Havis-Shields
EQUIPMENT CORPORATION

PT-VIDEO-MDVR

Installation and Users Guide

MOBILE DIGITAL VIDEO RECORDER
COMPACT FLASH STORAGE

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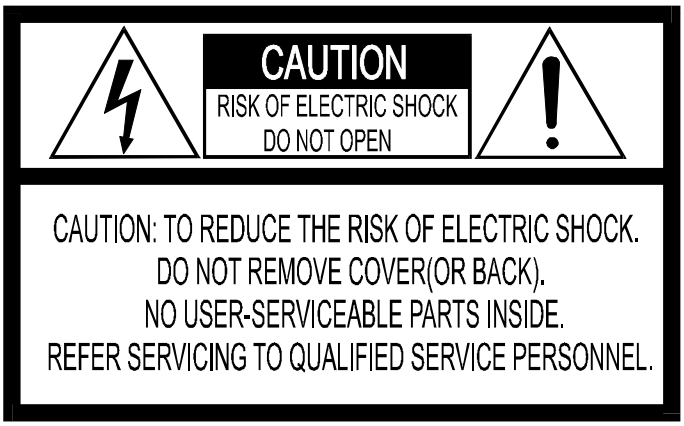
WARNINGS AND CAUTIONS

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE. DO NOT INSERT ANY METALLIC OBJECTS THROUGH THE VENTILATION GRILLS OR OTHER OPENINGS ON THE EQUIPMENT.

CAUTION



EXPLANATION OF GRAPHICAL SYMBOLS

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of un-insulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instruction in the literature accompanying the product.

IMPORTANT SAFEGUARDS

1. **READ AND RETAIN INSTRUCTIONS**
   Read the instruction manual before operating the equipment. Retain the manual for future reference.

2. **CLEANING**
   Turn the unit off and unplug from the power outlet before cleaning. Use a damp cloth for cleaning. Do not use harsh cleansers or aerosol cleaners.

3. **ATTACHMENTS**
   Do not use attachments unless recommended by manufactured as they may affect the functionality of the unit and result in the risk of fire, electric shock or injury.

4. **MOISTURE**
   Do not use equipment near water or other liquids.

5. **ACCESSORIES**
   Equipment should be installed in a safe, stable location. Any wall or shelf mounting accessory equipment should be installed using the manufacture's instructions. Care should be used when moving heavy equipment. Quick stops, excessive force, and uneven surfaces may cause the equipment to fall causing serious injury to persons and objects.

6. **VENTILATION**
   Openings in the equipment, if any, are provided for ventilation to ensure reliable operation of the unit and to protect if from overheating. These openings must not be blocked or covered

7. **POWER SOURCES**
   The equipment should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied at the installation location, contact your dealer. For equipment designed to operate from battery power, refer to the operating instructions.

8. **GROUNDING OR POLARIZATION**
   Equipment that is powered through a polarized plug (a plug with one blade wider than the other) will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. Do not defeat the safety purpose of the polarized plug.

   Alternate Warning: If the equipment is powered through a three-way grounding-type plug, a plug having a third (grounding) pin, the plug will only fit into a grounding-type power outlet. This is a safety feature. Do not defeat the safety purpose of the grounding-type plug. If your outlet does not have the grounding plug receptacle, contact your local electrician.

9. **CORD AND CABLE PROTECTION**
   Route power cords and cables in a manner to protect them from damage by being walked on or pinched by items places upon or against them.

10. **LIGHTNING**
    For protection of the equipment during a lightning storm or when it is left unattended and unused for long periods of time, unplug the unit from the wall outlet. Disconnect any antennas or cable systems that may be connected to the equipment. This will prevent damage to the equipment due to lightning or power-line surges.

11. **OVERLOADING**
    Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.

12. **SERVICING**
    Do not attempt to service the video monitor or equipment yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

13. **DAMAGE REQUIRING SERVICE**
Unplug the equipment from the wall outlet and refer servicing to qualified service personnel under the following conditions:

   A. When the power supply cord or the plug has been damaged.
   B. If liquid has spilled or objects have fallen into the unit.
   C. If the equipment has been exposed to water or other liquids.
   D. If the equipment does not operate normally by following the operating instructions, adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage to the unit.
   E. If the equipment has been dropped or the casing damaged.
   F. When the equipment exhibits a distinct change in performance.

