DT-5 Elevator Ride Comfort Analyzer
User   Manual

Reading this manual carefully before operation

Anhui Zhongke Intelligent Hi-Tech Co., Ltd.
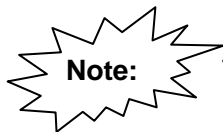
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Note: The type of the battery must be **9V 6LR61**.

Preface

Thank you for using DT-5 elevator ride comfort analyzer.

The DT series elevator ride comfort analyzer was developed by our company as the first of its kind in China. Since its birth in 1988, it has gained high praise from the exports of elevator industry for its excellent performance, reliable quality, reasonable price and excellent service we provided. The Chinese State Elevator Quality Inspection & Testing Center in LANGFANG is consistently using our product as their main measuring instrument for years in the elevator quality testing. Until now, the DT series elevator acceleration tester has been widely used in more than 30 provinces, cities and autonomous regions within China, and has occupied more than 80 percent of the market share.

DT-5 elevator ride comfort analyzer is the latest product of our company. It is a measuring instrument using for recording and analyzing the performance of elevator,

which is widely used in the product behavior testing for the elevator manufacturer, the elevator modifying for the elevator installer and also the elevator quality inspection for the Labor Safety Inspection Department and the Commercial Quality Inspection Bureau.

DT-5 elevator ride comfort analyzer can record the whole course of the elevator from starting to braking, measure vibrations of three directions and sound level, automatically recognized the different sections among the whole elevator running period, calculate maximum acceleration levels for each of the 3 axes in the full speed section and highest sound level which were recorded during the whole period. The software of DT-5 elevator ride comfort analyzer is based on Windows 9X or later, it has a user-friendly interface and very easy to use. Communication between DT-5 elevator ride comfort analyzer and the PC is under the software control. Retrieved the stored data of the DT-5 elevator ride comfort analyzer by USB port, the software

adopts data base management system, save/restore data available, easy to find file and analysis data. The software has powerful analysis function, adopts digital filter and vibration frequency analysis, can measure the actual elevator travel time with a high degree of precision, analyses of the acceleration data include integration of vertical acceleration data to develop elevator speed (elevator speed at any point of time) and location time histories. Moreover, the soft can simultaneously display/print many the parameters and curves relating to the starting, braking and vibration behavior of elevator, such as acceleration levels for the 3 axes and sound level, mark the peak to peak vibration during the full speed section, elevator velocity curve, distance curve and jerk curve of Z axis and so on.

Instrument Structures

DT-5 elevator ride comfort analyzer is a combined hardware & software approach to recording and analyzing the performance of elevator. The DT-5 data-collection part can work independently or be combined with PC, that is, work in offline mode or online mode. This will be described in detail latter.

Both sides of the DT-5 data-collection part are shown as Figure 1 and Figure 2 below.

USB jack

Switch

Figure 1   top side of the DT-5 data-collection part

hinged cover

batter
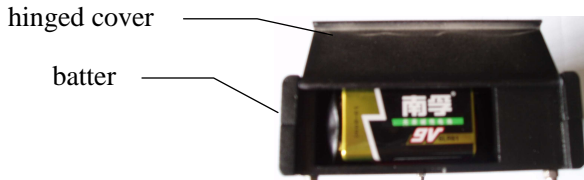
Figure 2　　　bottom side of the DT-5 data-collection part

The switch on the DT-5 data-collection part (shown as figure 1) can switch the DT-5 on/off. The USB jack on the DT-5 (shown as figure 1) and the USB port on the PC are connected by USB cable we supplied. The stored data of the DT-5 data-collection part can transfer to the PC by USB port, so it's not necessary to take PC to the testing field.

Note: There is a hinged cover (shown as Figure 2) at the bottom side of the DT-5 data-collection part, usually it is close very tightly. When the battery needs to be replaced, you must open the hinged cover (shown

as Figure 3), done as follow:

First, keep the fingers press vertically at the top of the hinged cover (shown as A in Figure3).

Then, it's easy to pull horizontally at the bottom of the hinged cover (shown as B in Figure3).
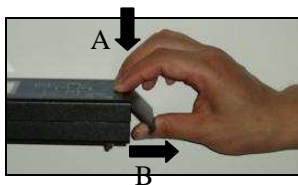
Figure 3   how to open

The stored data of the DT-5 data-collection part can transfer to the PC by USB port, so it's not necessary to take PC to the testing field.

Back side of the DT-5 data-collection part is shown as Figure 4 below.
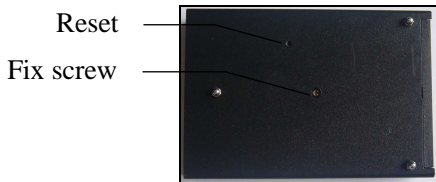
Reset
Fix screw

Figure 4   back side of the DT-5 data-collection part

If the DT-5 data-collection part can't work normally, press reset key by a slender and pointed implement, such as pin, needle, toothpick and so on.

The DT-5 data-collection part is fixed by one screw, please don't unscrew.

If you have any trouble in use, please get in touch with our company.

Chapter 1: Software Setup

1.1. Computer Hardware Requirements

The instrument requires that the computer CPU is superior to PIII450, having USB port, memory is more than 64Mb free, and the display area is no less than 1024×768 pixels.

1.2. Install the Application Program

The software is based on Windows 9X or later. Insert the supplied CD into the CD-ROM, enter Setup directory, then run Setup.exe, and complete the install.

1.3. Install the Driver Program

There are two methods of install the driver program.

Method 1: Insert the supplied CD into the CD-ROM, copy all of the files of Driver Setup directory to the hard disk of PC, then enter the copied Driver Setup directory of PC, run Install.exe, and complete the install.

Method 2: Connect the DT-5 data-collection part with PC by USB cable supplied, turn on DT-5 power, and wait for a while, then the LCD screen will be shown as Figure2.1. Press " ↑ " key, move cursor to "Pc_connect", press "OK" key, then the PC will pop-up an interface of find new hardware, according to installment prompt step operation, select corresponding driver file based on the PC operation system. There are two subdirectories inside the Driver Setup directory of the supplied CD, inside the subdirectories is corresponding driver file related to the PC operation system.

Note:

Only after installing the driver program successfully, the USB LED will be lighted when the DT-5 data-collection part connected with PC and working in online mode.

