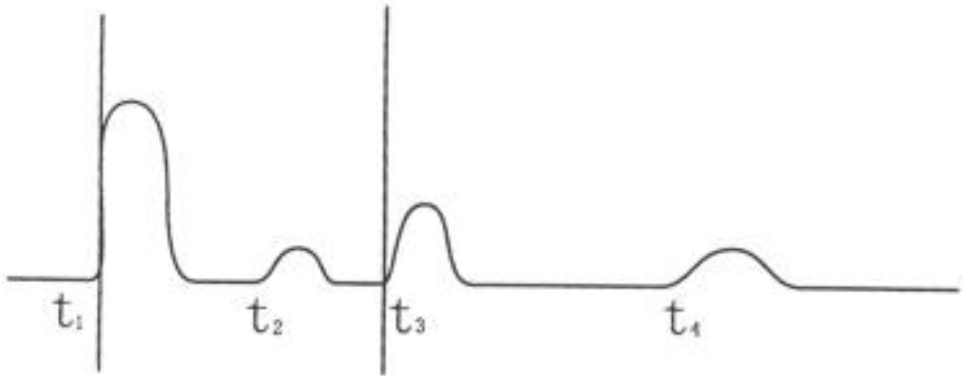
In the process of this software, user can look over instruction if meet any problems.

5.10 About us

Introduce establishment of our company、grow up and culture, please call us or email to us if you need any help.

6.About Waveform

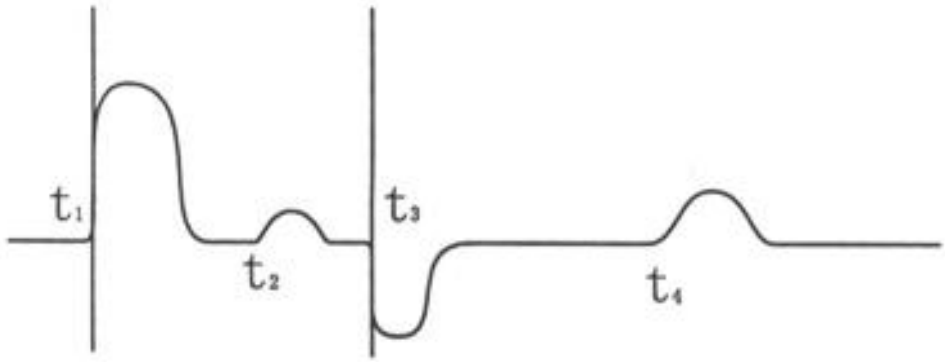
6.1 Standard waveform of open fault



Analysis: t_1 refers to pulse wave shape of the flash tester and has positive polarity (it can also be negative); t_2 refers to cable center butt joint reflective pulse wave shape (the reflective wave of joint has the same polarity in general; but it is related to the joint structure); t_3 refers to reflective pulse wave shape of open route malfunction and has positive polarity. It refers to reflection with same polarity (polarity of malfunction wave

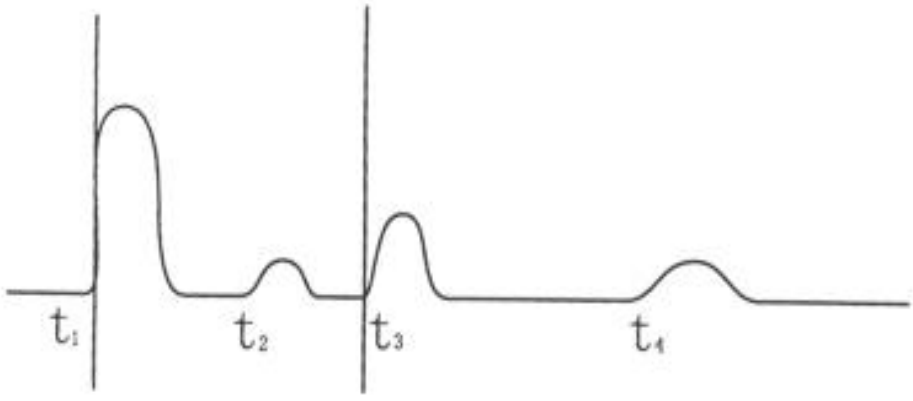
shape is same as pulse wave polarity of instrument); t_4 refers to second reflective pulse wave shape of open route malfunction. Given the attenuation of pulse wave, second reflection ratio of t_4 is smaller than one-time reflective wave amplitude of t_3. The distance S between malfunction point and measurement end is as follows: $|t_1 - t_3| = |t_3 - t_4|$. During the real operation, the instrument will automatically display and calculate the distance of malfunction point by moving the cursor.

6.2 Standard waveform of low resistance



Analysis: t_1 refers to pulse wave shape of the flash tester and has positive polarity (it can also be negative); t_2 refers to cable center butt joint reflective pulse wave shape; t_3 refers to reflective wave shape of low resistance malfunction point and has negative polarity. It refers to counter-polarity reflection (contrary to the pulse wave polarity of instrument); t_4 refers to reflective wave shape of cable terminal. The distance S between malfunction point and measurement terminal is as follows: $S = |t_1 - t_3| = |t_3 - t_4|$.