14. **REPLACEMENT PARTS**
When replacement parts are required, be sure the service technician uses replacement parts specified by the manufacturer or that have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.

15. **SAFETY CHECK**
Upon completion of any service or repairs to the equipment, ask the service technician to perform safety checks to verify that the equipment is in proper operating condition.

16. **FIELD INSTALLATION**
The installation of equipment should be made by a qualified service person and should conform to all local codes.

MOBILE DIGITAL RECORDER FEATURES

The Mobile Digital Recorder is a true VCR replacement with advanced features that take it beyond the standard VCR. The digital recorder features one video and two audio inputs and one video /audio output. The DVR operates as a simplex recorder offering up to 640 x 240 resolution recording at 30 frames/sec and simultaneous dual channel audio recording. The recorder may also be used in a time-lapse mode for recording frame rate up to 1 frame every 8 seconds.

Multiple trigger inputs are available that can be connected so the recorder can be used as an event recorder. The triggered events are also logged along with the video and audio. The unit features a LED recorder status output as well as an Open Collector trigger output.

The unit has low power consumption while recording and milliamp power consumption when powered off. The embedded operating system allows for instant power up less than 1 seconds. With selectable video quality and frame rates, the unit automatically calculates the amount of recording time available.

Conditioned power is provided to supply 12VDC to external cameras.

A front panel Compact Flash socket is available for easy video archiving. The Compact Flash allows storage of audio/video AVI files and JPG files requiring no special GUI to review audio/video on a PC or the recorder. Integrity of the archived video files is maintained with authentication software. A simple GUI verifies the content of the archived files.

The small mechanical size allows several recorders to fit in the space of an existing VCR or allow the unit to be mounted in a standard automotive DIN format.

- True low cost VCR replacement with no moving parts, no internal fan, no audible noise.
- Unparalleled Search capability with up to 98x Fast Forward Review.
- Optional integrated GPS position and speed tracking and recording.
- Recording of the GPS speed, position and time attached to a video frame.
- Synchronization of the unit's time with the GPS satellite system.
- Recording to Compact Flash Card media for unmatched reliability.
- Selectable record resolution: 640 x 240 or 320 x 240.
- Single video input with stereo audio input similar to a VCR system.
- 12V tolerant five channel configurable multi-event triggered inputs.
- Output trigger to control other devices and an external LED record output.
- Mobile power supply protection to allow direct connection of the unit to a vehicles 12V power supply without the use of any filtering.
- Mobile specific embedded operating system for unmatched reliability, security and fast power up times in less than 1 second.
- Video authentication support via the Graphical User Interface (GUI).
- Delayed start recording and delayed stop recording on ignition.
- Rugged Aluminum Extrusion construction designed for standard 1 DIN automotive installation.

The MDVR features dual captured nuts in both sides of the unit allowing console faceplate mounting.
Bracket model number C-EB25-MMT-1P

See wiring details below

MDVR IGNITTION / POWER ON CONNECTION

MDVR Ignition Trigger Power ON Control

The MDVR features an auto power on and begin to record function on the “ignition trigger”. When this trigger goes high, the DVR will turn on and begin to begin recording.

If the **Power Button** on the front of the unit is hit, the unit will turn off, but then read the “ignition trigger” and turn back on. This is a “ignition trigger” priority unit.

MDVR Ignition Trigger Power OFF Control

After the ignition trigger goes low (car turned off), the DVR will turn off after the power off delay has been reached.

MDVR Power Button Control (Ignition Trigger OFF)

If the ignition trigger is low (car off), the power is controlled only by the **Power Button**. When the button is pressed, the unit will turn on until he button is pressed again.