1.4. Using the DT-5 software on Windows Vista operation system

When using the DT-5 software on Windows Vista operation system for the first time, there may be pop-up an error dialog box as "Network initialization failed. Permission denied", under this situation, please done as follow:

a) Open my computer "Control Panel".

b) Enter " User Account" interface，then double click "Open or close

user account control".

c) On the interface of   "Open or close user account control", click the mouse to blank the box before " use UAC to protect your PC".

d) Restart your PC, everything will be OK!

1.5. Uninstall the Application Program

Open my computer "Control Panel", double click "Add or Remove Program" icon with the left key of the mouse, the system provides the following interface (Figure1.1) :

Find "DT-5", then run "Change/Remove", uninstall it according to the suggestion.
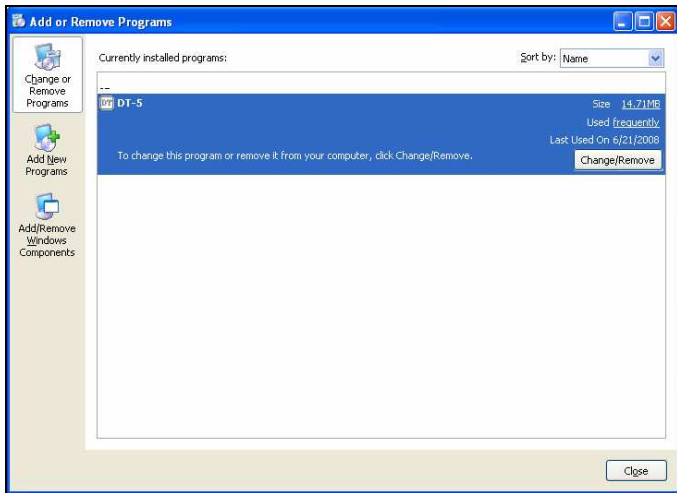
Figure1.1

Chapter 2: Offline Mode

2.1. Button Explanation

There are five keys in the data-collection part. Press ↑ key can move the cursor up or left to your choice, press ↓ key can move the cursor down or right to your choice, press "OK" to confirm your choice, and press "ESC" to return to upper menu. The "⊙"key is soft-switch.

2.2. Mode Selection

Place the DT-5 data-collection part on the horizontal surface, press "⊙"key to turn on the power, waiting for a while (generally about 1 minute). When the DT-5 data-collection part is steady, mode selection menu is shown on the screen (shown as Figure 2.1), and the default choice is offline mode. Once the cursor choice is "Dt5", you can

press "OK" to enter the offline mode.

```
Select mode：
Pc_connect        Dt5
```
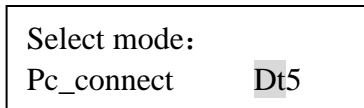
Figure2.1 mode selection menu

2.3. Main Menu in Offline Mode

Enter main menu in offline mode (shown as Figure2.2), and the cursor choice is "Configure" in default. Press"↑"or"↓"keys can move the cursor to "Test" or "Battery". Once you press "OK", it will show the corresponding subordinate menu interface. If you press the key "ESC", it'll return to the mode selection menu (shown as Figure2.1).

When you move the cursor to "**Configure**", press "OK" to enter the

configuration menu (shown as Figure2.3).

When you move the cursor to "**Test**", press "OK" to enter the testing menu (shown as Figure2.4).

When you move the cursor to "**Battery**", press "OK" to display the current voltage of   the battery. Press "OK" again, it'll return to the offline mode main menu.

```
Configure        Test
Battery
```
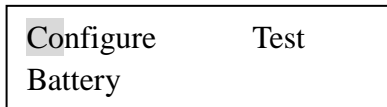
Figure2.2 main menu

2.4. Configure

There are two contents in the part of Configure. Press" ↑ "," ↓ "keys can

move the cursor to "Set operation" or "Check memory", and "Set operation" is in default(shown as Figure2.3).

| Set operation |
| Check memory |
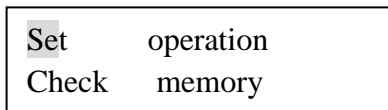
Figure2.3 configuration menu

Once you press "OK", it will show the corresponding subordinate menu interface. If you press the key "ESC", it'll return to the main menu (shown as Figure2.2).

Check memory

When you move the cursor to "Check memory", press "OK" to show the free memory. The largest capacity is 2150 seconds, and it inquires you whether clear all the memory or not. If choose "N", it'll return to the main menu; if choose "Y", it'll clear the memory empty, then go back to the main menu.

Note:

As the DT-5 data-collection part has limited memory, you'd better transfer the recordings in DT-5 data-collection part to the PC after finishing testing (we'll talk about the operation in detail in 3、1 of chapter 3) , and then clear the memory empty. Verify that the recordings have been transferred properly before clearing the memory.

Set operation

When you move the cursor to "Set operation", press "OK" to enter the set operation menu.

Set operation includes set record time, set lift type, set lift speed and set test type. The default record time is 99 seconds; the default lift type is Class A; the default lift speed is 0.63 m/s; the default test type is Comfort. The default record time 99 seconds means that the DT-5 data-collection part will stop testing automatically after recording for 99 seconds.

Note:

You can stop testing at any time, by pressing "OK", or the soft-switch. This allows you to maximize use of the DT-5 available memory.

Set record time:

The first thing is to set record time after entering the set operation menu. The range is from 0 to 99s, 99s in default. Press " ↑ " once to make the figure add by 10, and press " ↓ " once to make the figure add by 1. At the moment, press "Esc" to return to the configuration menu(shown as Fig2.3); press "OK" to save the setting record time and go to the setting lift type menu.

Set lift type:

There are 4 selections of lift type, including Class A, Class AA, Class AAA, Class S and Class M, Class A in default. Press " ↑ " or " ↓ to change the different lift type; press "Esc" to return to the setting record time menu; press "OK" to save the setting lift type and go to the setting lift speed menu.

If you choose Class M (this type let you set the limit by yourself), press "OK" to enter the setting limit menu. You can set the value of X, Y, Z, and S. Setting method is as follows: first, adjusting the number on the left of the decimal point; then adjusting the number on the right of the decimal point. After you adjust X, Y, Z and S, press "OK" to confirm your setting and go to the setting lift speed menu.

Set lift speed:

There are 14 selections of lift speed, including 0.63m/s, 1m/s, 1.6m/s, 2.0m/s, 2.5m/s, 3m/s, 3.5m/s, 4m/s, 5m/s, 6m/s, 7m/s, 8m/s, 9m/s, 10m/s and self-selection (you can set speed by yourself), 0.63m/s in default. Press " ↑ " or " ↓ to change the different lift speed; press "Esc" to return to the setting lift type menu; press "OK" to save the setting lift speed and go to setting test type menu.

