

Digital BUS-WATCH®

**SD40
710292**

**Hardware User Manual
Hardware Installation Manual**



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Introduction

All of us at Radio Engineering Industries, Inc. would like to thank you for purchasing a Digital BUS-WATCH® surveillance system. This manual is intended to provide the user with the information required for proper installation, initial setup and explanation of the individual programming options. If you have any questions, or need assistance, please call:

SERVICE HOT LINE
USA & CANADA
1-877-726-4617 Toll Free
1-402-339-2200

The SD40 is a cost effective, fanless, embedded mobile DVR solution supporting up to 4 camera inputs. This system features a unique compact rugged design engineered to meet the demands of harsh mobile environments. The SD40 mobile DVR features the latest technologies including H.264/MPEG-4 Advanced Video Compression, dual streaming technology, and all solid state construction.

Features

- Ultra compact extruded aluminum housing, low weight, high temperature and vibration resistant
- Low-voltage, low-current architecture designed for harsh mobile environments
- Removable SD Cards with tamper-resistant lock and secure controls
- All DVRs fully support NTSC and PAL, Fahrenheit and Celsius, KM/H and MPH
- Communications are supported through a TCP / IP network interface and a USB connection to PCs
- Each DVR comes with a hand-held IR remote control with on-screen display (OSD) for configuration and control of the DVR
- 4 channels for video input, full-motion (30 FPS / camera) continuous video recording and display. 4 channels for high-fidelity, digitally recorded, 4 independent synchronized audio channels matched to 4 independent video channels
- Secure, constant recording while system is powered with event bookmarks for easy event searching
- Utilizes H.264/MPEG-4 Advanced Video Compression for high video quality, low storage requirements, and long record times
- User-selectable settings for quality and audio record enable / disable for each video channel
- Multi-level password protection for settings, playback, remote access, and more

Digital BUS-WATCH® SD40

- Integrated and filtered power supply for cameras, sensors, relays and other accessories
- Selectable idle frame rate with event-triggered burst recording speeds up to 30fps / camera
- Multiple alarm inputs with selectable pre-alarm and post-alarm recording
- Full event logging of every operation controlled by the DVR
- TV output channel for recorded and live videos

Video Viewing

- DVD-quality streaming audio / video channel with independent NTSC or PAL television output
- Convenient SD card, USB, or TCP / IP media updating and status file downloading
- Award winning Live View and Play Back PC Software

Video Retrieval and Archiving

- Ethernet port on the rear panel for easy video retrieval on the vehicle with a notebook computer
- Two sets of video and audio outputs for monitor viewing on the vehicle
- USB 2.0 connection for fast file transfer utilizing USB flash drives
- Easy to use PC-based software application for playback, file transfer, archiving management, and video file format conversion
- Vehicle management PC software interprets audio, video, and vehicle data for driver and vehicle use assessment
- Video event search software allows intelligent searching of video based on event information

Supplemental Data and Driver Management Modules

- External GPS antenna module for embedded digital information of GPS location, speed, heading, and time
- External 3-axis inertia sensor for embedded digital information or trigger of video-matched motion events for accident reconstruction

Digital BUS-WATCH® SD40

System Overview

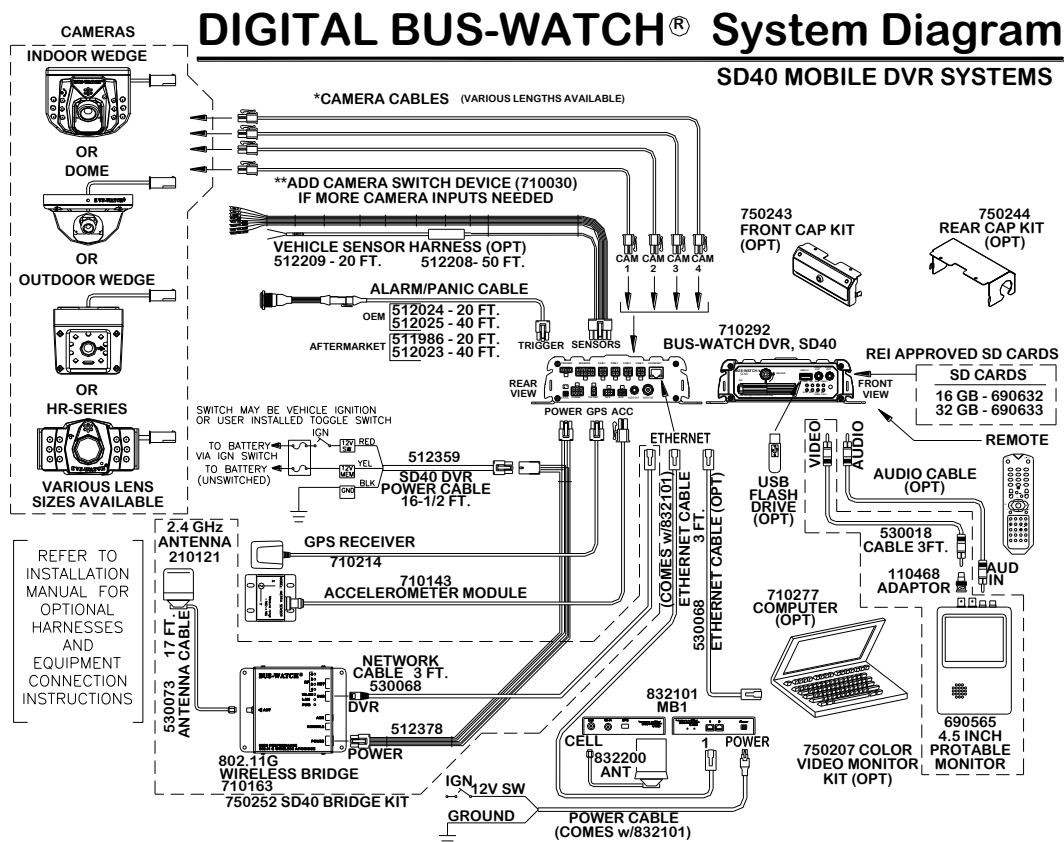


Figure 1: SD40 Expanded System Overview

Front and Back Panels

FRONT PANEL LAYOUT

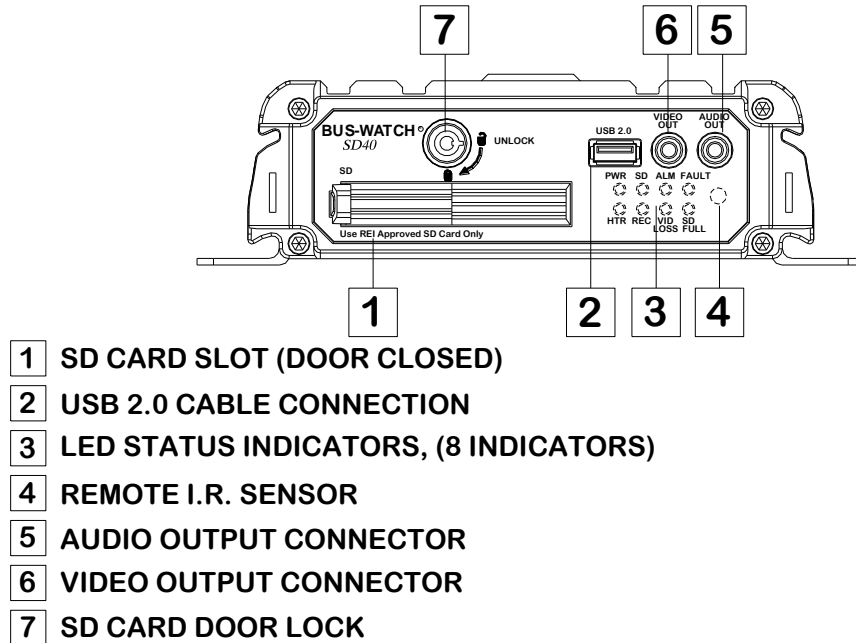
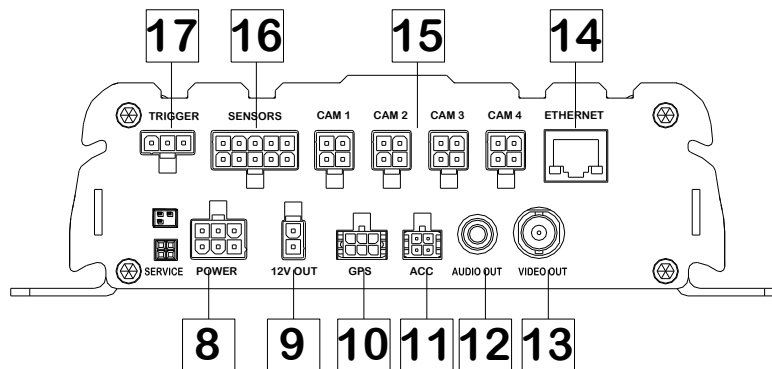


Figure 2: Front Panel Layout

REAR PANEL LAYOUT



- 8 POWER CABLE CONNECTION**
- 9 ACCESSORY POWER**
- 10 GPS (GPS RECEIVER CONNECTION)**
- 11 ACC (ACCELEROMETER MODULE CONNECTION)**
- 12 AUDIO OUTPUT CONNECTION**
- 13 VIDEO OUTPUT CONNECTION**
- 14 ETHERNET CABLE CONNECTION**
- 15 CAMERA INPUTS (CAM 1-4)**
- 16 SENSORS (VEHICLE SENSOR CABLE CONNECTION)**
- 17 TRIGGER (ALARM/PANIC CABLE CONNECTION)**

Figure 3: Rear Panel Layout

Remote Control

REMOTE

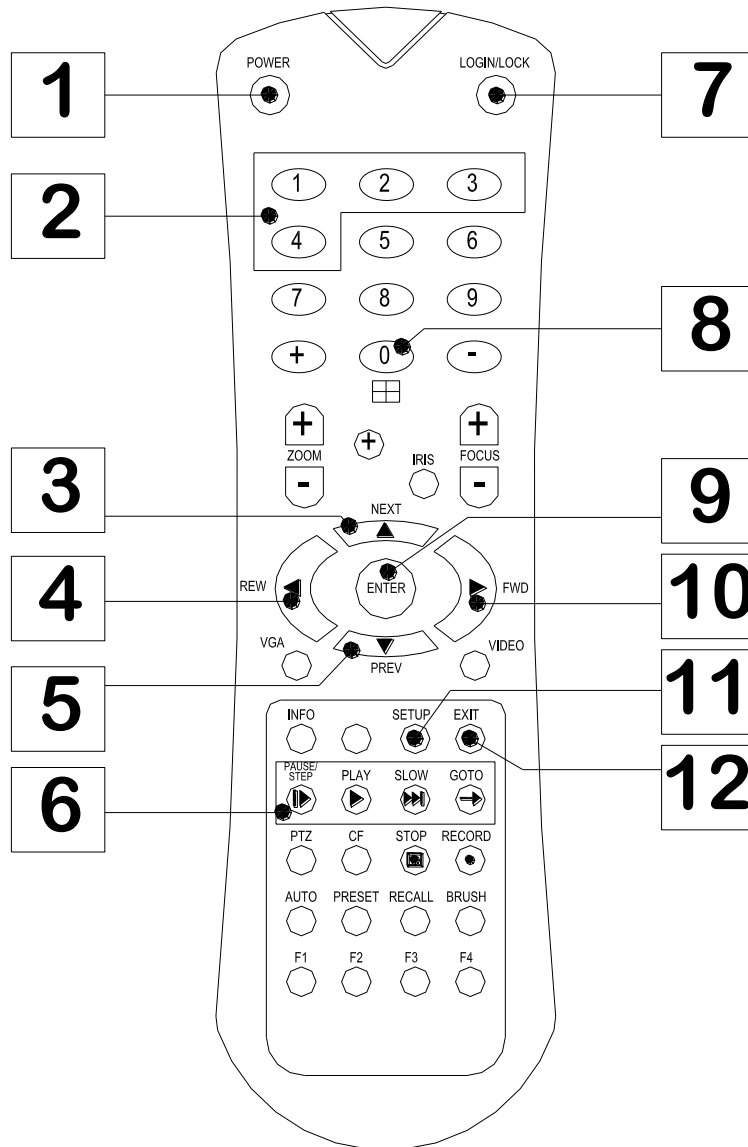


Figure 4: DVR Remote Control


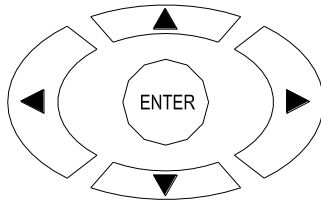
I.D.	LABEL	FUNCTION
1	POWER	Turn DVR On/Off
2	Numeric "1" through "4"	Select Camera
3	NEXT	Volume UP
4	REW	Playback Function, X2, X4
5	PREV	Volume DOWN
6		Playback Functions
7	LOGIN/LOCK	Access Menu
8	"0"	Quad Screen
9	ENTER	Installers Mode
10	FWD	Playback Function, X2, X4
11	SETUP	Menu
12	EXIT	Exit

Figure 5: Remote Control Button Description

NAVAGATION ARROWS



Use the ARROW keys to move between selections, input fields and icons. Press ENTER to select and EXIT to return. NEXT and PREV is also used to increase or decrease volume.

Figure 6: Remote Control Navigation Arrows

NUMERIC INPUT KEYS

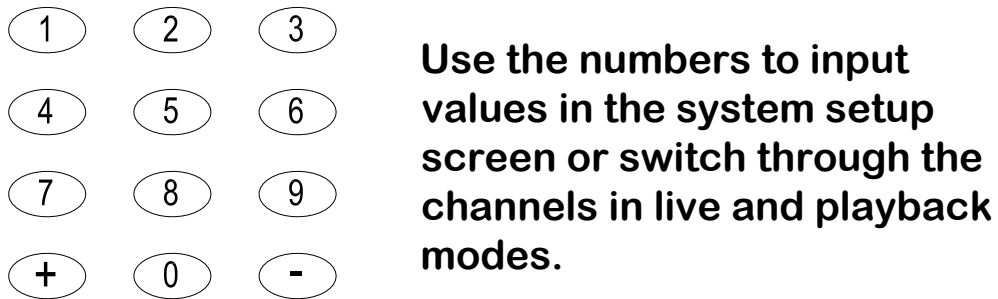


Figure 7: Remote Control Numeric Input Keys

Initial Set Up

The Digital BUS-WATCH® system will operate prior to any user setup with the default settings. However, it may not show the correct time and date (factory set to Central Standard Time). To set the correct date and time, and program the system operation to your requirements, please refer to the *Menu Configuration* section of this manual.

When accessing the menu, it is necessary to connect a video monitor to the video jack on the front or back of the unit. REI recommends our battery-powered 7-inch Color LCD monitor, P/N 690554.

Removable SD Card

DVR Loading and Unloading

Inserting the SD Card: Turn the SD card key to the unlocked and off position. Slide the SD card door to expose SD card slot. Insert the SD card into the slot all the way, release, and verify it is locked in place. Close SD card door and turn the SD card key to the locked and on position, as shown in Figure 8 on Page 15.

Removing the SD Card: Turn the SD card key to the unlocked and off position. Slide the SD card door to expose SD card slot. Eject SD card by pressing it all the way then release. Gently remove the SD card from the slot.