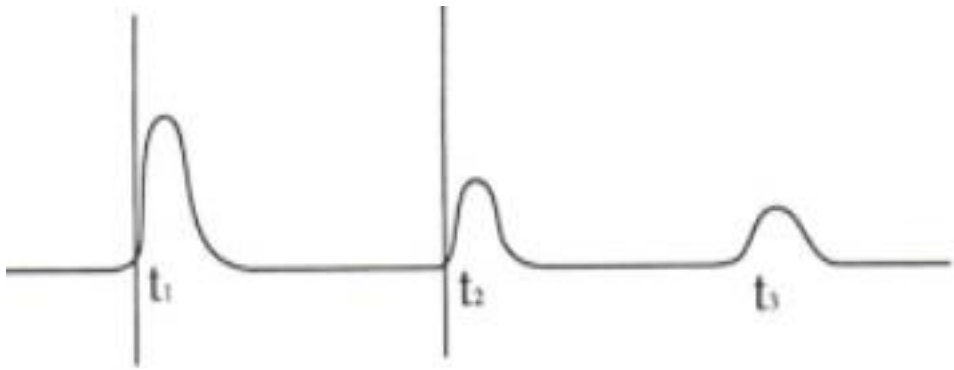
6.3 Standard wave shape of total length and center butt joint



Analysis: t_1 refers to pulse wave shape of the flash tester and has positive polarity (it

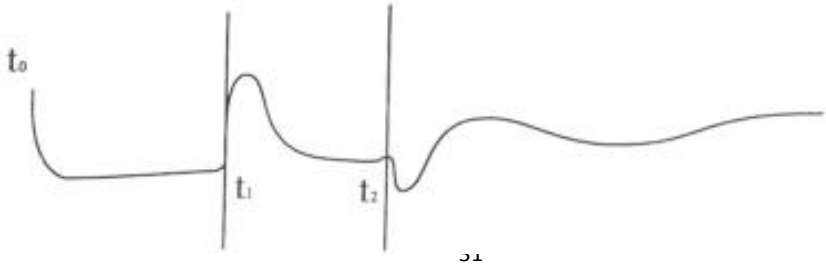
can also be negative such as SDCA-2/5 instrument); t_2 refers to cable center butt joint counter-flushing wave shape; t_3 refers to full length (terminal) reflective pulse wave shape and has positive polarity. It refers to same polarity reflection (similar to open route broken wire malfunction); t_4 refers to full length (terminal) second reflective wave shape. Given the attenuation of pulse wave, second reflective pulse wave of t_4 is smaller than one-time reflective pulse wave amplitude of t_3. The distance S between total cable length $S_{全} = |t_1 - t_3| = |t_3 - t_4|$ and center butt joint is as follows: $S_{头} = |t_1 - t_2|$.

6.4 Standard wave shape of transmission speed of electric wave



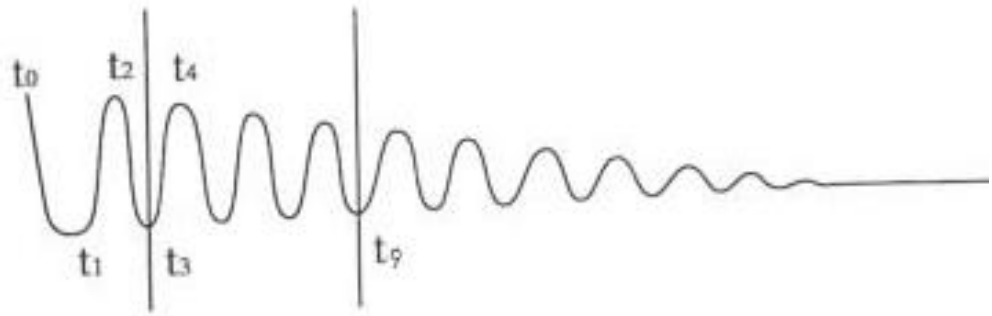
Analysis: t_1 refers to pulse wave shape of the flash tester and has positive polarity (it can also be negative such as SDCA-2/5 instrument); t_2 refers to full length reflective pulse wave shape and has positive polarity. It refers to same polarity reflection; t_3 refers to full length second reflective wave shape. The transmission speed of electric wave in the cable is as follows: $v = \dfrac{2S}{|t_1 - t_2|}$.

6.5 Standard flashover waveform



Analysis: t_0 refers to sphere gas power discharge waveform; t_1 refers to first reflective waveform of cable fault point; t_2 refers to second reflective waveform of cable fault point. Since high voltage impulse be reduced, the whole waveform like as reduced Cosine oscillation, the distance between test terminal and malfunction point is as follows: $S = |t_1 - t_2|$. Notice: normally $|t_0 - t_1| > |t_1 - t_2|$

6.6 Standard waveform near test lead



Analysis: t_0 refers to sphere gas power discharge waveform; after t_1 refers to multiple reflective waveforms of cable fault point; the whole waveform like as reduced Cosine oscillation, this waveforms is not same as the former waveform, so we should select multiple reflective waveforms, and then averaging them out. Working out distance S between t_3 time and t_9 time, then divided by number n(n=6)(double cosine wave cycle) of rising edge and trailing edge from t_3 time to t_9 time, that is the distance between test terminal and fault point is as follows:

$$S = \frac{t_n - t_3}{n-3} \bullet \frac{v}{2} = \frac{S_n}{n-3}$$

IV.Cable Fault Pin Pointer

cable faults pin-pointer is used for pin-Pointing kinds of cable faults of underground Power cable by using acoustic and magnetic method. by means of Electronic flashover generates by the impulse generator. Magnetic sound signal of the electronic flashover wave is picked up and amplified through the probe, and judged by auditory and visual to accuracy find out the underground cable faults.