If you choose self-selection, press "OK" to enter to the manually setting the value of speed menu. After you adjust the number on the right of the decimal point, press "OK" to confirm your setting and go to the setting test type menu.

Set test type:

There are five selections of test type, including Comfort, Noise, Landing Door Test, Machine test, and Calibration, Comfort in default.

Comfort test: DT-5 data-collection part will record the whole course of the elevator from starting to braking, measure vibrations of three directions and sound level, automatically recognized the different sections among the whole elevator running period, calculate maximum acceleration levels for each of the 3 axes and highest sound level in the full speed section. (Note: The DT-5 software of PC will calculate more

exactly, it will calculate maximum acceleration levels for each of the 3 axes in the full speed section and highest sound level which were recorded during the whole period.)

*N*oise, Landing Door Test and Machine test: All of them will measure only noise, but they have different limits.

*C*alibration: This function only be used for calibration, and will be detail described later in chapter 3、9.

Press " ↑ " or " ↓ to change the different test type; press "Esc" to return to the setting lift speed menu; press "OK" to save the setting test type and go to the main menu(shown as Figure2.2). At this moment, the default cursor choice is "Test".

Based on the lift type, lift speed and the test type, there are different limits in the DT-5. After testing, the DT-5 data-collection part will draw a

conclusion of pass or fail based on the corresponding limits.

Note:

$\diamond$ Once the lift type and lift speed be set, the settings will be memorized even when power down. After clearing the memory of the DT-5 data-collection part, the configurations return to the default setting.

$\diamond$ The configuration can be changed at any time, and the settings will be saved with the corresponding test file, when transfer the file which has been stored in the DT-5 data-collection part to the PC, and open the file by the DT-5 software, the settings will be easy to find, this will be in detail described in the chapter 3.

2.5. Test

In the main menu in offline mode(shown as Fig2.2), press"↑","↓"keys to move the cursor to "Test", and press "OK" to enter the setting ID menu(shown as Figure2.4).

> Set ID: 00000000
>   ^
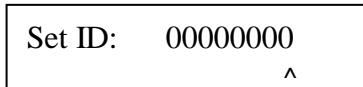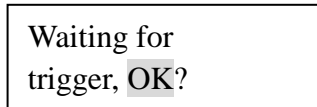
Figure2.4 setting ID menu

The ID range is from 0 to 99999999, 0 in default. "^" is pointed to the current setting location, press "↑" once to make the figure add by 1, and Press "↓" once to make the figure decrease by 1. At this moment, press "OK" will move the current setting location; press "Esc" will end the setting and inquire "Confirm ID, OK?", at this time press "OK" will save

the setting ID and go to waiting for trigger state(shown as Figure2.5),
press "Esc" will return to the main menu (shown as Figure2.2).

> Waiting for
> trigger, OK?

Figure2.5 waiting for trigger

The DT-5 data-collection part will only start testing when the "OK'" key
on the keyboard is pressed.

It is recommended that the DT-5 data-collection part be placed on the
floor of the elevator in the center of the elevator, the X axis arrow is
pointing toward the elevator doors, and the Z arrow is pointing upward,
this is a good method to fit for standard.

The built-in sensor needs some time to get balance. Do not change

the orientation of the DT-5 data-collection part before testing for nearly 1 minute.

At this moment, press "OK'" key on the keyboard to trigger the testing to begin. First, it shows "Avoid vibration" for 1 second, **please keep still in this period**! Then immediately run the elevator. **Make certain that the DT-5 data-collection part is testing before the elevator begins to move. It is also important that no one should move and keep silent while testing. People moving and talking will create vibration and sound which is unrelated to elevator vibration and sound, and this will be recorded as well.**

While testing, the DT-5 data-collection part shows each of the 3 axis vibration acceleration and sound value in real time. The unit of the vibration acceleration is cm/s^2($1cm/s^2$=1gal), and the unit of the noise is

30

dB.

Testing ends when the setting record time is over, or when you press "OK". Manually stopping is recommended, for it ensures that only the elevator vibration is recorded. When stopped, it goes to the save suggestion menu, shown as Figure2.6.
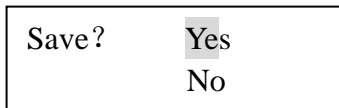
Save?	Yes
	No

Figure2.6 save suggestion menu

At this moment, choose "No" and then press "OK", it will return to the main menu directly without saving the data tested just now. At the save suggestion menu, choose "Yes", and then press "OK", it saves the data tested just now in the DT-5 memory, and then begin to calculating.

Note:

The whole course of the elevator from starting to braking must be recorded, or else it's difficult to calculate.

When calculating doesn't successfully, it will show "error, retry!" then return to the main menu. If calculating successfully, it shows a conclusion of pass or fail and enquire the maximum acceleration value of vibration for each 3 axis and maximum sound value, compared with the setting corresponding limits, the DT-5 data-collection part will draw a conclusion of pass or fail and inquire "See detail, OK?". At this moment, press "OK" will show the detail result (shown as Figure2.7), press "Esc" will return to the main menu (shown as Figure2.2). A detail result example is:

```
┌─────────────────────────────┐
│  X:31.8F        Y:26.5P      │
│  Z:33.2P        S:55F        │
└─────────────────────────────┘
```

Figure2.7 conclusion

It means that, the maximum acceleration value of vibration for X axis is 31.8cm/ s^2, bigger than the setting 30.7, fail; the maximum acceleration value of vibration for Y axis is 26.5cm/ s^2, less than the setting 30.7, pass; the maximum acceleration value of vibration for Z axis is 33.2cm/ s^2, less than the setting 35.5, pass; the maximum value of sound for is 55dB, bigger than the setting 53, fail.

Press '"OK" will end the conclusion and return to the main menu(shown as Figure2.2).

Chapter 3: Online Mode

3.1. Retrieve data of the DT-5 data-collection part

This function is used to transfer data which has been stored in the DT-5 data-collection part to the PC.