***Note:** The Digital BUS-WATCH® SD40 will not function properly if the SD card key is in the unlocked or off positions. If there is no SD card present in the slot but the key is in the locked and on position, the Digital BUS-WATCH® will still power up normally, the menus can be accessed, etc.; however, the unit will not be able to record any video.*

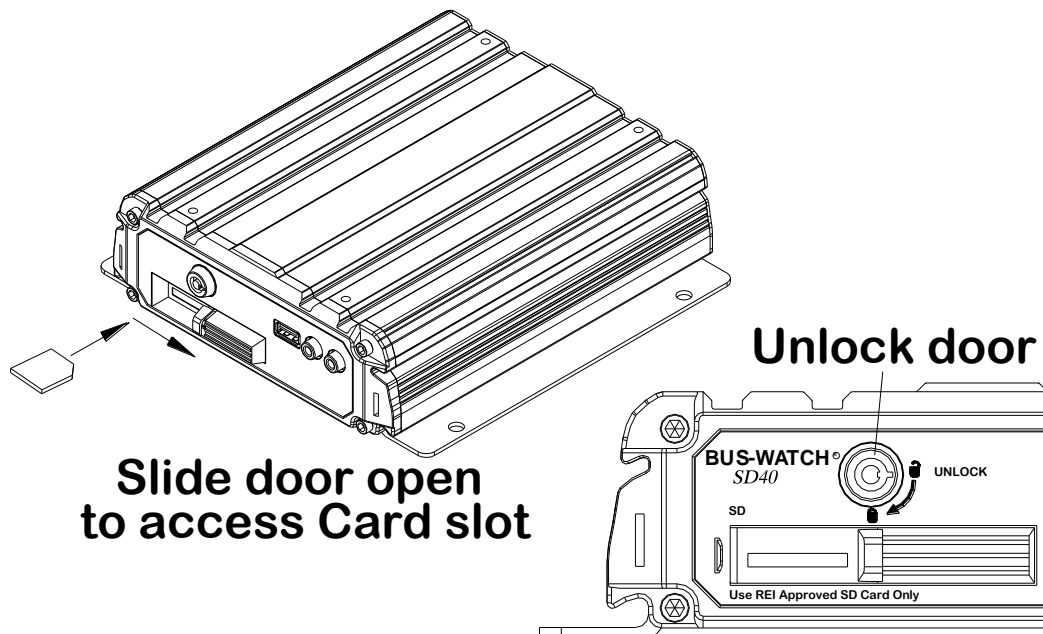


Figure 8: Removable Hard Drive Module Loading and Unloading

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SD Card Record Times

1 Camera with a 32GB SD Card (in Hours)

D1

Quality \ FPS	30	15	8	4	2	1
1	30	60	112	225	451	902
2	40	80	150	300	601	1202
3	50	100	187	375	750	1501
4	60	120	225	451	902	1804
5	68	136	256	513	1026	2052
6	76	153	288	577	1154	2309
7	85	171	320	641	1282	2565
8	96	192	360	721	1443	2886

HD1

Quality \ FPS	30	15	8	4	2	1
1	48	96	180	360	721	1443
2	64	128	240	481	962	1924
3	80	160	300	601	1202	2405
4	96	192	360	721	1443	2886
5	109	219	412	824	1649	3295
6	123	246	461	923	1847	3694
7	136	273	513	1026	2052	4105
8	153	307	577	1154	2309	4618

CIF

Quality \ FPS	30	15	8	4	2	1
1	76	153	288	577	1154	2309
2	102	205	384	769	1539	3078
3	128	256	481	962	1924	3848
4	153	307	577	1154	2309	4618
5	175	351	659	1319	2639	5278
6	197	394	740	1480	2960	5950
7	219	439	824	1649	3295	6597
8	246	492	923	1847	3694	7389

7389 hours = 307 days of constant 24 hour recording

Long Term Storage

Although the Digital BUS-WATCH® systems draw very little current in the stand-by mode, if the systems are installed but not used for an extended period of time (longer than 2 weeks) it is recommended that the power be disconnected from the DVR to avoid draining the vehicle battery. The DVR internal clock will hold time and date for up to 10 years sitting on a shelf, and the daylight saving time functions will kick in upon re-initialization when power is applied.

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Installation

WARNING

***DISCONNECT VEHICLE BATTERY VOLTAGE BEFORE INSTALLING
System WIRING***

WARNING

***DISCONNECT POWER TO THE DIGITAL BUS-WATCH® BEFORE
JUMP STARTING VEHICLE***

WARNING

***INSTALL DVR HORIZONTALLY. USE EXTERNAL SHOCK AND
VIBRATION DAMPENING IF NEEDED.***

System Wiring – Power and Camera Cables

Note: All cables should be hidden from view.

For the basic system (shown in Figure 9 on Page 19), there are five cables, one power (P/N 512002 – 16 Feet, or 512001 – 35 Feet) and 4 camera (P/N 510993 or any different length cable). For external record indication and alarm/event marking, the record indicator / event mark button harness (P/N 511986) is available (shown in Figure 10 on Page 20). The GPS harness (P/N 710144) is used for satellite location and movement information (shown in Figure 11 on Page 21). For additional vehicle monitoring, the BUS-WATCH® vehicle sensor options harness (P/N 512008) is available.

Connect the camera(s) using cable P/N 510781, or equivalent. There is no specific orientation for camera cables to be installed. If multiple types of cameras are installed in a single system, be careful to note which cameras are located where. Use lenses with more magnification (8mm) to bring objects closer. Use lenses with less magnification (4mm) for wide angle viewing.

Connect power using cable P/N 512002, or equivalent. The black wire connects to the negative terminal of the battery. The white wire (labeled 12V Battery) connects directly to the positive terminal of the battery. **The white wire should be fused at 10 Amps** see Figure 9.

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Connect Camera Switching Devices (P/N 700462 or 710030) as needed for multiple camera systems.

If the System operates in the Manual Record Mode, connect the red wire (labeled 12V SW), to the switched side of the ignition switch. The red wire should be fused at 1 A. The red wire does not need to be connected if the system is in Timer Record Mode, however, best practices should include this connection in case DVR configuration is changed in the future.

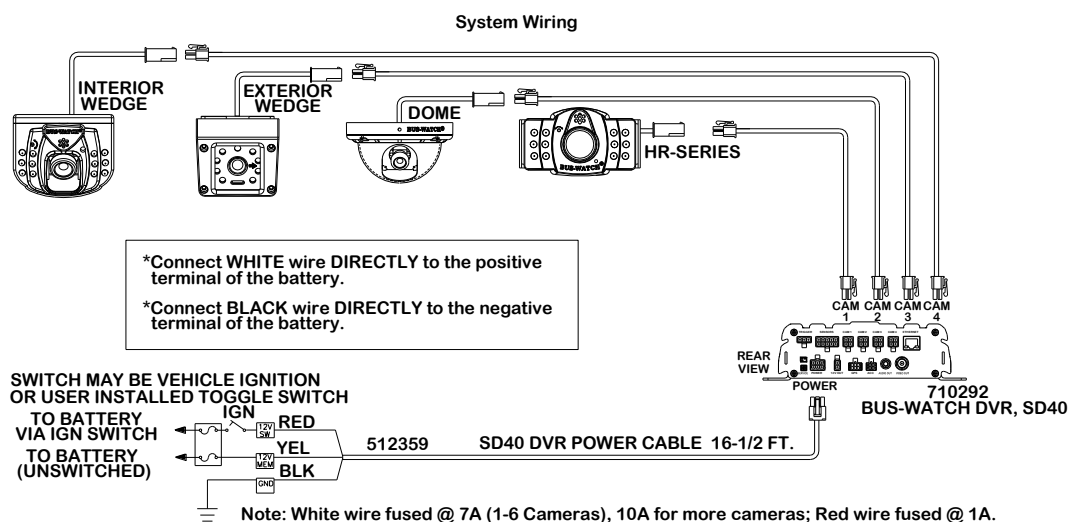


Figure 9: System Wiring – Power and Camera Cables

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External Record Indicator / Event Mark Button Harness

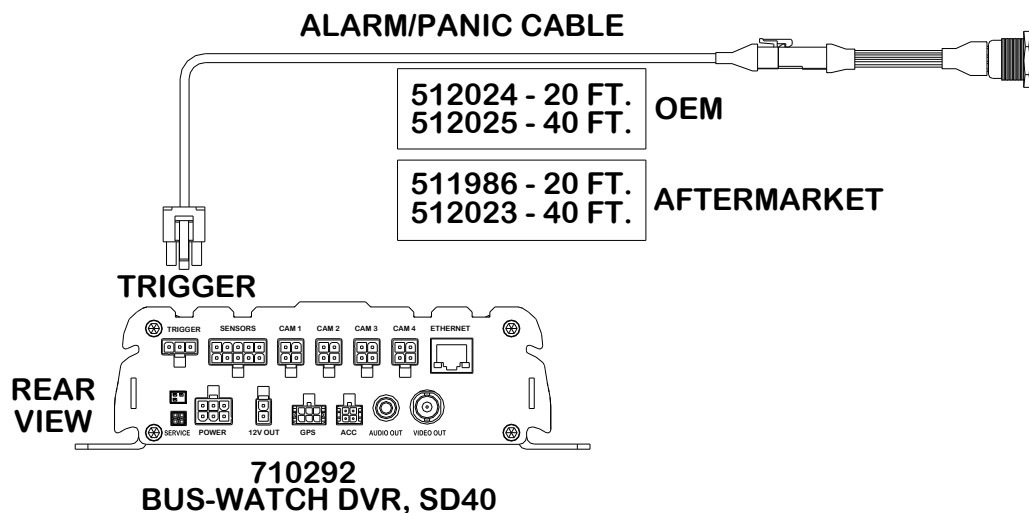


Figure 10: External Record Indicator / Event Mark Button Harness Connection

The optional Digital BUS-WATCH® external record indicator / event mark button harnesses come in 2 different types of switches, both in 2 different lengths. The 2 types of switches are OEM and aftermarket. The OEM switch is rectangular and fits into a standard size dashboard knockout. The aftermarket switch is round, for easier installation in vehicles without spare switch knockouts. All of the cables plug into the same port on the back of the DVR. See Figure 10 for connection illustration.

GPS Antenna Module Harness

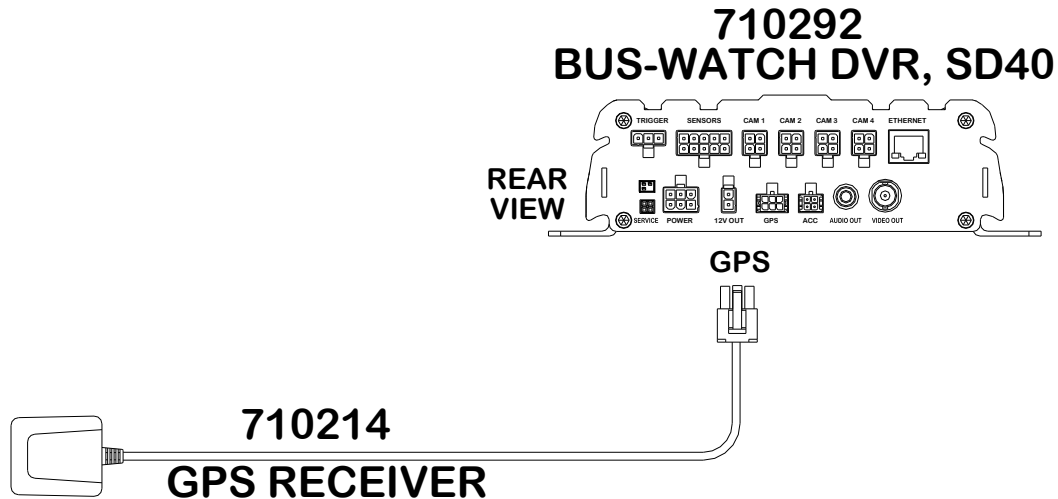
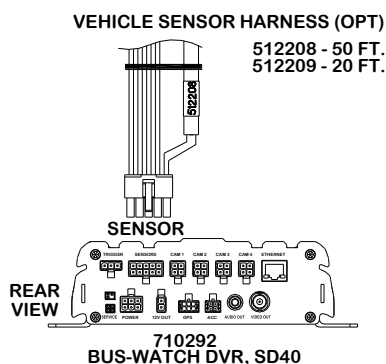


Figure 11: GPS Antenna Module Harness Connection

The optional Digital BUS-WATCH® GPS antenna module harness plugs into the back of the DVR as shown in Figure 11 above. This module will track up to twelve satellites at a time while providing one-second navigation updates at low power consumption. The GPS antenna module is housed in a black, water-resistant case and designed to withstand rugged operating conditions. Information provided to the DVR system includes longitude, latitude, speed, heading, date, and time. Internal memory backup allows the GPS antenna module to retain critical data such as satellite orbital parameters, last position, date, and time, to reduce valid data acquisition time.

Vehicle Sensor Options Harness

Vehicle Sensor Options Harness



	WIRE COLOR	CONNECTION	
		SCHOOL BUS	TRANSIT
SENSOR INPUT 1	BLACK	RED WARNING	LEFT TURN
SENSOR INPUT 2	BROWN	YELLOW WARNING	RIGHT TURN
SENSOR INPUT 3	RED	LEFT TURN	DE-ACCEL
SENSOR INPUT 4	ORANGE	RIGHT TURN	BRAKES
SENSOR INPUT 5	YELLOW	STOP ARM	FRONT DOOR
SENSOR INPUT 6	GREEN	BRAKES	BACK DOOR
SENSOR INPUT 7	BLUE	FRONT DOOR	AUX 1
SENSOR INPUT 8	VIOLET	REAR DOOR	AUX 2



Figure 12: Vehicle Sensor Options Harness Connection

The BUS-WATCH® Vehicle Sensor Options Harness connects to various locations in the vehicle to provide on-screen information regarding vehicle performance. Vehicles have different sets of signals that can be monitored. Three levels of on-screen displays are available to the installer: SCHOOL BUS, TRANSIT, and CUSTOM.

The default SCHOOL BUS monitored points in the vehicle are:

- Vehicle speed
- Brake activation
- Amber warning lamp operation
- Red warning lamp operation
- Stop arm lamp operation
- Front and Back Doors
- Turn Signals

The default TRANSIT monitored points in the vehicle are:

- Vehicle speed
- Brake activation
- Warning lamp operation (de-acceleration lights)
- Turn signals

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- Front door switch operation
- Back door switch operation
- Optional point with Auxiliary (Aux 1 is user-defined and may be used to monitor points such as wheelchair lifts, inertia sensors, etc.)

The CUSTOM vehicle sensor option allows for most other situations. The letters that appear on the screen are settable through the menu system. The default settings are blank.

When using these options, the DEFAULT condition is that the Digital BUS-WATCH® considers a low voltage (or ground) in the OFF state. A high voltage (5-15 VDC) is interpreted as the ON state. To switch the polarity of these signals, reference the Vehicle Sensor Levels Options menu page as shown in Figure 59 on Page 70.

Speedometer Harness Wiring Instructions

Refer to the vehicle service manual for speedometer type, exact wire location, and transmission manufacturer warnings.

The BUS-WATCH® speedometer input wires are designed to be spliced directly onto the transmission speedometer transducer wires. In some installations, this may not be possible (i.e. mechanical speedometer, transmission manufacturer warnings, etc.). The BUS-WATCH® Vehicle Speed Sensor Kit (P/N 750086) may be required.

Vehicle Sensor Options Harness Vehicle Connections

(Shown as School Bus)

WIRE COLOR	WIRE DESCRIPTION
BLACK	RED WARNING LAMP
BROWN	YELLOW WARNING LAMP
RED	LEFT TURN SIGNAL
ORANGE	RIGHT TURN SIGNAL
YELLOW	STOP ARM
GREEN	BRAKES
BLUE	FRONT DOOR
VIOLET	REAR DOOR

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Yellow Warning Lamps

Connect the BROWN wire to the Warning Lamp Flashers' Yellow lamp output.

Red Warning Lamps

Connect the BLACK wire to the Warning Lamp Flashers' Red lamp output.

Stop Arm Lamps

Connect the YELLOW wire to the switched side of the stop arm lamp.

Brake Lamp

Connect the GREEN wire to the switched side of one brake lamp.

Turn Signals

Connect the RED and ORANGE wires to the left and right turn signal lamps.

Front and Back Doors

Connect the BLUE and VIOLET wires to the switched side of the door switches.

On-Screen Information with Vehicle Sensor Options Harness

The Digital BUS-WATCH® Surveillance system, when equipped with the BUS-WATCH® Option Harness, will display information on-screen in the Installers Mode when the vehicle's monitored switches are activated and signals are applied to the monitored sensors.

ACTIVE SWITCH OR SIGNAL	ON-SCREEN DISPLAY
BRAKE APPLIED	BR
STOP ARM DEPLOYED	SA
YELLOW WARNING LAMPS On	YW
RED WARNING LAMPS On	RW
LEFT TURN SIGNAL On	LT
RIGHT TURN SIGNAL On	RT
FRONT DOOR OPEN	FD
REAR DOOR OPEN	RD
SPEEDOMETER (SEE NOTE 1)	XX MPH

NOTE:

1. The XXs represent the vehicle speed (i.e. 35).

Accelerometer Module Harness

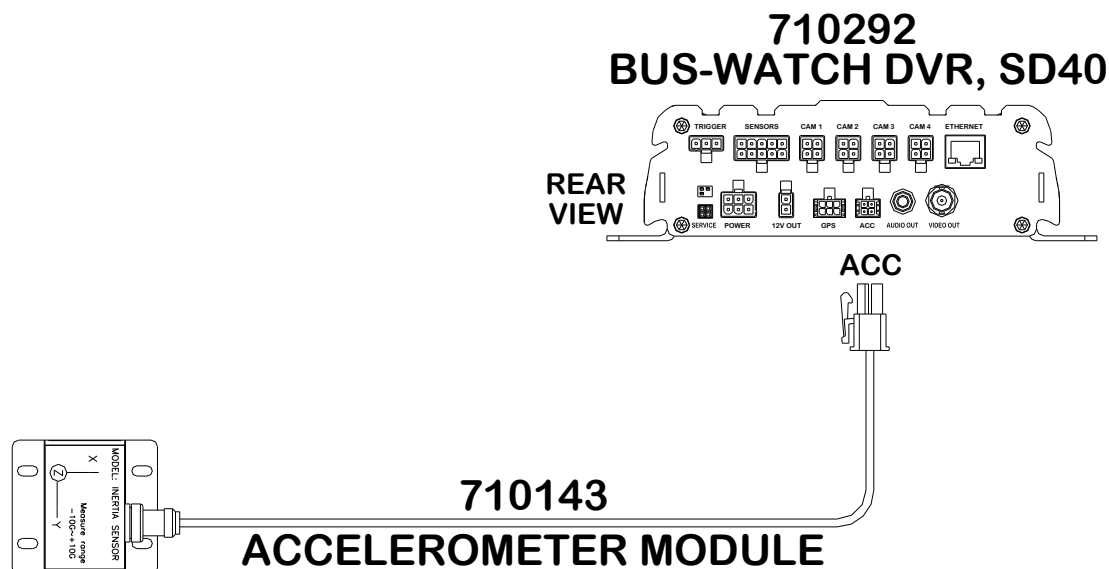


Figure 13: Accelerometer Module Harness Connection

The optional external Accelerometer, or Inertia Sensor, must be hard mounted to the vehicle floor, frame, or some other non-dampened part of the vehicle. The reason for this is so that if external dampening is used for the DVR, it will not throw off the Accelerometer readings.