1.Technical Data

(1) Synchronous receiving sound wave and electromagnetic wave during fault point discharge, use for confirm cable location of fault point.

(2) Magnification: 50,0000 times

(3) Working voltage: ±9V±20%

(4) Static current: ＜10mA

(5) Power dissipation: Quiescent current is less than 10mA, The working current is not more than 10mA

(6) output impedance :350Ω

(7) Positioning accuracy:±0.2m

2.Diagrammatic Sketch of Panel

Cable fault pin point panel picturer

1) Header-Teslameter： to indicate the magnetic field strength.

2) Level: adjust magnetic field strength base to make the indicator effective swing.

3) Frequency:adjust receiving frequency during cable route detecting.

4) Volume: Sound adjustwhen faults and cable route locating to adjust the suitable sound signal for the user.

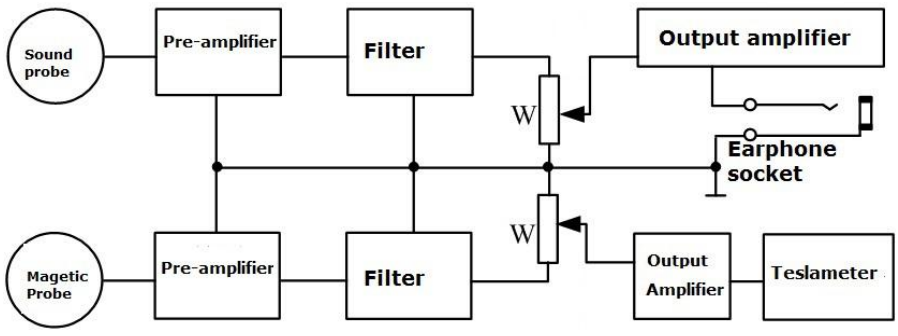
5) Input:connect with the probe

6) Way to work:Select working mode

7) Output: connect special earphone

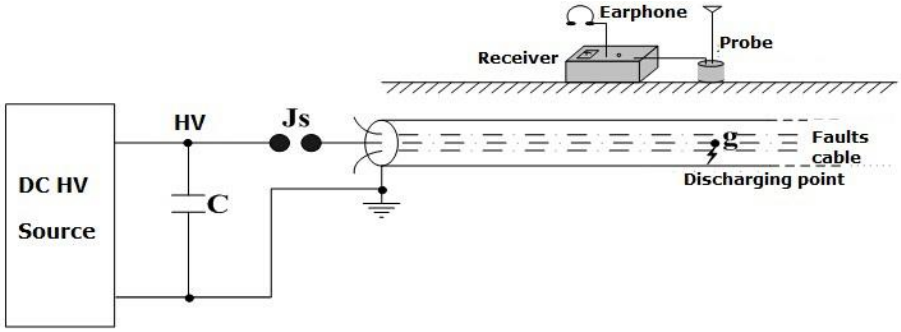
3.Cable fault locating principle and working method

The Cable fault point produce flashover discharging under the function of high voltage, at the same time there are four kinds of physical phenomenon: echo, sound wave, electromagnetic wave, infrared wave. The cable fault flash tester detects the echo to pre-locate the cable faults. XHDD503 cable faults pin-pointer to accuracy find out the cable faults by acoustic and electromagnetic of flashover discharging.

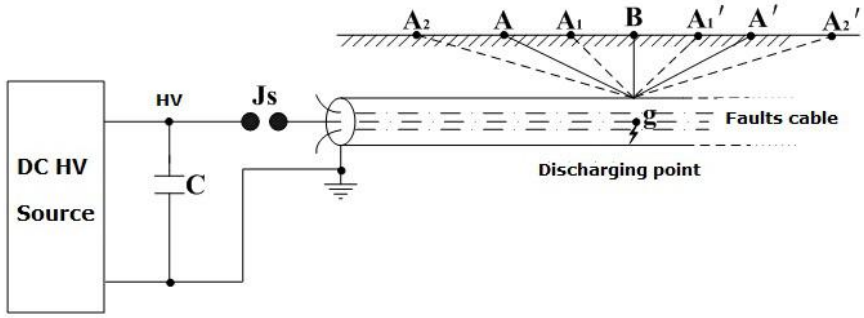


Working principle Graph

4.Field Testing Graph



Testing site



5.Operation steps

(1). Connect the earphone and the probe well with the control part.

(2).Adjust the **Way to work** knob to select the working mode to set the working mode at the Point mode (cable fault pin-point state). 3

(3).Adjust the **Level** knob to make the header of the Tesla meter swing effectively

(4) Adjust the **volume** knob to make the sound is suitable for the user.