Connect the DT-5 data-collection part with PC by USB cable supplied, turn on DT-5 power, and wait for a while, then the LCD screen will be shown as Figure2.1, press " ↑ " key. Move cursor to "Pc_connect", press "OK" key, then the LCD screen will be shown: "Pc_connecting", the USB LED will be lighted. Run DT-5 software, and the PC will pop-up main interface shown as in Figure 3.1.
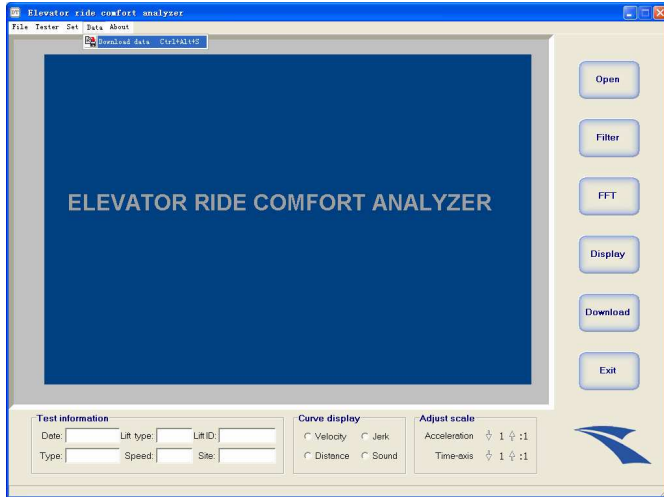
Figure3.1 main interface

Choose "Data" at the top menu bar, click on it will pop-up "Download data", then click on "Download data", a dialogue will be showed as Figure3.2.

Current save data path is displayed on the top of the download data dialogue, you can select any available directory to save data, but file name and file type mustn't be changed, they are created automatically by system.

When you select an available directory, move cursor to "Save" in Figure3.2, click to save.
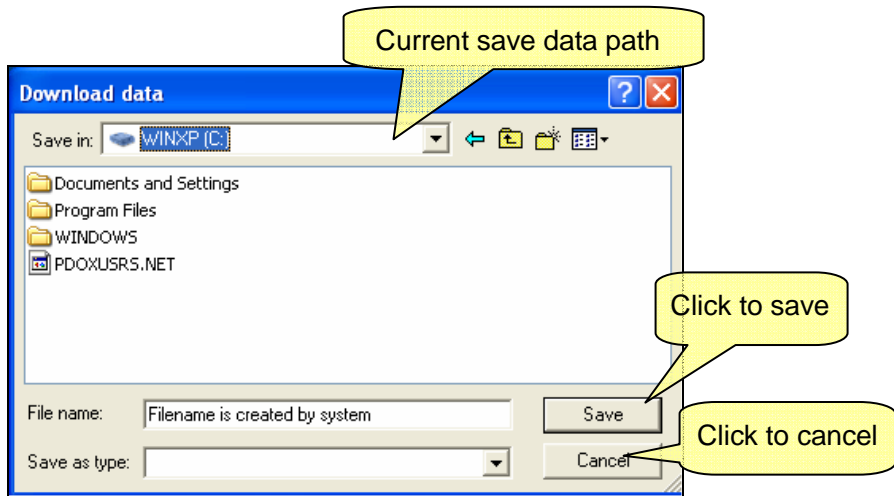
Figure3.2 Download data dialogue

Note:
- ✧ After proper connection and click to save, the USB LED will twinkle when the data transferring. So please wait until the USB LED doesn't twinkle. You can't do other operations until the data transferring process is over.
- ✧ After all of the data is retrieved, in your selected directory, you will find some new files named *.zks or *.sou. The serial of files are named one by one according to the record date and time, *.zks is vibration test file, *.sou is sound test file. If you have previously transferred one time, the system will never overwrite the old, the later will named with new sequence number. After the data retrieved to the PC, the file name can be changed to *.zks as you want, and the file can be moved to any available directory.

$\diamond$ When the data is retrieved, the memory of the DT-5 data-collection part is not cleared. If there is a communication failure for any reason, the process can be repeated. Verify that the recordings have been transferred properly by viewing the serial of files before clearing the memory of the DT-5 data-collection part. The operation of clear the memory is described in detail in 2、4 of chapter 2.

3.2. Open a record

Before starting analysis, it's necessary to open a record. Move mouse cursor to the "Open" push button on the right of the main interface (shown as Figure3.1) , left click mouse, enter the directory saved data, then select a file to open.

Once a file opened, the whole acceleration time history course of the

elevator ride from starting to braking will be displayed in current window (shown as Figure3.3). If the record file is not a whole course of the elevator ride from starting to braking or hard to be analyzed, the software will remind that "The process isn't analyzed, please test again".

For the first time open a record, the "Test information" (1 in Figure 3.3) on the left bottom of the main interface is filled automatically, they are the settings saved with the corresponding test file, the automatically test information is permanent for the corresponding test file, only Address item can be inputted.
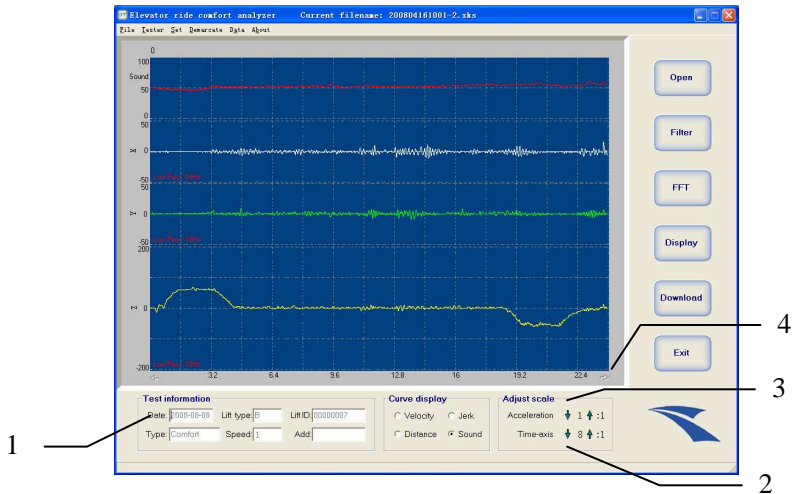
Figure3.3 Open a record interface

After input, move mouse cursor to "File" at the top menu bar, click on it will pop-up "Save address", then click on "Save address" will pop-up a saving dialogue, you must select the file current opened, this means add the address information to current opened file, next time you open the file, the address information will be displayed automatically until it be changed.

The information can be printed out in the report. If you don't input information, it will be blank.