To properly install the Accelerometer Module, the user must align the device with the picture on top of the module as shown in Figure 14 below. The X axis is drawn from the back to the front of the bus, the Y axis is drawn from the side of the bus to the other side of the bus, and the Z axis is drawn from the bottom to the top of the bus. The Accelerometer Module then needs to be calibrated as shown in **Error! Reference source not found.** on Page **Error! Bookmark not defined.**

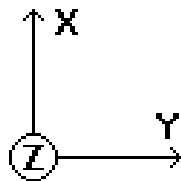


Figure 14: 3 Axis Inertia Sensor Directions

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Physical Mounting Requirements

L Bracket Mounting

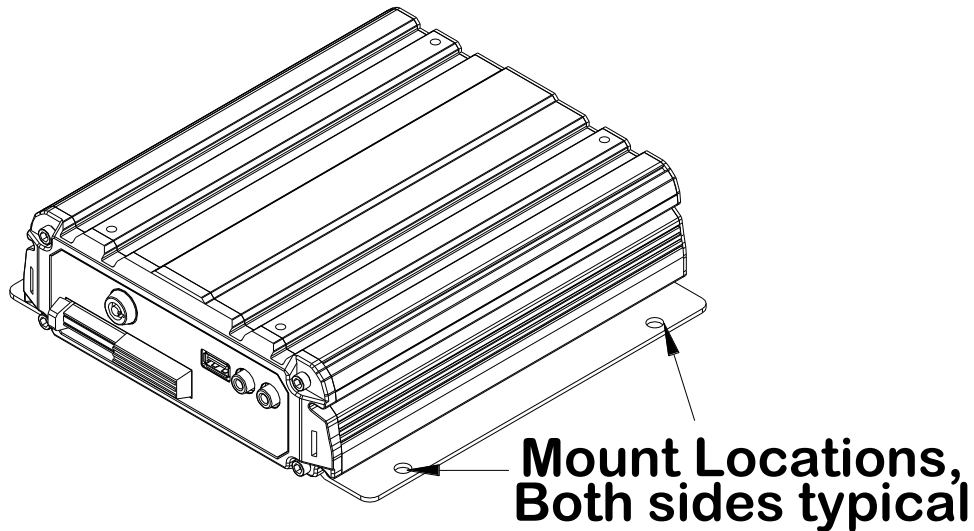


Figure 15: L Bracket Mounting

The DVR has two mounting brackets on the sides for easy mounting, as shown in Figure 15 above. This type of installation is recommended for vehicles that have a secured compartment, such as a radio box, where the DVR cannot be tampered with.

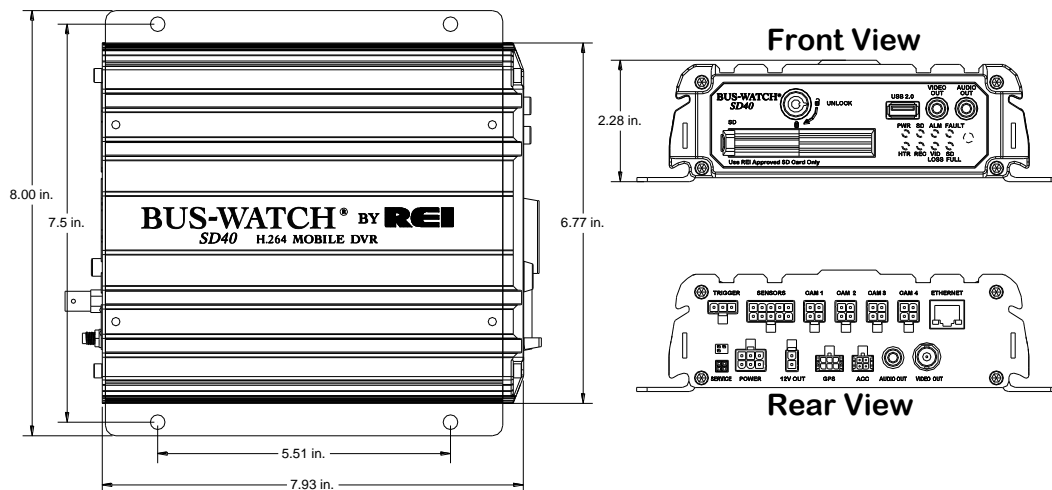


Figure 16: DVR Dimensions

Security Cover Mounting

There may be installations that require front and back of the DVR be enclosed in its own protective enclosure. Security covers can be installed to protect the front and back of the DVR.

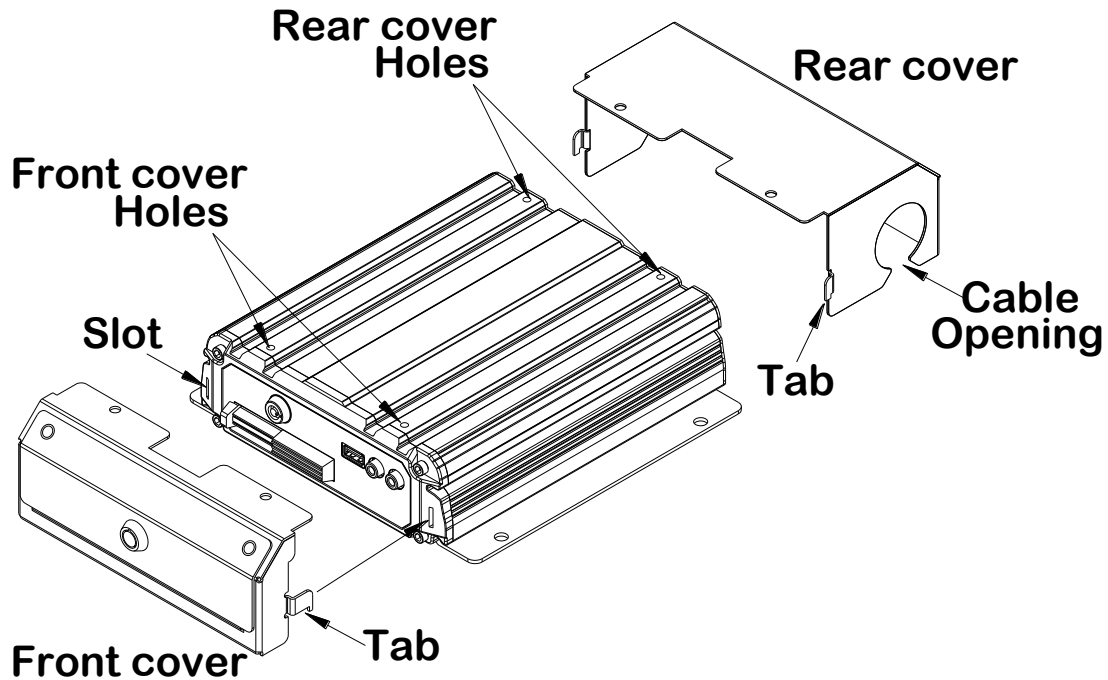


Figure 17: Security Cover Mounting

IMPORTANT:

Check local, state, and federal guidelines as to modification of the existing structures within the vehicle.

Camera Placement

The Digital BUS-WATCH® cameras can be mounted anywhere in the vehicle, unless this does not give a stable mount or it vibrates excessively. Use outdoor cameras for exterior placement.

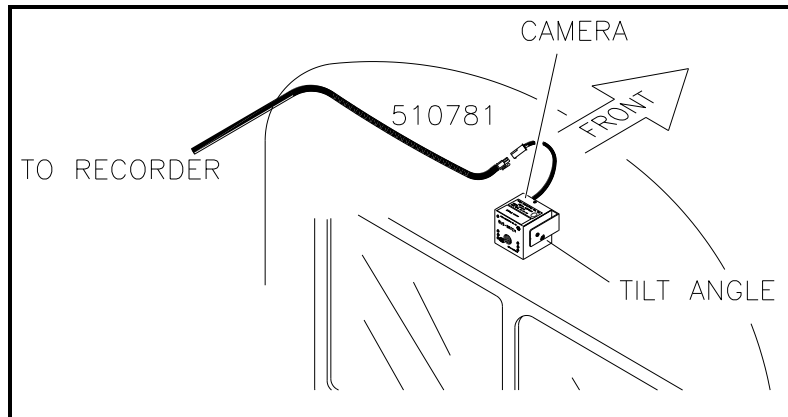


Figure 18: Camera Connection and Placement

For a single camera installation, it is common to place the camera in the front of the vehicle looking towards the rear of the vehicle. The Digital BUS-WATCH® camera shown in Figure 18 above is mounted to the center of the front header panel.