MDVR TYPICAL CONNECTION

The MDVR features a variety of connection points for various accessories as shown in Figure 3 below:

Figure 1: MDVR Connection Guide

The external connections feature:

- Camera audio and video input
- Camera 12V power output
- Video / Audio monitor output
- External magnetic attachment GPS Antenna
- Dual Audio inputs
- Main DB-25 Connector featuring:
  - Direct automotive power connection. The MDVR features an internal resetable fuse.
  - 5 trigger inputs.
  - 1 record status LED output.
  - 1 Open Collector trigger output.

MDVR main Harness wire connections
(25-pin connector)

Red – Power (direct 12 volt positive)

Black – Ground (12 volt negative)

Yellow – Ignition (switched 12 volt positive)

Green – Trigger 1

Orange – Trigger 2

Brown – Trigger 3

Blue – Trigger 4

Gray – Trigger 5

NOTE 1:

Trigger connections are pre-set (default) to activate on positive Switching. They can be changed to negative switching by changing MDVR settings in trigger Menu. (High = Positive / Low = Negative)

NOTE 2:
For correct operation, it is very important to connect the main power to a constant 12V supply (not switched) and the Ignition trigger to the ignition power supply (switched).

- **RCA to RCA 6 foot Cable # GSM70024**

  Monitor Video OUT to MDVR Video IN (use yellow connectors)

  MDVR Video OUT to Monitor Video IN (use white connectors)

  Red connector not used ***(see NOTE 3A below)***

- **RCA to Camera input adaptor. (# GSM70026)**

  (Use yellow RCA connector - Red not used)

NOTE 3:

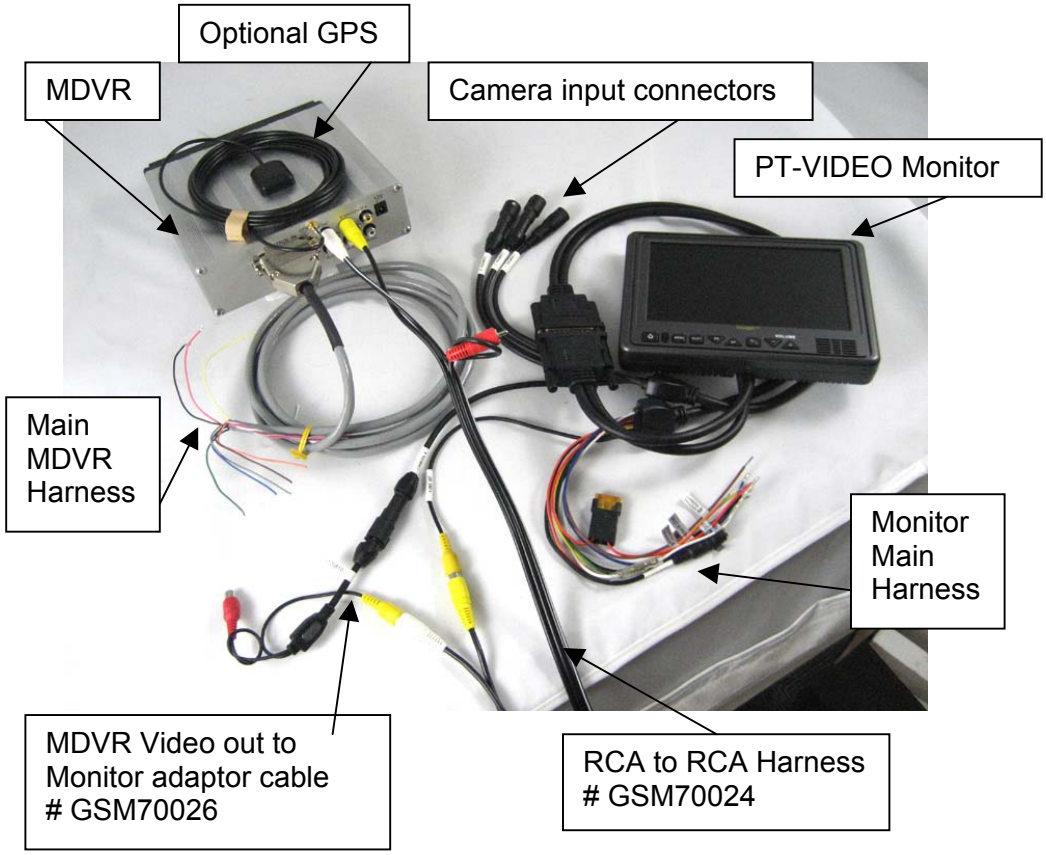
In order to view programmable settings on PT-VIDEO monitor, you must use adaptor cables provided to connect MDVR video out to number 2, 3 or 4 camera inputs on the monitor.

