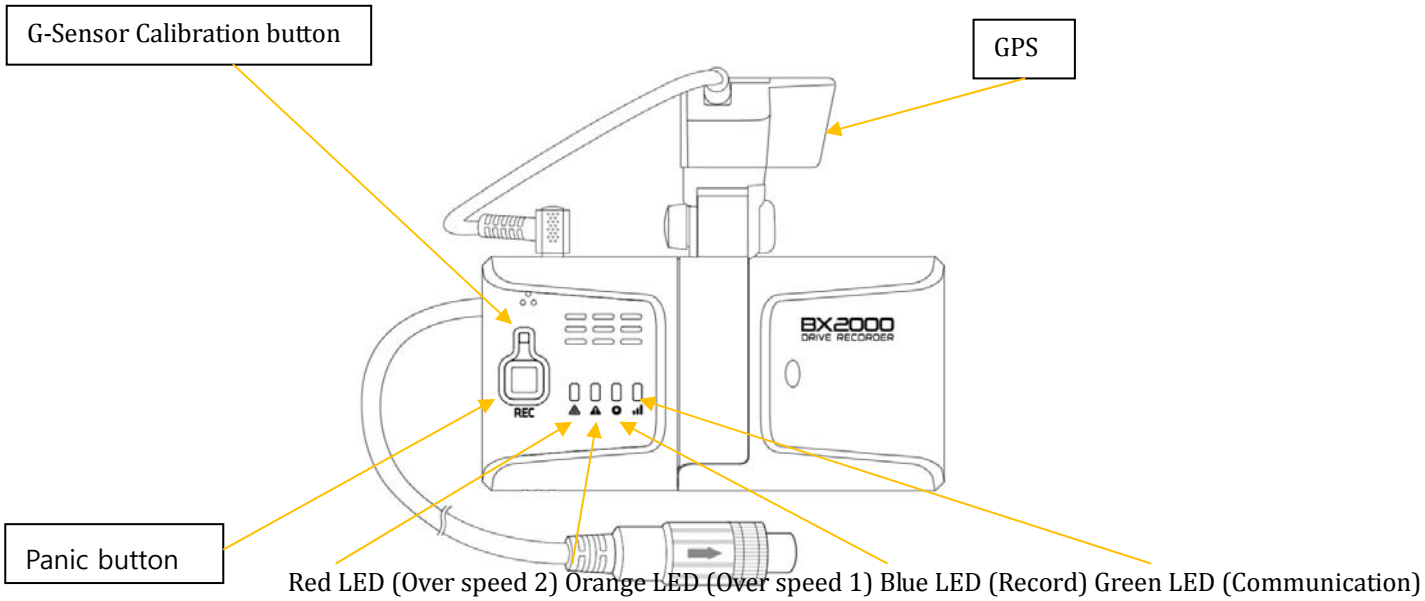
BX2000

USER GUIDE

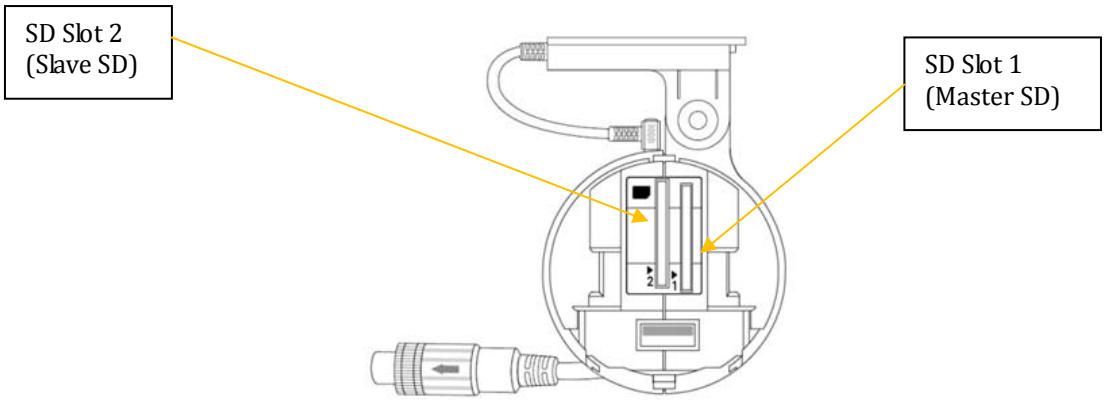
Ver. 2.1.0

- Thank you for purchasing SmartyHD.
- Please read this USER GUIDE carefully before using this Drive Recorder.
- Please keep this USER GUIDE in an easily accessible location.

Rear


G-Sensor Calibration button
GPS
BX2000
DRIVE RECORDER
REC
Panic button
Red LED (Over speed 2) Orange LED (Over speed 1) Blue LED (Record) Green LED (Communication)

Side


SD Slot 2
(Slave SD)
SD Slot 1
(Master SD)

Operation

Automatic start

Start the vehicle after install the BX2000 using the provided cable, the BX2000 will be automatically started.

The BX2000 will not start recording immediately after power on. It takes around 1 minute for the built-in power backup system to be charged. Thereafter, the internal flash memory will be ready to record.

** Please make sure to turn off the power of the BX2000 when inserting or ejecting the SD card and the USB 3G/4G dongle.

(LED operation at start-up)
Red LED On (around 6 sec) → Red LED (Warning) and Orange LED On (around 12sec) →
Red LED, Orange LED, Blue LED, Green LED On in sequence
(around 40 ~ 50sec) → Blue LED On/Off (Starting time: around 60 ~ 70sec)
(Buzzer sound operation at start-up)
Single "Beep" after starting.

G-Sensor Calibration

G-Sensor Calibration is needed after installing the BX2000.
Turn on the BX2000 and park the vehicle on a flat surface.
Press [G-Sensor Calibration] button one seconds.
This G-Sensor calibration is only needed at the first time the BX2000 is used.

Normal record (Continuous record)

The Normal(continuous) recording will be automatically started after power on.
The normal record files will be made every 10 minutes.
(LED operation of the Continuous record)
The blue LED is blinking slowly.

Event record

The event recording will be automatically started by G-sensor or Panic button or Alarm.
G-sensor sensitivity can be set with your PC.
Each event file contains up to 20 seconds prior & up to 20 seconds post event.
And the event file can be extended by 2nd trigger during event record.
When events are triggered continuously, for every event, 20 seconds post-recording from the time of the event will be added to the event data file with a maximum recording time of 3 minutes. When this 3 minutes is reached, the file will be split and a new file will be created but the data will be continuous.
(LED operation of the Event record)
The Blue LED is blinking.
(Buzzer sound operation of the Event record)
"Ping pong, Ping pong" when an event triggered.

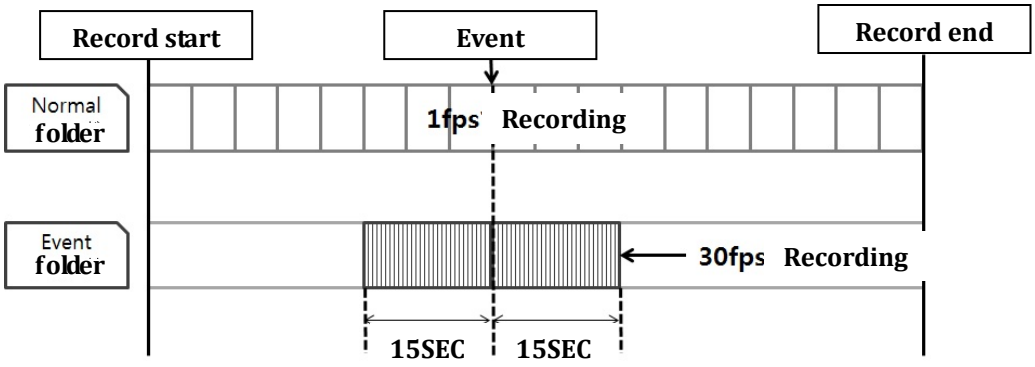
Auto format

The auto format function is optional. When any one of the SD card has an error and can't record, all cards will be formatted and all data will be erased. If a preset configuration is on the SD card this information will be saved and applied after the auto format but if there is no configuration information, default settings will be applied.

Dual record (Event & Normal record)

1) When we use only one SD card,

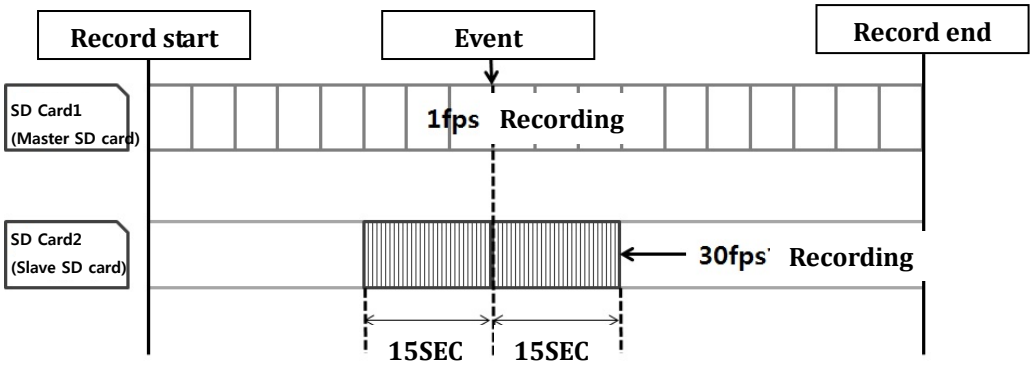
The Normal (continuous) record fps is 1fps and the file will be stored on the “Normal” folder.
Event record will work according to the Fps setting for example 30frames per second recording and the file will be stored on the “Event” folder



Picture 1) fps setting: 30fps, Pre / Post time: 15 sec

2) When we use two SD cards,

The Normal (continuous) record file will be stored on the SD slot No. 1
And the Event record file will be stored on the SD slot No.2



Picture 2) fps setting: 30fps, Pre / Post time: 15 sec

(LED operation of the Dual)

The Blue LED is blinking slowly during normal recording, and the blue LED is blinking fast during event recording.

(Buzzer sound operation of the Dual record)

"Ping pong, Ping pong” when an event triggered.

***Remark**

“Beep, Beep, Beep, Beep, Beep, Beep” sound will occur when SD error or SD full (overwrite off).
This can be turned off at setup page on PC viewer, if required.

Driving file record

The DRV (Driving) file will be recorded during driving even if there are no events or video. The DRV file is consist of GPS and G-sensor data and it helps to find specific data or driving behaviors.
The DRV file overwrites the oldest data. The DVR files will be made every 10 minutes.

Communication

The USB 3G/4G modem is attached to the USB terminal.
To use the USB3G/4G modem at BX2000, please contact your local distributor.

(LED operation of the communication)
Communication modem is properly recognized, Green LED lights when the state can communicate.
Communication LED (green) will flash when communication is actually performed.

(Buzzer sound operation of the communication)
Buzzer will sound as follows when the buzzer does not at the time of the communication, but communication error has occurred.
- Communication error: "beep, beep" (twice)
- Communication modem recognition errors: "beep, beep, beep" (3 times)

Over speed

Excessive speed can be set in two stages.
Over speeding 1:60 Km, over speeding 2: 80 Km
(LED operation of the over speeding)
Over Speeding1: The orange LED lights up for 5 seconds.
Over Speeding2: The Red LED lights up for 5 seconds.
(Buzzer sound operation of the over speeding)
Trigger sound will be "Ping pong, Ping pong," said when the over speeding occurs both excessive speed 1 and 2.

SD card initialization

Insert the SD card you want to initialize then connect the power.
Press and hold the Reset button for more than 3 seconds once the 4 LED four will start flashing in sequence about 20 seconds after the power on.
The Blue and Green LED flashes at the same time initialization of the SD card will begin.

Initialization operation of the SD card is 90 seconds from 10 seconds depending on the size of SD card.
Initialization of the SD card is completed the product will restart automatically.
Once complete, all files will be deleted and the configurations will default to the factory settings.
(LED operation of the SD card initialization)
The Blue and Green LED flash at the same time.
(Buzzer sound operation of the SD card initialization)
Buzzer will not sound.

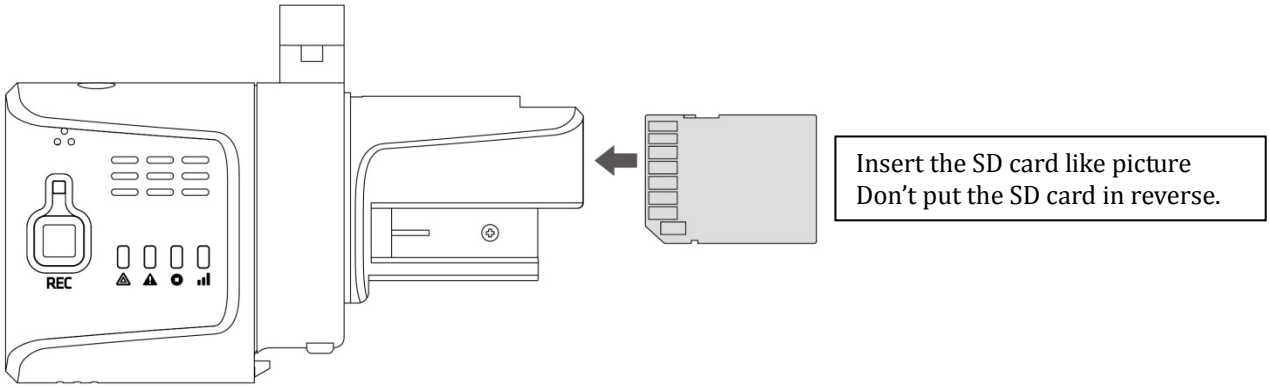
*** Warning**
Please do not remove the SD card during initialization.
There is a possibility that the SD card can be destroyed.

Removing the SD memory card

Turn off the power and then check the BLUE LED light. Once the BLUE LED light is off, take out the SD memory card. Press [G-Sensor Calibration] button more than 3 seconds and then remove SD card.

Inserting the SD memory card

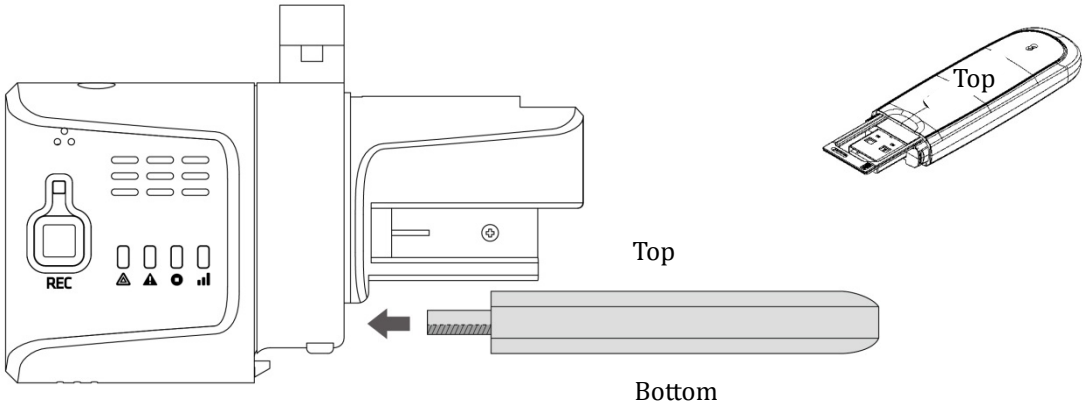
Turn off the power and then check the BLUE LED light. Once the BLUE LED light is off, insert the SD memory card.



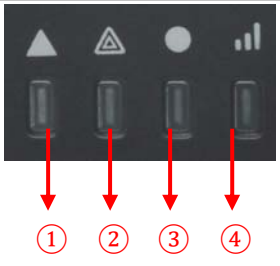
This product can be used up to two SD card.
Please insert the master SD which has the "Setting.ini" file at SD slot No.1

Inserting the 3G/4G USB modem

Turn off the power and then check the BLUE LED light. Once the BLUE LED light is off, insert the 3G/4G USB modem.



LED/Buzzer Specification



① Red LED (Over speed 2)

② Orange LED (Over speed 1)

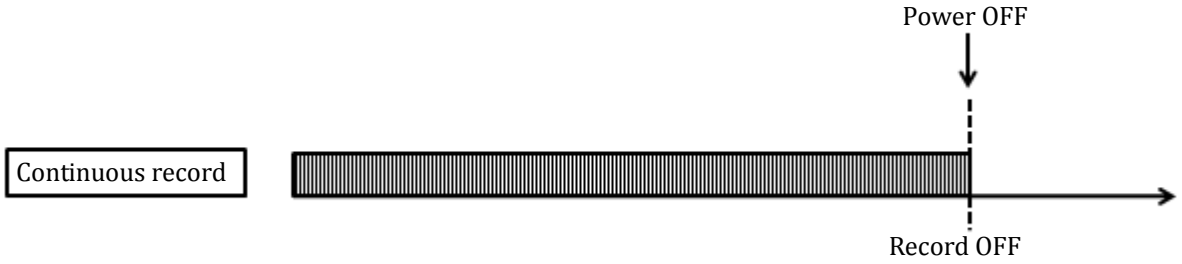
③ Blue LED (Record)

④ Green LED (Communication)

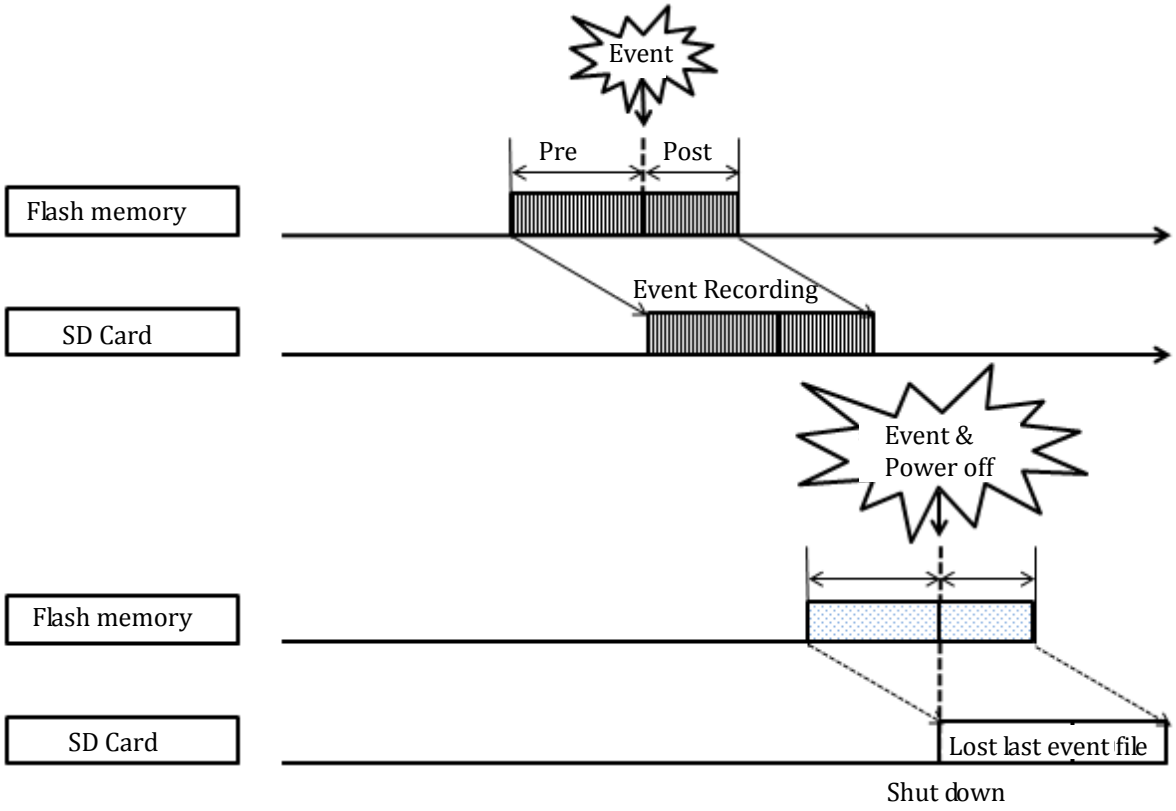
Item			LED				Buzzer Sound
			Red 	Orange 	Blue 	Green 	
Start-up			On (around 6sec)				
			On (around 12sec)				
			Flashing in sequence (around 40～50se)c				
					On (Start-up completion)		"Beep" (1 times)
Record	Normal record				Flashing (Blink rate : slow)		
	Event record	Before Event			On		
		Event			Flashing (Blink rate : fast)		"Ping-pong ping-pong " (1 times)
	Dual record	Normal record			Flashing (Blink rate : slow)		
		Event record			Flashing (Blink rate : fast)		"Ping-pong ping-pong " (1 times)
3G/4G	Connected					On	
	Sending data					Flashing (Blink: fast)	
Over Speed	Over Speed 1			On			"Pirippiri~tsu" (1 times)
	Over Speed 2		On				"Pirippiri~tsu" (1 times)
G-sensor calibration							"Beep" → (about 3 seconds) → "Pong"
SD card initialization					Simultaneous flashing		"Beep" (2 seconds
Firmware Upgrade					Flashing sequentially		
SD card full					Flashing / 3 times (blink : Long) ↓ Extinction (About 3 seconds))		beep (3 times)
Error	Record error		Simultaneous flashing				beep (3 times)
	Camera 2 video loss		Simultaneous flashing				
	3G/4G device error					OFF	beep (3 times)
	3G/4G service error					Flashing (Blink: slow)	beep (2 times)
	Without driver.inf file						beep (1 times)
	Without setting file		4 seconds simultaneous flashing (The repeated every Minute)			4 seconds simultaneous flashing (The repeated every Minute)	beep (2 times)

Recording when power cut

[During continuous recording]
The continuous video recording will be recorded up to just before the end of the power (ACC off).