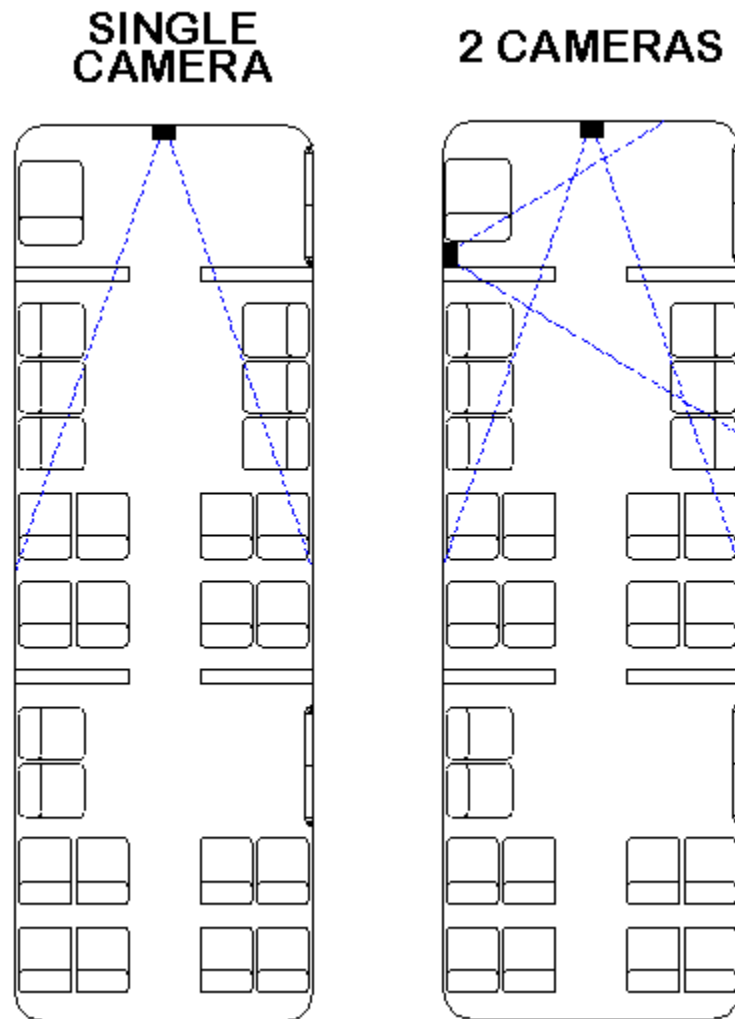


Figure 19: Potential Single and Two Camera Placement Options

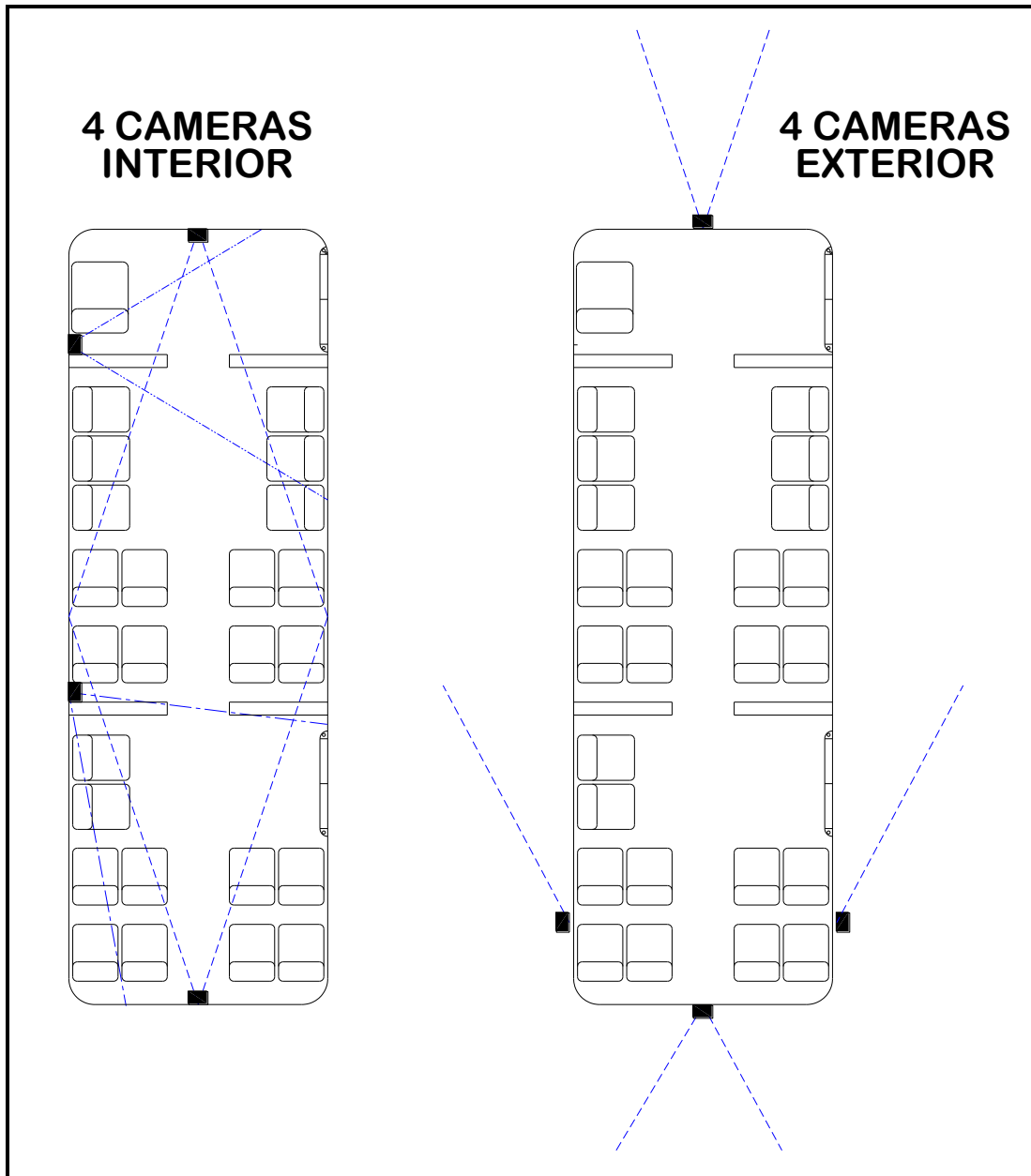


Figure 20: Potential Multiple Camera Placement Options

Typical Camera Lens Viewing Angles

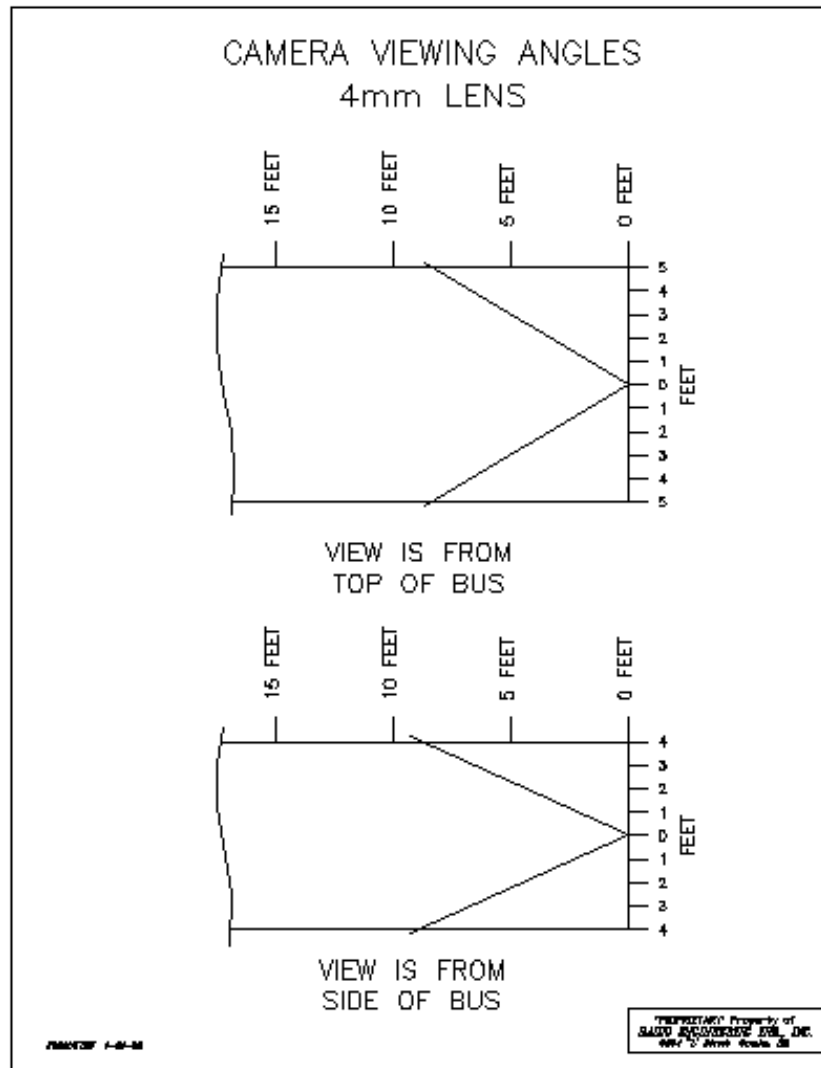


Figure 21: 4mm Lens Angles

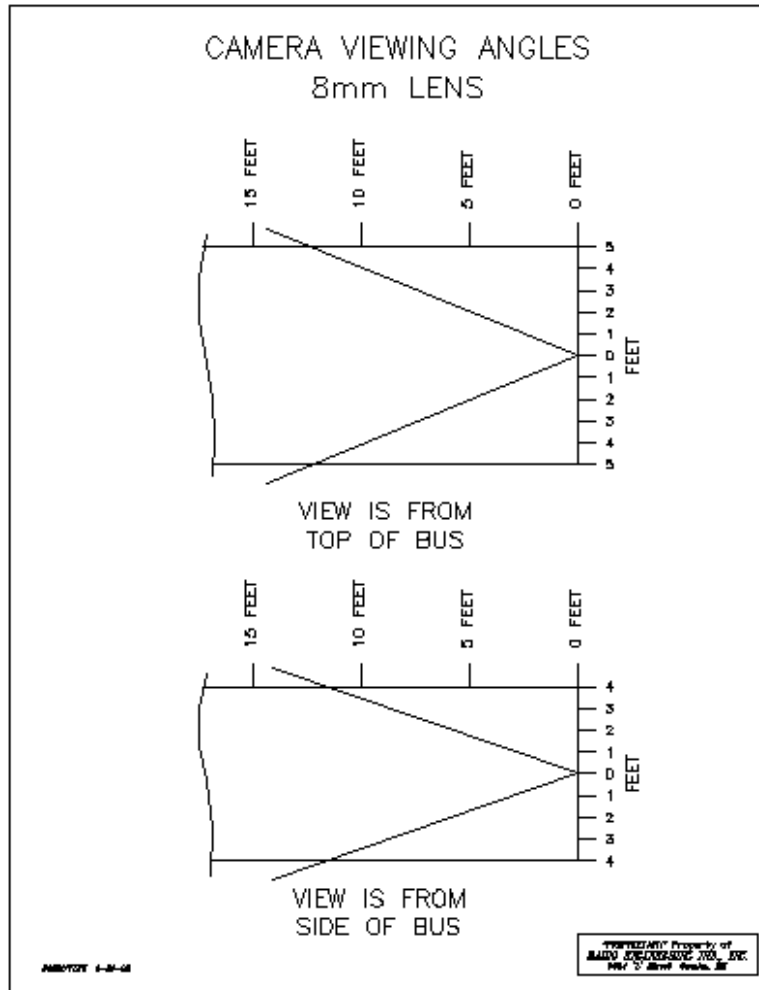


Figure 22: 8mm Lens Angles

Recording & Playback

System Start-Up

To start the recording process, place the *system switch* in the ON position (this will be done automatically if the *system switch* is connected to the ignition switch and the ignition switch is in the ON position). Upon turning the system switch ON, the Digital BUS-WATCH® will commence recording.

System Shut-Down

To stop the recording process, place the *system switch* in the OFF position. If the OFF DELAY option is enabled, the Digital BUS-WATCH® will continue to record for the prescribed number of minutes. When the off-delay expires, the camera and Digital BUS-WATCH® shut off.

Playback Options

There are three ways to view the recorded videos: through the TV Video Outputs (Front or Back), through the Removable SD card, and through the PC Network Connection.

TV Video Outputs (Front and Back)

Using a TV Monitor and a Remote Control, the user can access recorded video files by Date and Time or by Event. After selecting the appropriate file, the user can review the video using Play, Stop, Pause, Fast Forward, Fast Rewind, Slow Forward, Slow Rewind, Frame Forward, and Frame Reverse. The user can select individual video channels to be displayed full screen by pressing the numeric button on the remote corresponding to that channel, or view all channels at the same time by pressing the “0” button on the remote.

Removable SD Card

Using the REI RMS PC Software, the user can access the files by connecting SD card to the computer.

PC Network Connection

Using the REI RMS PC Software, the user can access the files by connecting the computer to the DVR Front Panel Ethernet port, as shown in Figure 23 below.

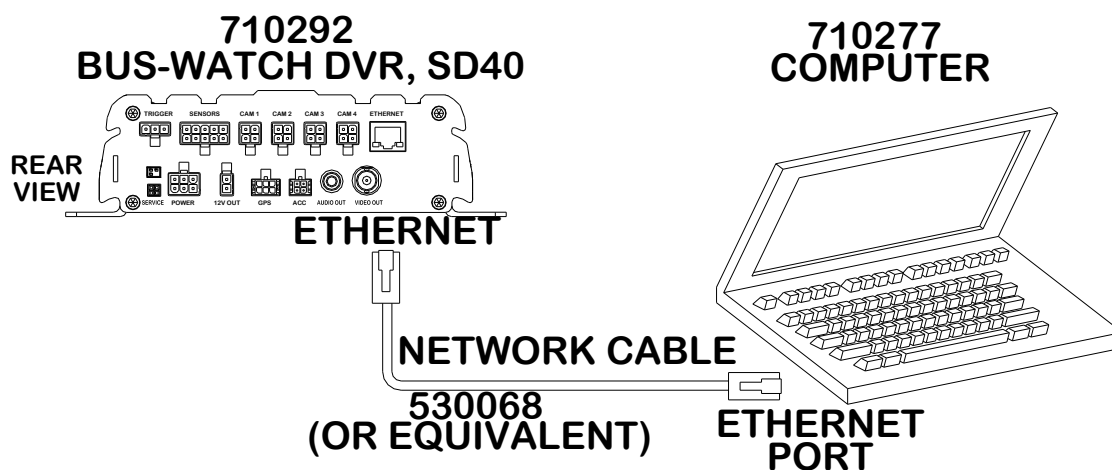


Figure 23: Connecting to the DVR with a Computer through the Ethernet Connection

Menu Configuration

Installers Mode Page

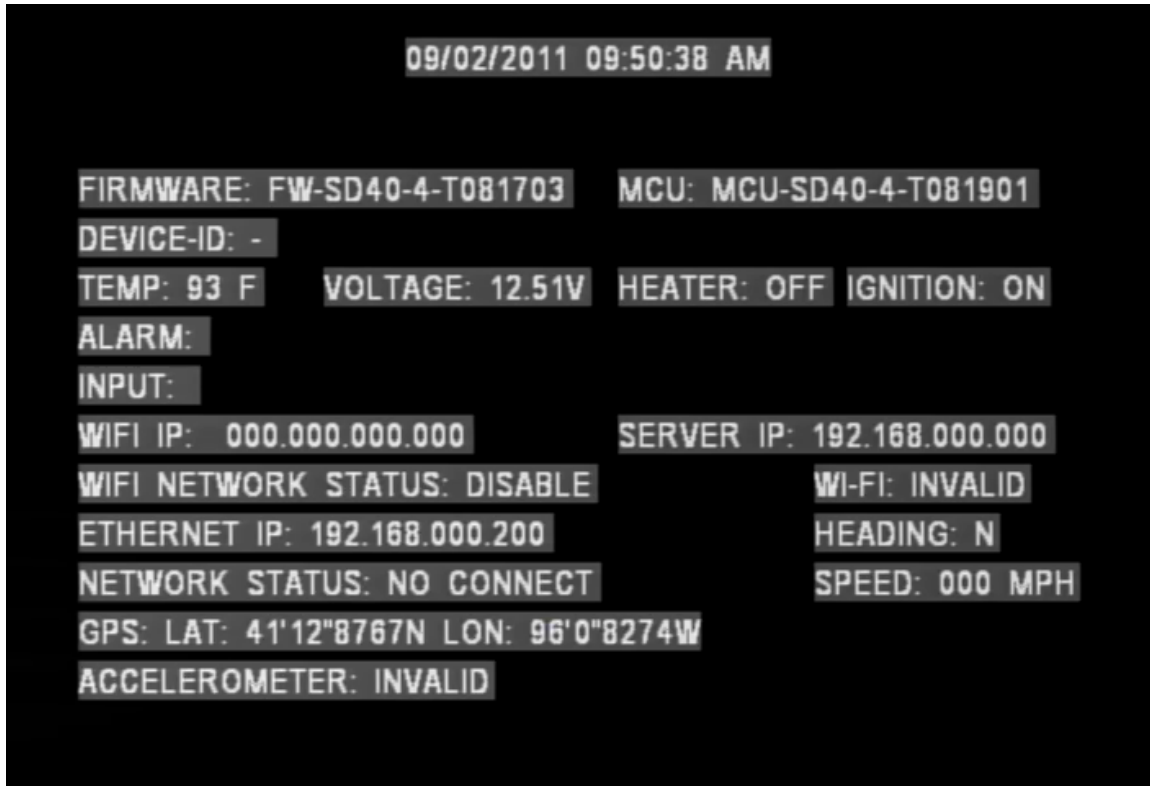


Figure 24: Installers Mode

The Installers Mode Page is a display that is brought up and taken away by pressing the Enter button on the remote control and is displayed on the video output RCA ports. The purpose of this on-screen text overlay mode is to give the installers an easy way to see some of the important information relating to the proper installation of the DVR. Any of the vehicle sensor options that are being currently activated, such as brakes or turn signals, would display on the screen in this mode. No text placed over the screen, either in this mode or any other, is ever recorded to the video. All of the data associated with the video is digitally embedded into the video frames, creating a proprietary format that requires REI PC Software to decode and display.

Main Menu Page

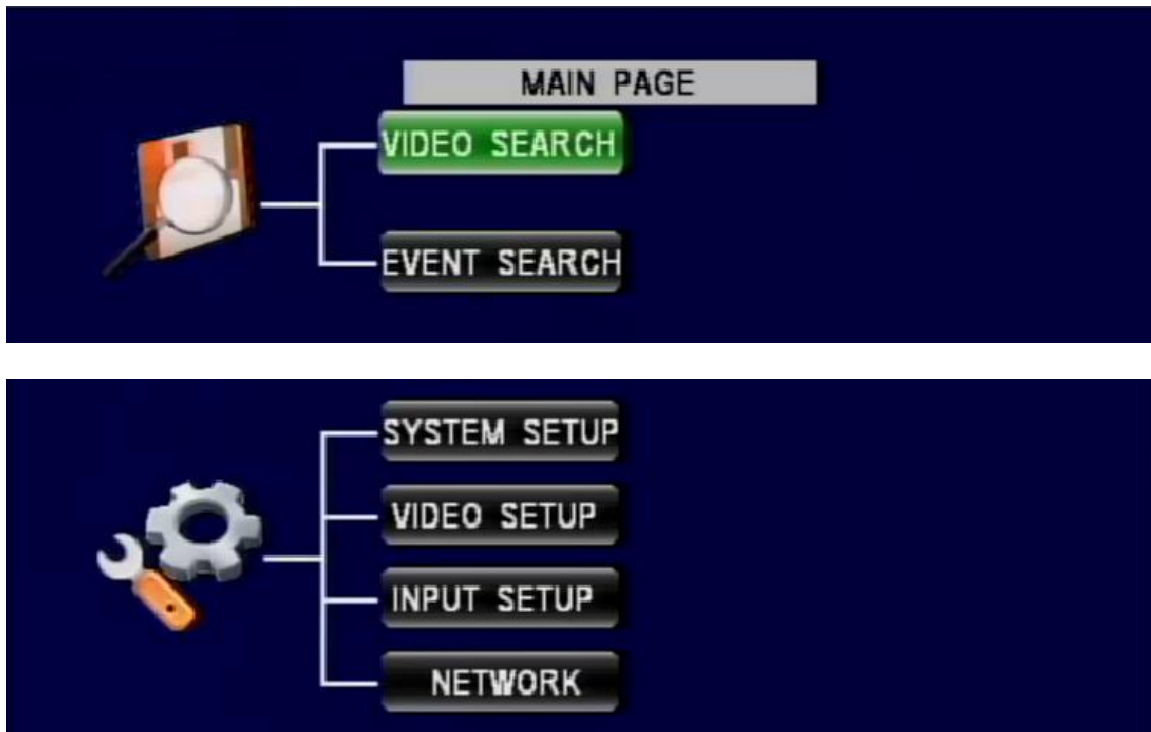


Figure 25: Main Menu

The DVR Configuration Menu can be accessed by pressing the Setup button on the remote control. Using the Up, Down, Left, Right, and Enter buttons on the remote control, the user can access all of the different options of the DVRs. Video Search is where the user can play back video by choosing the specific Time and Date they would like to view. Event Search allows the user to select video playback by pre-defined event triggers. System Setup is where the system information, time date and operation mode setting, and utility menu are. Video Setup is where the recording, live, and OSD settings are. Input Setup is where the event, alarm and audible settings are. Network is where the Ethernet, Wi-Fi, and 3G settings are.

Setup Menu

This section describes where all of the various record configuration settings can be viewed or set using a video monitor and a remote control.

The Setup section of the Menu is subdivided into 4 main categories, System Setup, Video Setup, Input Setup, and Network.

System Setup Menu

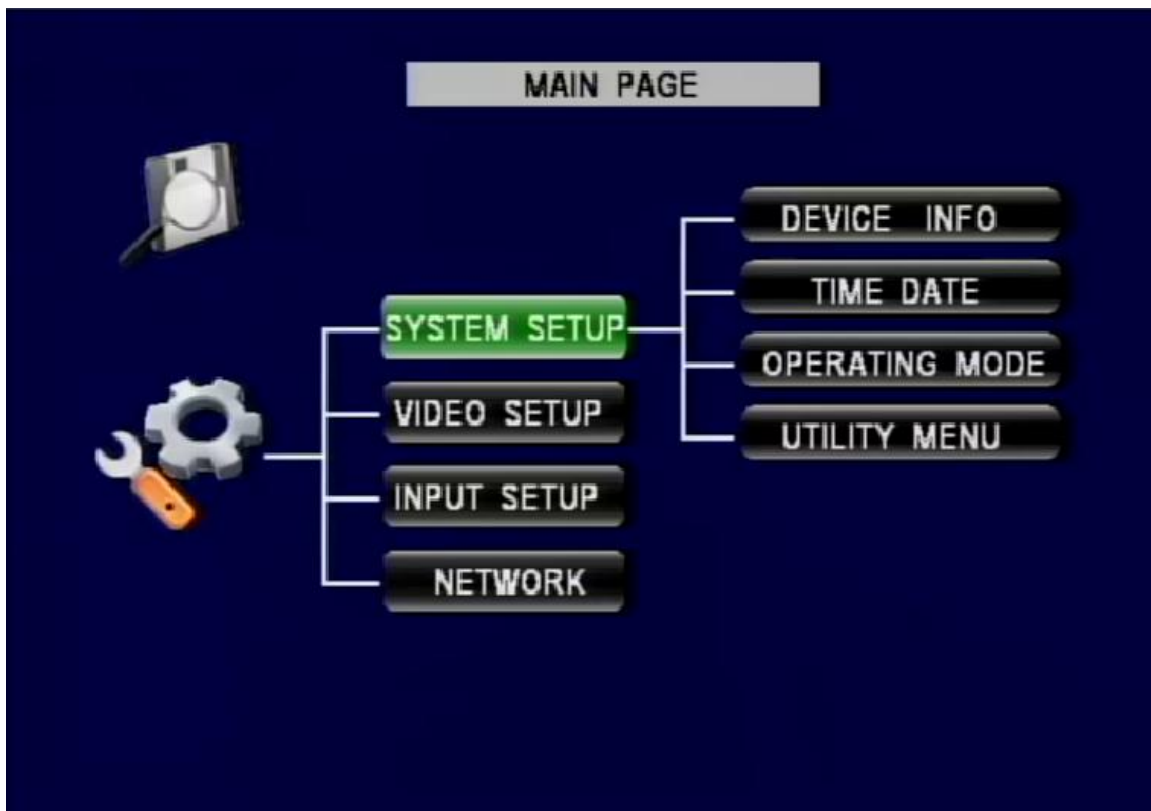


Figure 26: System Setup

The System section of the System Setup Sub-Menu is subdivided into four subcategories, Device Info, Time Date, Operating Mode, and Utility Menu.