3.3. Curve analysis and parameter display

The horizontal axis bellow the blue window is time axis, unit is second. For example, in the Figure3.3, the bottom numbers bellow the blue windows mean 2.8second, 5.6sencond, 8.4second, and so on.
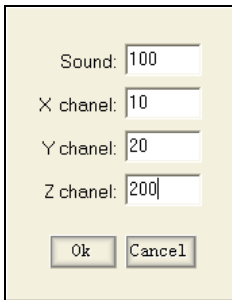
The top window is used for displaying the sound level time history, the vertical axis range is from 0 to 100dB(A). The bottom 3 windows are used for displaying the acceleration time histories for the X, Y and Z channels, the X and Y vertical axis range is from -50 to +50, the Z vertical axis range is from -200 to +200, the unit of the 3 axes is cm/s^2.

Adjust scale

For detailed observation, horizontal and vertical scales can be changed. Default scales are X/Y: 20, Z: 150. There're two methods to adjust.

Method 1:

Choose "Set" at the top menu bar, click on it will pop-up "Adjust scale", then click on "Adjust scale", a dialogue will be showed as Figure3.4.

Figure3.4 Adjust scale interface

Input the scales for X, Y, Z and sound, the display will adjust automatically.

Method 2:

Time-axis default scale is to show all of the data in current screen. For

example, in the Figure3.3, the time-axis default scale is 7:1 (see 2 in Figure3.3), maximum scale is 20:1. You can adjust scale by click ↑ or ↓ icon beside the scale. When ↑ or ↓ icon turns form green to gray, it means that you have reached its climax.

The method of adjust acceleration scale is the same to above. The 4 vertical scales will be adjusted at the same time. The default setting is 1:1 (see 3 in Figure3.3), the maxim scale is 20:1.

Move curve

When the curve can't be displayed in one screen, the → icon bellow the display window will turn green (see 4 in Figure3.3). Click the ← or → icon by mouse, the curve will be moved to left or right, and current screen start time and end time will be displayed bellow the blue display

window. When the ← or → icon turns gray, it means that you have reached the start point or end point.

Display parameter

Move mouse cursor to the "Display" push button on the right of the main interface (shown as Figure3.1), click on it, the parameters of this record will be displayed on the bottom of the main interface, and the maximum points of the 3 channels are marked by " * ". Click on the "Display" push button again will hide the parameters interface.

The meanings and units of the parameters will be described in detail in Appendix 1.

Cursor bar

If you want to know one point value at a selected time, cursor bar is

needed.

Move mouse cursor to where you want to observe in the blue display window, left click mouse, the little mouse cursor turns to a big cursor bar (see 3 in Figure3.5).

The value of this point is displayed on the left top of blue display window (see 1 in Figure3.5), in this case, it displays "X: 11.872, -2", it means that this point X value is -2cm/s^2 at 11.872 second. The value of the mouse cursor is shown at 2 in Figure3.5, it will be changed when the mouse cursor moved.

If you want to observe another point, you can move the big cursor bar to the point by press the ↑, ↓, ← or → key of the PC keyboard. Note 1 in Figure3.5 will be changed, it is corresponding channel point value at the selected time.
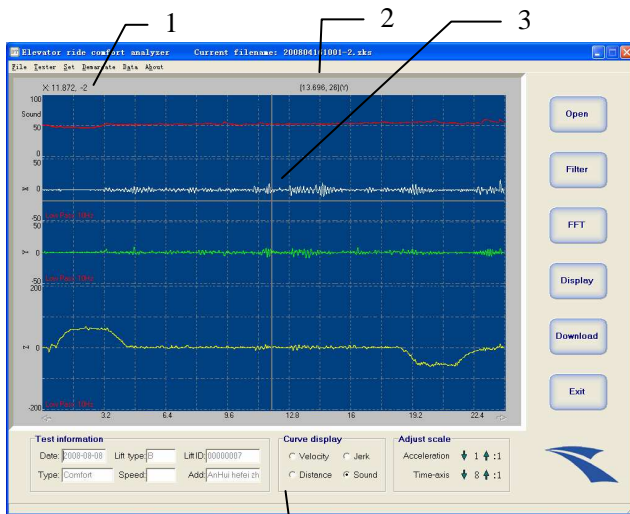
Fifure3.5 Cursor bar interface

3.4. Display velocity, distance and jerk curve

The velocity, distance and jerk curve of the vertical channel can be displayed for analyses. The Z channel will correspond to vertical channel if the DT-5 data-collection part was placed on the floor of the elevator.

The method of display curve is very simple, just move the mouse cursor to the "Curve display" box in the middle bottom of the blue display window (see 4 in Figure3.5), click on the switch box before "Velocity", "Jerk" or "Distance" will add a " √ " and the selection curve will be displayed. All of the 3 curves can be selected (shown as Figure3.6) and displayed at the top of the window, the bottom three window are still used for displaying X, Y and Z axis acceleration time history. For example, select "Distance", the window will be shown as Figure 3.6.
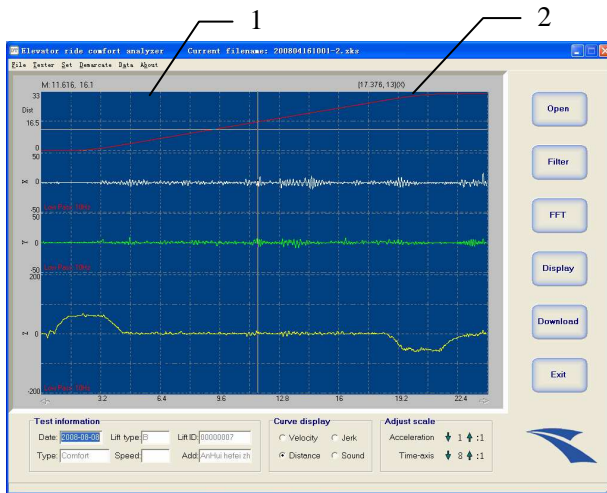
Figure3.6 Display distance curve

Click on it again the selection curve will be hidden.

If you want to know one point value at a selected time, cursor bar is still available in this interface. Move mouse cursor to where you want to observe in the blue display window, left click mouse, the little mouse cursor turns to a big cursor bar (see 2 in Figure3.6).

The value of this point is displayed on the left top of blue display window (see 1 in Figure3.6), in this case, it displays "M: 11.616, 16.1", it means that this point elevator location is 16.1 meter at 11.616 second.

If you want to observe another point, you can move the cursor bar to the point by press the ↑ , ↓ , ← or → key of the PC keyboard.

When you select different curve, the cursor bar function is also available, and the corresponding value will be displayed at the top of the window.

3.5. FFT (Fast Filter Transform)

The FFT is an extremely powerful trouble shooting tool which provides frequency information about the vibration.