[During event recording]
When the power (ACC off) is off and simultaneously an event is triggered, there is no time to record the event file. There is a possibility of lost the last event file.



[During dual recording]
The continuous video recording will be recorded up to just before the end of the power.
When the power (ACC off) is off and simultaneously an event is triggered, there is no time to record the event file. There is a possibility of lost the last event file.

BX2000 Specification

Image sensor	2 megapixel color CMOS
Angle of View	129.5° (horizontal: 107 °, vertical: 55.7 °)
2nd camera	Camera 2 (5V camera in)
Voice	Built-in microphone
Recording resolution	Body camera : 1280x720, 640x480, 320x240 2nd camera: NTSC: 720x480, 720x240, 352x240 PAL: 720x576, 720x288, 352x288
Frame rate	Total: Max.60 fps Built-in camera: Max.30fps, 2nd camera: Max.30 fps
Recording	Continuous mode Event mode (G-sensor, Panic button, Alarm) Dual (Continuous + Event) mode
Recording time	Event: before 20 (15, 10, 5) sec after 20 (15, 10, 5) sec, Continuous recording: Min 100min ~ Max 167hours
GPS	Internal GPS
G-Sensor	Internal 3-axis G-sensor
Memory	2 x SDHC flash memory card (support 4GB, 8GB, 16GB, 32GB) Max. 32GB + 32GB
RTC	Internal battery
Buzzer	Recording start, error
LED	4 LED (Red, Orange, Blue, Green)
Super Capacitor	Enable recording last file and shut down
PC software	PC Viewer
Alarm In	Cigar Jack: N / A Power Adapter: 1 EA Junction Box: 4 EA
Alarm Out	Cigar Jack: N / A Power Adapter: 1 EA Junction Box: 4 EA
Signal input	Cigar Jack: N / A Power Adapter: N / A Junction Box: Left, Right, Brake, Reverse, Speed Pulse, RPM Pulse, ACC
Recording Format	Video: H.264, audio: G.711
Communication	USB type modem (optional)
Power	Cigar Jack: Input DC 12V/24V 2A OUTPUT : DC 5V, 3A Power Adapter: Input :DC 12/24V, 2A, OUTPUT : DC 5V, 3A Junction Box: Input :DC 12/24V, 2A, OUTPUT : DC 5V, 3A
Size/Weight	110mm x 57Ø, 150g
Operation temperature	-10 ~ +55 ℃

BX2000 Recording Time Table (Continuous Recording)

Camera1			4GB	8GB	16GB	32GB
Resolution	Quality	FPS				
HD(720P) 1280x720	SUPER	30	1.8hours	3.5 hours	7.1 hours	14.2 hours
		1	8.4 hours	16.7 hours	33.4 hours	66.9 hours
	HIGH	30	2.2 hours	4.4 hours	8.8 hours	17.6 hours
		1	10.2 hours	20.5 hours	40.9 hours	81.9 hours
	Normal	30	2.9 hours	5.8 hours	11.6 hours	23.2 hours
		1	13.2 hours	26.4 hours	52.8 hours	105.7 hours
VGA 640x480	SUPER	30	4.3 hours	8.5 hours	17.0 hours	34.0 hours
		1	18.6 hours	37.2 hours	74.4 hours	148.9 hours
	HIGH	30	5.5 hours	11.1 hours	22.2 hours	44.4 hours
		1	23.4 hours	46.8 hours	93.5 hours	166.7 hours
	Normal	30	8.0 hours	16.0 hours	31.9 hours	63.8 hours
		1	31.5 hours	62.9 hours	125.9 hours	166.7 hours
QVGA 320x240	SUPER	30	14.2 hours	28.4 hours	56.8 hours	113.6 hours
		1	48.1 hours	96.2 hours	166.7 hours	166.7 hours
	HIGH	30	16.8 hours	33.7 hours	67.3 hours	134.6 hours
		1	53.8 hours	107.6 hours	166.7 hours	166.7 hours
	Normal	30	20.6 hours	41.3 hours	82.6 hours	165.1 hours
		1	61.0 hours	122.0 hours	166.7 hours	166.7 hours

Camera1			Camera2			4GB	8GB	16GB	32GB
Resolution	Quality	FPS	Resolution	Quality	FPS				
HD(720P) 1280x720	SUPER	15	D1 720x480	SUPER	15	2.1	4.3	8.6	17.2
		1			1	6.1	12.2	24.4	48.8
	HIGH	15		HIGH	15	2.7	5.4	10.8	21.6
		1			1	7.6	15.3	30.6	61.1
	Normal	15		Normal	15	3.7	7.3	14.6	29.3
		1			1	10.2	20.4	40.9	81.7
VGA 640x480	SUPER	30	HD1 720x240	SUPER	30	2.8	5.7	11.4	22.8
		1			1	13.2	26.3	52.7	105.4
	HIGH	30		HIGH	30	3.6	7.3	14.6	29.2
		1			1	16.5	33.0	66.1	132.2
	Normal	30		Normal	30	5.1	10.1	20.3	40.6
		1			1	22.1	44.3	88.6	166.7
QVGA 320x240	SUPER	30	CIF 352x240	SUPER	30	7.6	15.2	30.5	61.0
		1			1	31.3	62.6	125.1	166.7
	HIGH	30		HIGH	30	9.2	18.3	36.6	73.2
		1			1	36.3	72.5	145.1	166.7
	Normal	30		Normal	30	11.5	22.9	45.8	91.6
		1			1	43.1	86.3	166.7	166.7

* This is a guideline only. Actual results may very depending on a variety of factors.

[Limitation of the total file number]
At the Event Record Mode,
1 camera recording: The number of files is limited to a maximum of 3,000.
2 camera recording: The number of files is limited to a maximum of 2,000.
At the Continuous Record Mode,
Regardless of the number of cameras, recording the maximum number is 1,000.
At the Dual (Continuous + Event) Record mode
1 camera recording, maximum recording number (Event folder: 2,000, Normal folder: 1000)
2 camera recording, maximum recording number (Event folder: 1,500, Normal folder: 1000)

File number of recorded if it has more than 1000, which is the maximum number of recording in continuous recording mode, it will be overwritten from the oldest data of the SD card.

BX2000 Recording Time Table (Event Recording)

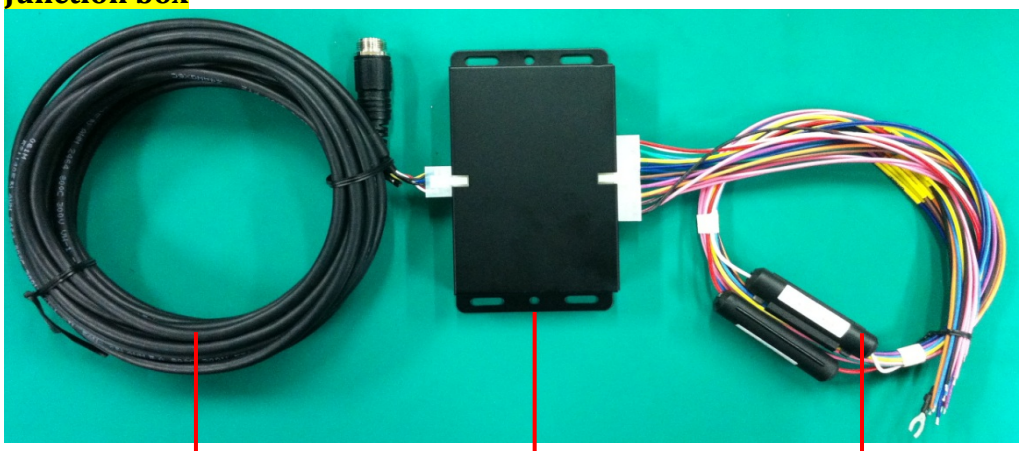
Camera1			4GB	8GB	16GB	32GB
Resolution	Quality	FPS				
VGA 640x480	SUPER	30	750 Events	1500 Events	3000 Events	3000 Events
	HIGH	30	900 Events	1800 Events	3000 Events	3000 Events
	NORMAL	30	1350 Events	2700 Events	3000 Events	3000 Events

Camera1			Camera2			4GB	8GB	16GB	32GB
Resolution	Quality	FPS	Resolution	Quality	FPS				
VGA 640x480	SUPER	30	D1 720x480	SUPER	30	375 Events	750 Events	1500 Events	2000 Events
	HIGH	30		HIGH	30	450 Events	900 Events	1800 Events	2000 Events
	NORMAL	30		NORMAL	30	700 Events	1400 Events	2000 Events	2000 Events

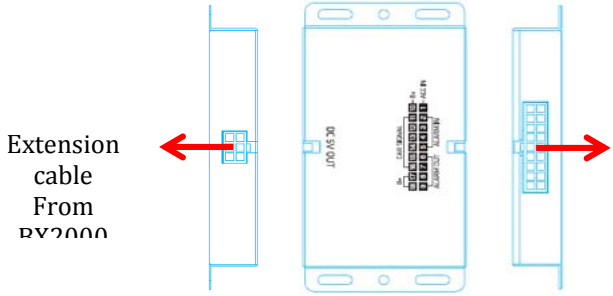
BX2000 Recording Time Table (Dual Recording)

Camera1			Camera2			Record Folder	4GB	8GB	16GB	32GB
Resolution	Quality	FPS	Resolution	Quality	FPS					
VGA 640x480	SUPER	1	D1 720x480	SUPER	1	Normal folder	5 hours	10 hours	20 hours	40 hours
		30			30	Event folder	185 Events	370 Events	740 Events	1480 Events
	HIGH	1		HIGH	1	Normal folder	6hours	13 hours	26 hours	52 hours
		30			30	Event folder	225 Events	450 Events	900 Events	1500 Events
	NORMAL	1		NORMAL	1	Normal folder	9 hours	18 hours	37 hours	74 hours
		30			30	Event folder	350 Events	700 Events	1400 Events	1500 Events

Junction box

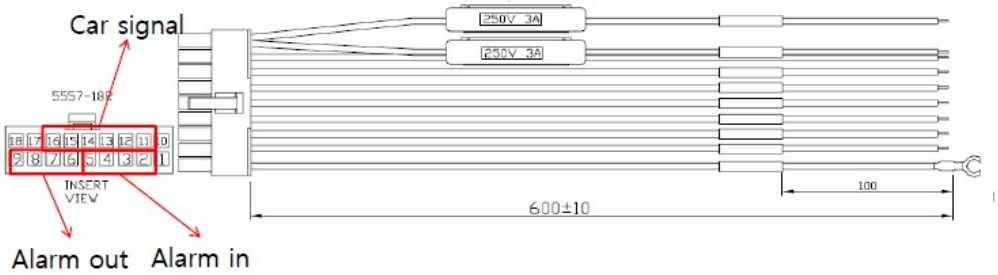


Extension cable from BX2000 | Junction box | Signal and Power cable



Extension cable From BX2000

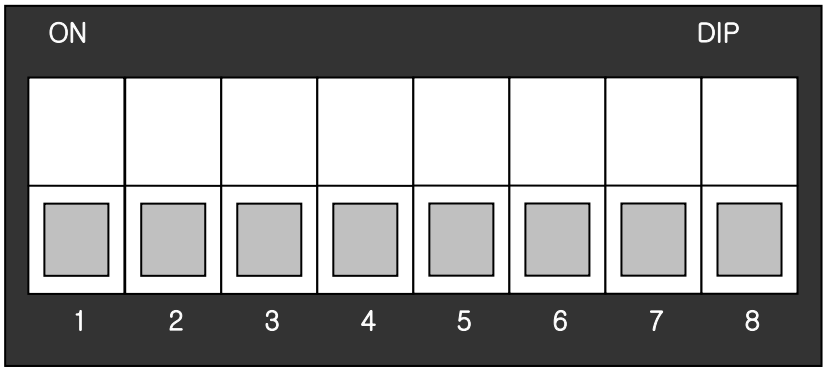
Signal and Power cable from vehicle.



1. ACC IN (White)
2. Alarm IN 1 (Sky Blue): Voltage ON / OFF
3. Alarm IN 2 (Sky Blue): Voltage ON / OFF
4. Alarm IN 3 (Sky Blue): Normal OPEN / CLOSE
5. Alarm IN 4 (Sky Blue): Normal OPEN / CLOSE
6. Alarm OUT1B (Pink)
7. Alarm OUT1A (Pink)
8. Alarm OUT2B (Pink)
9. Alarm OUT2A (Pink)
10. Battery + (Red)
11. Left signal (Green)
12. Right signal (Yellow)
13. Brake signal (Blue)
14. Reverse signal (Brown)
15. Speed Pulse (Violet)
16. RPM (Orange)
17. Battery – (Black)
18. Battery _ (Black)

Junction Box DIP Switch Setting

1) Switch (On: Low, Off: High)



2) Delayed shutdown Time Setting

DIP Switch No.			**Time**
1	**2**	**3**	
OFF	OFF	OFF	1 Min
ON	OFF	OFF	30 Min
OFF	**ON**	OFF	1 H
ON	**ON**	OFF	2 H
OFF	OFF	**ON**	4 H
ON	OFF	**ON**	15 Min
OFF	**ON**	**ON**	∽
ON	**ON**	**ON**	0

3) Power On Delay Time Setting

DIP Switch No.		**Time**
4	**5**	
OFF	OFF	0 Sec
ON	OFF	5 Sec
OFF	**ON**	10 Sec
ON	**ON**	30 Sec

5) Not Used

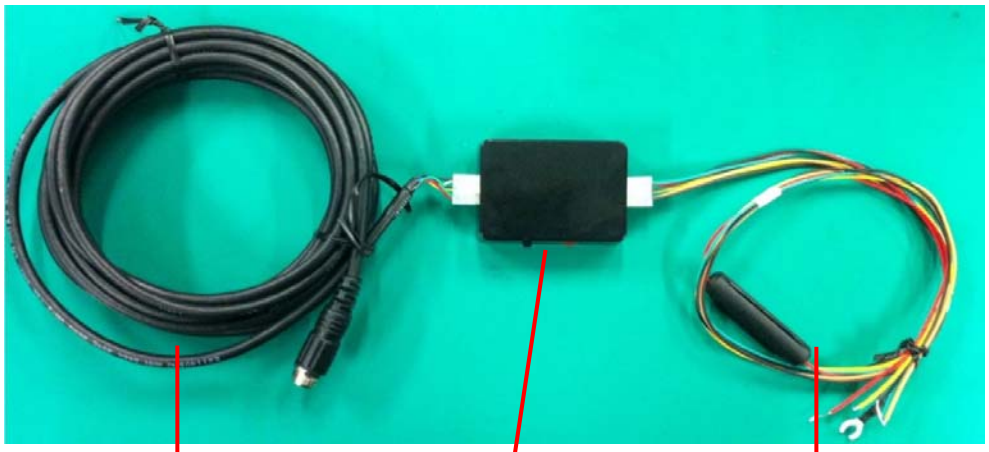
DIP Switch No.		**Description**
6	**7**	
Not used	**Not used**	**Not used**

4) 12V / 24V Select Setting

DIP Switch No.	**Voltage**
8	
OFF	12 V
ON	24 V

Input Voltage	DC 12V/24V, 2A		
Output Voltage	DC 5V, 3A		
Operation Temp.	-20℃ ~ 60℃		
[When it use at 12V car]		[When it use at 24V car]	
Initial Voltage (To turn on the unit)	12.39V	Initial Voltage (To turn on the unit)	23.3V
Power Cut Voltage	11.9V	Power Cut voltage	22.7V