(5)Put on the earphone, and hand held the instruments and the probe.

(6)During the detection the user should walk along the cable route to detect the cable faults within the pre-location range, the noise is increased when close to the fault point ,above the fault points the sound is loudest and the header of the Tesla material swinging strongest. This point is the cable fault point, as the B point of above graph.

6.Attentions

1, The batteries should be taken out of the instrument to avoid leakage if not using it

for long time.

2, when the battery voltage is low, the sensitivity decreased, shall immediately replace the battery.

V.HZ-504 Cable Route Tracer

1.Introduction

Cable Router Tracer is specially-designed for detecting the underground cable layout position and underground depth in a certain range.

Cable route detector consists of signal transmitter and receiver (Cable fault pinpoint detector), both of which finish the detection. By united operation the Cable route tracer could exactly pinpoint the cable route in the probable range of cable burial.

2.Main Consist of Cable Route Tracer

Cable route tracer mainly consists of route signal transmitter and receiver.

2.1 Cable Route signal transmitter

Cable route tracer is the big power route signal transmitter required in detecting the underground cable route.

2.1.1 Main Technical Index Parameters.

a) big power output, anti-vibration, strong anti-interference ability, stable and reliable;

b) With reliable over current, open circuit and short circuit protection function;

c)Output Frequency: Audio Frequency.

d) Output signal：intermittent，0～50Vpp

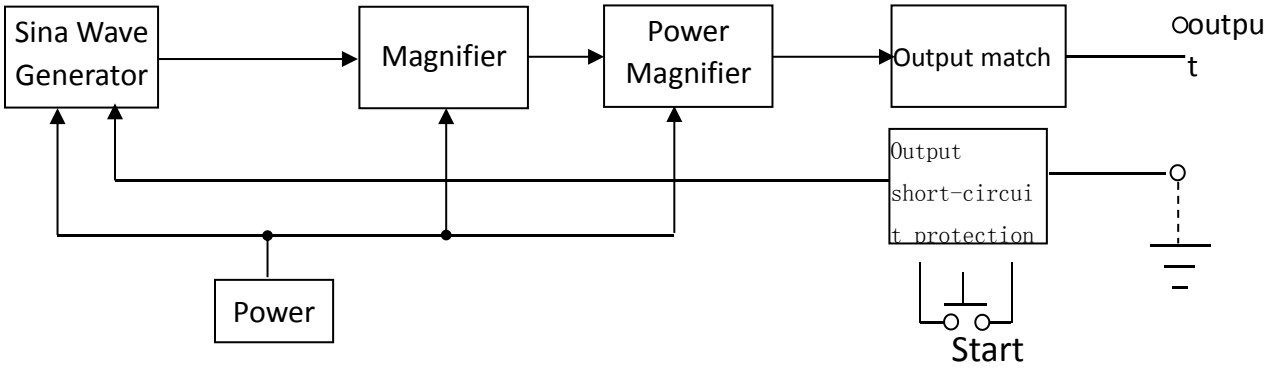
e) Working power supply：220V（1±10%） 50Hz（1±5%）;

f) Output power：100W;

g) Output current：0～2A;

2.1.2 Working principle.

Working principle diagram.



Cable Route tracer Working Principle Diagram

Sina Wave generator output audio sina wave signal, which load to Power magnifier by control circuit, The power output impedance matching “output”. If the output end load short-circuit (< 2 ohms), signal source will immediately protected, once the load short circuit condition exclusion, press the "start" button, signal source recovery normal work.

2.1.3 Cable route tracer (route signal generator) Panel layout

Diagram of Cable route tracer panel

1、Output Positive : Signal source output positive, connected to cable phase line.

2、Overload indicator : Overload indicator light, the light is on at the condition of

output short-circuit or too large signal.

3、Output adjustment: output amplitude adjustment knob, it can change the size of the output amplitude;

4、Output negative: signal output negative, connect to the ground wire;

5、Power switch: turn on the power to make the path instrument work, and at the same time there is an indicator light;

6、Fuser pipe : A2 Fuser pipe; one for spare.

7、Power input: input 220V (1 + 10%) 50Hz (1 + 5%);

8、Start button: when the overload lights, reduce the output amplitude, then the key can restart signal generator, the signal path to the output

9、The output header: when the head pointer swing it show the output signal; when the pointer does not move without the output signal; the pointer swing amplitude of said output signal amplitude (trend of numerical output, larger or smaller does not represent a specific unit value);

10、Grounding pillar: the test site to connect safely to the earth.