Set FFT

Move the mouse to the beginning of the point of interest, left-click the mouse, the cursor turns to a big cursor bar, it's the beginning of the FFT, it can be moved.

Move mouse cursor to the "Tester" menu at the top menu bar, left-click the mouse to open a pull-down menu. Click on "FFT" will pop-up a dialog box, shown as Figure 3.7. Or, move mouse cursor to the FFT push button on the right of the main interface, left-click on it will pop-up a dialog box, shown as Figure 3.7. You can set channel, FFT Length and

FFT Unit, click on Cancel will close the dialogue, click on OK will display present analysis FFT result, Figure 3.8 shows a FFT result.

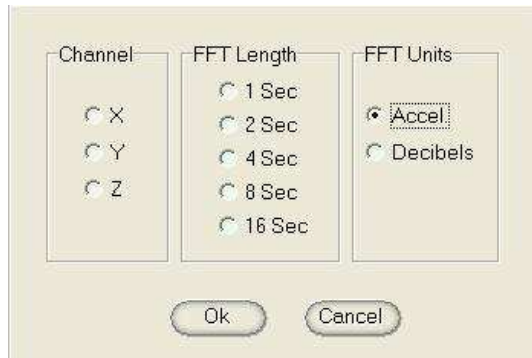This particular analysis shows the maximum acceleration is 2.47 milli(g) at 4hZ.

Figure 3.7 FFT setting dialogue

When you move the mouse cursor in the display window, the corresponding time and value will be shown on the left top of the display window.
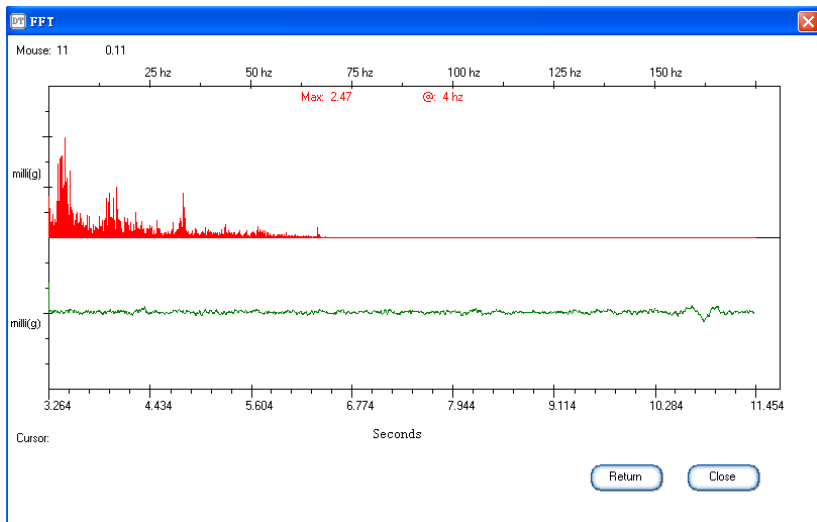
Figure 3.8 FFT result

Zoom

If you want to see detail, zoom FFT can be used.

Move the mouse to the beginning of the point of interest, keep the left-button of the mouse down and move to drag an area, which will be zoomed after you release the left-button of the mouse.

Zoom FFT can be used for only one time, if you want to zoom FFT again, first, click Return will return to the original FFT window, then mouse drag can be used and zoom FFT can be used again.

FFT Cursor Bar

If you want to know one point value at a selected time, cursor bar is needed. FFT cursor bar can be used after zoomed. In the roomed window, left-click the mouse will show a big cursor bar, see Figure 3.9.
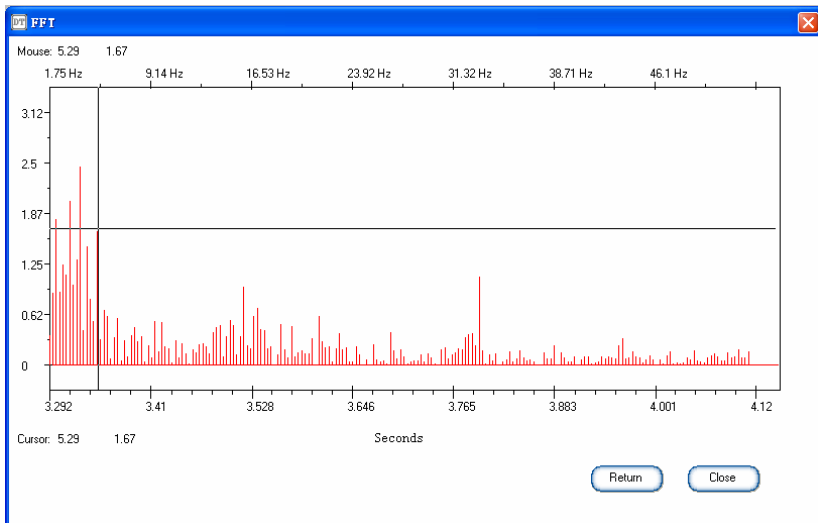
Figure 3.9 FFT cursor bar

When you press the ↑ , ↓ , ← or → key of the PC keyboard, the cursor bar will be moved and the Cursor value on the left bottom of the zoomed window will be changed.

When you move mouse, the Mouse value on the left top of the zoomed window will be changed.

Click on Return will return to the original FFT window, click on Close will close the window.

3.6. Filter

Filtering is a mathematical process of removing components of the total vibration signature outside of a certain band of frequencies. Specifically, the DT-5 software allows the acceleration data to be filtered using different pass band or ISO filter.

There are 4 sorts of pass band, that is, 10Hz, 12Hz, 100Hz and none-filter, the X and Y axis default filter pass band is 12Hz, the Z axis default filter pass band is 100Hz.

Figure 3.10 Set filter

You can choose deferent filter as you needed. The method is, move mouse cursor to "Set" at the top menu bar, left-click to open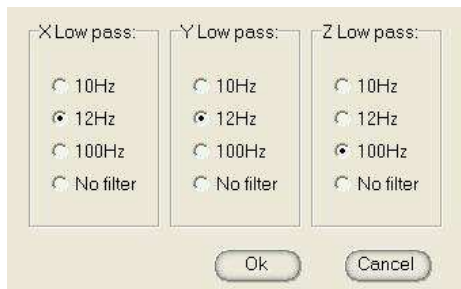 a pull-down menu. Click on "ISO" will select ISO filter, click "Filter" will pop-up a dialog box as Figure 3.10. You can select different pass band filter, Click "OK" will set the filter, click "Cancel" will only close this dialog box.