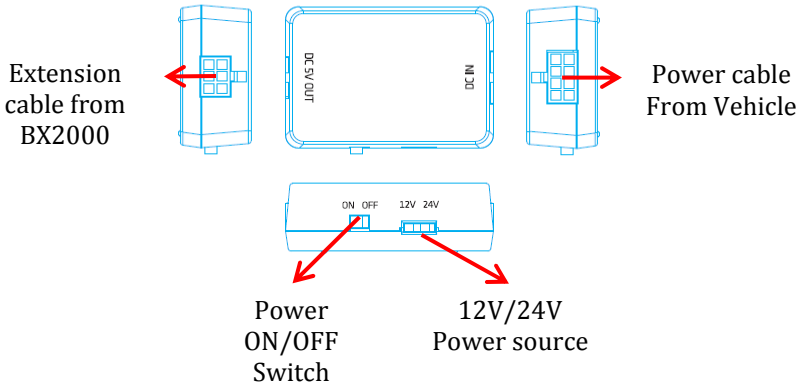
Power Adaptor

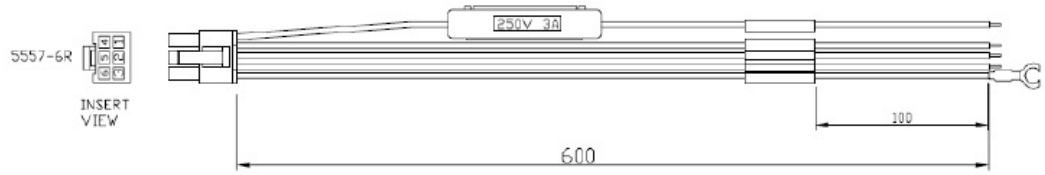


Extension cable from BX2000

Power Adaptor

Power cable





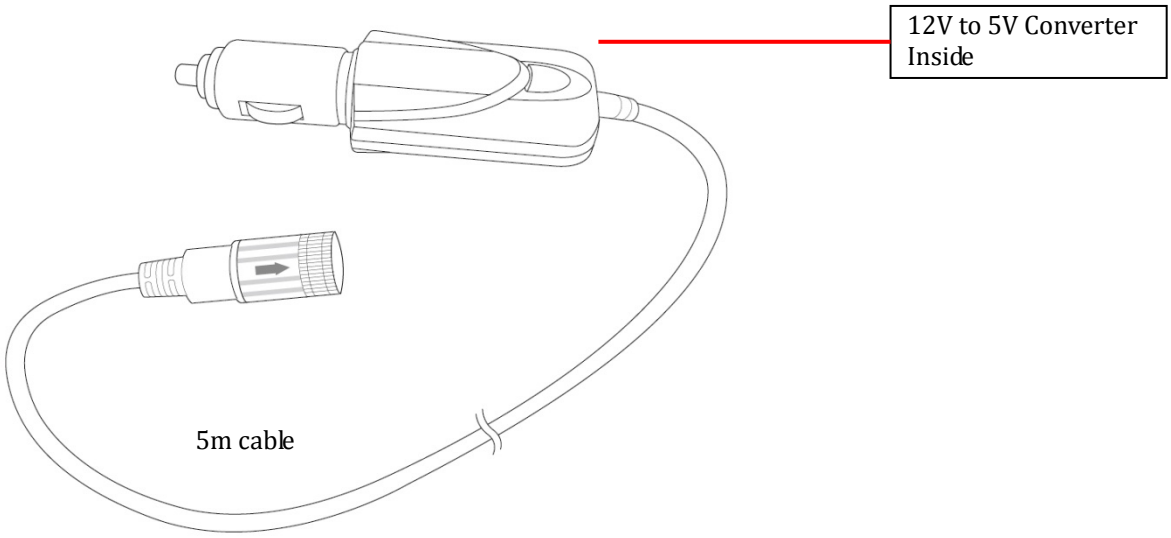
1. Battery + (Red)
2. Alarm OUT 1 (Yellow): "HIGH" to “LOW”
3. Alarm OUT 2 (Orange): "HIGH" to “LOW”
4. Alarm IN (Green): Normal OPEN / CLOSE
5. Battery - (Black)
6. Battery - (Black)

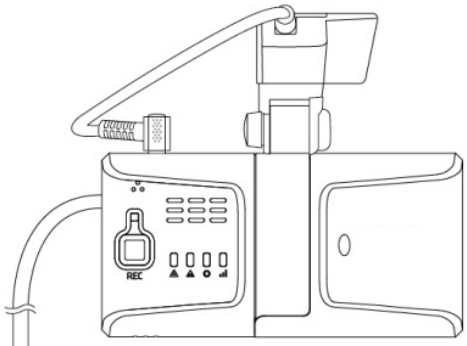
The Power Adaptor will automatically cut off the battery power when battery voltage dropped below 12V or 24V.

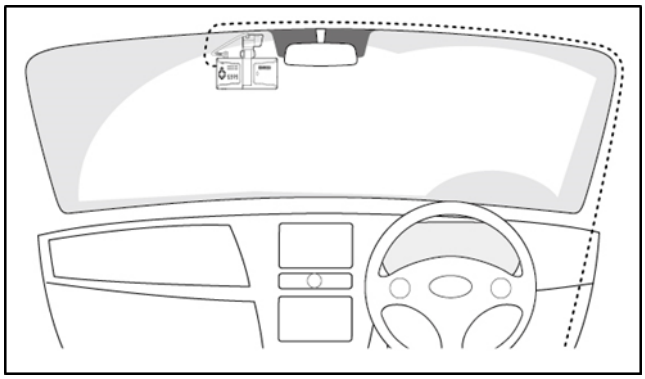
Input Voltage	DC 12V/24V, 2A		
Output Voltage	DC 5V, 3A		
Operation Temp.	-20℃ ~ 60℃		
[When it use at 12V car]		[When it use at 24V car]	
Initial Voltage (To turn on the unit)	12.5V	Initial Voltage (To turn on the unit)	23.2V
Power Cut Voltage	12V(±0.2V)	Power Cut voltage	22V(±0.4V)

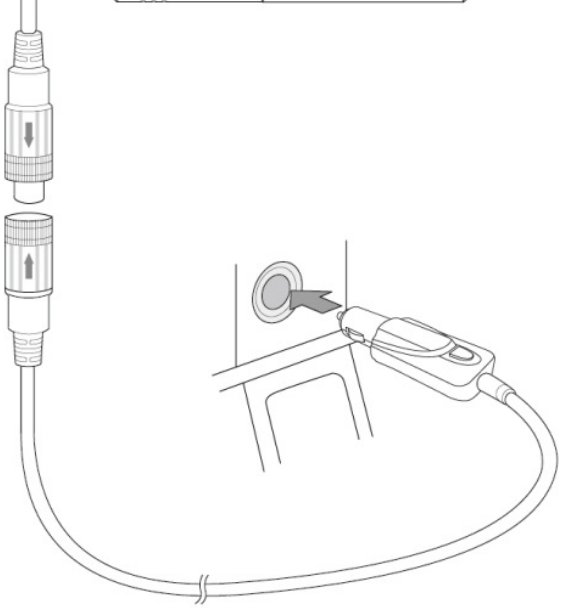
Cigar Power

DC 12V only









BX2000 Analysis Software

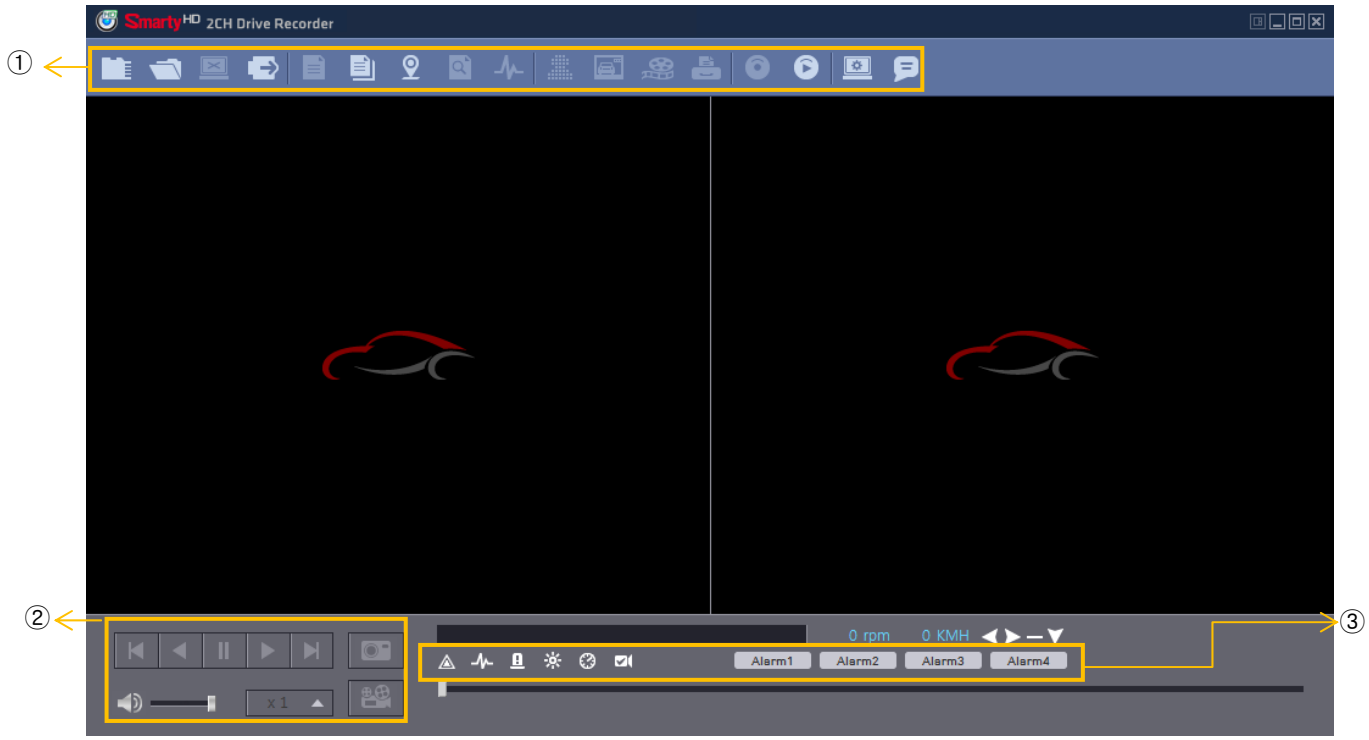
BX2000 allows you to play the recorded data by the BX2000 Analysis Software.

Installation of BX2000 Analysis Software

Insert the SD card and run the [setup.exe] file at the [Software] folder.
Select the language of use at the beginning and follow the on-screen instructions to install the software.
The following icon appears on your PC if you check [create a desktop icon] during installation.

BX2000 Analysis Software Icon

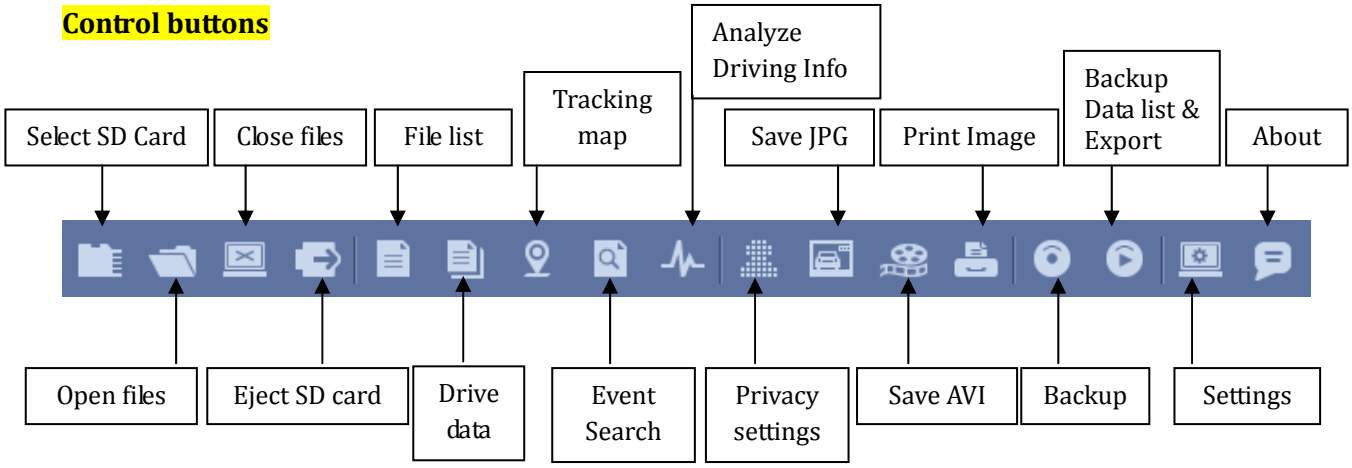
Description and execution of BX2000 Analysis Software.
Insert the SD Card of BX2000 and double click the icon of BX2000 Analysis Software, then the main screen will be displayed as follows.



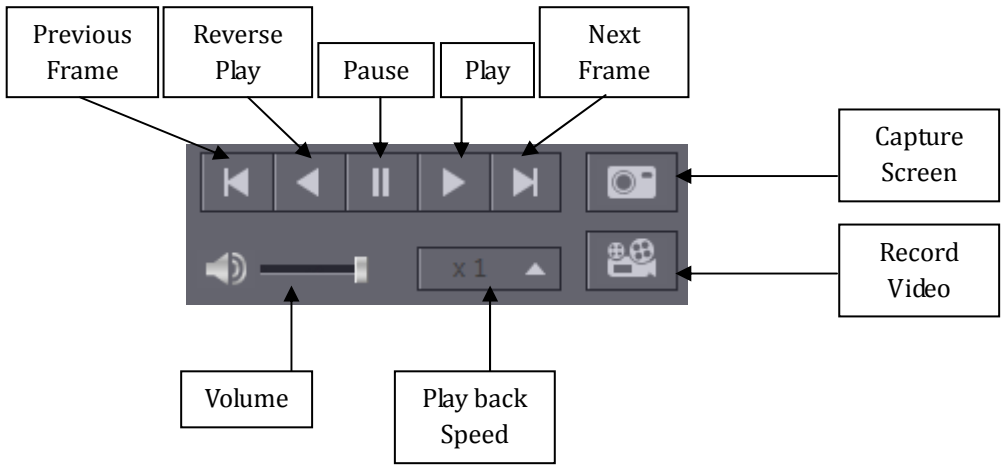
Description of BX2000 Analysis Software screen

① Control buttons
② Playback Control buttons
③ Signal and Alarm Display Bar

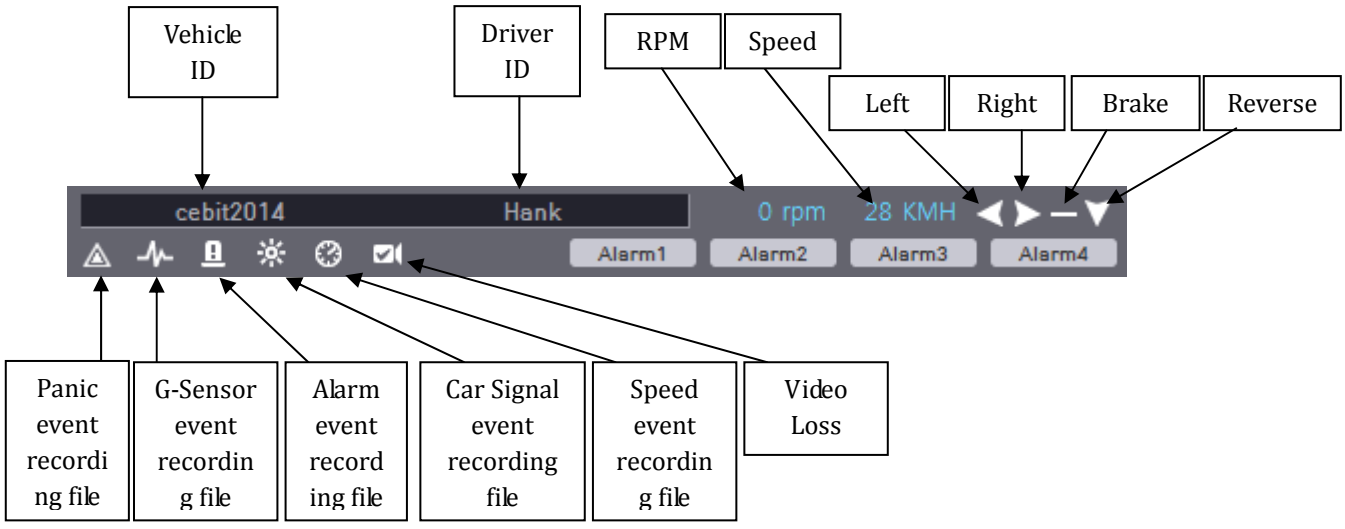
Control buttons



Playback Control buttons



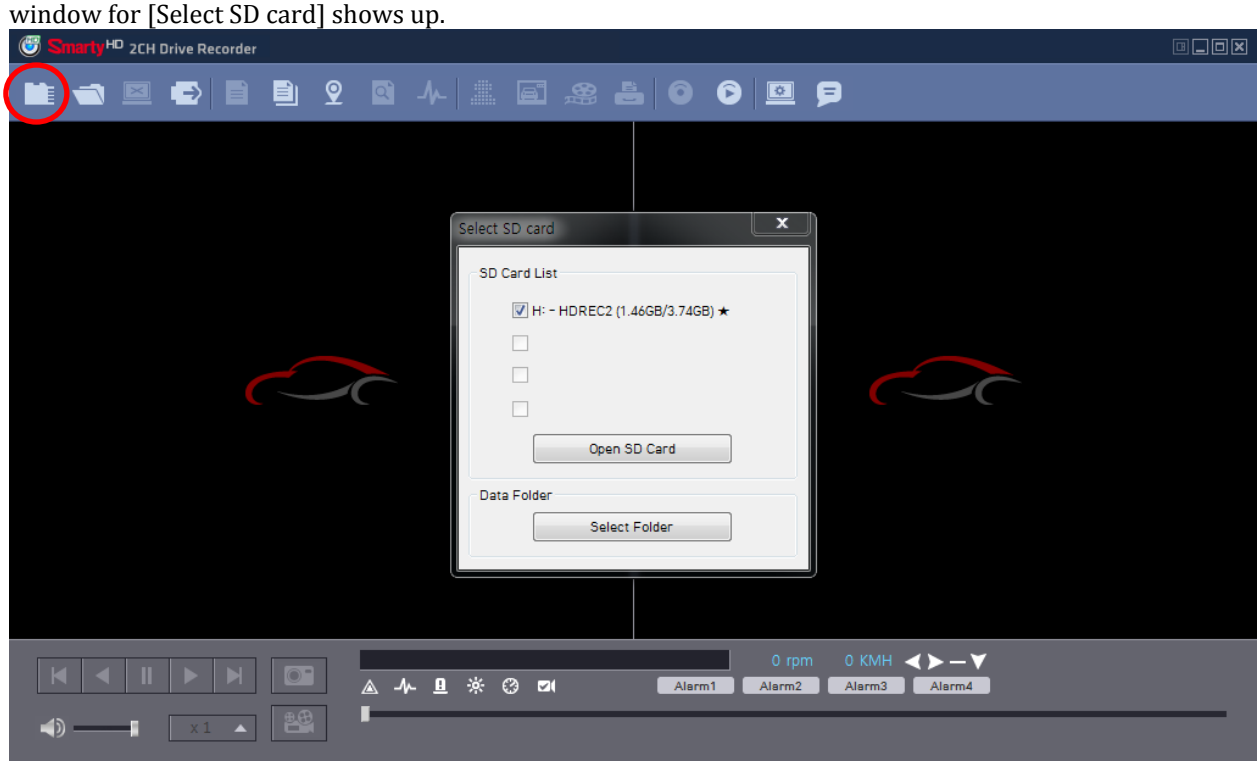
Signal / alarm Indicator



Playing

Insert the SD Card to your PC. Make sure that the SD Card is properly recognized.
It happens that even correct SD Card is not recognized by the PC and you are recommended to try again using the SD Card Reader.

After confirming that SD card is recognized correctly in the PC, click the “Select SD Card” button and the window for [Select SD card] shows up.



Select SD card drive and Click [Open SD Card] button.

The list of data tab "continuous" and "event" is displayed on the right side of the screen.
The recorded data is displayed under each tab, as shown below.

To play video, click the file you want to play from the data list.

Playback file list can be separated from the main screen and you can hide it or change the position.
In addition, file list can be displayed on the screen as well by clicking the "File List" button.

Video playback will end by clicking the "close" button.
Take out the SD Card after you click the "disconnect safely and removing the SD card" button.