(Cannot connect to camera 1 input.).

*** If you have a four-camera system (PT-VIDEO-4) you must temporarily disconnect one of the cameras and attach the MDVR video out cable in order to view the recorder settings and data. After MDVR settings are confirmed, the camera must be reconnected.

(Leave this camera cable accessible for future MDVR programming)

The MDVR Data will not be viewable on cab monitor, but it will be recorded and viewable when downloaded onto main computer system.



DIGITAL RECORDER FRONT PANEL OPERATION

The DVR features an illuminated keypad for easy operation in dark environments. Below is a description of the functions of the Digital Recorder front panel buttons. Some buttons will have different functions depending upon if the recorder is recording, stopped, or playing back video.

Figure 2: Front Panel Controls

***Power Button*:**
The unit is typically powered on by the **Ignition trigger**, but may alternately be powered on by pressing the **Power Button**. If manually powered on, the unit will remain powered on until the **Power Button** is pressed again.
Holding the **Power Button** in for 10 seconds will perform a hardware reset of the entire MDVR unit.

Search / Menu Button:
The **Search / Menu Button** accesses the recorded video search menu. Pressing this button once brings up the search menu. Holding this **Search / Menu Button** for greater than 3 seconds brings up the main system configuration menu where all DVR functions can be changed and titles can be entered.

Left Arrow Key (mode dependant):
Pause & Playback Mode: **Left Arrow Key** adjusts fast reverse playback speed up to 90x.

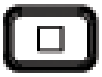
Right Arrow Key (mode dependant):
Pause Mode: **Right Arrow Key** adjusts the slow forward playback speed from paused to 0.5x speed.

Playback Mode: **Right Arrow Key** adjusts fast forward playback speed up to 90x.

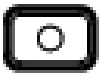
Up Arrow Key (mode dependant):
Playback Mode: During standard 1x playback, **Up Arrow Key** selects audio channel 1 to be output.

Down Arrow Key (mode dependant):
Playback Mode: During standard 1x playback, **Down Arrow Key** selects audio channel 2 to be output.

Pause Button:
The Pause Button allows pausing of playback video and resume play of video.



Stop Button:
The Stop Button stops playback of video and moves into live view mode.



Record Button:
The Record Button begins recording of the video of the selected channel.

BASIC MDVR OPERATION

The OSD shown in Figure 5 below is the basic OSD for the Record, Live View and Playback Modes of operation. The video is recorded without these overlays, but the data shown is attached to each video frame as Meta data for extraction by the video player software.

Time & Date:
This time and date is either entered manually and kept current with by the MDVR or is acquired and synchronized by the GPS unit if the option is selected.

Trigger Inputs:
There are 6 user selectable trigger inputs with a 1 character symbol.

MDVR Status:
Determines the status of the MDVR; includes stop, record, playback and playback speed, and pause.

MDVR Name:
This is the 14 character field to identify car, officer and MDVR unit. This field can be divided up into 3 fields by the back-end software for database searching.

GPS Information:
This included Latitude, Longitude and current vehicle speed.

Remaining Record Time:
This is the remaining storage time left on the Compact Flash card in units of hours: minutes.