3.7. Print

You can use local printer attached to this computer or a network printer. Move mouse cursor to the "File" menu at the top menu bar, left-click the mouse to open a pull-down menu. There are "Print" and "Print Set" in the menu. Click on "Print Set" will open pop-up dialog box, set the type of the printer and paper (paper must be A4), then click "OK". After setting printer, move to "Print" in the menu will display "Accel" and "Curve". The "Accel" report includes parameters and curves of 3 axes vibration and sound level (shown as appendix 4), and the "Curve" report includes jerk, distance, velocity and acceleration of Z axis (shown as appendix 5). Click on "Accel" or "Curve" will begin to correspondingly print.

3.8. Set DT-5 clock

The clock inside the DT-5 data-collection part works continually no matter the DT-5 is powered on or off. If the clock loses the time, it is necessary to adjust it by PC.

The adjust method:

Connect the DT-5 data-collection part with PC by USB cable supplied, and let the DT-5 data-collection part working in online mode.

Run the DT-5 software on PC, move mouse cursor to the "Set" menu at the top menu bar, left-click the mouse to open a pull-down menu. Click on "Set DT-5 clock" will open pop-up dialog box, filled with current system time of your PC, the clock also can be changed in the same format. Click "OK" will download the setting clock to the DT-5 data-collection part, click "Cancel" will only close this dialog box.

3.9. File export to Excel

All files inside a selected directory can be exported to an Excel file automatically by using this function. Excel 2000 or above version is needed to be installed beforehand. The detail method:

Move mouse cursor to the "File" menu at the top menu bar, left-click the mouse to open a pull-down menu. Click on "Files" will pop-up dialog box, shown as Figure 3.11.

Figure 3.11 select directory

Select the file directory, double-click it, then left-click "OK" will start to export. It will pop-up an information when all of the files inside the directory have been exported to the Excel sheet.

3.10. Manual analysis

If a file cannot be analyzed automatically, or if you want to manual analysis a file, do as follows:

Move mouse cursor to the "Set" menu at the top menu bar, left-click the mouse to open a pull-down menu, click on "Manual", then open the file you want to analyze, and the whole period curve of the file will be shown. You need to set the start point and the end point of the starting period as S1 and E1, set the start point and the end point of the braking period as S2 and E2, then click on "Display" push button to show the results of the manual analysis.

3.11. Calibration and Demarcation

In order to guarantee that test result is accurate and reliable, the DT-5 data-collection part needs the regular calibration and demarcation.

Calibration and Demarcate has been done before sale, and the demarcation coefficients have been saved in the memory of the DT-5 data-collection part, revises the result automatically.

Please cautiously use this function when necessary.

Calibration method:

A. Place the DT-5 data-collection part on the standard shake table, keep it static and balance. Let the DT-5 data-collection part working in offline mode, clear the memory empty (It is in detail described in check memory of **chapter 2.4, user manual**).

B. Set the test type: Calibration, press "OK" gently, avoiding vibration

for 1 second then calibration test would begin in 60 seconds.

C. Guarantee that adjust the standard shake table to stable output a standard shake with the frequency of 10.5Hz and the oscillation amplitude of $\pm150cm/s^2$ within the 60 seconds.

D. The DT-5 data-collection part will stop testing automatically after recording for 5 seconds, and show the reference testing peak to peak value. Press "ESC" to exit.

E. Connect the DT-5 data-collection part with PC by USB cable supplied, and let the DT-5 data-collection part working in online mode. Run the DT-5 software on the PC

F. Choose "Data" at the top menu bar, click on it will pop-up "Download data", then click on "Download data", you can select any available directory to save data, but file name and file type mustn't be

changed, they are created automatically by system. When you select an available directory, move cursor to "Save", click to save.

G. Move mouse cursor to the "Open" push button on the right of the main interface, left click mouse, enter the directory saved data, then select the calibration file (*.zkb) to open. Once the calibration file opened, move mouse cursor to the "FFT" push button, a dialog box will be displayed on the left of the main interface shown as Figure 3.12.
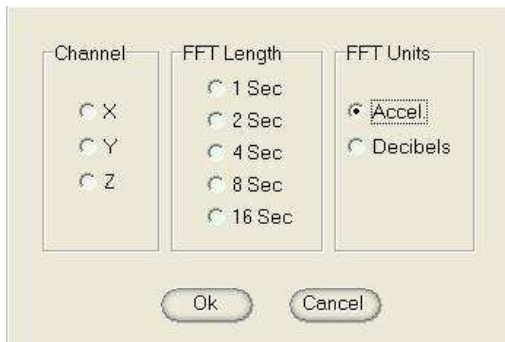
]

Figure 3.12 FFT setting dialogue

✧ When calibration direction Z, set channel is Z, set FFT Length is 4sec and set FFT Units is Accel, then click on OK will display present analysis FFT result, it is the testing maximal oscillation

amplitude value of direction Z, **remember this value as Z test value**!

- ✧ When calibration direction Y, set the channel is Y, FFT Length and FFT Units are same to the above, then click on OK to display the result, **remember this value as Y test value**!
- ✧ When calibration direction X, set the channel is X, FFT Length and FFT Units are same to the above, then click on OK to display the result, **remember this value as X test value**!
- H. Move mouse pointer to the "Demarcate menu" in the headline of the main menu, left-click the mouse and select "Download demarcate data" will open pop-up dialog box, shown as Figure 3.13.
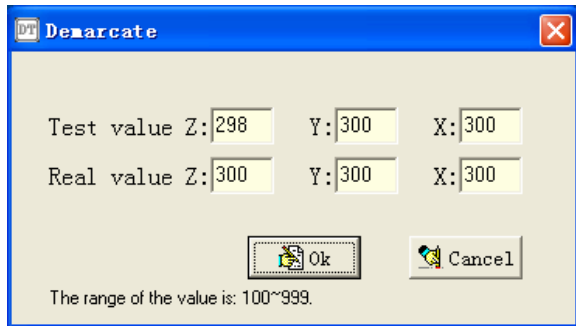
Figure 3.13

Input the test value and the real oscillation amplitude value of the standard shake table (this case is 300) of each direction, then click "OK" will write this new demarcation coefficients into the memory of the DT-5 data-collection part and be saved until next calibration, click

"Cancel" will not adjust the demarcation coefficients and close this dialog box.

I. The above steps can be done repeatedly until meet the standards.

J. When end calibration, clear the memory empty.

Chapter 4: Maintenance and Cautions:

4.1. Battery

The type of the battery must be **9V 6LR61**.