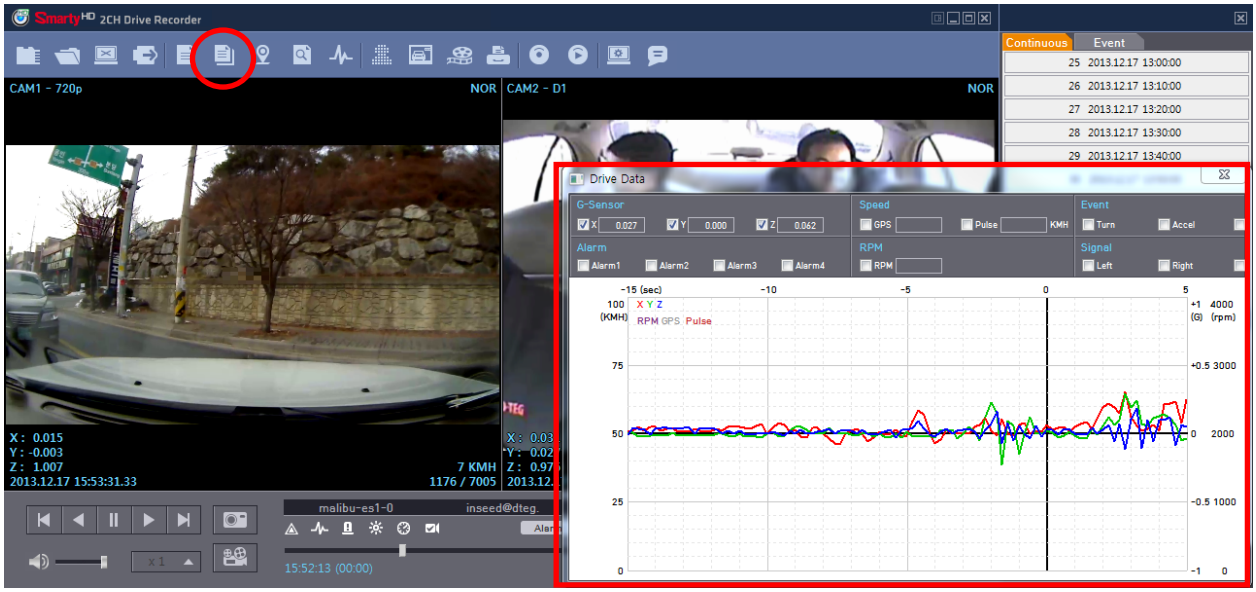
Open files

If you want to play only specific file among the data that has been backed up on the PC or SD Card, click the “Open files” button.
Select the specific MDT file you want to play and click the "Open" button, then the image of the selected file will be displayed.

You can play using the playback buttons.

Drive data

BX2000 can record not only video and audio, GPS information, speed but also vehicle information like the alarm, G-Sensor and left / right blinker, brake, back, speed Pulse, RPM together.
The recorded information can be analyzed and played through PC Viewer software.

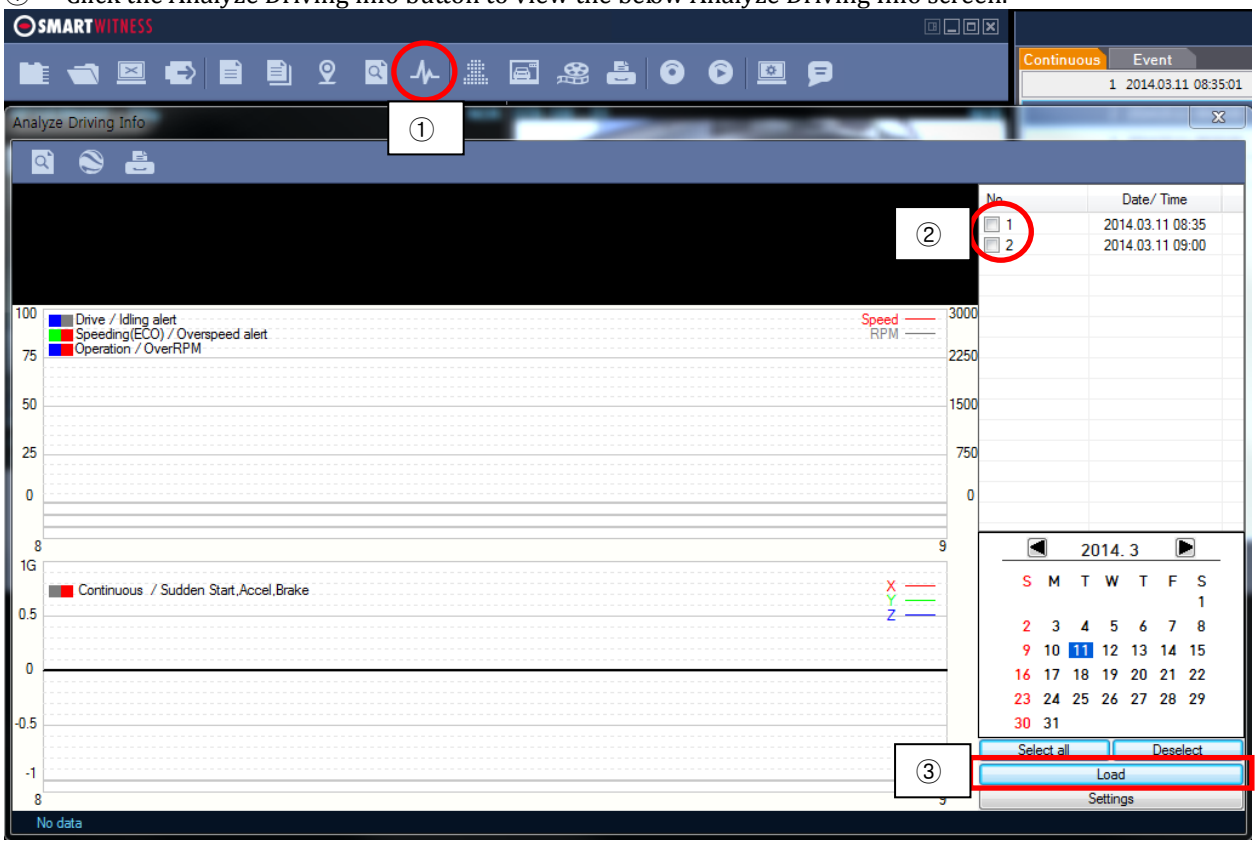


The default setting only displays the G-sensor graphs but other information may be added by checking the boxes in the upper part of the screen as below..

- G-sensor (X axis: red, Y axis: green, Z axis: blue, based on the positioning of the main unit) is shown with the data reference point zero-point calibrated and positive shocks as (+) and negative shocks as (-)
- Speed: GPS measured speed is displayed in grey while the speed-pulse measured speed is displayed in red.
- RPM: Displayed in purple.
- All triggers (signals and alarms) are displayed on the bottom of the screen with the grey bar meaning the trigger is activated.

Analyze Driving info

① Click the Analyze Driving info button to view the below Analyze Driving Info screen.

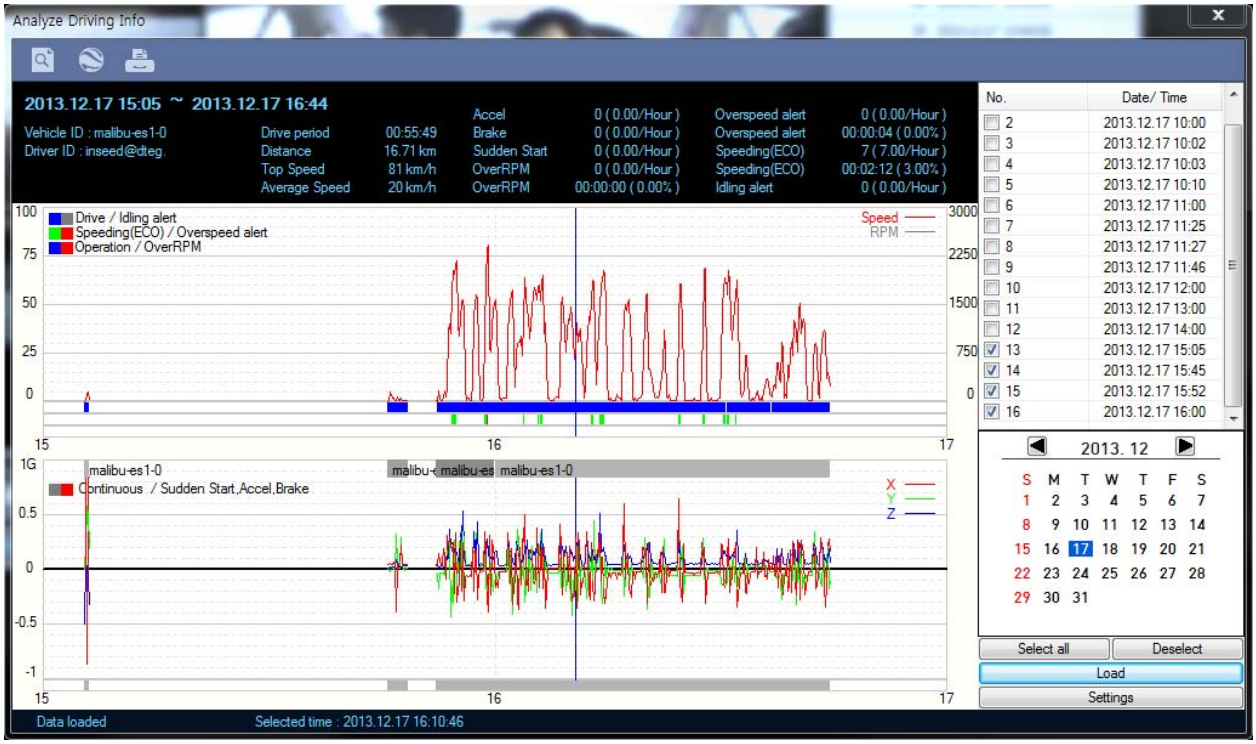


② Select data

③ Click load button.

From the calendar in the bottom right corner, choose the date you wish to inspect among the dates highlighted in blue. Dates that are not highlighted in blue, do not have the relevant data. All data from the selected date will be automatically chosen from the selection on the right. You can unselect data that you do not need. Click load for access.

* The time span for the data selected cannot exceed 24 hours.

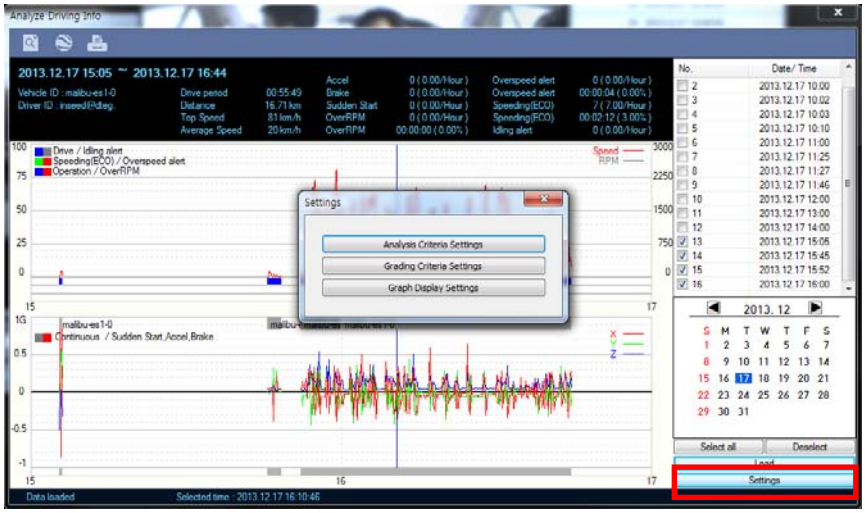


A summary of information can be found on the top including vehicle ID; Driver ID; Drive period; Distance; and number of over-accelerations, over-decelerations, sharp turns, over-speeding, over-RPMs that exceeded the pre-set limit.

The top graph shows the speed (red) and RPM (grey) and right below are three indicator bars that show driving patterns. The first bar shows driving (blue) and idling (grey). The second bar shows the speed where white means within both the permitted speed and eco-speed limit, green means above eco-speed but within permitted speed limit, and red means above the legal speed limit. The last bar shows the state of the engine where white means the engine is off, blue means it is running properly within the pre-set RPM limit, and red means over acceleration, i.e. exceeding the pre-set RPM limit.

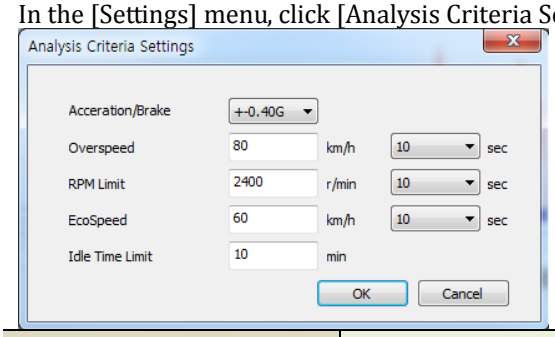
The lower graph shows the G-sensors where the x-axis is in red, y-axis in blue, and z-axis is green. The indicator bar right below shows jolts in the G-sensor values, i.e. G-sensor values that exceed the pre-set limit. Grey means normal conditions, red means jolts in the x-axis direction, blue in the y-axis direction, and green in the z-axis direction.

Configurations for this function can be set by clicking the [Settings] button in the right bottom corner. The limits for g-sensor, permitted speeding, excessive RPM, and eco-speeding can be set under the tab Analyze, and ranges for the two graphs can be set under the tab Component.



Analysis Criteria Settings

This menu offers the option to change the analysis criteria settings.
In the [Settings] menu, click [Analysis Criteria Settings] to launch the below window.



Acceleration/ Brake	This sets the criteria for excessive acceleration and deceleration, i.e. any acceleration and deceleration that exceeds this set value will be counted as excessive. Scroll down the list to select the appropriate value.
Speed Limit	This set the criteria for excessive speed, i.e. speeds that exceed this value for more than the set amount of time will be regarded as excessive. The speed value can be set from 0 ~ 999 km/h and the time can be set by scrolling down and selecting the appropriate value. Speeds that exceed the speed limit but for less than the set amount of time will not be counted as excessive speed.
RPM Limit	This sets the criteria for excessive RPM, i.e. RPM that exceed this value for more than the set amount of time will be regareded as excessive. The RPM value can be set from 0 ~ 999 RPM and the time can be set by scrolling down and selecting the appropriate value. RPM that exceed the RPM limit but for less than the set amount of time will not be counted as excessive speed.
Eco-speed Limit	This sets the criteria for excessive eco-speed, i.e. speeds that exceed this value for more than the set amount of time will be regareded as excessive. The eco-speed value can be set from 0 ~ 999 km/h and the time can be set by scrolling down and selecting the appropriate value. Speeds that exceed the eco-speed limit but for less than the set amount of time will not be counted as excessive speed.
Idle Time Limit	This sets the criteria for excessive idling, i.e. any idling for more than the set amount of time will be counted as excessive. The idling time can be set from 0 ~ 999 minutes. Idling that does not exceed the set amount of time will not be counted as excessive idling.

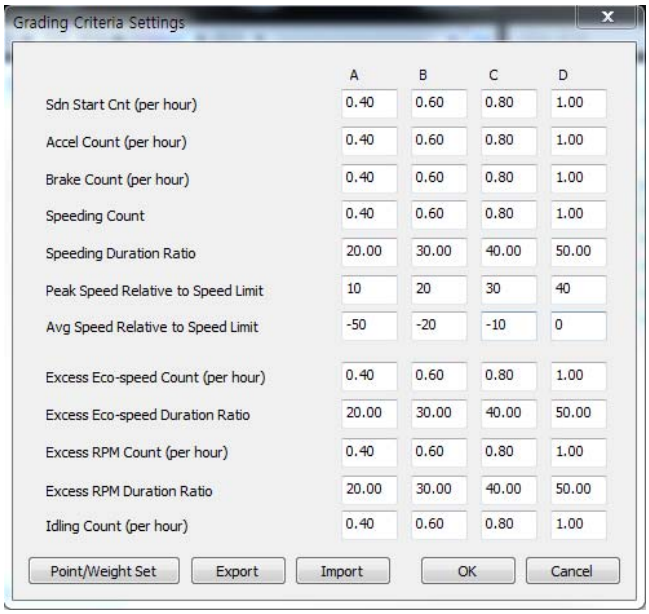
The criteria settings in this menu are used in the grading process, which is explained in the next section, and various displays.

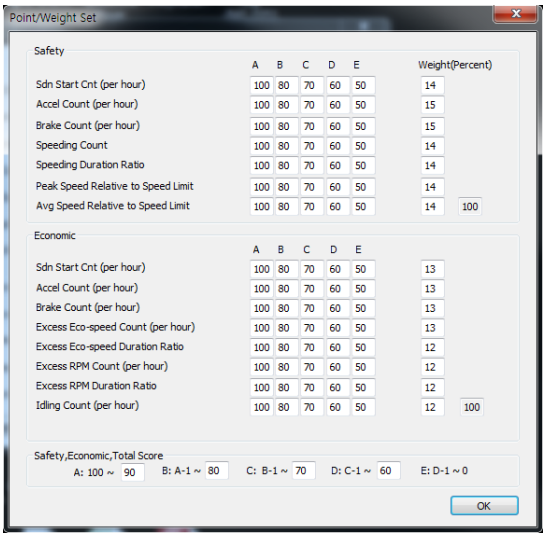
Grading Criteria Setting

Criteria for grading the drivers' safety and eco-score can be set in this menu.
Safety and eco-grading criteria has 7 or 8 separate components each. A weighted average of these component scores are used to determine the safety and eco scores and the total score is estimated with an average of the two scores. Grading for each criterion is set at 4 levels: A, B, C, D and if the driver's score is lower he/she is given an F for fail.

Each criterion can be given a different weight when calculating the grades to provide the flexibility to the operator in assessment provided that the sum of all weights equal 100.

Click the [Grading Criteria Settings] under the [Settings] menu to launch the bellow input window.