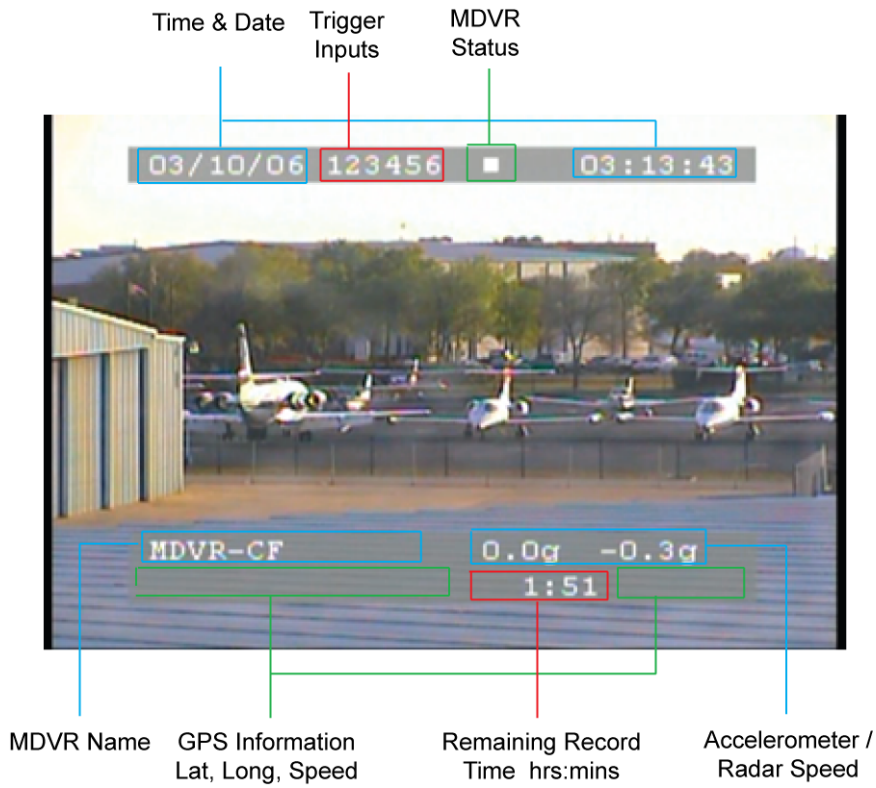


Figure 3: Basic OSD

MDVR MENU STRUCTURE

MDVR Video Search Menu

The OSD shown in Figure 5 below is the video search menu used for searching recorded video files on the Compact Flash card. The column on the left shows the days with the column on the right showing time in that day. A pound symbol in the right column signals that record was triggered by an event.

Figure 4: Recording Search Menu

MDVR Main Menu

The OSD shown in Figure 8 below is the main unit menu. From this menu access to all other setup screens is possible.

Figure 5: Main Menu

Setup Menu (Figure 9)		
Field	**Action**	**Default**
Units	Selection of English or Metric units.	English
Video Dwell Time	Selects the time between video switches. 0 seconds will allow a trigger position to determine camera input selected.	0 sec
Time Setup	Brings up the Time Setup menu.	
Password Setup	Brings up the Password Setup Menu	
Advanced Setup	Brings up the Advanced Setup menu	

Figure 6: Setup Menu

Time Setup Menu (Figure 10)		
Field	**Action**	**Default**

Date	System date (assuming GPS date is OFF)	Today's Date
Time	System time (assuming GPS time is OFF)	Today's Time
Daylight Savings	Automatic adjustment for daylight savings time change.	ON

Figure 7: Time Setup Menu

Advanced Setup Menu (Figure 11)		
Field	**Action**	**Default**
Restore Defaults	Restores the factory default settings.	
Erase Media	Permanently deletes all recorded data from the selected media.	
Menu Password	Sets the password field or no password for the menu.	

Title Setup (Figure 14)		
Field	**Action**	**Default**

System Name	14 character name (i.e. Car # / Officer / Other)	MDVR-CF
Trigger x	1 character trigger name	1 - 6

Figure 8: Titles Setup Menu

Trigger Setup (Figure 15)		
Field	**Action**	**Default**
Trigger 1-6	Enter a name for the trigger event / Enter if the trigger is active high or low / Select the action for the trigger event (MARK EVENT, START RECORD, STOP RECORD, RECORD while active, SWITCH CAMERA, STEALTH REC, DISPLAY ONLY)	Trigger-x / Active H / No Action
Speed	Enable recording at a given input speed.	Disabled

All 6 triggers can be configured to one of seven actions. All triggers are recorded in the meta-data. These actions are defined below:

- MARK EVENT: Starts a recording if not already recording and labels the recording as an event in the file name.