Device Info

DEVICE INFO

MODEL # SD40 SERIAL # 00000

ORGANIZATION REI

VEHICLE I.D. TEST

DEVICE-ID REI-TEST

FIRMWARE VER. FW-SD40-4-T081703

MCU VER. MCU-SD40-4-T081901

SD CAPACITY 16.1GB/13.9GB FREE

DEVICE HISTORY

CANCEL OK

Figure 27: Device Info

The Device Info is where the Model #, Serial #, Organization, Vehicle and Device ID, Firmware and MCU versions, and SD capacity are.

MODEL # shows the DVR model.

SERIAL # shows the serial number and can be changed accordingly by using the remote control.

ORGANIZATION allows the user to enter custom information to identify the DVRs, such as company name.

VEHICLE ID also allows the user to enter custom information to identify the DVRs, such as bus number.

DEVICE-ID is generated automatically based on Organization and Vehicle ID and cannot be changed by the user.

FIRMWARE VER. shows the firmware version the DVR currently has.

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MCU VER. shows the MCU version the DVR current has.

SD CAPACITY shows the total/available space the SD card has.

DEVICE HISTORY shows the device status history, including highest recorded speed, miles logged, hours logged, maximum acceleration, high/low temperatures, and high/low voltages. User can reset each individual record or select Reset All to reset all of them.

The screenshot displays the 'DEVICE HISTORY' screen with a dark blue background and white text. At the top, a grey box contains the title 'DEVICE HISTORY'. Below this, several metrics are listed, each with a corresponding date and time. To the right of each metric is a 'RESET' button. At the bottom, there are three buttons: 'RESET ALL' (highlighted in green), 'CANCEL', and 'OK'.

Metric	Date/Time	Action
HIGH SPEED 0MPH	09.02.2011 09:35:40	RESET
MILES LOGGED 0MILE		RESET
HOURS LOGGED 0		RESET
MAX ACC X: (+)00.000	09-02-2011 09:35:40	RESET
Y: (+)00.000	09-02-2011 09:35:40	RESET
Z: (+)00.000	09-02-2011 09:35:40	RESET
LOW TEMP +89 F	09.02.2011 09:35:55	
HIGH TEMP +111 F	10.18.2010 02:01:51	RESET
LOW VOLT 12.22V	09.02.2011 09:45:00	
HIGH VOLT 33.51V	09.02.2011 09:35:40	RESET

RESET ALL CANCEL OK

Figure 28: Device History

Time/ Date

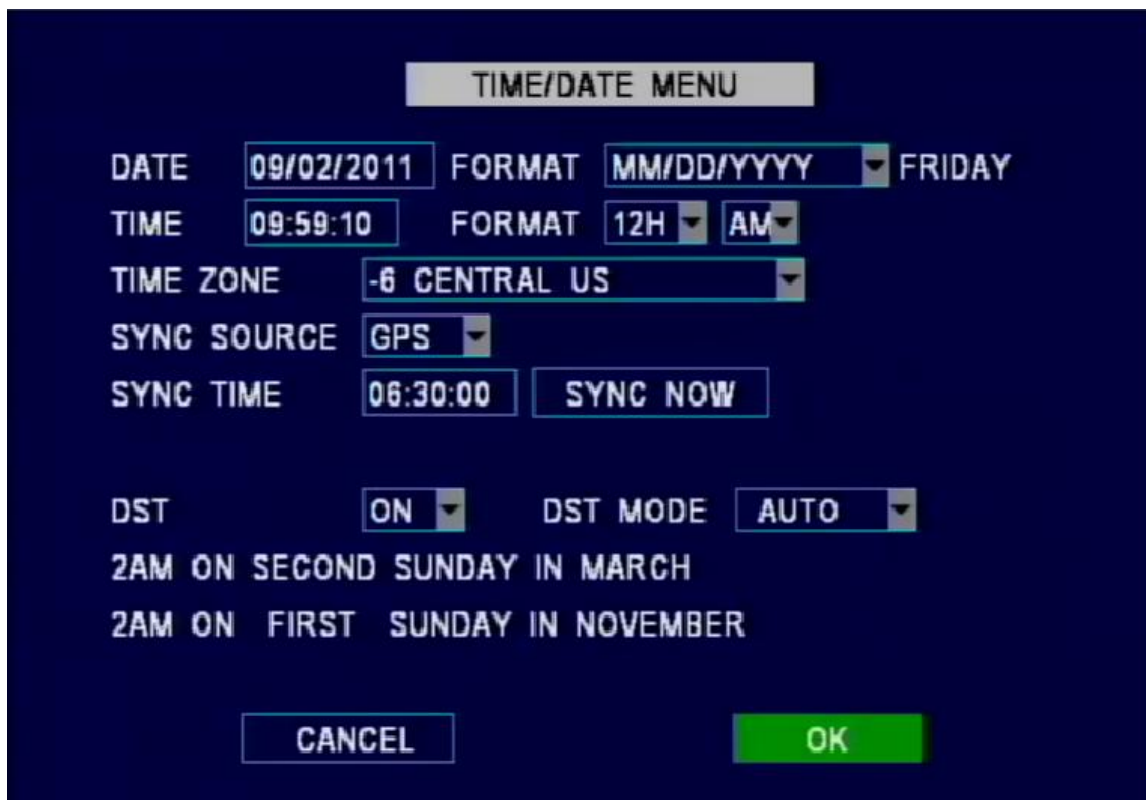


Figure 29: System – Time/Date

The Time/Date menu allows the user to configure options for setting the Date and the Time. All REI DVRs use high accuracy, extended temperature range Real Time Clocks with 10 year internal battery backup for consistent and reliable time keeping over the life of the DVR system. Using the arrow, enter, and numeric buttons on the remote control, the user can change these settings.

DATE allows the user to manually enter the date and also to change the format of the date as it appears on the OSD overlay of the video feed-through.

TIME allows the user to manually change the time and the time display format from AM/PM to 24 Hour.

TIME ZONE is for use with the GPS and Sync Time, as GPS satellite time comes in as GMT and needs to be offset for your time zone for proper automatic time synchronization.

SYNC SOURCE allows the user to use a time synchronization system, either GPS, or NTP (Network Time Server), or None.

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SYNC TIME gives the option to set a specific time. To immediately sync time, highlight SYNC NOW and press enter on the remote.

DST, when set to ON, will make the system clock change automatically with Daylight Saving Time. If your region does not use Daylight Saving Time, setting this item to OFF disables the Daylight Saving Time function.

DST Mode can be changed from Auto to Custom. The Energy Policy Act of 2005 changed the time change dates for Daylight Saving Time in the U.S. DST begins on the second Sunday of March and ends the first Sunday of November. Because Congress retains the right to revert Daylight Saving Time back to the 1986 time schedule, certain real-time clock embedded systems need to have the ability to be changed. The DST Mode can be set from 'Auto' to 'Custom'. When the DST Mode is set to 'Auto', the Daylight Saving Time triggers will conform to the EPA of '05 rules. When the DST Mode is set to 'Custom', the Daylight Saving Time triggers can be changed to any of the first, second, third, fourth, or last week of any month, not overlapping, as shown below.



Figure 30: Custom DST Triggers

Operating Mode

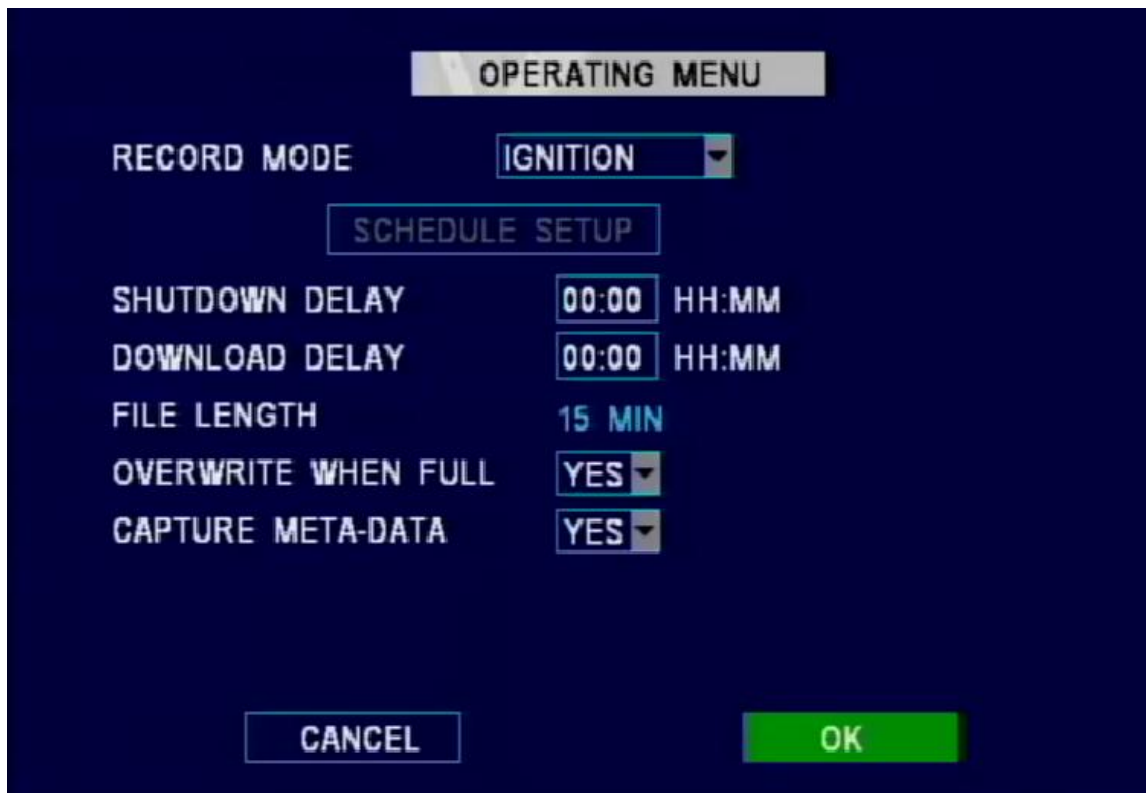


Figure 31: Operating Mode

The Operating Menu allows the user to choose when the DVR starts recording video, how long the DVR stays on after shutting off the ignition, what happens when SD card is full, and if the DVR is allowed to capture Meta-Data.

Record Mode lets user to choose when DVR starts recording videos. There are four settings for user to choose: Ignition, Schedule, Both, and Either.

IGNITION: DVR starts recording as long as ignition signal stays on.

SCHEDULE: DVR starts recording only by schedule regardless ignition signal.

BOTH: DVR starts recording by schedule and when ignition is on at the same time.

EITHER: DVR starts recording by schedule or when ignition is on.



Figure 32: Schedule Menu

Schedule section of the menu is where the user can set the date and times that the DVR will automatically turn on and shut off.

DATE: Every, Sun, Mon, Tue, Wed, Thu, Fri, Sat, or None.

ON - OFF: Start Time – Stop Time.

SHUTDOWN DELAY: The number of hours and minutes the DVR will continue recording after the Record Mode expires.

DOWNLOAD DELAY: The number of hours and minutes the DVR will stay on but not recording after Record Mode expires.

FILE LENGTH: The length of videos each file contains.

OVER WRITE WHEN FULL: when set to Yes, the DVR overwrites the SD card, first in, first out, as the DVR needs more room for storage. When this is set to No, the DVR will write once and then stop, lighting the SD Full LED on the face of the DVR. When this setting is set to No, the user must manually delete files off the SD card, or format the card for more record time.

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CAPTURE META-DATA: When this setting is set to ON, it allows the DVR to create a black box file on the SD card for fast search.

Utility Menu

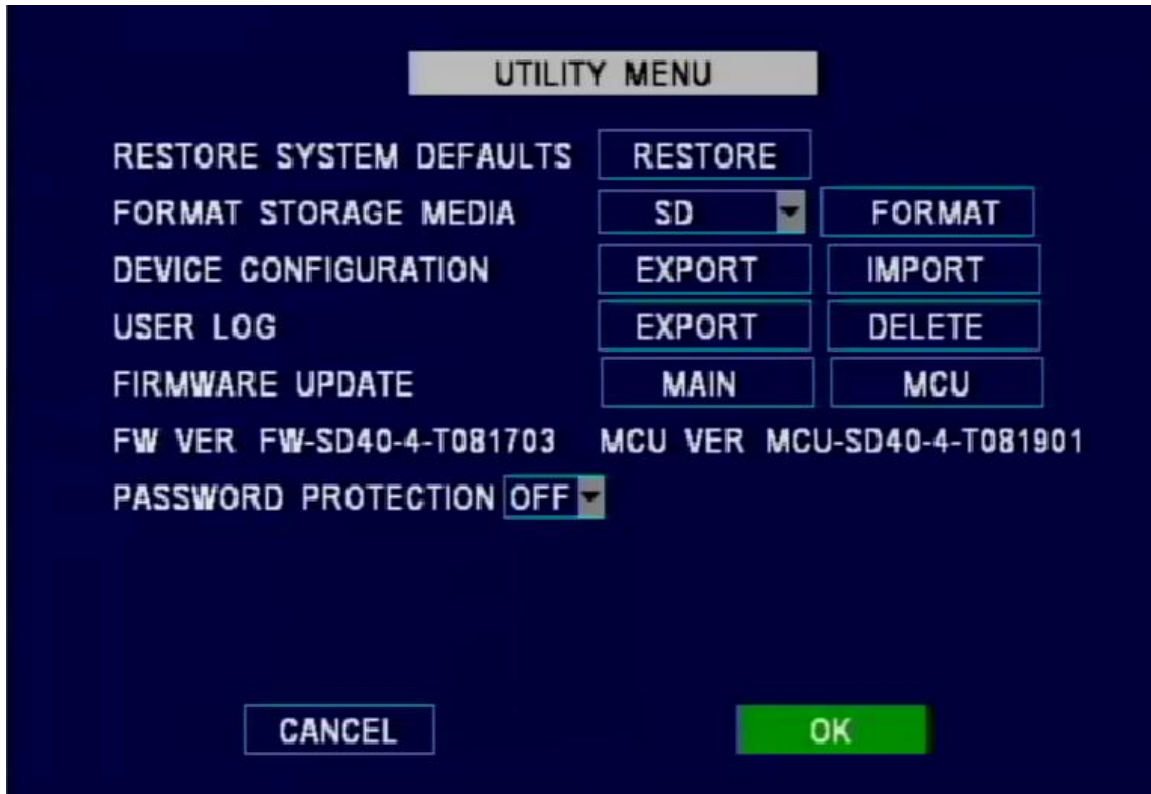


Figure 33: System – Utility Menu

Utility Menu allows user to restore default setting, format SD/USB storage, export/import configuration, export/delete user log, update main/MCU firmware, and set up password.

RESTORE SYSTEM DEFAULTS: The user can restore DVR to factory default settings by using this function.

FORMAT STORAGE MEDIA: The user can completely erase the video and audio files off of the SD card or USB drive by using this function. The function will rebuild the basic directory structure of the drive to allow for continued and immediate recording of audio and video. Use the drop-down menu to select which media to format.

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DEVICE CONFIGURATION: This function allows user to export and import device configuration for fast setup or customized setting recovery.

USER LOG: The user log function allows user to export or delete user log.

FIRMWARE UPDATE: The DVR contains two different types of firmware. To update main firmware, highlight MAIN and press enter to start. To update MCU firmware, highlight MCU and press enter to start.

FW/MCU VER.: Firmware version and MCU version.

PASSWORD PROTECTION: Allows user to set a password on the DVR to prevent unauthorized enters to the setup menu.

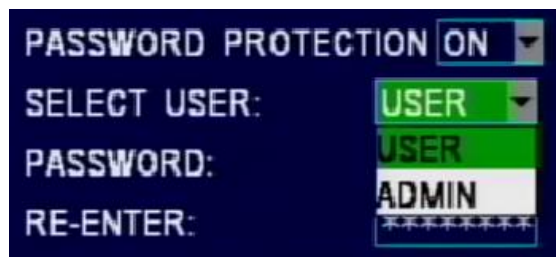


Figure 34: System – Password Protection

The User password allows a user to access the videos but will not allow the user to access any of the setup. This would be useful for a user who needs to use the remote control to play back video footages, but not to change any of the recorder settings.