Sudden Start Count (per hour)	This sets the grading criterion for sudden starts per hour. Since it is an average for the whole duration of the drive, it can be set as a decimal number, e.g. if a driver drove 8 hours one day and has 4 sudden starts during that time, his/her score on this criterion would be 0.5 and based on the above setting, they would be graded as B. This criterion is used in both safety and eco grading, but the weights can be set separately. The assessment of this criterion is based on the {Acceleration/ Brake} component in the analysis criteria settings.
Sudden Acceleration Count (per hour)	This sets the grading criterion for sudden acceleration per hour. Since it is an average for the whole duration of the drive, it can be set as a decimal number, e.g. if a driver drove 8 hours one day and have 4 sudden accelerations during that time, his/her score on this criterion would be 0.5 and based on the above setting, they would be graded as B. This criterion is used in both safety and eco grading, but the weights can be set separately. The assessment of this criterion is based on the {Acceleration/ Brake} component in the analysis criteria settings.
Sudden brake Count (per hour)	This sets the grading criterion for sudden brake (or deccleeration) per hour. Since it is an average for the whole duration of the drive, it can be set as a decimal number, e.g. if a driver drove 8 hours one day and have 4 sudden brakes during that time, his/her score on this criterion would be 0.5 and based on the above setting, they would be graded as B. This criterion is used in both safety and eco grading, but the weights can be

	set separately. The assessment of this criterion is based on the {Acceleration/ Brake} component in the analysis criteria settings.
Speeding Count (per hour)	This sets the grading criterion for speeding and is calculated per hour. Since it is an average for the whole duration of the drive, it can be set as a decimal number, e.g. if a driver drove 8 hours one day and have 4 counts of speeding during that time, his/her score on this criterion would be 0.5 and based on the above setting they would be graded as B. This criterion is used only for safety grading. The assessment of this criterion is based on the {Speed Limit} in the analysis criteria settings.
Speed Duration Ratio (% of whole shift time)	This is another grading criterion for speeding as a longer time at speeds over the speed limit increases the risk of accidents. This value is estimated as a ratio of time speeding to time driving it is set as a percentage, e.g. if a driver drove 8 hours one day but was speeding for 1 hour in total, his/her score on this criterion would be 12.5% and based on the above setting, they would be graded as A. This criterion is used for only safety grading. The assessment of this criterion is based on the {Speed Limit} component in the analysis criteria settings.
Peak speed relative to speed limit (km)	This is another grading criterion for speeding and calculates the peak speed the driver drove relative to the speed limit. The value is set in km/h and can be set from 0 to 999 km/h. This criterion is used only for safety grading. The assessment of this criterion is based on the {Speed Limit} in the analysis criteria settings.
Average Speed (km)	This is another grading criterion for speeding and calculates the average speed in relation to the speed limit. The value is set in km/h and can be set from -999 to 0 km/h. This criterion is used only for safety grading. The assessment of this criterion is based on the {Speed Limit} in the analysis criteria settings.
Excess Eco-speed Count (per hour)	This sets the grading criteria for eco-speeding and is calculated per hour. Since it is an average for the whole duration of the drive, it can be set as a decimal number, e.g. if a driver drove 8 hours one day and have 4 counts of eco-speeding during that time, his/her score on this criterion would be 0.5 and based on the above setting, they would be graded as B. This criterion is used only for eco grading. The assessment of this criterion is based on the {Eco-Speed Limit} in the analysis criteria settings.
Excess Eco-speed Duration (%)	This is another grading criterion for eco-speeding as a longer time at speeds over the speed limit increases the risk of accidents. This value is estimated as a ratio of time speeding to time driving it is set as a percentage, e.g. if a driver drove 8 hours one day but was eco-speeding for 1 hour in total, his/her score on this criterion would be 12.5% and based on the above setting, they would be graded as A. This criterion is used for only eco grading. The assessment of this criterion is based on the {Eco-Speed Limit} component in the analysis criteria settings.
Excess RPM Count (per hour)	This sets the grading criteria for excess RPM use and is calculated as per hour count. Since it is an average for the whole duration of the drive, it can be set as a decimal number, e.g. if a driver drove 8 hours and had 4 counts of excess RPM use during that time, his/her score on this criterion would be 0.5 and based on the above setting, they would be graded as B. This criterion is used only for eco grading. The assessment of this criterion is based on the {RPM Limit} in the analysis criteria settings.

Excess RPM duration ratio (%)	This is another grading criterion for excessive RPM use as a longer time at RPMs over the RPM limit increases the gas consumption, and hence cost. This value is estimated as a percentage ratio of time exceeding the RPM limit to total time driving, e.g. if a driver drove 8 hours one day but exceeded the RPM limit for 1 hour in total, his/her score on this criterion would be 12.5% and based on the above setting, they would be graded as A. This criterion is used for only eco grading. The assessment of this criterion is based on the {RPM Limit} component in the analysis criteria settings.
Idling Count (per hour)	This sets the grading criteria for idling and is calculated as per hour count. Since it is an average for the whole duration of the drive, it can be set as a decimal number, e.g. if a driver drove 8 hours and had 4 counts of idling during that time, his/her score on this criterion would be 0.5 and based on the above setting, they would be graded as B. This criterion is used only for eco grading. The assessment of this criterion is based on the {Idling Time Limit} in the analysis criteria settings.

Once the Grading Criteria Setting is decided and recorded, it can be exported into an ini file and then imported into other Analysis software to ease in setting multiple Analysis software.

**** Grading Method**

* Grades: Each criterion is given a grade of {A, B, C, D} and anything lower is given a grade of F for fail. The set value for each grade is the lower limit and all scores that are lower in value, including the set limit, will be given that particular grade. Any score exceeding this value will be given a lower grade and all scores that exceed the limit for grade D will be given an F.

* Weights: Each criterion can be given a different weight when calculating the safety and eco grades to provide the flexibility to the operator in assessment, provided that the sum of all weights equal 100.

* Grading and scores
Each grade is assigned a score: A=100, B=80, C=70, D=60, F=50 and with this score the safety and eco scores are assessed by a weighted average of all the relevant criteria scores. The total score is an average of the two safety and eco scores. The scores are then graded again based on the scale below.

90 ~ 100	A
80 ~ 89	B
70 ~ 79	C
60 ~ 69	D
0 ~ 59	F

For example, lets say two drivers received the below scores in each criteria. With these set weights, their grades would come out as shown below.

Eco grade	**Weight**	**Driver 1**	**Driver 2**
Sudden Ctart Count	**20**	A(100)	**C(70)**
Sudden Acceleration Count	10	A(100)	A(100)
Sudden Brake Count	20	**C(70)**	A(100)
Speeding Count	**20**	A(100)	**C(70)**
Speeding Duration Ratio	10	**C(70)**	A(100)
Peak Speed	10	A(100)	A(100)
Average Speed	10	A(100)	A(100)
Eco score		**91**	**88**
Eco grade		**A**	**B**

[Driver 1]
Eco score = 20*100/100 + 10*100/100 + 20*70/100 + 20*100/100 + 10*70/100 + 10*100/100 + 10*100/100 = **91 = Eco grade A**

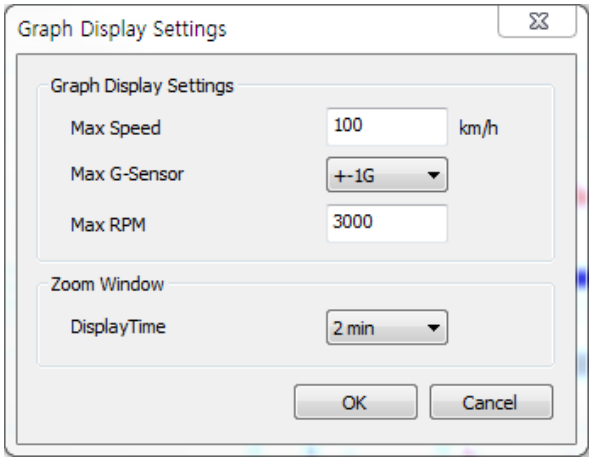
[Driver 2]
Eco score = 20*70/100 + 10*100/100 + 20*100/100 + 20*70/100 + 10*100/100 + 10*100/100 + 10*100/100 = **88 = Eco grade B**

Although both drivers received a C in two different criteria, each score is weighted, and therefore the eco grades differed.

Graph Display Settings

The graph scales can be set in this [Graph Display Settings] menu.

Click the [Graph Display Settings] button to launch the below window.



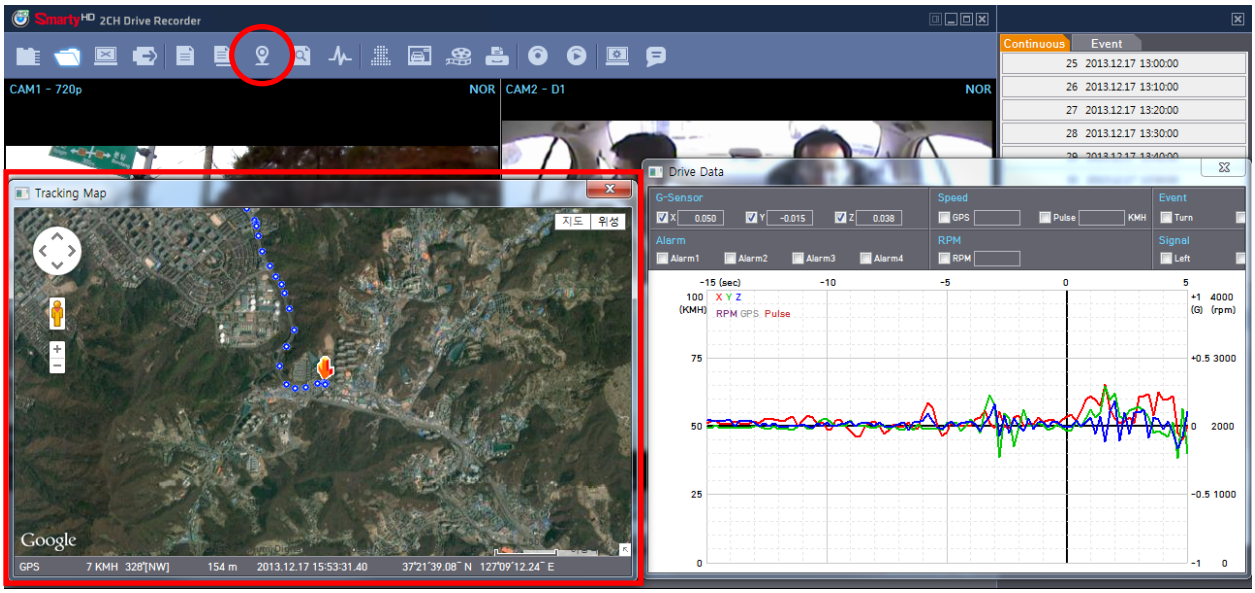
MaxSpeed	The graph's upper speed limit can be set here from 0 to 999 km/h.
MaxGSensor	The graph's upper g-sensor limit can be set here scrolling down and selecting from {+-1G, +-2G, +-3G}.
MaxRPM	The graph's upper RPM limit can be set here from 0 to 9999.
Zoom Window Display Time	The time scale for the zoom graph can be set here, scrolling down and selecting from {1min ~ 10min}.

The graph settings will be applied to the following window displays: Manual Mode, Data Search, Driving Data, and the Zoom graph.

[Default Settings – MaxSpeed: 100 Km/h, MaxGSensor: +-1G, MaxRPM: 3000)]

Tracking Map

During the viewing, if you click the tracking map button, the below screen will pop up showing a map of the region, the route and the location of the vehicle with an orange arrow.



In case the map does not show up, make sure that the PC is connected to the internet correctly.

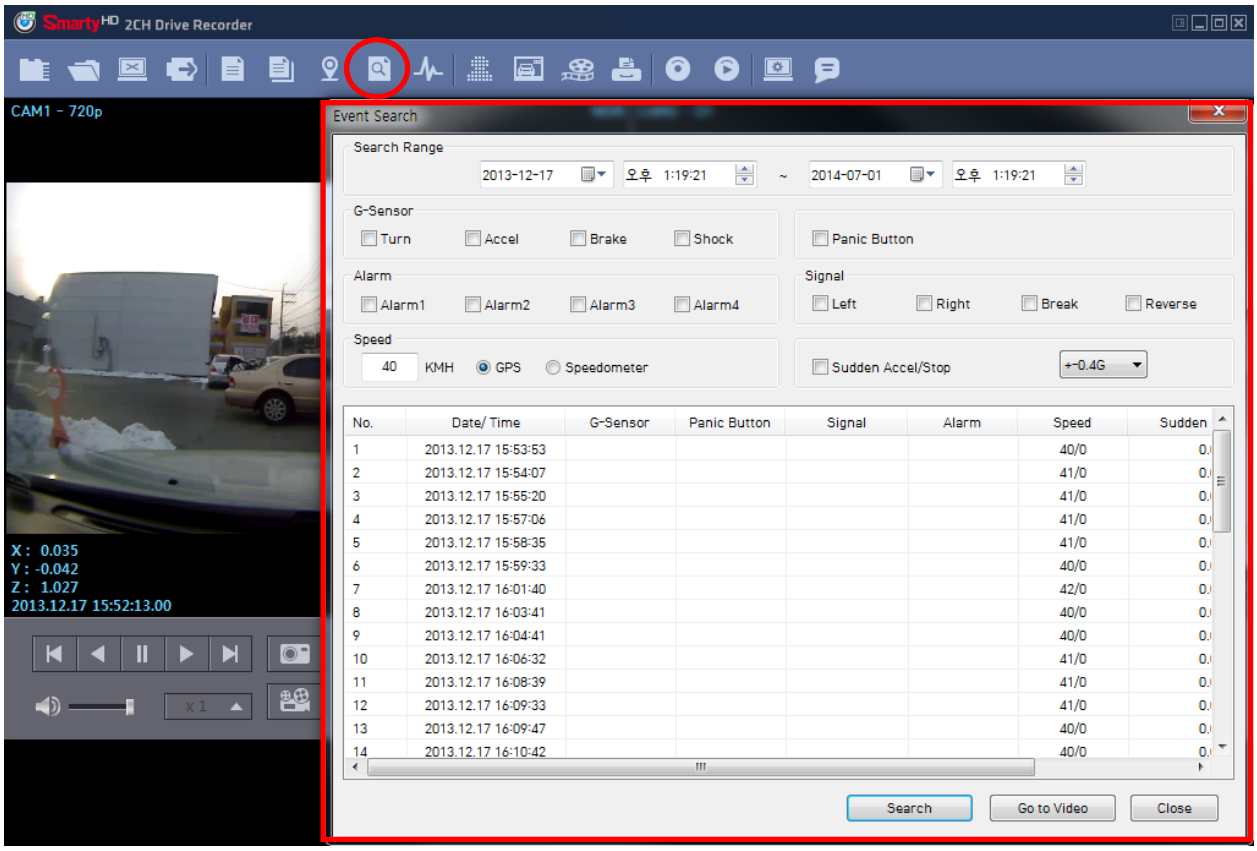
The BX2000 Analysis Software is composed of a main screen, drive data screen, drive data analysis screen, and the tracking screen. These screens can be displayed independently and their location and size changed to improve use and management of data.

In addition, it is also possible to display in the multiple monitors. By using different screen modes of Viewer software, you can play / analyze video data more efficiently.

Event Search

With the BX2000, searching and filtering the data is made easy. Utilizing supplementary data such as g-sensor, signals, alarms, speed, and RPM, you can find incidents and events quicker than monitoring the vast amounts of video and audio recordings.

Click the Event Search button: to access the event search screen.



Firstly, set the search range (Date and Time).

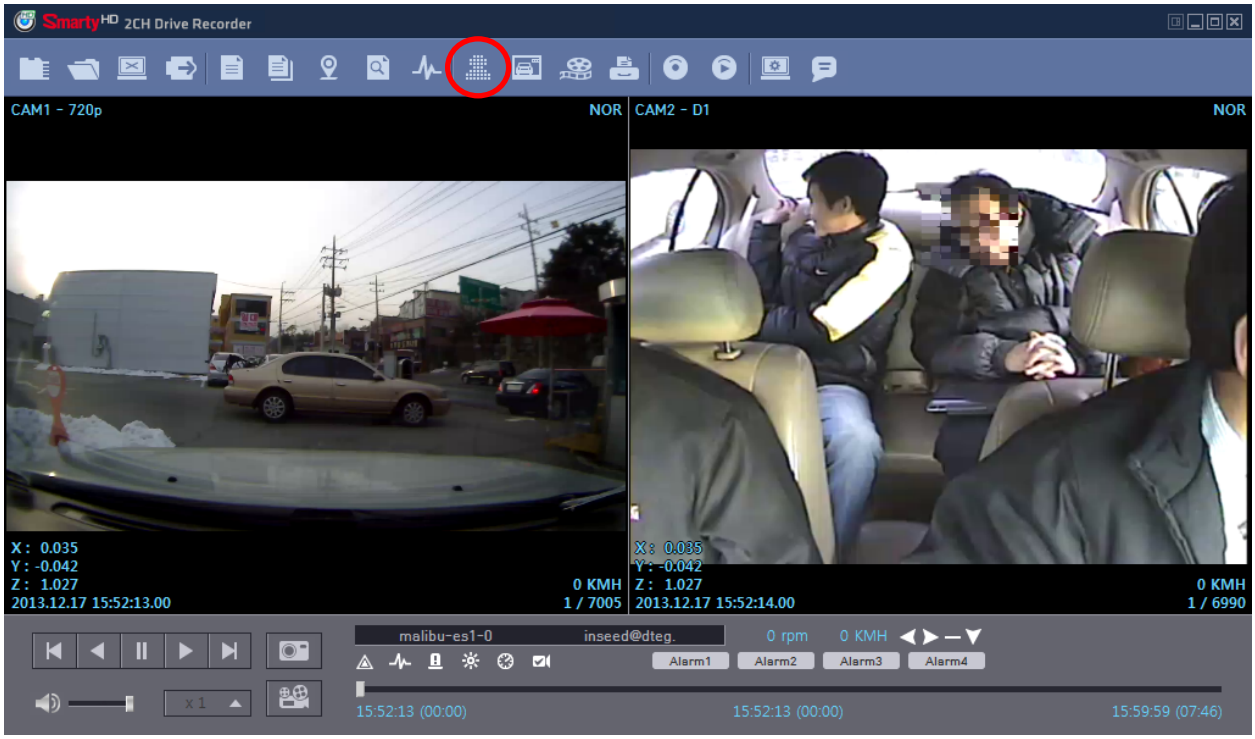
If you select the type of events you want to search for like G-sensor, signal, alarm, speed, etc., and then click the “Search” button.

Select the data you want to play from the list and click the Go to Video button and the video that you selected is displayed on the screen.

Privacy Settings (Blur function)

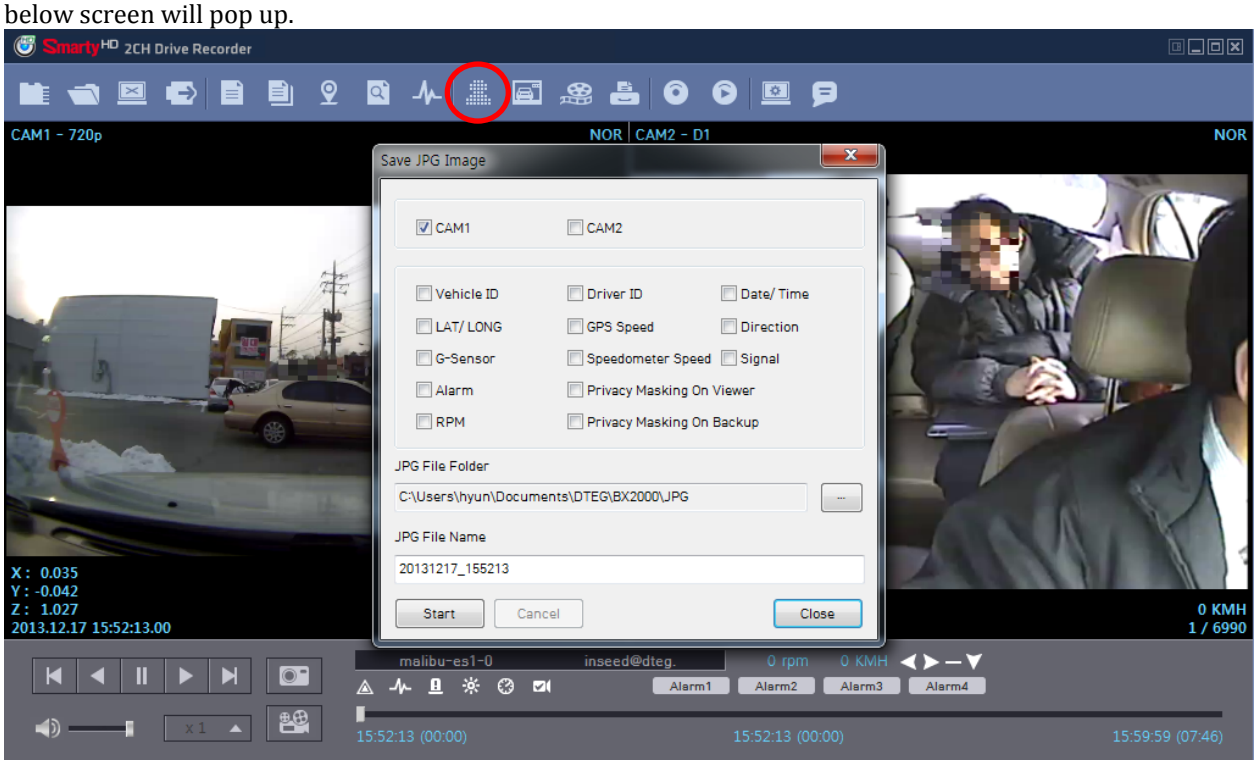
BX2000 allows you to set the mosaic area on each channel for privacy protection.
In case of back up the data as JPG or AVI format and playing in the Viewer software, you are able to make a mosaic processing on the area you have set. Put the video on pause and click the “Privacy settings” button. Privacy setting screen will pop up.

