GPSBOX-GP General Purpose GPS Video Overlay Unit

The GPSBOX-GP video overlay unit provides a simple method for displaying the speed, time and position information from a GPS receiver over the picture from a standard definition composite video camera. The unit has an integral 66 channel GPS receiver which provides the data for the overlay. The display is updated 10 times per second (10Hz). The unit has an external antenna suitable for vehicle mounting. In addition the unit has a three axis accelerometer for vehicle applications. With additional equipment the unit may also be used as part of a lap / interval timing system. Please read the entire document before using the overlay unit. There are three versions of the unit with different video interfaces.

GPSBOX-GP

GPSBOX-GP-25

GPSBOX-GP-35

GPSBOX-GP versions	
GPSBOX-GP	Standard RCA phono video connectors
GPSBOX-GP-25	2.5mm jack plug cable interface for mini dvr units
GPSBOX-GP-35	3.5mm jack plug cable interface for JXD personal media players

GPS Receiver

- MTK- 3329 high performance GPS Chip Set 66 channel all-in-view tracking.
- Very high sensitivity (Tracking Sensitivity: -158dbm).
- Rapid Time To First Fix at low signal level, Cold start typically <55 seconds, Hot start typically 1 second.
- Position Accuracy 10 m CEP
- Datum WGS-84.

Accelerometer

Choice of three ranges ±2g, ±4g or ±8g. Accurate to ±0.1g

GPSBOX-GP video overlay unit.
Compatible with colour and mono standard definition composite video signals. 1Vp-p. PAL and NTSC
Dimensions 95 x 65 x 30mm LxWxH (without connectors)
Power supply 9 - 12V DC regulated
Power consumption 150mA with antenna
Operating Temp. 0° - 85°C

Power supply

The GPSBOX-GP units require a 9 - 12V DC regulated power supply connected via the 2.1mm power connector on the unit's front panel. The unit draws approximately 150mA. The unit has a simple on / off power switch to isolate it from a battery power supply. There is no internal battery compartment. The GPSBOX-GP-25 and GPSBOX-GP-35 **do not** draw power from the DVR or PMP they are connected to.

Please ensure proper care is taken in making power and video connections. Although the designated power connector is protected against accidental reverse polarity connection, short circuiting power to the video connectors or other input connector will result in the electrical failure of the unit. Our warranty specifically excludes failure due to electrical damage caused by improper connection.

WARNING! It is important to ensure correct connection of the video text overlay unit to the power supply or battery. Failure to observe correct power supply connection polarity may result in the electronic failure of the unit or in the battery bursting to cause personal injury and damage. The power supply **must** have a regulated output. Connection to a non-regulated power supply, in particular direct connection to the cigar lighter socket of a vehicle, can cause the unit to fail. The warranty is void in such a case.

Connections

All connections to the GPSBOX-GP should be made or removed when the power to all parts of the system is off. The video in and video out connections should always be made before powering the system up.

GPSBOX-GP video connections

The GPSBOX-GP version connects via standard RCA phono connectors to a camera and monitor / recorder.

GPSBOX-GP

GPSBOX-GP-25 video connections

The GPSBOX-GP-25 version is designed to be used with either the KL509 or MiniDVRIII mini dvr units. These units use a 2.5mm jack plug connector between the camera cable and the DVR unit. To connect the GPSBOX-GP-25, first ensure the DVR unit is off. Never remove or replace any cables when either the DVR or the overlay unit are powered as damage to the units will result. Next remove the camera cable from the AVin socket of the DVR unit. Insert the camera cable into the 2.5mm socket marked video in on the front panel of the overlay unit. Insert the video out cable supplied with the overlay unit into the AVin socket of the DVR. Ensure that the 2.5mm jack plugs are fully inserted. The video overlay unit will not pass the video signal from the camera when it is switched off. Therefore when powering up the system always switch the overlay unit on first or at the same time as the DVR. If the DVR is turned on first it will report no video signal. If the camera is not attached to the video overlay unit it will generate its own video signal displaying the data over a blank black background.

Mini DVR units compatible with the GPSBOX-GP-25

DVR unit AVin connectors

Insert camera cable into overlay unit and overlay unit cable into DVR unit

GPSBOX-GP-35 video connections

The GPSBOX-GP-35 is designed to be used with a range of personal media players (PMP) and other equipment that connect to external video equipment via a 3.5mm jack plug. The unit shown below is a JXD 990. Like similar units it is provided with an AVin cable for recording from televisions or other video sources. This cable connects to a 3.5mm socket marked Avin on the PMP.