- START RECORD: Starts a recording and will record until the stop button is pushed on the front of the unit or the storage media is full.
- STOP RECORD: Stops a recording if the unit is recording.
- RECORD: Starts a recording and records while the trigger is active. Stops recording when the trigger is not active.
- SWITCH CAMERA: Switches the camera input to the unit based on the settings in the ***Setup Menu***.
- DISPLAY ONLY: Will display the trigger event on the OSD and will record the trigger in the file meta-data.

Figure 9: Trigger Setup Menu

Record Setup (Figure 16)		
Field	**Action**	**Default**
Record Mode	STOP IF FULL or CONTINUOUS RECORD	STOP IF FULL
Image Size	Selects the image resolution 640 x 240 / 320 x 240	320 x 240
Image Quality	Image quality selection of HIGH, MEDIUM HIGH, MEDIUM, MEDIUM LOW, LOW. Lower	MEDIUM

	image quality provides longer record time at lower video quality.	
Frame Rate	Selects the frame rate from 30 FPS down to 1/8 FPS.	30 FPS
Audio Recording	Selects whether to record 2 channels of audio (ON), one channel associated with the video being recorded (SWITCHED) or no audio (OFF).	ON
Priority Prompt	ON / OFF: Selects whether to prioritize the recorded video. See Figure 6	OFF
Total Time	Displays the recording time capacity based on the Compact Flash card size and record settings above.	

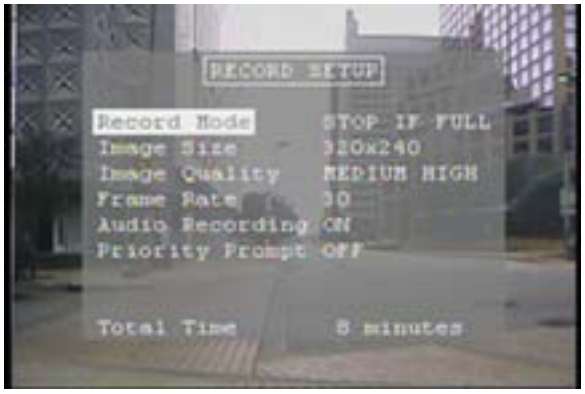


Figure 10: Record Setup Menu

GPS Setup (Figure 17)		
Field	**Action**	**Default**
Use GPS	Selects whether to utilize the GPS positioning data.	YES
Use GPS Time	Selects whether to utilize the GPS time and date settings.	YES
UTC / Local Time	Selects the difference between universal time and local time (in hours – 6 for Central Time).	- 6

GPS Data Format	Selects GPS display format: DDD:MM:SS, DDD:MM.mm, DDD.dddd	DDD:MM:SS

Figure 11: GPS Setup Menu

System Info (Figure 18)		
Field	**Action**	**Default**
Disk Capacity	Storage capacity of the record media.	
Percent Used	Percentage of used space on the record media.	
Percent Free	Percentage of free space on the record media.	
Firmware Version	Version of the installed firmware.	

Figure 12: System Info Menu

MDVR Password Menus

The menus shown in Figure 19 below allow for configuration of the units password access. All buttons on the front of the unit may be used for password access **EXCEPT THE POWER BUTTON**. The password field consists of 6 characters with a default password of: “Left Arrow”, “Right Arrow”, “Left Arrow”, “Right Arrow”, “Left Arrow”, “Right Arrow”. After this sequence is entered, the system allows access for 30 minutes (or after cycle power) before the password is enabled again.
The unit supports 4 levels of password protection with the ability to enable any or all levels. These are defined below:

- All Keys: Any key press required a password.
- Power-off: The Power button requires a password.
- Playback: Video playback requires a password.
- Menu: Access to the menus requires a password.