The DT-5 data-collection part can continuously work for about 4 hours. If the voltage of the battery is insufficient (lower than 6.8V) , the DT-5 data-collection part will prompt you, and the LCD display will twinkle.

Replace battery method: It is in detail described in the beginning of the manual, **chapter Instrument structure**.

Automatic shutdown: If you don't operate for more than 60s, the DT-5 will shutdown automatically. (When DT-5 works in online mode and be in testing state, it won't shutdown automatically).

You'd better switch the DT-5 off by yourself (shown as figure 1).

4.2. Interfere

The DT-5 data-collection part is a very sensitive device, we should pay attention to keep it clean, waterproof at ordinary time; avoid being shaken violently and percussion fiercely artificially.

When vibration happens, the strong interfering signal appears in three directions. Please don't change the orientation of the DT-5 data-collection part before testing for nearly 1 minute then try again (It is in detail described in the **chapter 2.5**); or check whether the battery is not enough.

4.3. The communication of the instrument

USB port of instrument allows "hot insert or draw". That is, no matter the DT-5 data-collection part or Pc turned on or off, remove and install can

be done.

Insert and pull out gently, don't rotate otherwise the plug, jack or cable may be damaged.

Proposed operating order: Start the PC first, then join the communication cable of USB, and switch DT-5 data-collection part to the on position finally.

Only after installing the driver program successfully, the USB LED will be lighted when the DT-5 data-collection part connected with PC and working in online mode.

The method of install the driver program is in detail described in the **chapter 1.3**.

4.4. Stability

In order to guarantee to the stability of the DT-5 software, while operating DT-5, please don't operate other procedures.

4.5. Memory

When the data is retrieved, the memory of the DT-5 data-collection part is not cleared. If there is a communication failure for any reason, the process can be repeated. **Verify that the recordings have been transferred properly by viewing the serial of files before clearing the memory of the DT-5 data-collection part.** The operation of clear the memory is described in detail in **chapter 2.4**.

The memory is limited, the more data stored in the memory of the DT-5 data-collection part, the more USB communication time is needed, so

you'd better transfer the recordings in DT-5 data-collection part to the PC after finishing testing and then clear the memory empty.

4.6. Service

In any case when you were in trouble in using the DT-5, you would expect to obtain the solution and the help from our company.

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Appendix 1: Parameter definition

Parameter	Definition	Unit
Acc_process_time	The lasting time in the lift accelerating course	S
Acc_process_avg	The average acceleration in the lift accelerating course	m/s²
Acc_process_max	The maximum acceleration in the lift accelerating course	m/s²
Acc_process_a95	a95 acceleration in the lift accelerating course	m/s²
Dec_process_time	The lasting time in the lift slowdown course	s

Dec_process_avg	The average deceleration in the lift slowdown course	m/s²
Dec_process_max	The maximum deceleration in the lift slowdown course	m/s²
Dec_process_a95	a95 deceleration in the lift slowdown course	m/s²
X_max_a	The maximum vibration peak-to-peak value in X axis	m/s²
X_a95_a	a95 vibration peak-to-peak value in X axis	m/s²
Y_max_a	The maximum vibration peak-to-peak value in Y axis	m/s²
Y_a95_a	a95 vibration peak-to-peak grade in Y axis	m/s²

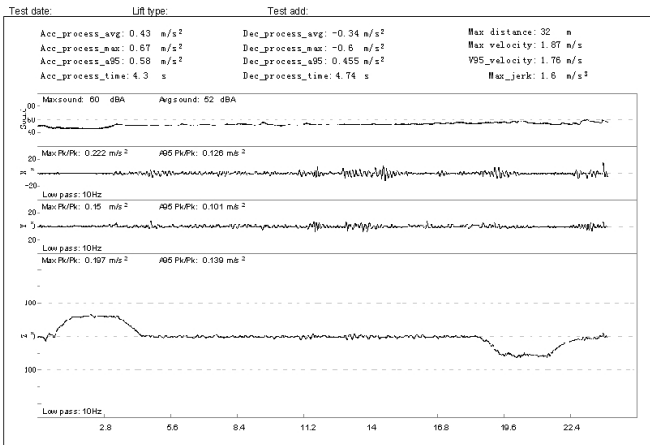| Z_max_a	The maximum vibration peak-to-peak value in Z axis	m/s²
Z_a95_a	a95 vibration peak-to-peak grade in Z axis	m/s²
max_jerk	The maximum acceleration of acceleration in Z axis	m/s²
v95_velocity	V95 speed of the lift	m/s
max_velocity	The maximum speed of the lift	m/s
Max_distance	The maximum displacement	m
Max_sound	The maximum noise	dBA
Avg_sound	The average noise	dBA

Appendix 2: Explanation of nouns

1. a95 acceleration in the lift accelerating course: It is the maximum acceleration in the range of 5% to 95% of the maximum speed in the first half.

2. a95 deceleration in the lift slowdown course: It is the maximum deceleration in the range of 5% to 95% of the maximum speed in the latter half.

3. The maximum peak-to-peak value: It is the maximum one of all peak-to-peak values found in the defined demarcation（Arithmetic sum of two signal peak-to-peak values in the opposite direction）.

4. a95 vibration peak-to-peak grade: It is the value that 95% of the peak-to-peak grades are no more than it in the defined demarcation.

5. The maximum acceleration: It is the maximum absolute acceleration value in Z axis of the defined demarcation.

6. V95 speed：It is the maximum speed between the time 95% maximum speed point in acceleration range adding 1s to the time 95% maximum speed point in deceleration range pulsing 1s.

Appendix 3: Main technical indicator of the instrument

- ✧ Memory: 4096Kb;
- ✧ Display: 122*32;
- ✧ Communication: USB;
- ✧ Sensor: 3 axes accelerations, 1 microphone;
- ✧ Range:
  - Vertical: Dynamic measurement $\pm980cm/s^2$;
  - Horizontal: Dynamic measurement $\pm300cm/s^2$;
  - Sound: 30~100dB;
- ✧ Dynamic Correction Precision:≤2%;
- ✧ The Baseline Noise:≤$5cm/s^2$;
- ✧ Frequency response: selectable 10Hz, 12Hz, 100Hz and none-filter according to different measurement requests;
- ✧ Power: DC 9V 6LR61;
- ✧ Dimensions: 153mm×104mm×34mm;
- ✧ Weight: 0.5Kg.

Appendix 4: "Accel" report

Appendix 5: "Curve" report