2.2 Cable route receiver (Cable fault pinpoint locator)

Receiving the signals from the cable route tracer, by this detect exactly the depth and trace of underground cable.(HZ-503 Introduction)

3.Cable Route Tracer Operation

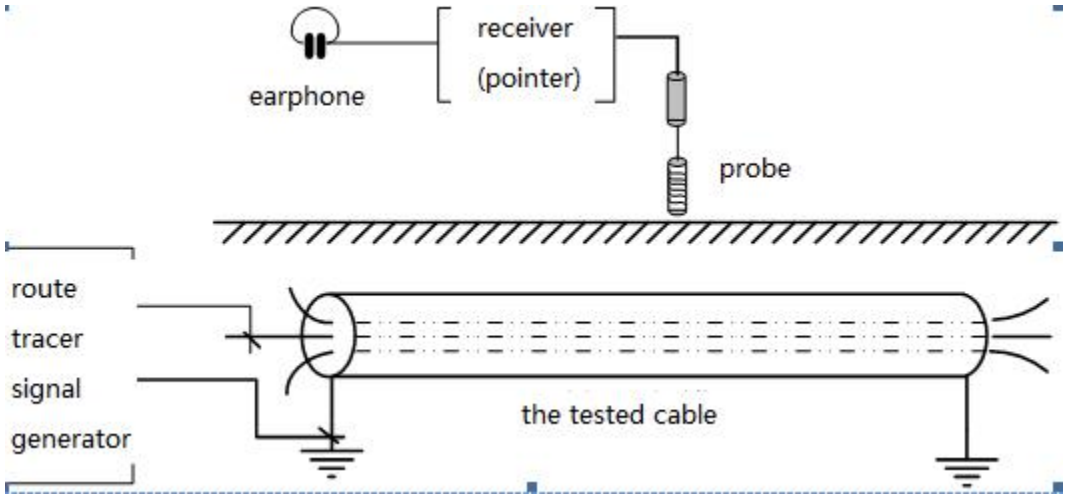
3.1 Usage.

3.1.1 Probe connection

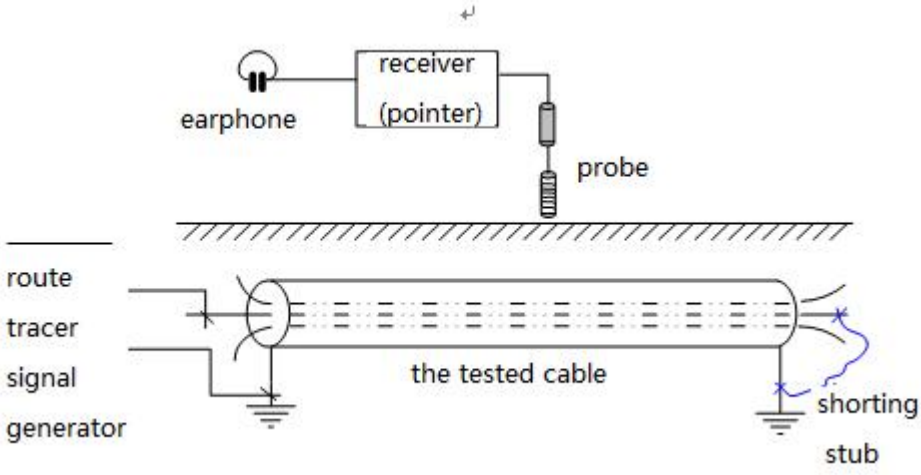
a) Connect the power supply line

b) Connect the red pillar (output positive) to fault cable (or working cable) phase.“Earth”black pillar (output negative),the other terminal three phase of cable should be open circuit to ground. If outputting signal is weak, Pls connect the other cable terminal is short circuit to earth.

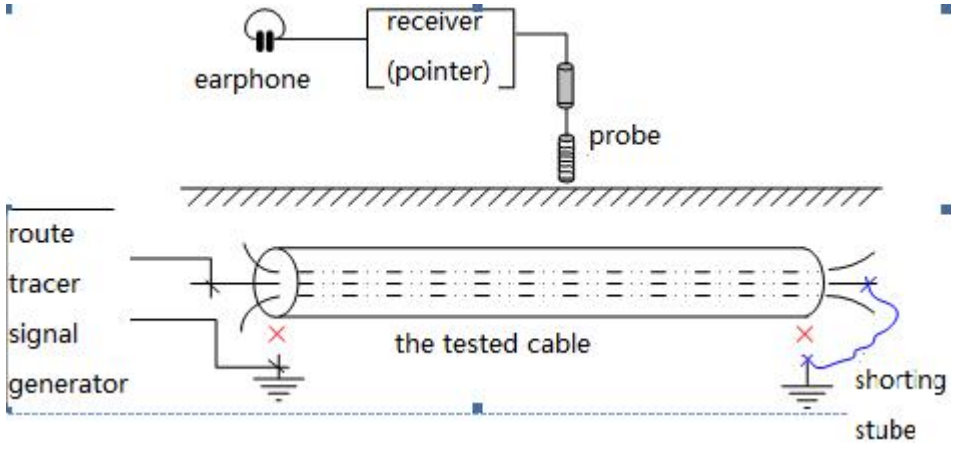
Diagram



General route detect connecting wire diagram.



Super-length or breaking cable route detection wiring diagram.



Special route detection wiring diagram.

3.1.2 Output signal initial adjustment.

Rotate “output adjustment knob “to minimum anti-clock wisely.

3.1.3 Pre-adjustment after getting through the power supply.

Press the power switch, the power indicator light; adjust "adjustable output regulation" make "output header" in the appropriate range. If the measured cable length is more than a few kilometers away, can make the the pre-adjusted output voltage increase; if the "overload" light, reduce the output amplitude, press the "start" button to restart the signal.