Using the scroll down, select the camera you wish to set up.
On the selected camera view, blur out the area you wish to protect by left-clicking on the sections. You can select multiple areas.
You can also unselect, selected areas by right-clicking the blurred areas.
To select all or clear all, click on the [Select all] or [UnSelect All] buttons on the bottom, respectively.
The blurred areas will be as shown below.



Still frame conversion to jpg format

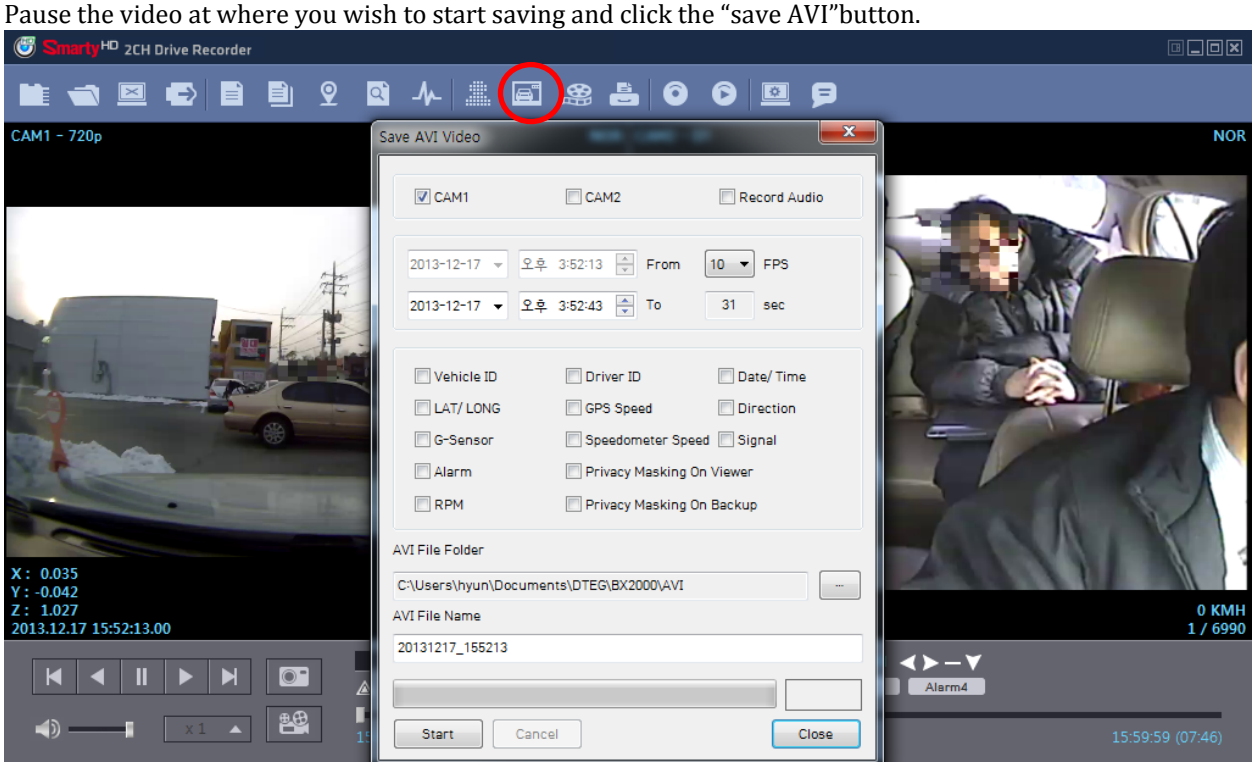
This will create a still frame jpg back up file for a certain instance.
After finding the precise time you want to save, pause the playback and click the “Save jpg” button and the below screen will pop up.



Select the channel you want to save..
Check all the information you want to include from the options shown. The selected information will be imprinted on the image itself.
Choose the folder you want to save the image to and click “start” Still frame from the all selected cameras at the paused instance will be saved as jpg files in the folder.
(It will be saved in the default folder of "My Documents\SmartWitness\BX2000\JPG" if you do not specify a Folder.)
If you check “Privacy Masking”, the image will include the blurs.

Video conversion to AVI file

Pause the video at where you wish to start saving and click the “save AVI”button.



Check the cameras you wish to convert into an AVI file and if you wish to include audio, check the [Audio Ch] box and scroll down to the channel you wish to include.

* Multiple video channels can be converted but only one audio channel can be recorded and that one audio channel will be included in all AVI conversions.

Program the period you wish to convert.

(The starting time is automatically set to the time that was paused at the start of this process and cannot be changed)

Select the frame rate (FPS), from 1 to 30, you wish to use.

(For the most natural video stream, use 30 FPS)

Check the supplementary information you wish to include in the video. The selected the information will show up as text on the video itself.

Choose the folder you wish to save the AVI file and type a file name.

(The default folder is “My Documents\SmartWitness\BX2000\AVI” and the default name is the date and time.)

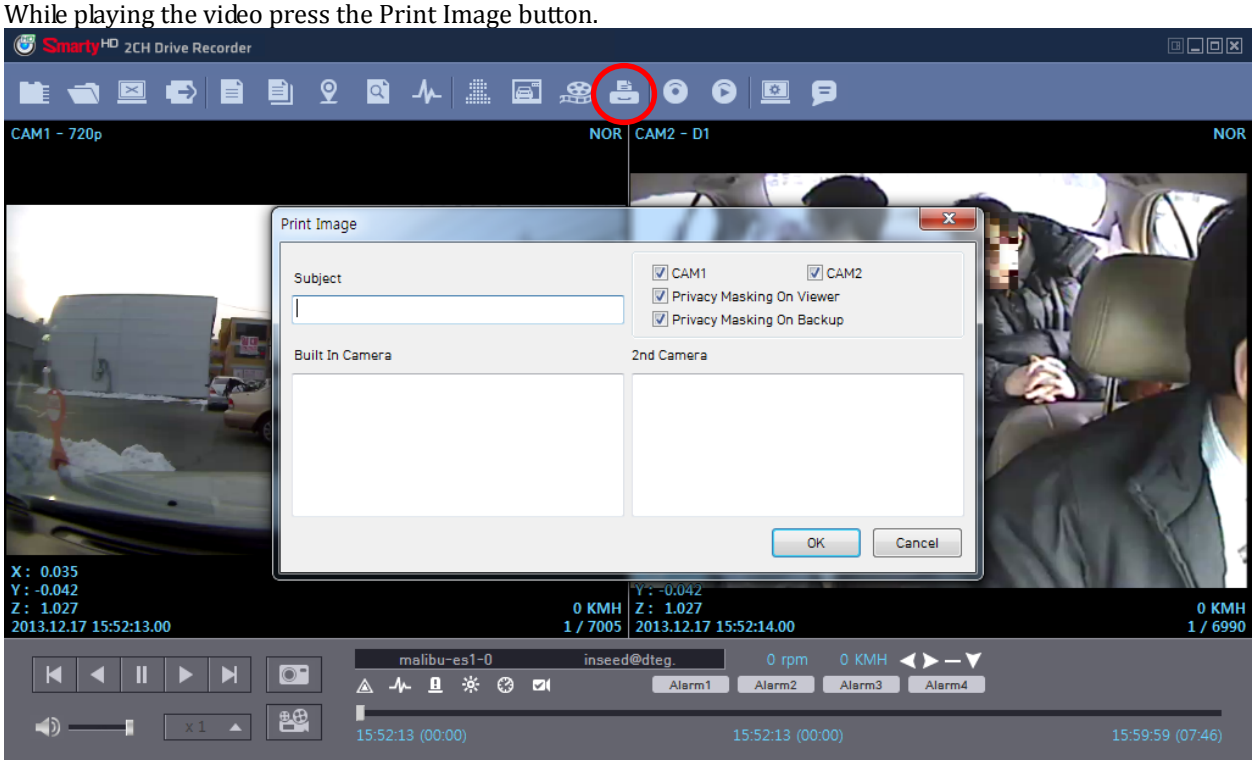
A video of each camera will be made into an AVI file.

If you check “Privacy Masking”, the blur effect will be included in the AVI conversion.

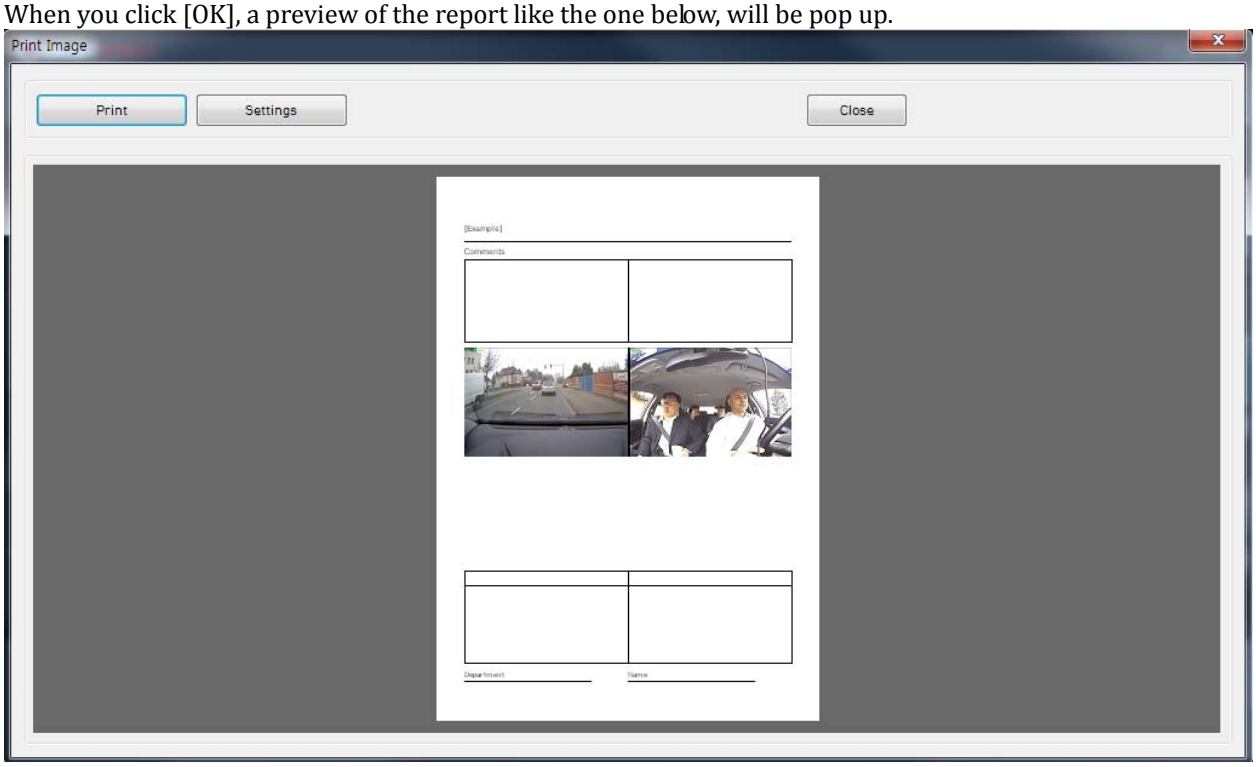
[NOTE] The maximum amount of time you can convert is one hour.

Print image

You can print selected images with accompanying information for reporting purposes.
While playing the video press the Print Image button.



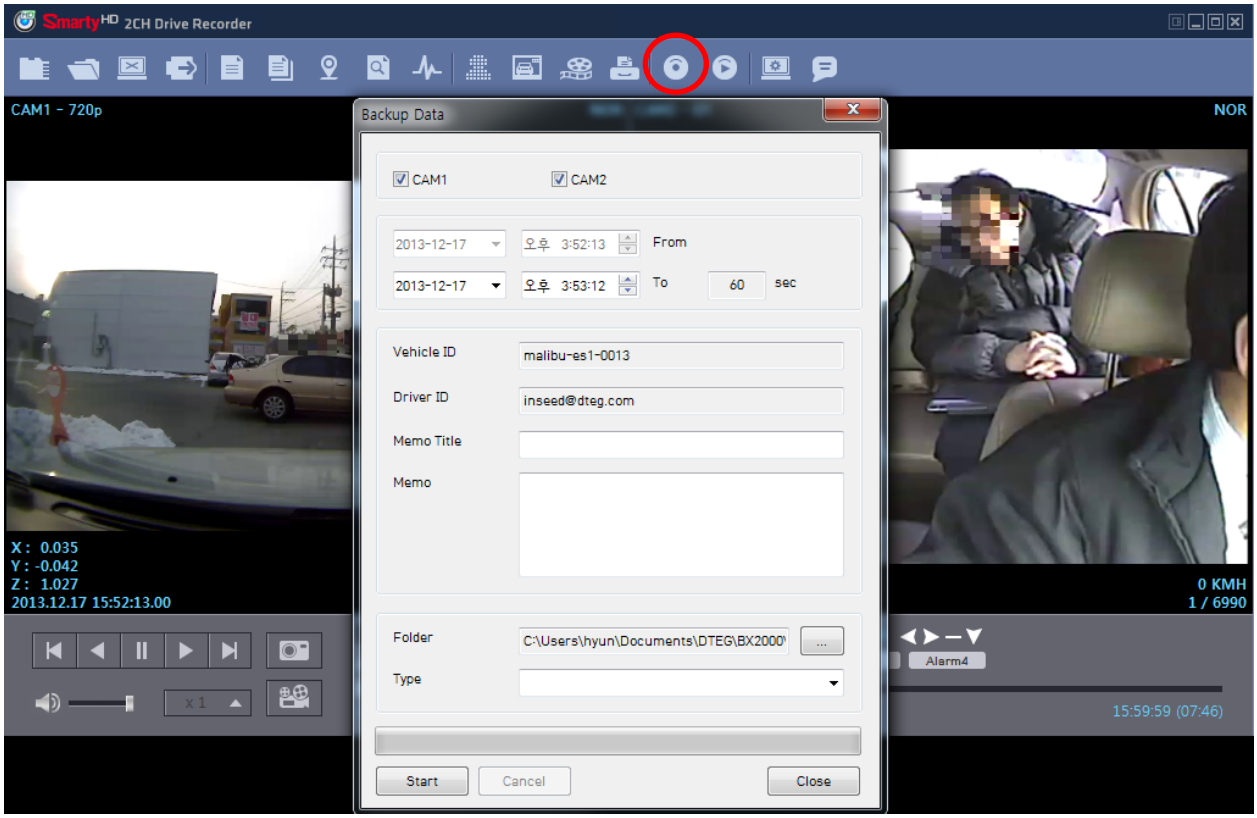
Check all camera images you wish to include in the report.
Type the title of the report and any comments about the situation or other reminders.
If the Privacy Masking box is checked, the pre-set blur effect will be applied.
When you click [OK], a preview of the report like the one below, will be pop up.



After checking all the information, press [Print] to print the report.

Backup

You can back up the recorded data on your PC or other data storage medium.
The BX2000 offers an option to store data by type to ease management of data. You can also input additional data such as Vehicle ID, Driver ID, title, and comments to help in administration.
Click the Backup button.

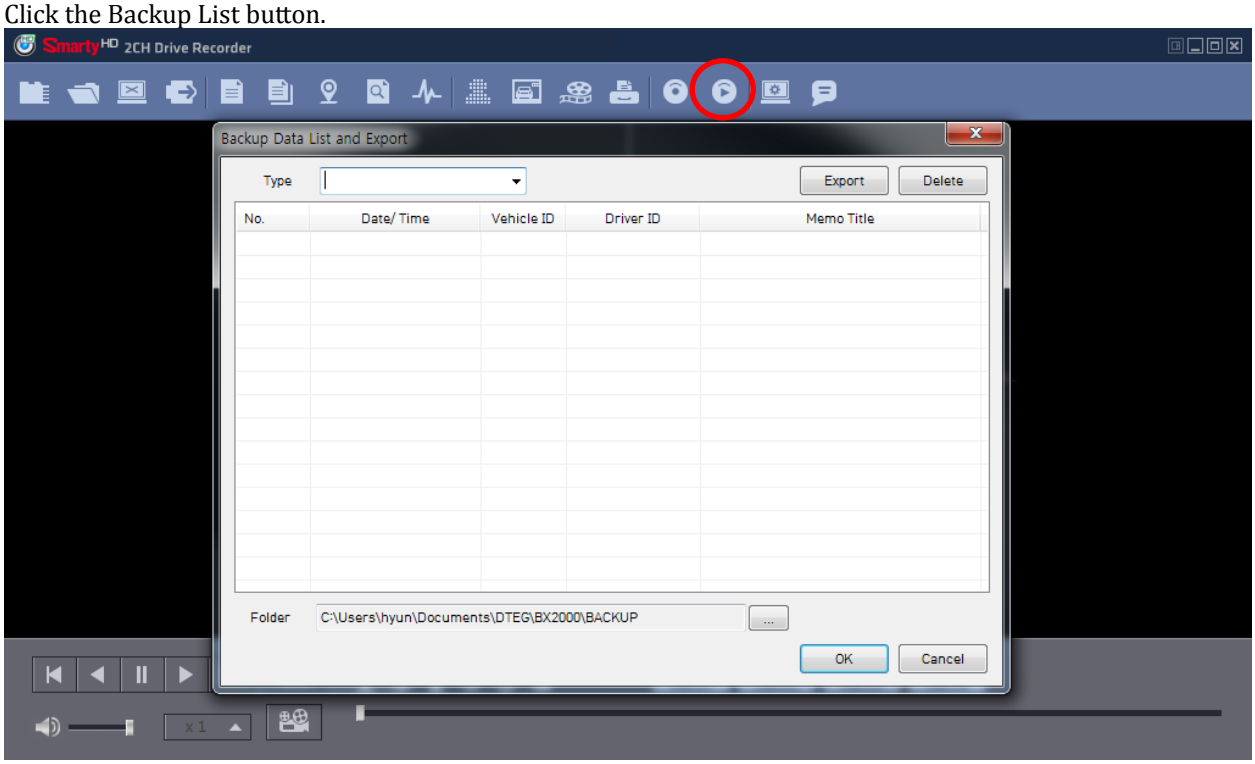


Check all the camera boxes you wish to back up.
Set the time you wish to backup.
(The start time is when the video was paused and cannot be changed once you start this process)
Input all the information you wish to include in the back up file including DVR ID, User ID, title, and comments.
Select the folder where you wish to save the backup file.
(The default folder is “My Documents\SmartWitness\BX2000\BACKUP”)
To ease management of the backup files, choose a type in (or later select from the previously logged types).
Press [Start] to create the backup file.
These backed up files can be access from the Backup List.