Example of AVin connections of JXD PMP

To connect the PMP to the GPSBOX-GP-35 unit first remove the AVin cable from the PMP AVin socket and then insert it into the 3.5mm socket marked video in on the front panel of the GPSBOX-GP-35. Next insert the video out cable from the GPSBOX-GP-35 into the AVin socket of the PMP. Switch on the overlay unit before you turn on the PMP as it will not pass video while switched off.

Camera set up with PMP and GPSBOX-GP-35

Antenna connection

The active antenna supplied with GPSBOX-GP should be attached to the connector on the front panel of the enclosure. The antenna should be situated in a location with a relatively clear view of the sky. If testing the unit indoors this should be at least a window sill, preferably south facing. Optimal accuracy will result from the antenna being placed with a clear 360° view of the sky. Avoid mounting the units close to potential sources of electrical interference such as engine ignition coils, alternators or radio transmitters.

Unit Operation

The unit runs immediately it is connected to a power supply and the text display will appear within approximately 5 seconds. Without a video input signal the text display will be shown over a dark grey background video signal generated by the unit. The unit can automatically detect when a camera is connected and the text display will then be shown over the video signal from the camera. If the camera is disconnected the unit will automatically switch back to its internal video signal. The unit will automatically detect the video standard, PAL or NTSC, at the time the unit is switched on. It will not detect a change in the video standard while the unit is powered, i.e. you cannot hot swap PAL and NTSC cameras. Disconnect the power, connect the new video input signal and connect the power again to select the new video standard. The font, text size and positions of the data display are fixed and cannot be changed. See the set up procedure for the data types and screen positions.

Initialisation of the GPS receiver takes approximately 15 seconds, after which the time and date will be displayed, if selected. Accelerometer and lap timer displays will appear if selected. Initially, before the GPS receiver has a fix, the message “GPS BAD” will be displayed at the top left of the screen. The time and date will be displayed at the bottom of the screen if they have been selected for display. The time and date may be incorrect until the receiver has a fix. Once a fix has been achieved the gps data selected for display will appear on the screen. If the GPS position fix is lost the gps data rows will be cleared and the “GPS BAD” message will be displayed again at the top of the screen. The time and date will remain on screen if the time and date are selected for display. The time taken to achieve a GPS fix depends on the placement of the antenna and its resulting the view of the sky, combined with the relative position of the visible satellites together with the time and distance the receiver has moved since the last valid fix.

Due to the way the DVRIII unit displays the video picture in standby, the top and bottom lines of the video overlay display will not be seen on the screen until the unit starts to record.

Display Set up

The GPSBOX-GP can display the following parameters

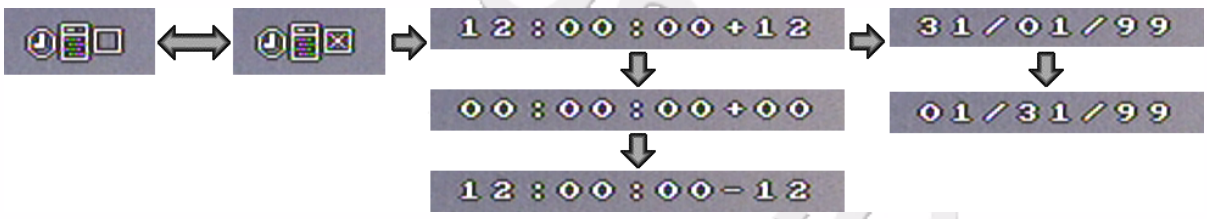
1 Speed selected for display in miles per hour, kilometres per hour or knots
2 Altitude above / below mean-sea-level selected for display in feet or metres
3 Heading in degrees
4 Acceleration in 2 or 3 axes with ±2g, ±4g or ±8g ranges. Accurate to ±0.1g
5 Lap timer, current, last and best lap (Requires external interface)
6 Latitude and Longitude
7 Time and Date. User selected timezone offset, DD/MM/YY or MM/DD/YY format

Set up procedure

Please read this description of the set up procedure all the way through before attempting to set up the display. Each stage of the set up procedure is represented by a different icon. All display elements are selected by pressing the set / reset button when the relevant icon is flashing on the screen. If you do not press the set button when an icon is flashing the data selection will be left unchanged and the set up procedure will step on to the next icon after approximately 20 seconds. The unit will step through the entire procedure once entered even if you do not press the set button. Changes are stored as they are made so the procedure can be cut short by turning the unit off after a subset of display has been changed. To start the set up procedure turn the unit off with the power switch on the front panel. If you wish to set up the accelerometer display ensure the unit is on a flat, level surface. Press and hold the set / reset button and switch the unit back on. The set up icon will flash on the screen. To abort the set up procedure at this point simply continue to hold the set button down for 20 seconds and the unit will default to the display with the last settings unchanged.