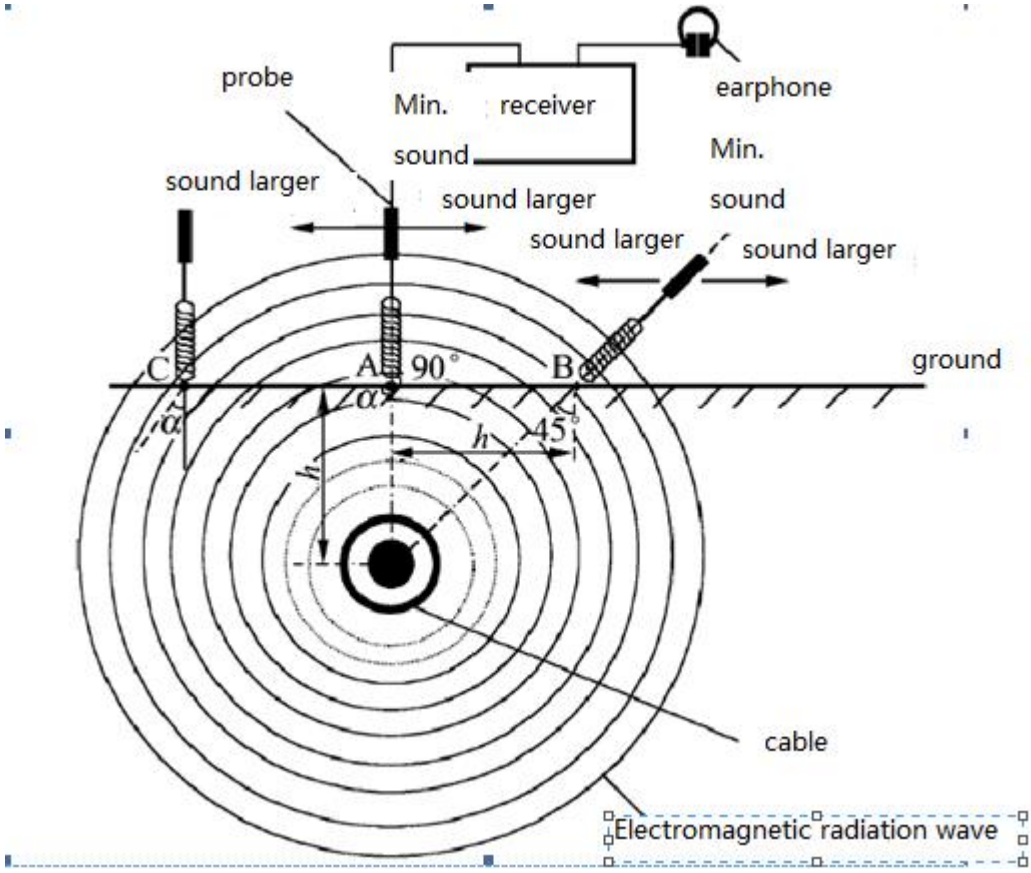
3.2 a）the receiver probe and the headset operation

b） Receiver (Pinpoint locator) “working selection” switch to “route ” position, at this time the receiver should receive the audio route signal. “Audio volume adjustment “put in appropriate position, adjust “frequency micro-adjustment” potentiometer, which make the headphone beat output the intermittent sound. The minimum points of the probe perpendicular to the ground hear into line, is buried buried cable path.

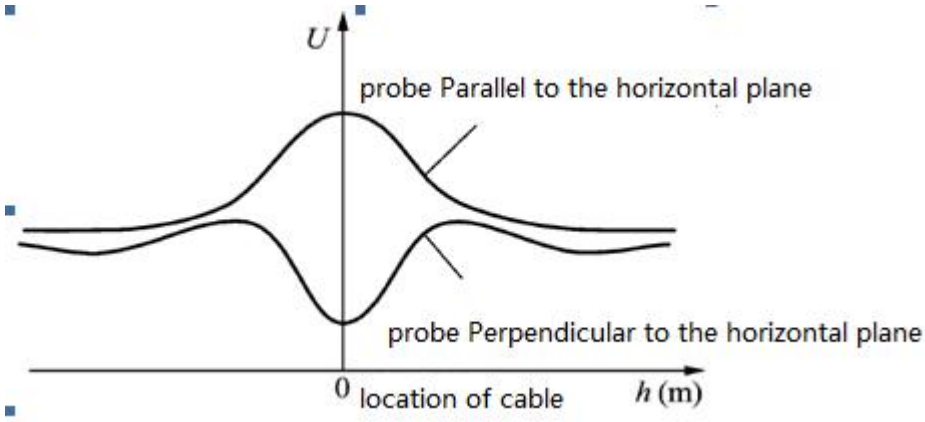
c）To assess the cable laying depth can be measured in cable position above, will probe into the ground 45 angle perpendicular to the path to move outward when the headset sound signal weakest,

the buried depth is the translated probe distance of cable above.

Diagram 4



probe position diagram



Relation schema of route tracer receiver amplitude and position

Route detection receiver amplitude and position diagram

Namely in detecting cable path to position, to always keep a vertical state of the probe and the horizontal plane, when the probe in the cable to position is above, received

"headphones sound" is a relative minimum, namely "relative indication minimum location on the ground connection is the measuring cable route go to position.