[NOTE] The maximum amount of time you can back up is one hour.

Backup list

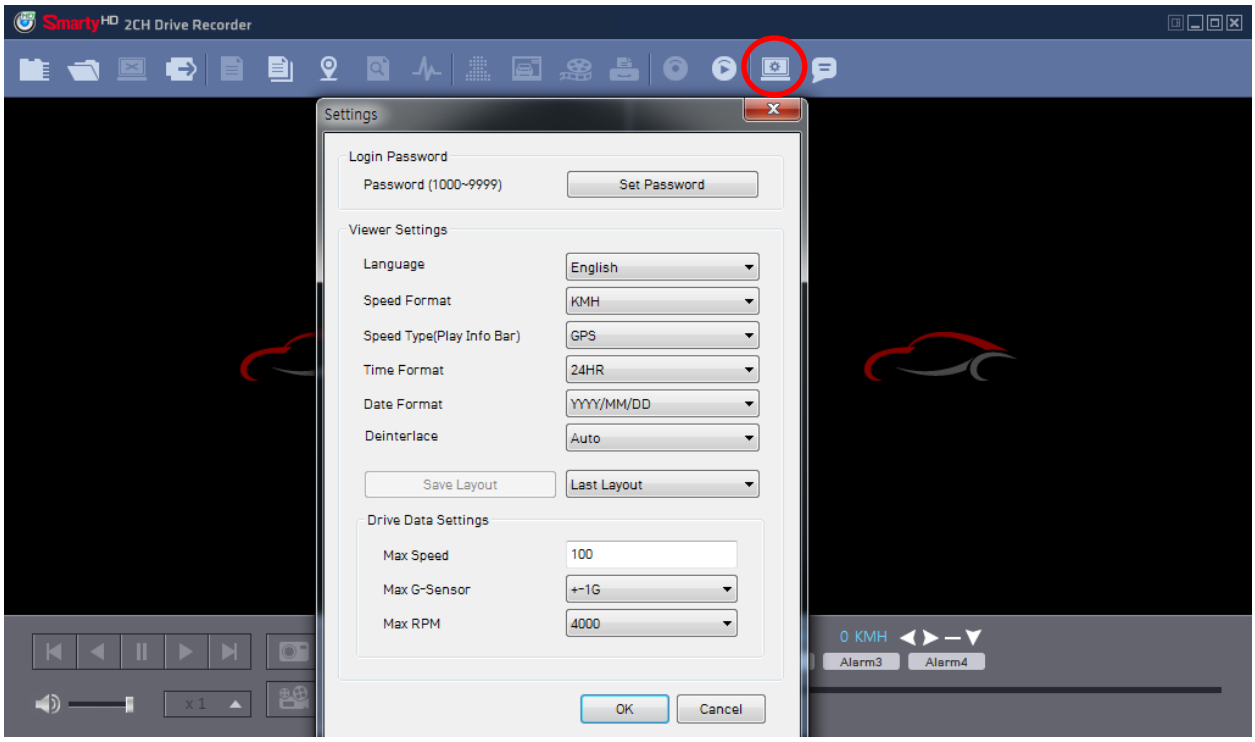
Data that has been saved using the backup menu you can play more effectively using the backup list menu.
Click the Backup List button.



Choose the folder where the backup files are at the bottom of the screen.
(It will automatically show the last folder that was accessed.)
Select the report type by scrolling down the options.
The files are listed showing the “Date/Time, Vehicle ID, Driver ID, Title”.
Check the box next to the file you wish to play back click [OK]. The below file list will pop up. Double click the file and video files will show on the Viewer.

BX2000 Analysis Software Settings

The following window is displayed when you click the ”Settings” button.



Click “Set Password” button. Password for BX2000 Analysis Software: can be set with any number of 1000-9999. Once you set the password. You should enter the password each time you run the software

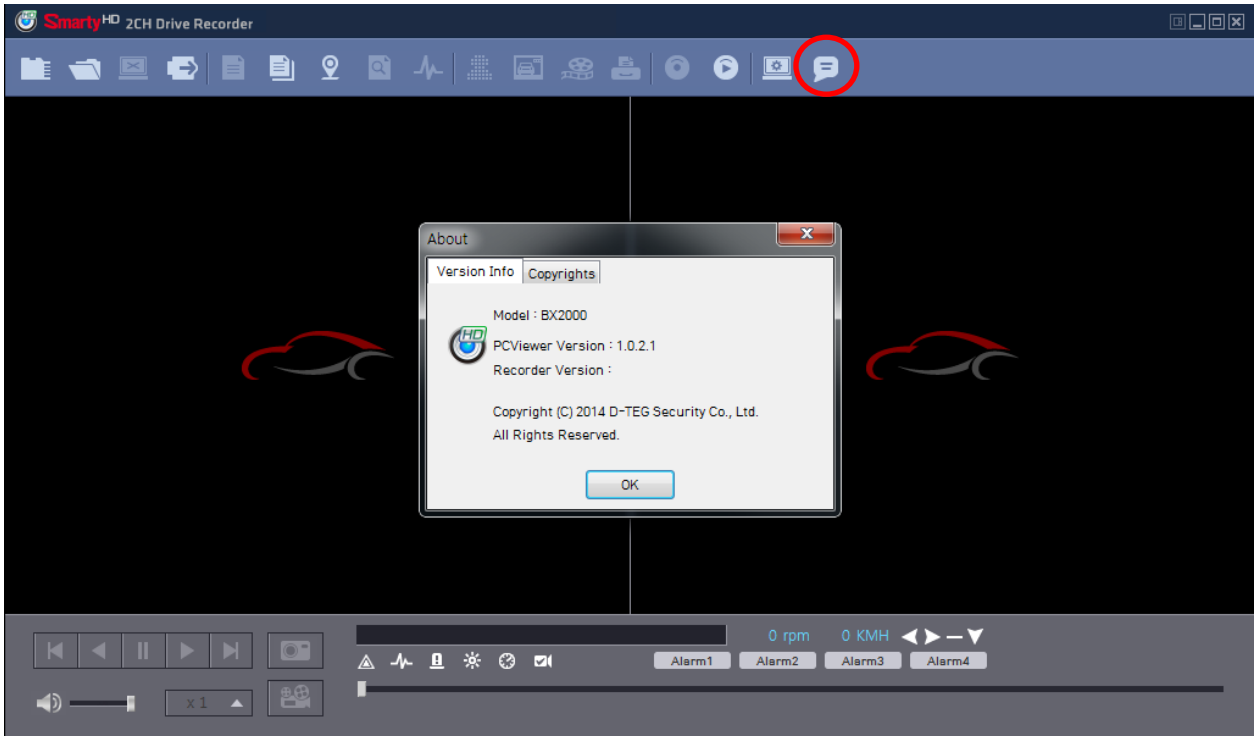
[Note] It will not be able to run PC Viewer software without password, please be careful not to forget the password that you set once.

BX2000 Analysis Software Settings
- Language: Selectable from "Japanese / Korean / English/ Spanish/ Russian".
- Velocity form: Selectable from "km / h" or "mile / h".
- Speed type (Play information bar): Selectable from the vehicle speed pulse or GPS.
- Time unit: Selectable from "24HR" or "AM / PM".
- Date Format: Selectable from "YY/MM/DD”, “MM/DD/YY” or “DD/MM/YY".
- Default Layout: The program will launch with the Default Layout
- Last Layout: The program will launch with the same layout as it was when it was closed.

Drive Data Settings
- The graph scales for the Drive Data Window will be modified according to the settings.

About

You can check the version information of the BX2000 Analysis software.
Click the “About” button to see the below pop up.



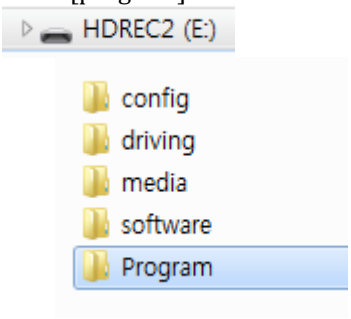
You can check the Analysis software version and BX2000 firmware version.

Firmware Upgrade

Install “Configuration Tool BX2000”software on your PC, and then initialize the SD card using “Configuration Tool BX2000” software.

[NOTE] To get the upgrade firmware, please contact your local distributor. New firmware is released occasionally by D-TEG.

Make [program] folder at SD root folder as below,



Copy “BX2000_X.X.X.bin” file in to the SD card [program] folder.

Insert the prepared SD card to BX2000 SD slot 1 and turn on the power.
Upgrading the unit usually takes about 1 to 2 minutes.

[Warning] Do not turn off the power during upgrading.
If the upgrade fails, the “BX1500 Plus” unit should be returned to your local distributor.

Once the upgrading is finished, the unit will automatically turn off and on the power.

Trouble-Shooting

The BX2000 is not turned on (power is not supplied)
There is a possibility that the power cable is not connected correctly. Turn off the engine first and remove the ignition key. Again, connect correctly the power connector to the vehicle power.

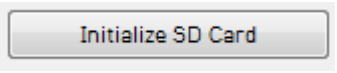
Recording is not implemented (The four LEDs flash all and buzzer beeps / repeated three times)
Check the following items after you turn OFF the power.
- Make sure that SD card is inserted successfully.
- Check whether locking tab on the SD card is not in the locking position.
- Check whether overwrite setting is turned OFF and SD card is full.

Data transmission is not done
Please check the following items after you turn OFF the power.
- Make sure that USB 3G/4G modem has been inserted properly.
- Check USIM card has been inserted correctly into the USB modem.

Configuration Tool BX2000

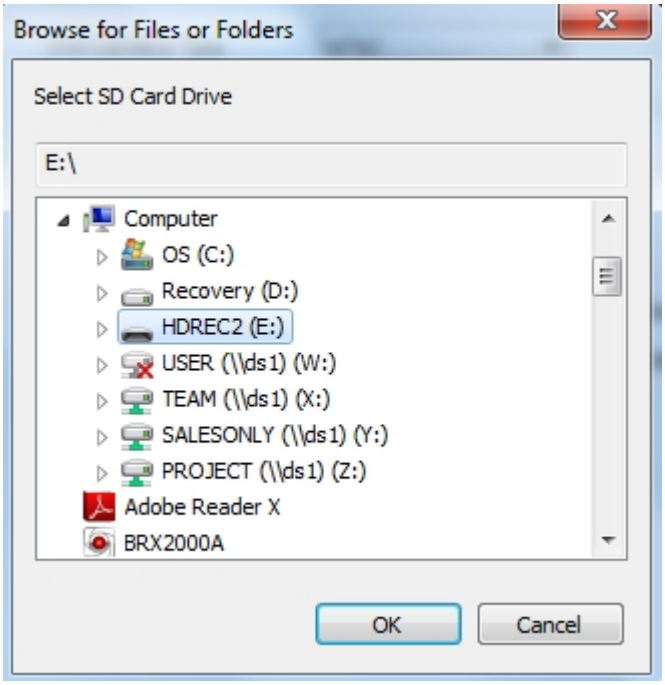
You can configure the BX2000 with the configuration tool BX2000.
Prepare a SD card and connect it to the PC.

Initialize SD card

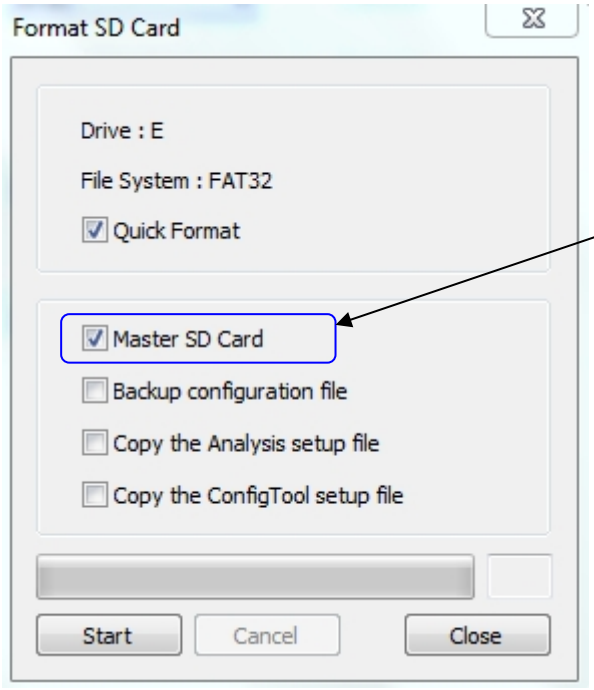


<= Click!

To initialize the SD card quickly, click on the above icon and ou will be presented with the following screen to choose the SD card to initialize. Click 'OK' when selected.



On the following screen, check the 'Quick Format' button and uncheck the 'Backup Configuration File' and Click 'Start' to begin initialization.

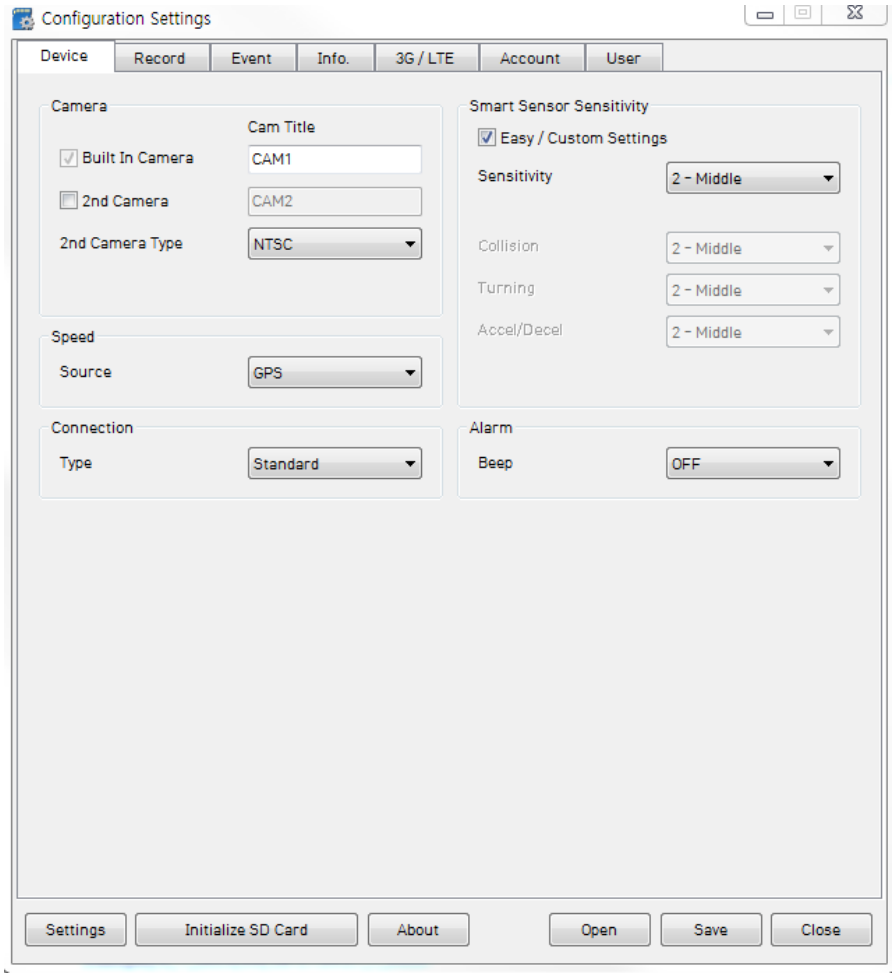


SD Slot 1: Master SD card
SD Slot 2: Slave SD card

Check 'Master SD card' when you make the Master SD card to insert it to SD slot 1.

Uncheck "Master SD card' when you make the Slave SD card to insert it to SD slot 2.

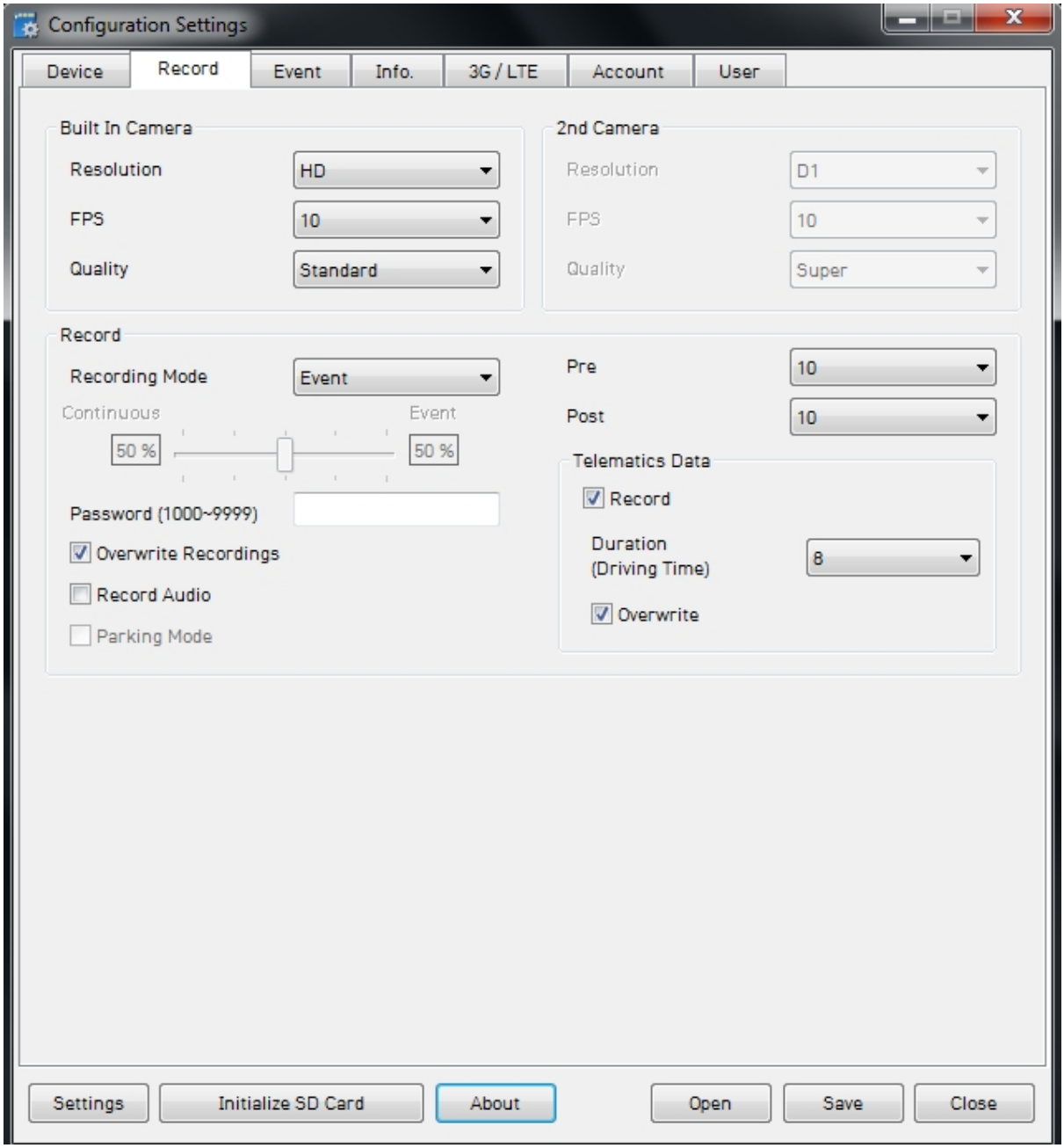
Device Settings



Camera	Check Box	Check it to use 2nd camera
	Cam Title	Use the alphabet and numbers to rename (max 10 digits) the cameras. The new names will be displayed on the live screen and all recordings.
	2nd Camera Type	Select from NTSC or PAL
Speed	Source	Select from GPS or Pulse (car speed pulse)
Connection	Type	Standard: Cigar power BX2000-INT1: Power adaptor BX2000-INT2: Junction box
Smart Sensor Sensitivity	Easy/Custom Settings	Check box allows you to set the sensitivity to 1-High 2-Middle 3-Low
	Collision Turning Aceel/Decel	Uncheck box, you can set 3 different Smart Sensor values individually. Collision shock Sensitivity(1~3), Turning shock Sensitivity (1~3) and Acceleration/Deceleration shock sensor (1~3)
Alarm	Beep	Turn the beep on or off
Speedometer	Type	This menu is only available when you use BX2000-INT2
RPM	Type	This menu is only available when you use BX2000-

		INT2

Record Settings



Built In camera Resolution

HD (1280x720)
VGA (640 x480)
QVGA (320 x240)

2nd camera Resolution

D1 (720x480)
HD1 (720 x240)
CIF (352x240)

Recording Mode

Continuous
Event
Continuous + Event: 1fps continuous recording + Event recording (adjust the 'FPS' from 1fps to 30fps)

Available FPS & Max FPS per resolution.