Time and Date

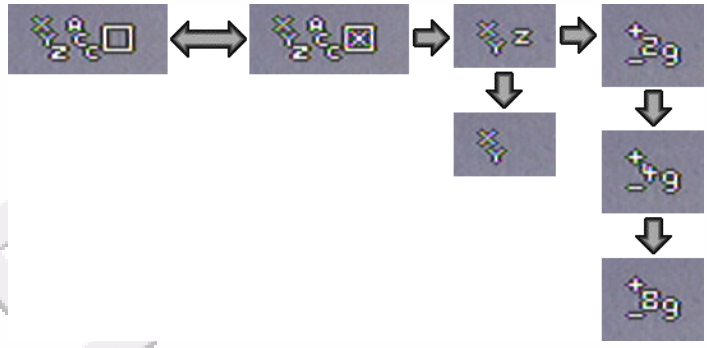
To enter set up release the set button while set up icon is flashing. The flashing time and date select icon will be displayed. The time and date can be selected for display by pressing the set button. This will check or uncheck the select check box. Once the selection has been made the time and date select icon will display for 20 seconds after the last set button press. If the time and date is not selected then the accelerometer display select icon will be displayed next, otherwise the time zone selection will be displayed.



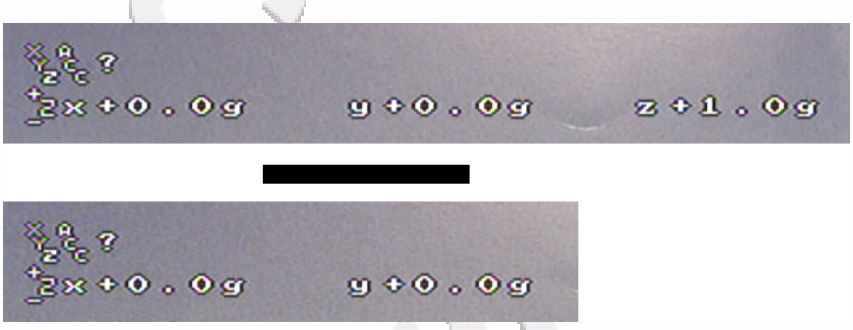
Pressing the set button while the time zone selection is displayed will set the offset between the GPS UTC time and the desired time zone between -12 and +12. For example select -05 for EST or +01 for CET / BST. The time zone will be displayed on the screen as an offset from 00:00:00 UTC. For example selecting +05 will be acknowledged by the display of 05:00:00+05. When the time zone selection has been made wait 20 seconds without pressing the set button and the date mode selection will be displayed. Pressing the set button will toggle the display of the date between the DD/MM/YY standard date format and the MM/DD/YY format used in the USA. The date 31/01/99 will be shown in the format selected.

Accelerometer

When the date mode selection has been made, the flashing accelerometer display select icon will be displayed 20 seconds after the last button press. Press the set button to select or unselect the accelerometer display as required. If the accelerometer display is not selected, after 20 seconds the lat - lon display select icon will be displayed.



If the accelerometer display is selected the XY or XYZ select icon will be displayed. Press the set button if you wish to change the setting between either the two axis or three axis display. When the selection has been made, after 20 seconds the acceleration range selection icon will be displayed. The range will be ±2g, ±4g or ±8g depending on the previous setting. Press the set button to change the range as desired.



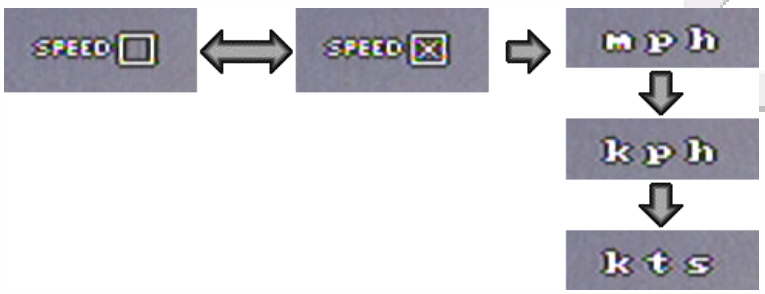
After 20 seconds the current accelerometer reading will be displayed with the flashing accelerometer setting icon. If you have previously selected only X and Y axis acceleration, the Z axis reading will not be shown. The accelerometer reading values should be 0.0g in the x and y axes and 1.0g in the z axis. If this is not case press the set button to reset the readings. Please note that the accelerometer is only accurate to approximately ±0.1g. When you are happy with the accelerometer readings leave the set button for 20 seconds and the lat- lon display select icon will be displayed.