Also in detecting cable path buried depth, should make a probe and cable to vertical and angle with the horizontal plane into 45; to the side of the moving probe, "headphones sound" are a change from big to small, from small to big, that at the end of the "relative indication" minimum ground the cable ground to the vertical distance is the cable in the premises of the buried depth.

4.Site Detection Notes

a) If the "output" overload signal or cable to be tested are short-circuit phenomenon, route instrument "overload" indicator light, signal source No output; at this time should reduce source output regulation or exclude the measured cable short circuit
(it is best to use "good phase") , then press the "start" button to get the normal work of the signal source

b) Before detection the operator should read the operation manual carefully so as to operate the instrument fluently; in the process of detection, the “adjustment knob “should keep stable, which can make the headphone sound “big” “small “stable and reliable. All of which could guarantee the detected results are exact. Therefore, the operation experience of the operator proficiency level and experience accumulation is one of the necessary preconditions for the successful detection of the cable path

c) Always do the detection marks, mark clear and credible, so as to avoid unnecessary rework the retest phenomenon.

d) When the power switch is turned on, the light does not shine Pls check the insurance tube.

e) In strict accordance with the electric power industry operating procedures, safe operation, to ensure personal safety and equipment in good condition, so that the detection test carried out smoothly.

VI.DC High Voltage Power Supply

1.General

DC high voltage power supply completely satisfy DL/T846-2004"*high voltage test equipment general technical conditions*" and DL/T474-2006 *insulation test guidelines for the implementation of site*. It is mainly used for 35 kV and lower voltage cable fault impact discharging testing, also be used for DC withstand voltage testing of other electrical equipment. The device can completely replace the traditional testing transformer and operating box (Usually a 5KVA testing transformer is about 50 kg, a control box more than 20 kg).

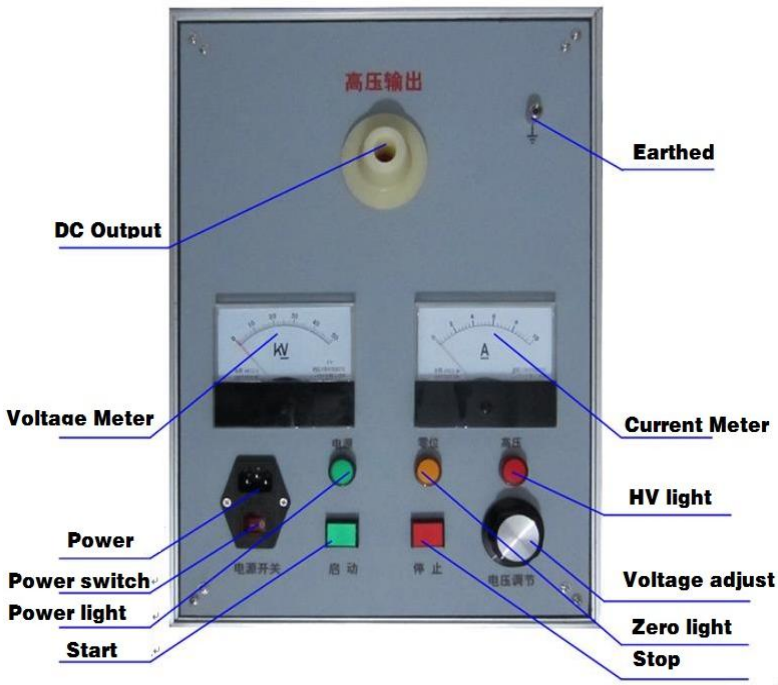
The power supply adopts high precision, high stability high voltage electronic components and high frequency high voltage technology, make the whole structure is simple, and light in weight. The power supply adopts humanized design of operating mode, safe and reliable. Never be break down, if the High voltage is shorted to ground can also for normal working. It's the most light, capacity any combination, the most humane operation DC high voltage Power supply in our markets.

2.Main Features

- Has a high voltage side, low voltage side and supply-side triple over-current, over-voltage and over-heating protection functions;
- absolutely uniform impulse discharge
- Super short circuit protection, high voltage output can be shorted to ground to work directly;
- With current, voltage dual 1.5 pointer table display, intuitive clear, impact-discharge process at a glance;
- High side voltage measurement, accurate real-time display, connecting microampere meter high side can act as DC high voltage generator
- With overheating protection and zero start protection, safe and reliable;
- The unique design of self-discharge, output voltage in the stop mode is zero; voltmeter indicates real-time capacitance and voltage

- Main technical data:
- Output voltage: 0 ~ 30/35/40 kV continuous adjustable;
- Power: 200/300/400/500W (can be customized)
- Short circuit current: 0 ~170/250/340/430mA(can be customized)
- High voltage accuracy: Voltage Accuracy 1.5
- External connection capacitor:0.1~2/4/8/16uF
- Surge/Impact time:1~8s
- Over-temperature protection:85℃
- Volume: 400L × 310W × 320H
- Weight:8/12/17/23kg
- Using temperature :-20～+50℃

3.Panel Display



Graph 1 Panel display

1、**DC Output**: DC High voltage Terminal

2、**Voltage Meter**: Output Voltage(kV)

3、**Power** :AC 220V/50Hz(This can be customize as the user's local power supply)

4、**Power switch**

5、**Power light:** when power switch is turn on,this light is on.