Single camera mode (Built In camera only)

Resolution	FPS
HD(720P) 1280x720	30
	15
	10
	5
	4
	2
	1
VGA 640x480	30
	15
	10
	5
	4
	2
	1
QVGA 320x240	30
	15
	10
	5
	4
	2
	1

Two cameras mode (Built In camera + 2nd camera)

Built In camera		2nd camera	
Resolution	FPS	Resolution	MAX FPS
HD(720P) 1280x720	15	D1 720x480	15
	10		15
	5		30
	4		30
	2		30
	1		30
HD(720P) 1280x720	15	HD1 720x240	15
	10		30
	5		30
	4		30
	2		30
	1		30
HD(720P) 1280x720	15	CIF 352x240	30
	10		30
	5		30
	4		30
	2		30
	1		30
VGA (640x480)	30	D1 (720x480)	30
QVGA(320x240)	30	D1 (720x480)	30

Pre Event recording time, Post Event recording time

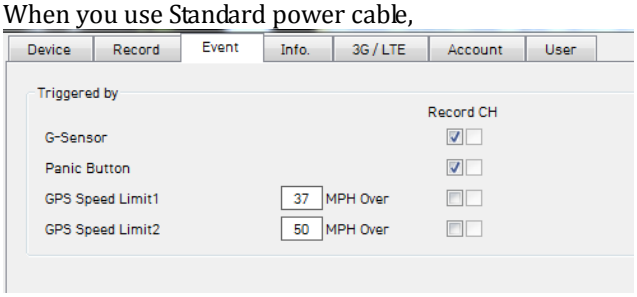
Adjust the Pre/Post time from 5 sec to 20 ssec.

Telematics Data

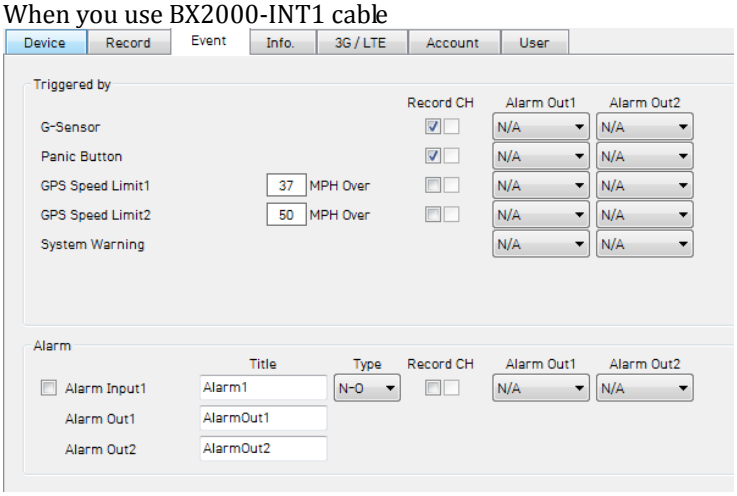
GPS data & G-Sensor data will be recorded with videos and at the same time, GPS data & G-Sensor data will be recorded separately, we call it as 'telematics data'.
Adjust Telematics Data duration from 8hours to 480hours.

Event Settings

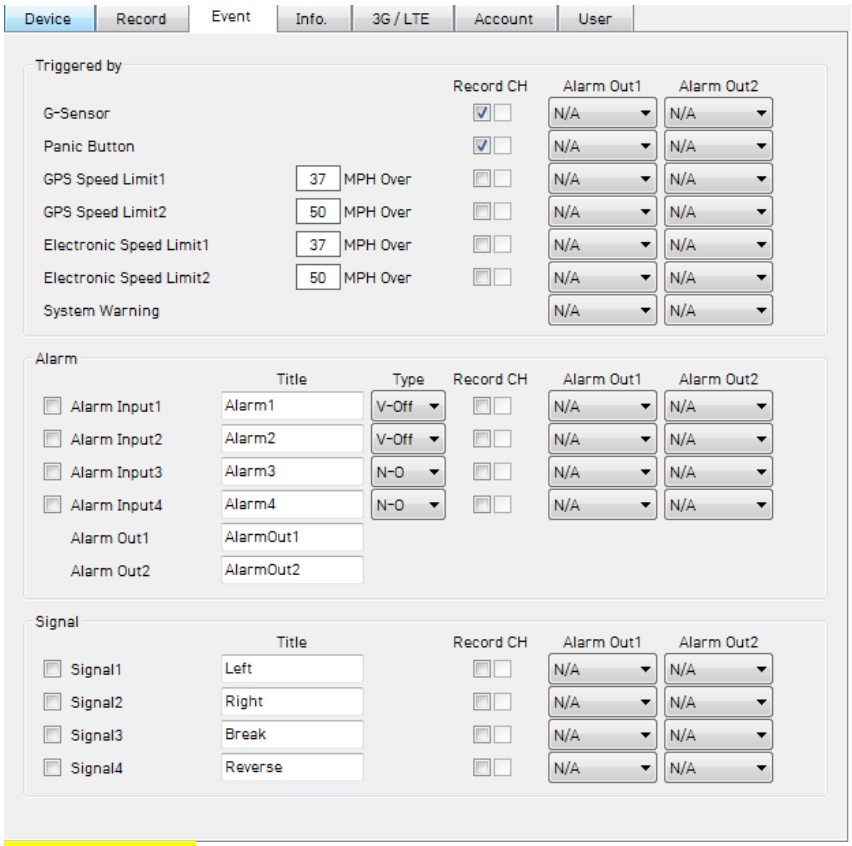
When you use Standard power cable,



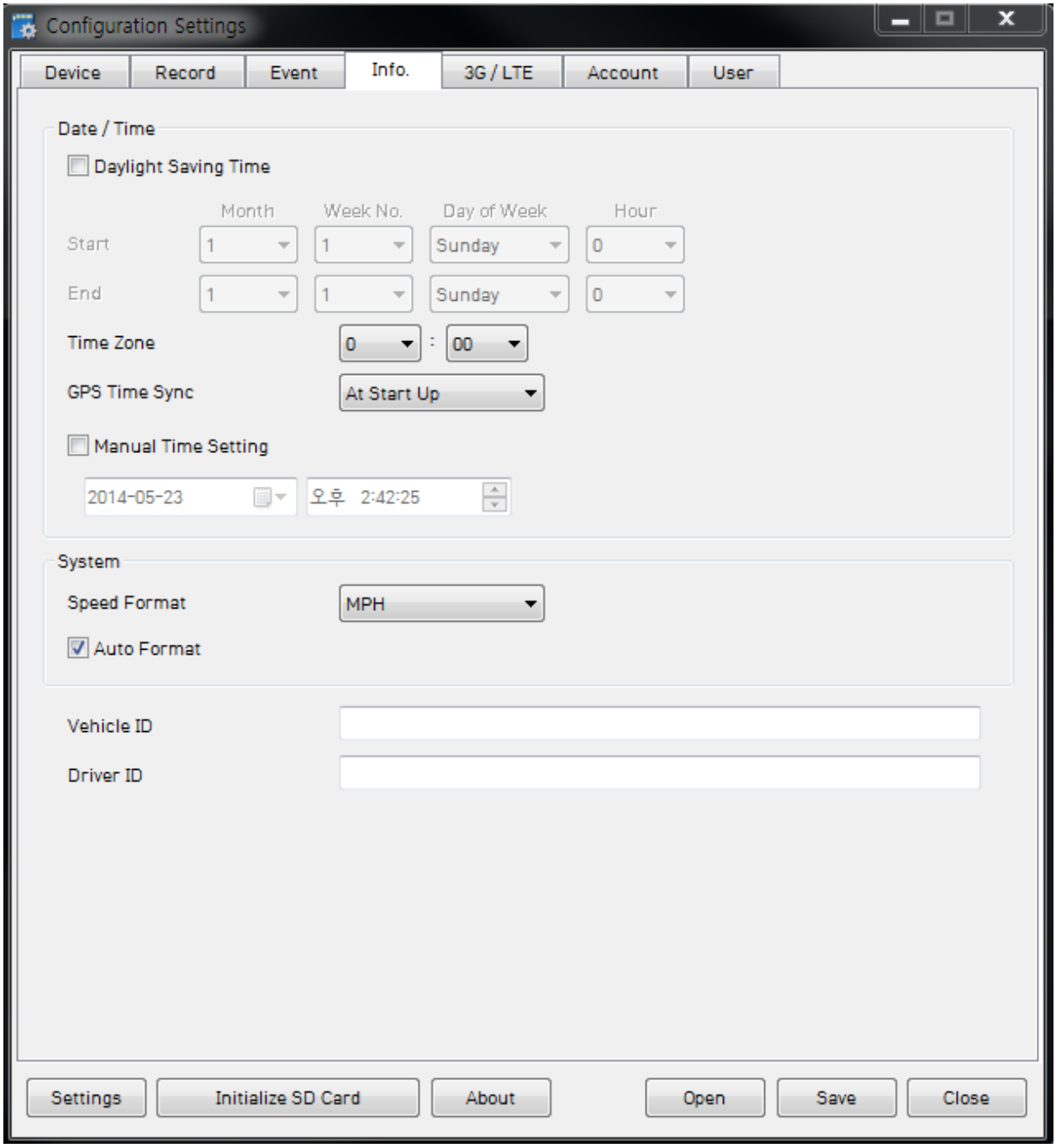
When you use BX2000-INT1 cable



When you use BX2000-INT2 cable



Info. Settings



Set your Time Zone

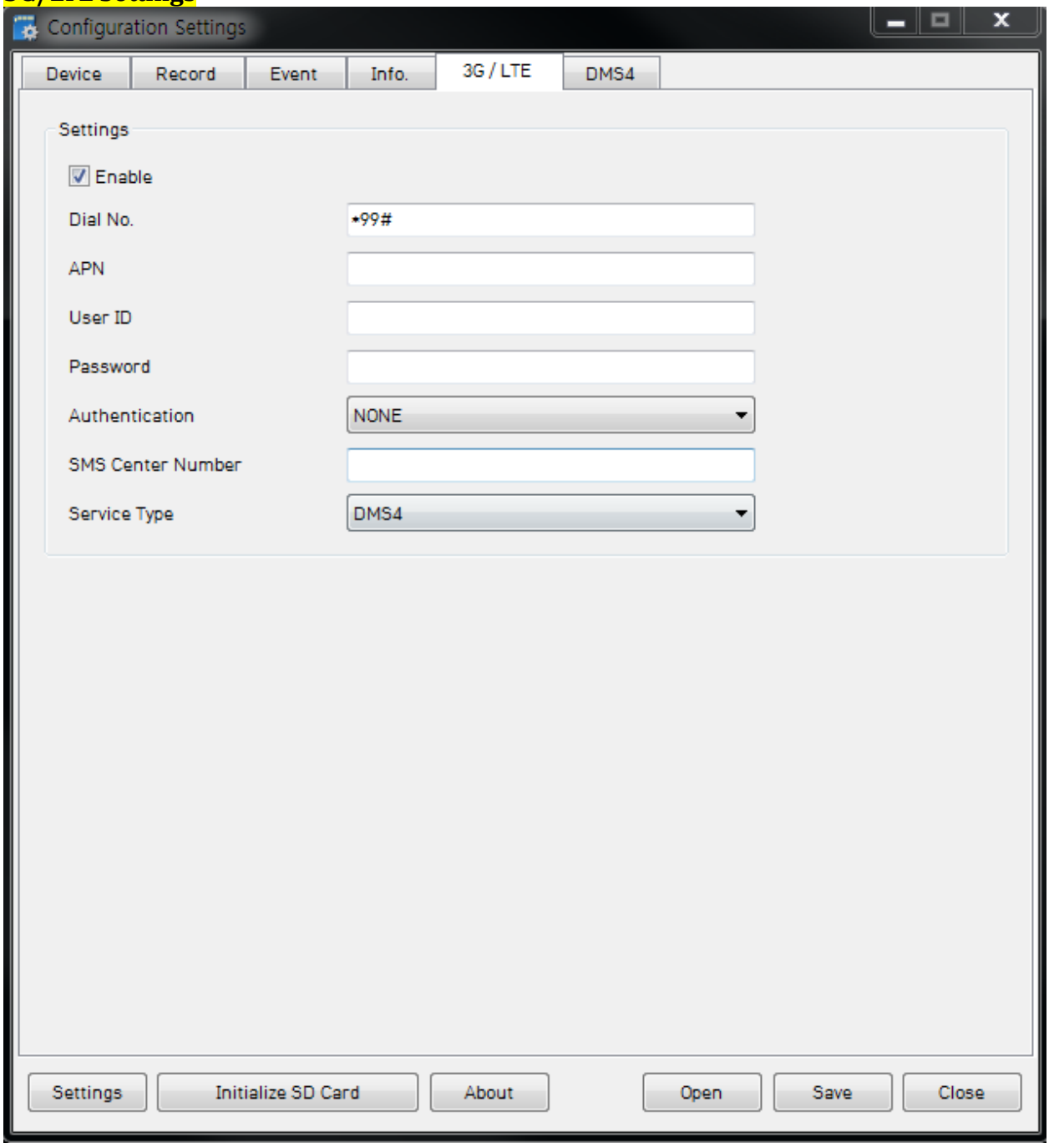
Set GPS Time Sync

Set your Vehicle ID

Set Driver ID

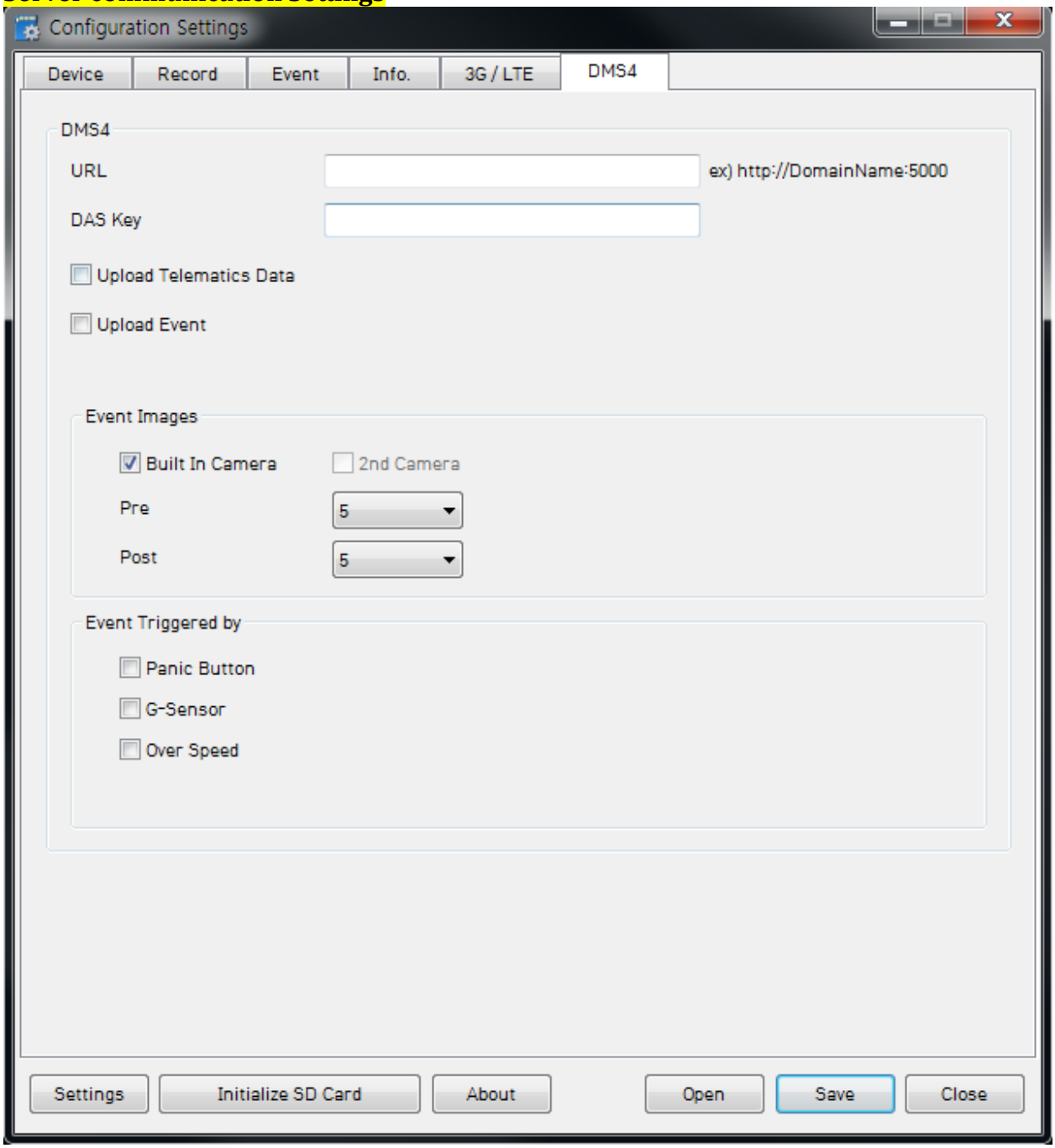
Auto Format: When the SD card doesnot working properly, BX2000 will format the SD card automatically.

3G/LTE Settings



Set Dial No. and APN. for the 3G/LTE USB modem communication.

Server communication Settings



Set Server URL
Allow Images and event to send it to server.

SmartyHD

D-TEG Security Co., Ltd.
3F, Jungmin Bldg, 53 Maewha-ro, Bundang-gu,
Seongnam, Gyeonggi-do 463-827, Korea
Tel: 82-31-706-2514 , Fax: 82-31-8016-0252
Email: dteg@d-teg.com
Homepage: http://www.d-teg.com

MADE IN KOREA