Figure 13: Password Menus

COMPACT FLASH FILE STRUCTURE

In the root directory of the Compact Flash card, the DVR will create a new subdirectory for each day of recording. The subdirectory is named as follows:

Mmm.dd.yyyy

Mmm = 3 letter month abbreviation, e.g. Jan, Feb, Mar, ... Dec
dd = day (01 - 31)
yyyy = 4 digit year, e.g. 2006

Each subdirectory will contain one or more AVI files named as follows:

ssssssssssssss_Mmm.dd.yyyy_hh.mm.ss.avi

sss.. = User defined system name. This name can be from 0 to 14 characters in length. This field is free-form for the end user to define car number, officer name, whatever within the 14 character limitation. The user is free to put spaces within this name, but these are replaced with underscores ('_') in the filename.

Mmm.dd.yyyy = same as directory name
hh.mm.ss = 24 hour time in hours, minutes, and seconds
.avi = AVI file extension

NOTES:
. If the system name is 14 characters in length, then there is no trailing underscore after the system name.
. File names can contain a 'suffix' which indicates that the file is a continuation of a recording (every 10 minutes, the DVR starts a new file). Also, an event can be marked with a suffix. The suffixes are:

'+' : this is a continuation file
'#' : this file contains an 'event' of interest

The suffix is placed just prior to the file extension, e.g:

```
Jan.01.2006_01.00.00.avi    /* First file        */
Jan.01.2006_01.10.00+.avi   /* Continuation file */
Jan.01.2006_01.12.15*.avi   /* Event file        */
```

BACK PANEL CONNECTIONS

Main Interface Connector	
25-pin DSUB	
Pin #	**Function**
1	Record LED Out; 3.3V with a 1k series resistor.
2	12V Camera Output
3	Trigger In 1
5	Trigger In 2
6	Remote power on / Ignition
7	Trigger In 3
8	Trigger In 4
9	Trigger 5
10	AUX 12V Output w/ 100ohm series resistor.
11	Trigger 6 / Mic Trigger In on 8-pin Molex.
14	Spike protected Automotive Power Output.
15-16	Automotive Power Input
4, 12, 13, 17,18, 25	Automotive Ground
19	RS232-RX 4
20	RS232-TX 4
21	RS232-RX 3

22	RS232-TX 3
23	RS232-RX Radar IF
24	RS232-TX Radar IF
25	Ground

Notes: 1. Pins 23 & 24 are dedicated to the Radar Interface Only.
2. Pin 11, Trigger 6 / Mic Trigger Input are also connected to pin 4 of the 8-pin Molex. Use only one or the other.
3. Pin 14 is protected automotive output power which could range from 10V to 26V.

Camera Power Connector
2-pin Molex 43650-0200

Specifications	
Recording Capabilities	NTSC video camera input up to 30 fps with synchronized audio and meta-data.
Meta-Data Capture for Each Frame	Input voltage, unit temperature, 14 character unit name, panic button events, all triggers status and names, operating mode & version numbers, time & date, optional GPS lat/long/speed.
Compression	Motion JPEG compression w/ 5 selectable compression ratios.
Resolution:	Selectable 640 x 240 or 320 x 240.
Frame Rate:	Selectable 30 FPS to 1/8 FPS.
Video File Format	Standard AVI playable in Windows Media Player.
Archive Media Type:	Type 1 Compact Flash Card support up to 32GB.
Typical Record Time	4GB CF Card: 4.6 hrs up to 6.6 hrs. 8GB CF Card: 9.2 hrs up to 13.2 hrs.
Power Supply Input Rating	Standard automotive power range; 8 – 24 Volts.
On Power Consumption w/o Cameras	< 270 mA
Off Power Consumption	< 10 mA
12V Camera Power Output Max	12V @ 1 Amp regulated switched power outputs.
External Trigger inputs:	6 input triggers plus the ignition trigger.
External signal outputs:	1 LED driver, 1 Open Collector output.
Transient Protection	2500 Watts for 10ms
Operating Temperature:	-20 C ~ 60 C (- 4 F ~ 140 F) ambient temperature.
Operating Shock:	1,000Gs being equivalent to a five-foot drop.
Unit Weight:	1.4kg (3.0 lbs)
Unit Size:	7 in (178 mm) x 2 in (51 mm) x 8 in (203 mm); 1DIN Mountable