6、**Start**: when the zero light is on, press this key.

7、**Stop:** After testing or if the testing is abnormal, press this key to cut off the DC output.

8、**Zero light**: express the DC Output at 0 state, only when this key is on the Start key is effective.

9、**voltage adjust/voltage regulator**: to adjust the DC output voltage.

10、**HV light** :express the DC output voltage

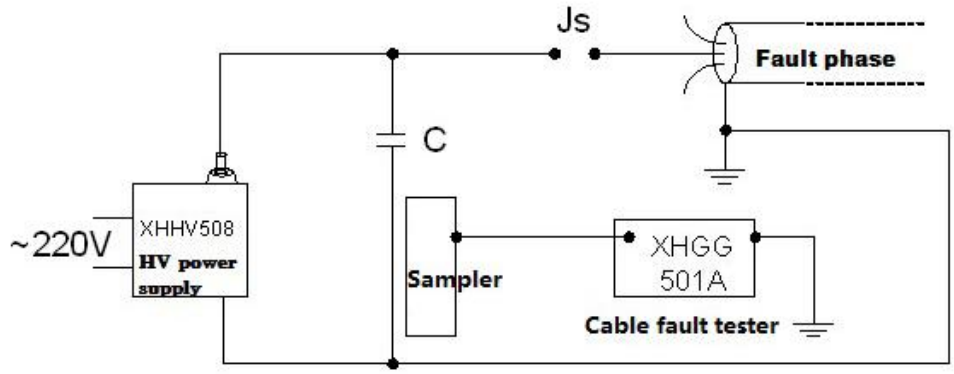
11、**Current Meter:** to display the current at the LV side.

12、**Earthed:**High voltage ground, safety grounded. It must be connected when testing.

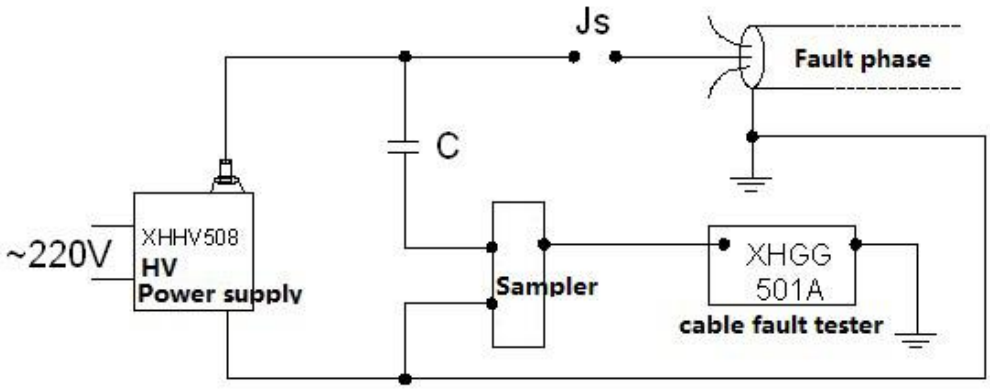
4.Site operation

1.The cable fault testing location

1.1Connection according to Graph 2 or Graph 3)



Graph 2:Inductive sampling connection



Graph 3：Graph: Wiring sampling connection

1.2 Connected with AC 220V**±10**％ power

1.3 urn on power switch, the power light is on.

1.4 When Zero light is on ,press “Start” key to start high voltage. if the zero light is off, the user should adjust the voltage to zero, ensure the voltage adjust to 0 ,and at this moment, the zero light is on.

1.5 When the high voltage is normal start, the high voltage light is on, then slowly adjust voltage regulator knob in clock-wise. to observe the voltage meter and adjust it to the required testing voltage.

1.6 When the discharging intervals is too fast: the user can adjust the voltage regulator too reduce the output High voltage; when the discharging intervals is too slowly, the user can adjust the voltage regulator to increase the output voltage, we can adjust the voltage regulator until the discharge interval to our satisfaction.

1.7 After Fault location or DC withstand voltage testing to adjust the voltage regulator to start state to ensure the zero point, and the zero light is on.

1.8 Zero light is on then press stop key to cut off the High voltage output, to completely discharged by discharging rod, and to connect the earthed wire on the HV terminal of the HV capacitor.

1.9 Turn off the power. and packed all testing leads

Cautions:

A. Any abnormal during testing, the user can press “stop” key to cut off power to ensure the safety

B. The instruments must be discharged and earthed when disconnecting the HV leads.

VII High Voltage Pulse Storage Capacitor

High voltage impulse storage capacitor

1. Mainly used for high impendence fault pre-location for variety of cable types.

2. Mainly used for accurate position for all of fault type

3. Impulse put to use special high voltage process, with small volume, safe and reliable.

4. Capacitance voltage: 2μF (1±10％)/35kV

5. Loss of value: not more than 0.006(1kHz)

6. Insulation resistance: RC ＞7500MΩ•uF

7. electrode withstand: 1.1-1.5Un•2s power to shell: 2Un•2s

8. Temperature: -25-40℃ height above sea level:1000m.