The Admin password allows the user to gain full access to all the menus, as if there were no password protection.

Video Setup

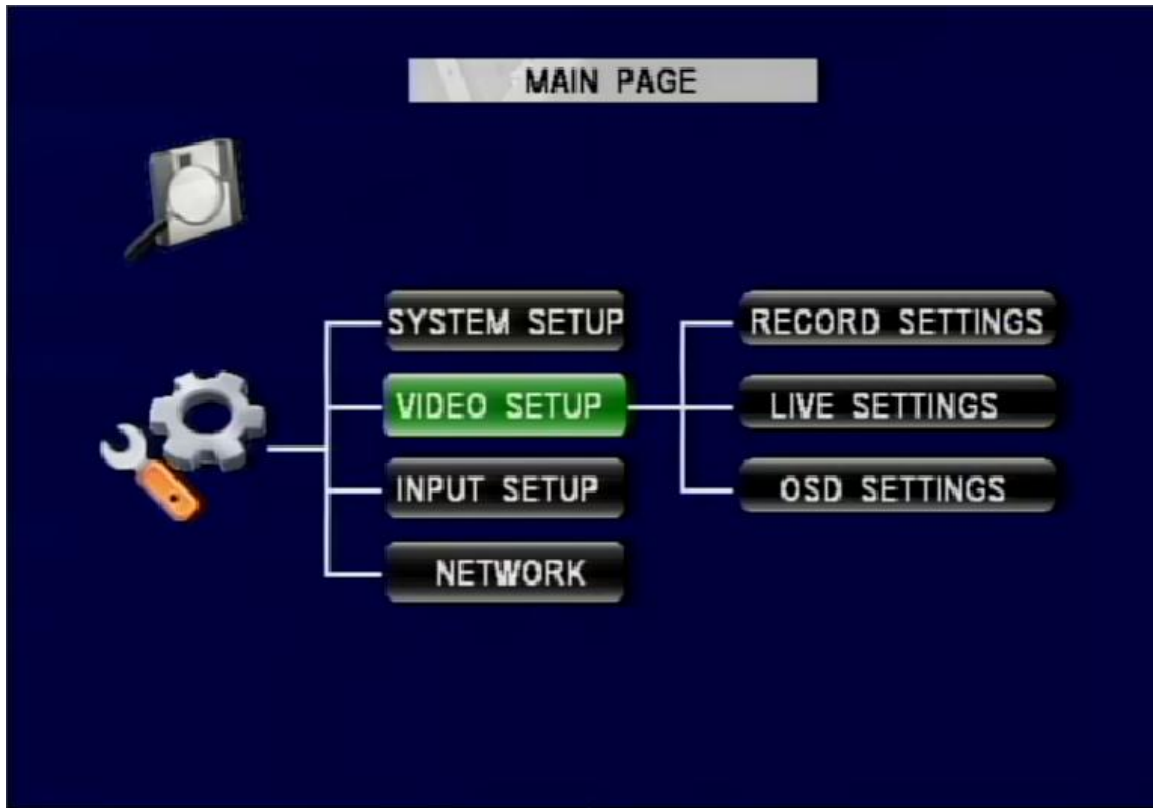


Figure 35: Video Setup

The Video Setup section of the menu is subdivided into 3 main categories, Record Settings, Live Settings, and OSD Settings.

Record Settings

RECORD SETTINGS

GLOBAL VIDEO TYPE: **NTSC** VIDEO LOSS ALARM: **ON**

CH ID	EN	NAME	AUDIO	LIVE
CH1	ON		ON	ON
CH2	ON		ON	ON
CH3	ON		ON	ON
CH4	ON		ON	ON

RECORD PRIORITY

BALANCED **FIDELITY** **CAPACITY** **CUSTOM**

CUSTOM SETTINGS

CURRENT SETTINGS: 9 HOURS

CANCEL **OK**

Figure 36: Camera – Record Settings

The Record Settings subsection of the Video Setup section allows the user to change all the related camera record settings, such as number of cameras, resolution, frame rate, etc.

GLOBAL VIDEO TYPE: PAL or NTSC depending on which country the user is in.

VIDEO LOSS ALARM: Allows the DVR to record as alarm video when there is a video loss.

CH ID: Channel ID.

EN: Enable channel when set to ON, disable when set to OFF.

NAME: The name of the channel.

AUDIO: Record audio when set to ON, no audio when set to OFF.

LIVE: Allows channel to be seen in Live View when set to ON, disables when set to OFF.

AUDIO: Select ON or OFF for independent audio recording for each channel.

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LIVE: A check represents that this channel will be previewed on the video monitor output feeds through the front and back video ports of the DVR.

RECORD PRIORITY: Three preset record settings to allow user to choose between quality and space and one custom setting.

BALANCED: Resolution – CIF
Frame rate – 15 FPS
Alarm frame rate – 30
Quality – 4

FIDELITY: Resolution – D1
Frame rate – 30 FPS
Alarm frame rate – 30
Quality – 1

CAPACITY: Resolution – CIF
Frame rate – 8 FPS
Alarm frame rate – 30
Quality – 4

CUSTOM: Custom record setting for each camera.

The screenshot displays the 'VIDEO RECORD SETTINGS' menu. It features a table with columns for 'CH ID', 'RES', 'NORMAL FR', 'ALARM FR', and 'QUALITY'. Below the table, there are labels for 'FR 50%' and 'AL FR 50%'. At the bottom, there are 'CANCEL' and 'OK' buttons.

CH ID	RES	NORMAL FR	ALARM FR	QUALITY
CH1	CIF	30	30	1
CH2	CIF	30	30	1
CH3	CIF	30	30	1
CH4	CIF	30	30	1

FR 50% AL FR 50%

CANCEL **OK**

Figure 37: Custom Record Settings

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The Custom Record setting allows user to customize record setting to each individual cameras.

RES: Resolution – D1, HD1, CIF

NORMAL FR: Frame rate for normal recording – 30, 24, 15, 8, 4, 2, 1

ALARM FR: Frame rate when during alarm – 30, 24, 15, 8, 4, 2, and 1

QUALITY: Video quality 1 being highest and 8 being the lowest

FR/AL FR: Percentage of the DVR processing power is used. It shows ERROR when settings exceed processing power.

CURRENT SETTING: The number of hours the current SD card can store under current record settings.

Live Settings

SUB-STREAMING

BAND WIDTH: 4000 (20-4096)Kbps

CAMERA	ENABLE	RES	FPS
CH1	OFF	CIF	21
CH2	OFF	CIF	21
CH3	OFF	CIF	21
CH4	OFF	CIF	21

OK **EXIT** **CUSTOM**

Figure 38: Sub-streaming

The Live Settings allow the cameras to be seen through network. The function broadcasts both main-stream (higher quality) and sub-stream (lower quality) video data simultaneously. The menu contains live video (main-stream) setup page and sub-streaming setup page. DVR opens up sub-streaming page when entering live settings by default, highlight Custom button and press enter to switch to live video settings page.

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Kbps). BAND WIDTH: Selects the maximum network bandwidth (20 – 4096

ENABLE: Set to ON to allow camera to be seen through network.

RES: Resolution

FPS: Frame Per Second

CH ID	EN	RES	FR	QUALITY	Kbps
CH1	ON	CIF	30	1	1024
CH2	ON	CIF	30	1	1024
CH3	ON	CIF	30	1	1024
CH4	ON	CIF	30	1	1024

SUB-STREAM VIDEO TRANSMISSION PRIORITY
FRAME RATE

OK EXIT OPTIONAL

Figure 39: System – Live Video Settings

EN: Allow cameras to be seen when set to ON.

RES: Resolution (CIF, QCIF)

FR: Frame Rate (30, 29, ..., 2, 1)

QUALITY: Video Quality (1 - 8)

Kbps: Video Bandwidth (16 - 2000)

SUB-STREAM VIDEO TRANSMISSION PRIORITY: FRAME RATE
(smoother video playback), VIDEO QUALITY (better video quality).

OSD Settings

ITEM	LIVE OSD	RECORD OSD
MENU IDLE TIME	10 MIN	
DATE/TIME	ON	ON
SENSOR INPUT	ON	ON
ACCEL DATA	ON	ON
TEMPERATURE	ON	ON
FIRMWARE VER.	ON	ON
GPS DATA	ON	ON
CHANNEL NAME	ON	ON
NETWORK I.D.	ON	ON
WATERMARK		ON

CANCEL OK

Figure 40: OSD Settings

The OSD Setting allows the user to customize what shows up on the live screen and record screen. When each item is set to Live OSD On, it allows the item to show up on the live screen. When Record OSD is set to on, the item will be recorded into the video files.

MENU IDLE Time: How long before the menu disappears automatically.

DATE/TIME: Current date and time.

SENSOR INPUT: The sensor input from the vehicle.

ACCEL DATA: Acceleration data from the accelerometer.

TEMPERATURE: Temperature of the device.

FIRMWARE VER.: Device firmware version.

GPS DATA: GPS coordinates from the GPS module.

CHANNEL NAME: The name of the channel.

NETWORK I.D.: The network I.D of the device.

WATERMARK: When set to on, date, time, and device ID will be hard coded to the video.

Input Setup

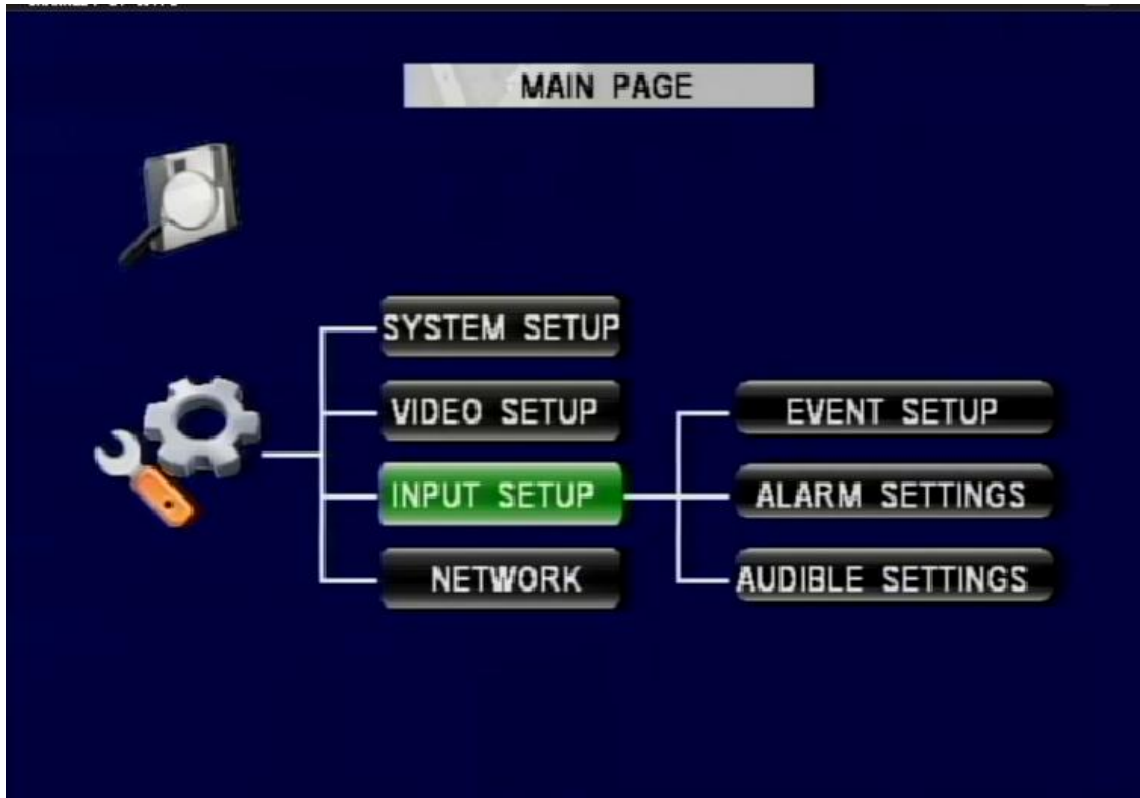


Figure 41: Input Setup

The Input Setup allows the user to customize the name that shows up on the OSD when the sensor is activated, to calibrate speed signal and accelerometer, set the alarm settings, and adjust audible settings.

Event Setup

SENSOR INPUT

VEHICLE TYPE: **SCHOOL BUS**

	EN	NAME	OSD	SET	ALARM
S1	ON	RED WARN	RW	HIGH	OFF
S2	ON	YEL WARN	YW	HIGH	OFF
S3	ON	LEFT	LT	HIGH	OFF
S4	ON	RIGHT	RT	HIGH	OFF
S5	ON	STOP ARM	SA	HIGH	OFF
S6	ON	BRAKES	BK	HIGH	OFF
S7	ON	F-DOOR	FD	HIGH	OFF
S8	ON	R-DOOR	RD	HIGH	OFF
S9	ON	PANIC	PB	N.O	ON

DOWNLOAD **THRESHOLD** **OK**

Figure 42: Sensor Input

The Sensor Input has all the available inputs on the DVR. Each signal can be renamed, adjusted to high/low, and set to activate an alarm. There are two preset vehicle type to choose from: school bus and transit. When set to custom, each channel can have its own name and OSD abbreviation.

EN: When set to ON, sensor signal will be recorded to the video.

NAME: The name of the signal. Use remote to enter name.

OSD: OSD abbreviation. Use remote to enter abbreviation.

SET: Set to high if signal is high (positive) when activated; set to low if signal is low (ground or negative) when activated. For panic button, set to N.O if button is normally open when not pressed; set to N.C if button is normally closed.

ALARM: Set to ON if triggering an alarm event is required when sensor is activated.

DOWNLOAD: Allows the user to set auto-download settings.

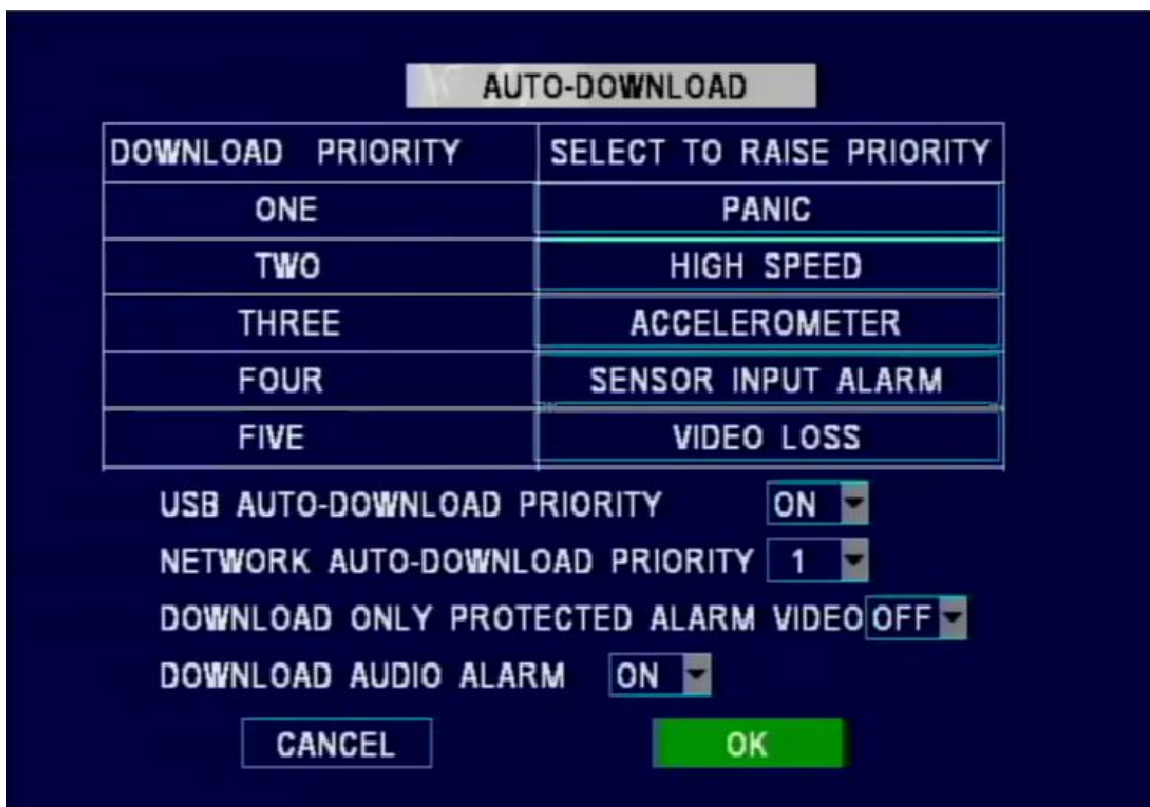


Figure 43: Auto-download Settings

The Auto-Download function allows the DVR to save videos to USB storage or back up to network server. The user can set up download priority by order by moving the event categories, using the remote control. To move a category up, highlight the item and press enter on the remote.

DOWNLOAD PRIORITY: One to five (one being the highest priority).

USB AUTO-DOWNLOAD PRIORITY: When set to on, the highest priority video will be transferred to a USB storage first followed by the lower priority categories.

NETWORK AUTO-DOWNLOAD PRIORITY: 1 – 5. When set to 1, only priority one videos will be backed up to the server or transferred to USB storage. When set to 2, priority one videos will be backed up to the server or transferred to USB storage first, followed by priority two. When set to 3, priority one first, then priority two, followed by three. 4 is from priority one to four. 5 is from priority one to five.

DOWNLOAD ONLY PROTECTED ALARM VIDEO: When set to ON, user can only download protected alarm videos from the DVR.

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DOWNLOAD AUDIO ALARM: When set to On, DVR will produce a beeping sound for 10 seconds once USB download is finished.

THRESHOLD: Threshold page allows user to calibrate accelerometer, speed sensor, and set temperature alarm.

THRESHOLD

ACCELEROMETER TEMPERATURE SPEED

ACCELEROMETER PORT FUNCTION: ACC INPUT

ACCEL THRESHOLD X 5.5 X ALARM OFF

ACCEL THRESHOLD Y 5.5 Y ALARM OFF

ACCEL THRESHOLD Z 5.5 Z ALARM OFF

CURRENT VALUE: X: (+)00.000 Y: (+)00.000 Z: (+)00.000

CALIBRATE

CANCEL OK

Figure 44: Accelerometer Threshold

The Accelerometer set up page allows user to set alarm threshold values and calibrate accelerometer.

ACCELEROMETER PORT FUNCTION: When an accelerometer is connected to the DVR, this setting needs to be set to ACC INPUT to receive accelerometer readings. When set to STATUS OUTPUT, the DVR will output status through the accelerometer port.

ACCEL THRESHOLD X/Y/Z: The minimum value to trigger an alarm event.

X/Y/Z ALARM: When set to ON, if the sensor readings reach the threshold values, the DVR stores an accelerometer event.

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CURRENT VALUE X/Y/Z: Current acceleration readings from the accelerometer.

CALIBRATE: Accelerometer must be calibrated after installation.
Highlight Calibrate and press enter to calibrate accelerometer.

The screenshot shows a dark blue background with white text and buttons. At the top, a grey button labeled 'THRESHOLD' is highlighted. Below it are three buttons: 'ACCELEROMETER', 'TEMPERATURE' (which is highlighted in green), and 'SPEED'. Under the 'TEMPERATURE' button, there are two rows of settings. The first row shows 'HIGH TEMP ALARM' set to 'OFF' with a dropdown arrow, followed by 'THRESHOLD' set to '+104' with a dropdown arrow and 'F'. The second row shows 'LOW TEMP ALARM' set to 'OFF' with a dropdown arrow, followed by 'THRESHOLD' set to '-40' with a dropdown arrow and 'F'. At the bottom, there are two buttons: 'CANCEL' and 'OK'.

Figure 45: Temperature Threshold

The Temperature setup page allows user to enable high/low temperature alarm.

HIGH/LOW TEMP ALARM: When set to on, the DVR will record an alarm event when temperature sensor readout is higher than threshold.

HIGH/LOW TEMP THRESHOLD: The highest/lowest temperature before triggering an alarm event.

SPEED: The speed setup page allows the user to set speed source, calibrate speed sensor, and set speed limit.

THRESHOLD

ACCELEROMETER TEMPERATURE **SPEED**

SPEED SOURCE VEHICLE

SPEED UNIT MPH

SPEED CAL SPD 022 P/S 00200 CALIBRATE

SPEED LIMIT 075

SPEED ALARM OFF

SPD SENSITIVITY LOW

CANCEL OK

Figure 46: Speed Threshold

The Speed Source setup page allows user to select between vehicle speed sensor or GPS signal.

SPEED UNIT: MPH or KM/H.

SPEED CAL SPD: Target speed for vehicle speed sensor calibration.
When speed source is set to GPS, this setting will now show.

CALIBRATION: To calibrate the vehicle speed sensor, set the target speed and drive the vehicle at the same speed as the target speed, press CALIBRATE to calibrate the vehicle speed sensor.

SPEED LIMIT: The minimum speed to trigger a speed alarm event.

SPEED ALARM: When set to ON, an alarm event will be recorded if the vehicle speed exceeds the speed limit setting.

SPD SENSITIVITY: Speed sensitivity affects the rate of read out change.
Set to LOW for slower rate and HIGH for higher rate.

Alarm Settings

ALARM SETTINGS

PRE-ALARM RECORD TIME	05	(1-15MIN)
ALARM DURATION	10	(1-15SEC)
POST-ALARM RECORD TIME	060	(30-300SEC)
NON-EVENT REC RATE	NORMAL	
PROTECT ALARM VIDEO	NONE	

CANCEL OK

Figure 47: Alarm Settings

The Alarm Settings page contains pre/post alarm record time, alarm duration, non-event record rate, and alarm video protection.

PRE-ALARM Record Time: The length of video that gets packed into the alarm event before an alarm is triggered.

ALARM DURATION: The length of triggered alarm before it times out. During the duration, if another same type of alarm is triggered, the timer will be reset.

POST-ALARM Record Time: The length of video that gets packed into the alarm event after an alarm is triggered.

NON-EVENT REC RATE: When set to NORMAL, the DVR will record at normal rate according to the settings in the Record SETTING. When set to I FRAME, the DVR will record at one frame per second to take less space of the SD card.

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PROTECT ALARM VIDEO: This setting allows user to determine how long (3/7/10/15 days) the alarm video gets kept on the SD card.

Audible Settings



Figure 48: Audible Settings

Audible Settings page lets user to set up the DVR to produce an audible beeping alert when an error or alarm is occurring.

AUDIBLE ALARM: When set to ON, the DVR will produce an audible beeping alert when an error or alarm is occurring.

SYSTEM ERROR: When set to ON, if there is a system error, the DVR will produce an audible alert.

VIDEO LOSS: When set to ON, if there is video loss, the DVR will produce an audible alert. Also, when there is video loss, the video loss LED will illuminate on the DVR's front panel.

ALARM CONDITION: When set to ON, if there is an alarm occurring, the DVR will produce an audible alert. Also, the alarm LED on the DVR's front panel will illuminate.

SD FULL: When set to ON, if the SD card is full, the DVR will produce an audible alert.

SD ERROR: When set to ON, if the SD card is not functioning, the DVR will produce an audible alert.

Network

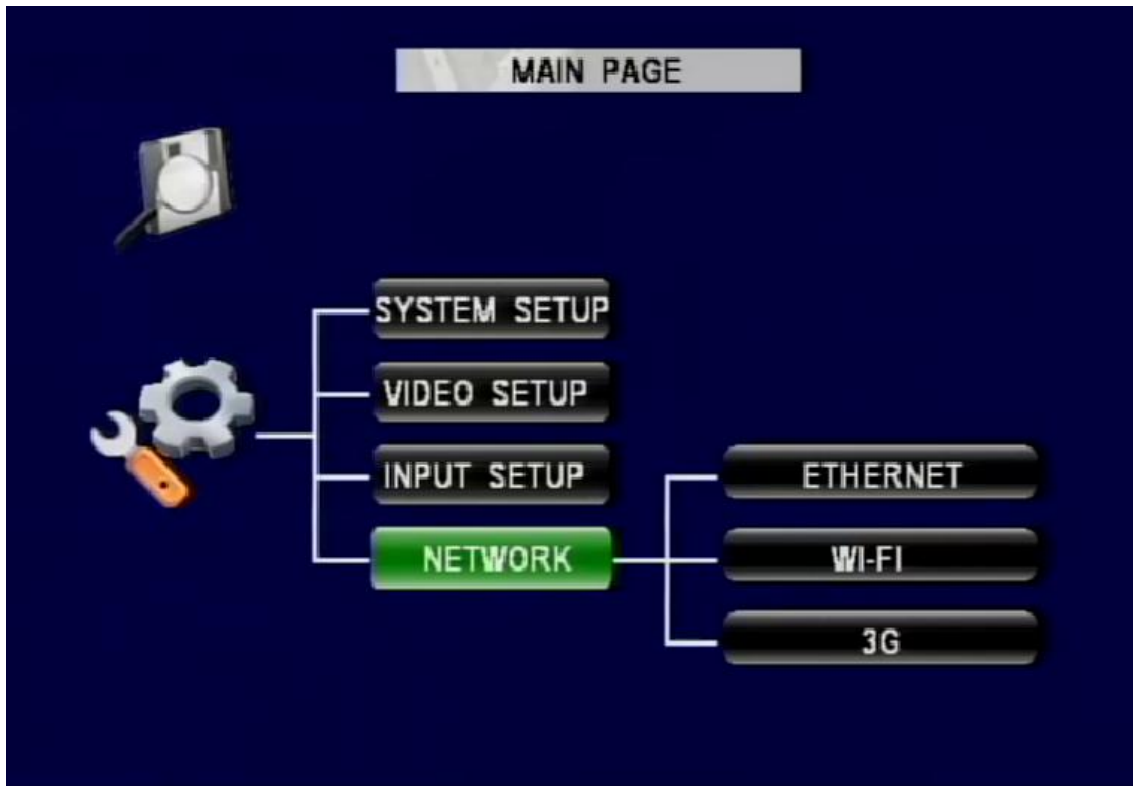


Figure 49: Network

The Network menu contains three categories: Ethernet, Wi-Fi, and 3G. It gives the user the options to access DVR through wired or wireless network using various types of devices.

Ethernet

LOCAL NETWORK

LOCAL IP ADDRESS 192.168.000.200

LOCAL SUBNET MASK 255.255.255.000

LOCAL GATEWAY IP 192.168.000.001

CLIENT PORT 00080

WEB PORT 00081

MAC ADDRESS 00-18-F5-05-5C-FD

SERVER IP ADDRESS 192.168.000.000

SERVER PORT 65535

CANCEL OK

Figure 50: Ethernet Settings

Ethernet settings is where the user set up the network configurations if using DVR's Ethernet port located on the back of the DVR.

LOCAL IP ADDRESS: The local IP address needs to be set up differently for each DVR. The IP address contains four three digit numbers from 0 to 255. The first three numbers needs to be the same as the local gateway IP address in order to have access to the DVR. The last number must be set up independently on each DVR.

LOCAL SUBNET MASK: A mask address is to use with the IP address as a pair. The default setting is 255.255.255.000. Depending on how the network is set up, the user needs to change it to work with the network.

LOCAL GATEWAY IP: Gateway IP is how a network accesses another network. Set it up accordingly to the network.

CLIENT PORT: This is the port where the user can access DVR's client function.

WEB PORT: This is the port where the user can access DVR's web function.

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MAC ADDRESS: MAC address is the identification of DVR's network module. It is unique in each DVR.

SERVER IP ADDRESS: In order to use REI software, the DVR needs connect to the server.

Wi-Fi

The image shows a 'WIFI' settings screen with a dark blue background. At the top, there is a title bar with the word 'WIFI' in white. Below this, several settings are listed on the left, and their corresponding controls are on the right. 'WIFI ENABLE' has a green 'ON' button. 'WIFI IP ADDRESS', 'WIFI SUBNET MASK', and 'WIFI GATEWAY IP' each have a text input field containing '000.000.000.000'. 'WIFI ESSID' has an empty text input field. 'ADDRESS TYPE' has a dropdown menu showing 'AUTO IP'. 'PASSWORD ENABLE' has a blue 'OFF' button. At the bottom, there are two buttons: 'CANCEL' and 'OK'.

Setting	Value/Control
WIFI ENABLE:	ON
WIFI IP ADDRESS:	000.000.000.000
WIFI SUBNET MASK:	000.000.000.000
WIFI GATEWAY IP:	000.000.000.000
WIFI ESSID:	
ADDRESS TYPE:	AUTO IP
PASSWORD ENABLE:	OFF

CANCEL OK

Figure 51: Wi-Fi Settings

The Wi-Fi network card settings allow the DVR to be connected wirelessly. It also supports Auto IP detection for easy set up.

WIFI ENABLE: Set to ON to enable Wi-Fi.

WIFI IP ADDRESS: The IP address needs to be set up differently for each DVR. The IP address contains four three digit numbers from 0 to 255. The first three numbers needs to be the same as the local gateway IP address in order to have access to the DVR. The last number must be set up independently on each DVR.

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WIFI SUBNET MASK: A mask address is to use with the IP address as a pair. The default setting is 255.255.255.000. Depending on how the network is set up, the user needs to change it to work with the network.

WIFI GATEWAY IP: The gateway IP is how a network accesses another network. Set it up accordingly to the network.

WIFI ESSID: In order for the DVR to find the wireless access point, it needs to know the correct wireless network name for it to connect to. Enter the wireless ESSID.

ADDRESS TYPE: When set to Auto IP, the DVR automatically finds an available network set up from the wireless access point. The access point DHCP function will assign the DVR an IP automatically. When set to STATIC IP, it allows the user to enter the network settings manually.

PASSWORD ENABLE: If the wireless network has a password, the DVR needs to have it in order to use the network. DVR supports WEP and WPA security. Choose the one that the network is set up to and enter password using the remote.

3G Network

MOBILE NETWORK

MOBILE NETWORK TYPE NONE

APN

USERNAME

PASSWORD

ACCESS NUMBER

CANCEL **OK**

Figure 52: 3G Network Settings

3G network settings allow the DVR to connect to the network using 3G mobile network.

MOBILE NETWORK TYPE: GPRS, CDMA, EVDO, WCDMA, EDGE, TD-SCDMA.

APN: Please check this setting with network provider.

USERNAME: Username for the network.

PASSWORD: Password for the network.

ACCESS NUMBER: Please check this setting with network provider

Play Back

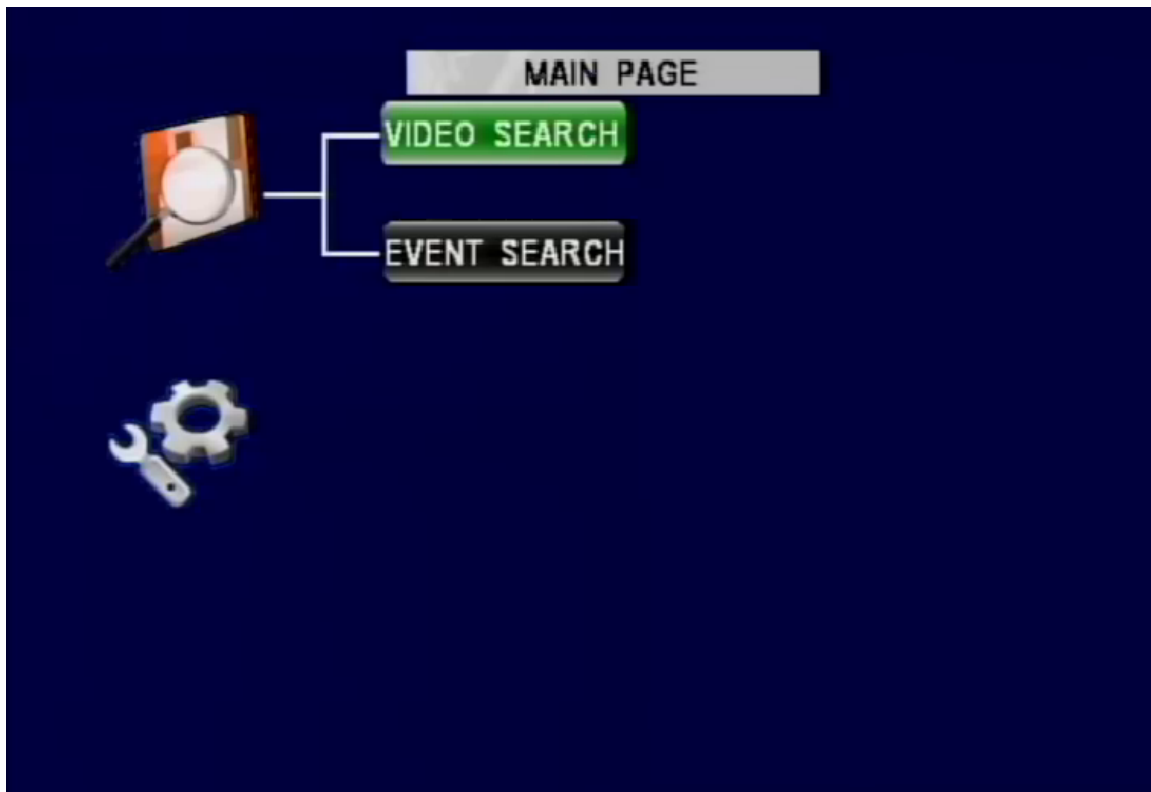


Figure 53: Play Back Function

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Videos recorded on the SD card can be fully accessed from the Play Back menu. User can search videos by using the Video Search function, and the Event Search function.

Video Search

The screenshot displays the 'FILE SEARCH' interface. At the top, a title bar reads 'FILE SEARCH'. Below it is a 5x7 grid representing a calendar. The columns are labeled S, M, T, W, T, F, S. The rows contain dates from 01 to 30. The date 06 is highlighted in green, and 07 is highlighted in red. Below the grid, there are input fields for 'FILE TYPE' (set to 'ALL'), 'DATE' (set to '2011-09-07'), 'START TIME' (set to '00:00:00'), and 'END TIME' (set to '23:59:59'). At the bottom, there are two buttons: 'CANCEL' and 'SEARCH'.

S	M	T	W	T	F	S
				01	02	03
04	05	06	07	08	09	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

FILE TYPE:

DATE:

START TIME: END TIME:

Figure 54: Video Search Page

The Video Search function gives user the ability to search videos by choosing the day and time. The user also can filter out non-event videos, showing the ones that contains alarm events.

The upper half of the screen shows a calendar of days that contain videos. If the day is green, it means there is no alarm event on that day. If there is an alarm event, the day will appear red.

FILE TYPE: file type allows the user to choose between displaying all the days with videos or only the days that contain alarm events.

DATE: enter specific date to search videos on that day.

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START/END Time: because there are many videos during a day, the user can enter start and end time to narrow down to the specific video.

SEL	LOCK	TYPE	CH	RES	FR	TIME	SIZE
<input type="checkbox"/>	U	N	1	D1	15	00:00-00:15	111.1M
<input type="checkbox"/>	U	N	1	D1	15	00:15-00:30	111.1M
<input type="checkbox"/>	U	N	1	D1	15	00:30-00:45	110.9M
<input type="checkbox"/>	U	N	1	D1	15	00:45-01:00	111.0M
<input type="checkbox"/>	U	N	1	D1	15	01:00-01:15	111.0M
<input type="checkbox"/>	U	N	1	D1	15	01:15-01:30	111.2M
<input type="checkbox"/>	U	N	1	D1	15	01:30-01:45	111.2M
<input type="checkbox"/>	U	N	1	D1	15	01:45-02:00	111.3M

FIRST

PGUP

PGDOWN

LAST

REV.

UNLOCK

EXPORT

EXIT

LOCK

Figure 55: Files List Page

After entering the date and time, select Search, the DVR will display a list of video files on the specific day during the specific time on the left part of the screen.

SEL: Select videos by highlighting the box in the front and press enter on the remote to mark the videos.

LOCK: U for unlocked and L for locked.

TYPE: N for normal non-alarm videos and A for alarm videos.

CH: Channel number shows which channel this video is from.

RES: Resolution of the video.

FR: Frame rate of the video.

TIME: When the video started and ended recording.

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SIZE: The file size of the video.

On the right part of the screen, there are buttons that allow user to navigate the list.

FIRST Button: Goes to the beginning of the video list.

PGUP Button: Goes to previous page.

PGDOWN Button: Goes to the next page.

LAST Button: Goes to the end of the video list.

To play a video, simply highlight the video on the list and press enter on the remote. During play back, press enter on the remote to display OSD. To go back to files list, press exit on the remote.

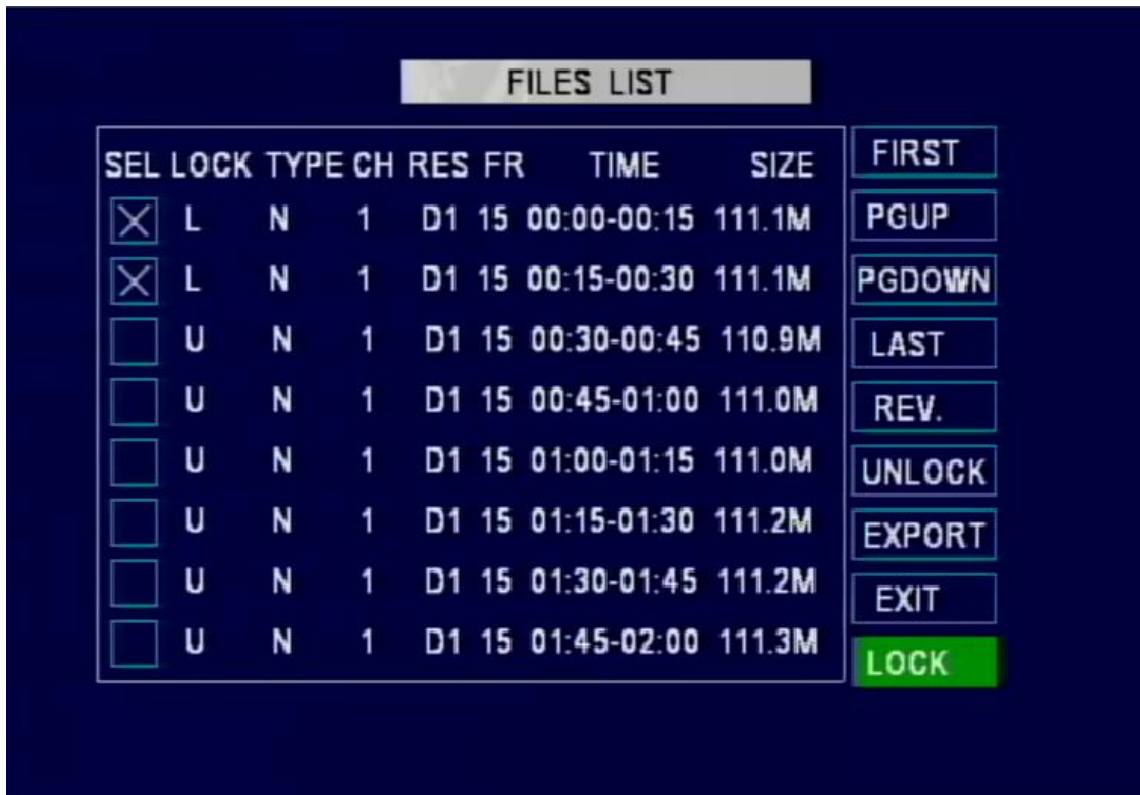


Figure 56: Files List Page Extra Function

The Files List also allows the user to do more than just playing back videos. The user can also lock the videos that are important so they would not be deleted from the SD card or even export videos to external USB storage.

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REV. Button: Reverse selection. When some of the videos are selected, if the user wants to select all the unselected videos quickly, select REV. Button to reverse select videos.

UNLOCK button: To unlock videos, select locked videos then press unlock button.

EXPORT: To export videos, first select the videos that need to be exported, then press EXPORT button (external USB storage needs to be plugged in first).

EXIT button: Exit file list page.

LOCK: Lock selected videos so they will not be removed from the SD card by the DVR.

Event Search

S	M	T	W	T	F	S
				01	02	03
04	05	06	07	08	09	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

EVENT TYPE:

DATE:

Figure 57: Event Search Function

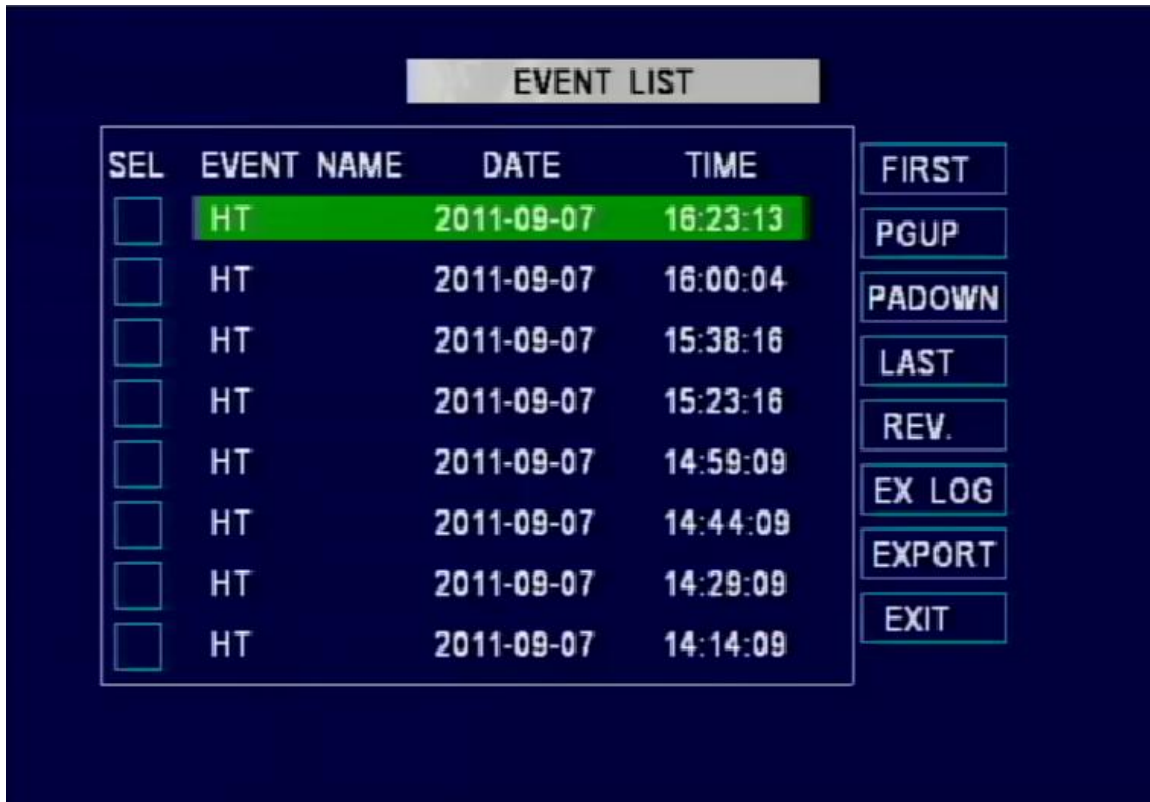
The Event Search Function offers the ability to search videos by selecting different types of events. The upper half of the screen shows a calendar that contains the days that have events. If the date only contains normal events, it will be green. If there is an alarm event, the date will be red.

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EVENT TYPE: To search more specific event videos, the DVR allows the user to choose from I/O Alarm, Accelerometer, Speed, Video Loss, System Error, Panic Button, and Temp Alarm.

DATE: Enter a specific date to search on that day.

Once Event Type and Date are selected, press Search to display the Event List.



SEL	EVENT NAME	DATE	TIME
<input type="checkbox"/>	HT	2011-09-07	16:23:13
<input type="checkbox"/>	HT	2011-09-07	16:00:04
<input type="checkbox"/>	HT	2011-09-07	15:38:16
<input type="checkbox"/>	HT	2011-09-07	15:23:16
<input type="checkbox"/>	HT	2011-09-07	14:59:09
<input type="checkbox"/>	HT	2011-09-07	14:44:09
<input type="checkbox"/>	HT	2011-09-07	14:29:09
<input type="checkbox"/>	HT	2011-09-07	14:14:09

Figure 58: Event List Page

The Event List shows a list of videos that contains events on that day. The left part of the screen shows the list and the right part shows the navigation and export buttons.

SEL: Select videos by highlighting the box in the front and press enter on the remote to mark the videos.

EVENT: The type of the event.

DATE: The date of the event.

TIME: Time when the event happened.

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FIRST Button: Goes to the beginning of the video list.

PGUP Button: Goes to previous page.

PGDOWN Button: Goes to the next page.

LAST Button: Goes to the end of the video list.

To play a video, simply highlight the video on the list and press enter on the remote. During play back, press enter on the remote to display OSD. To go back to files list, press exit on the remote.

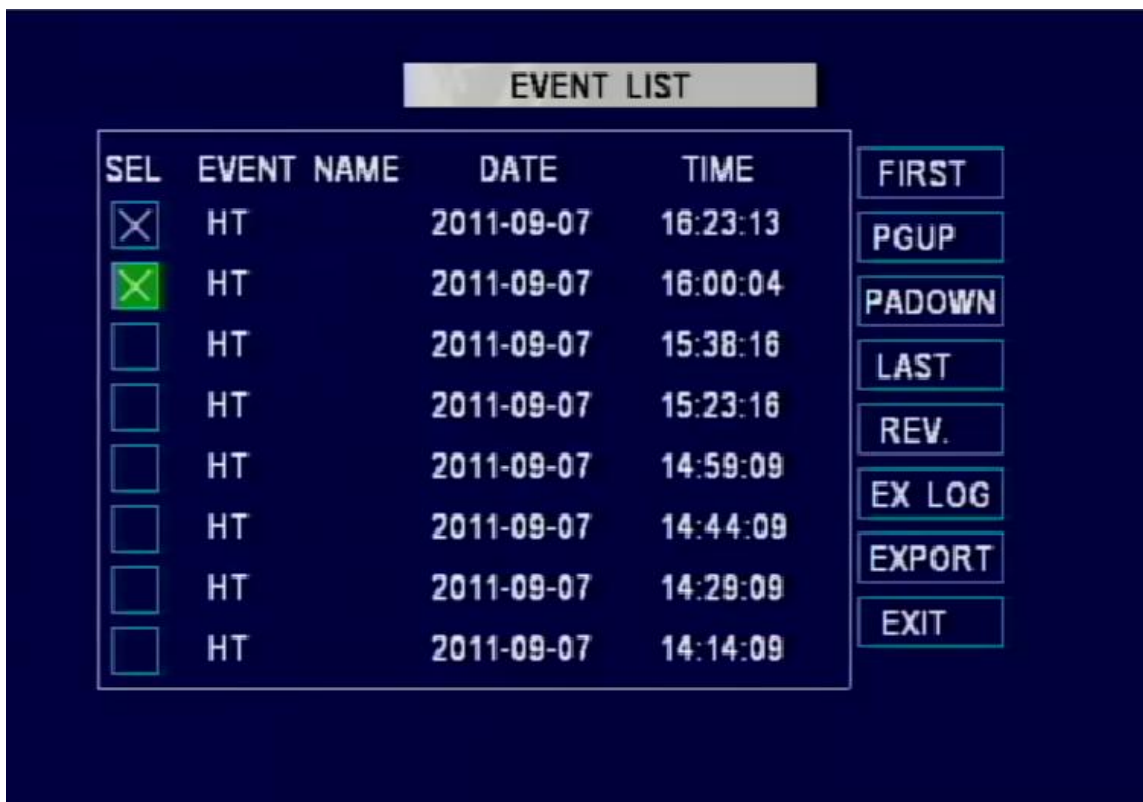


Figure 59: Event List Page Extra

The user also can export the event log and videos to external USB storage.

REV. Button: Reverse selection. When some of the videos are selected, if the user wants to select all the unselected videos quickly, select the REV. Button to reverse the selected videos.

EX LOG: To export event log, select EX LOG button and press enter on the remote control (external USB storage needs to be plugged in first).

EXPORT: To export videos, first select the videos that need to be exported, then press EXPORT button (external USB storage needs to be plugged in first).

EXIT Button: Exit Event List page.

DVR Firmware Upgrading

Due to improvements in technology and the availability of new features, the SD40 DVR comes with the ability to have the firmware (DVR operating system) be easily upgraded in the field. There are several ways this can be done: through the Ethernet connection or through the front panel USB connection.

Front Panel USB Firmware Upgrade

Create a directory named “dvrupgrade” on the USB external storage on a computer and put the upgrade file in that directory. Press BRUSH button on the remote or enter Utility Menu and select the type of firmware that needs upgrading. The DVR will automatically upgrade.

Ethernet Firmware Upgrade

The user can access the DVR configuration menu from a computer using REI software. In the configuration menu, choose the firmware file then click upgrade to upgrade the firmware.

Specifications

Mobile DVR

- Recording Medium: SD card
- Display Capability: On Screen Display and embedded video stream data
- GPS: Time Synchronization, Latitude, Longitude, Speed, Heading & Mapping
- Video Input: 4 Channel Inputs, 1V p-p / 75 ohm
- Video Output: 2 x Composite Video, 1 x Ethernet, and 1 x USB 2.0
- Image Resolution: 720 (H) x 480 (V)
- Video Compression: H.264 (8 quality settings)
- Frame Rate: 1 to 30fps Selectable
- Audio Input : 4 independent channel inputs
- Recording Modes: Continuous, Ignition, Scheduled & Event Triggered
- Playback: Search by Alarm, Date, Time & Camera
- Video Loss Detection

Input / Output

- 1 x USB 2.0 Port
- 1 x 10/100base-T Ethernet Port
- 8 x Vehicle Sensor Inputs
- 1 x GPS Input
- 1 x Accelerometer Input
- 1 x Transmission Pulse Speedometer Input

Environment

- Relative Humidity: 10%~95% at 40.C, Non-Condensing
- Operating Temp.: -40C ~ +65C
- Shock: 225Gs 2ms (Operating) / 900Gs 1 ms (Storage / Transit)
- Vibration: 1.0G, 5 ~ 500Hz (Operating), 5.0G, 5 ~ 500Hz (Storage / Transit)
- Power Requirement: 12VDC @ 2A / 24VDC @ 1A
- Power Consumption: 24W Maximum
- EMC and Safety: CE, FCC