Latitude and Longitude

Press the set button to when the lat - lon display select icon is displayed to select or unselect the display of the latitude and longitude. Leave the set button for 20 seconds and the speed display select icon will be displayed.

Speed

When the speed display select icon is displayed press the set button to select or unselect the speed for display. Leave the set button for 20 seconds, if the speed is unselected the altitude select icon will be displayed, otherwise the speed data type select will be

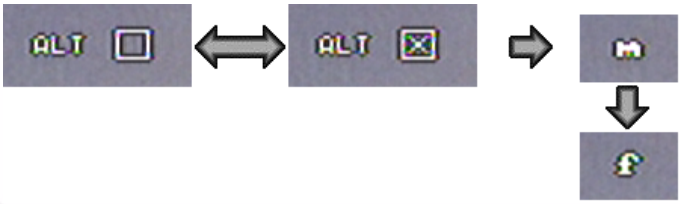


displayed.

Either mph, kph or kts will be displayed dependent on the speed data type previously select. Press the set button to change the selected speed data type. Once selected leave the set button for 20 seconds and the altitude select icon will be displayed.

Altitude

Press the set button when the altitude select icon is displayed to select or unselect the altitude for display. Leave the set button for 20 seconds, if the altitude is not selected, the heading select icon will be displayed, other wise the altitude data type select will be displayed. Either m for metres or f for feet will be displayed, press the set button to select the desired units for the altitude display.



Once selected leave the set button for 20 seconds and the heading select icon will be displayed.

Heading

When the heading select icon is displayed, press the set button to select or unselect the heading for display. Leave the set button for 20 seconds and the lap timer display select icon will be displayed.

Lap Time

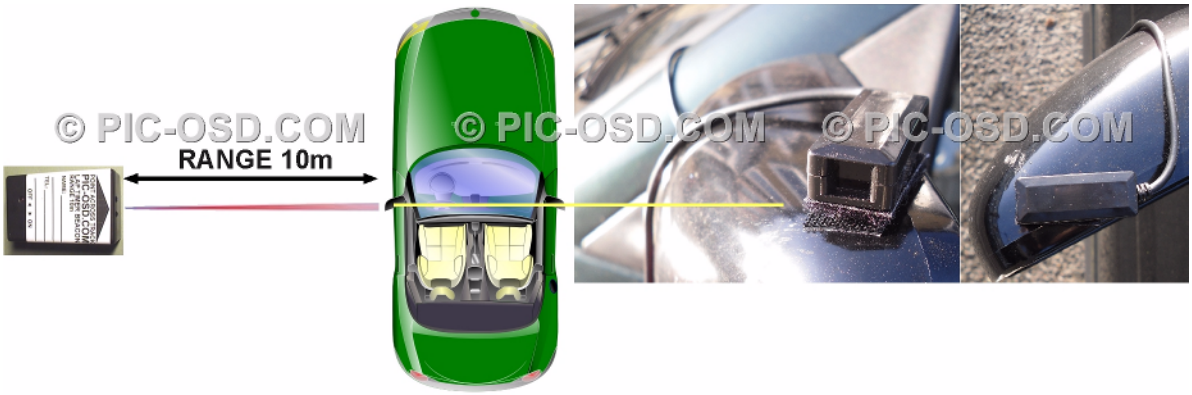
Press the set button when the lap timer display select icon is displayed to select or unselect the lap timer for display. The lap timer function is dependent on external hardware. It will not operate without this being connected to the unit. Leave the set button for 20 seconds and the set up procedure will end, the display will start.

When the display starts the data types selected will be displayed, if you wish to change the data types, turn the unit off and restart the set up procedure.

Lap Timer Operation

The GPSBOX-GP can be used for lap / interval timing with the addition of one or more infrared beacon(s) and an infrared (IR) receiver lead shown below left and centre. These are available separately. The receiver lead is 1.3m long ending with a right angled 3.5mm jack plug which should be connected to the 3.5mm socket marked L / F (Lap / Function) on the front panel of the unit as shown below right.

The IR receiver is supplied with a strip of industrial velcro to allow the receiver head to be mounted on the vehicle. It must be mounted to give a clear view of the track side at right angles to the direction of travel. The beacon is powered by 2 AA batteries and has a range of 10m. It must be mounted unobstructed on the track side so that its beam points across the track. The receiver is triggered as the vehicle passes through the beam. The beam is not coded to the receiver so care should be taken that there are not other beacons around the track. The receiver will not trigger on any beacons within 16 seconds of travel from the first trigger. This is therefore the shortest time interval / lap that can be measured. The maximum interval is 59:59.99 with an accuracy of ±00.20 over this period.



The current lap number and time are displayed on the left of the screen. The last lap number and time are on the right above the best lap number and time. At the start of each session, press the set / reset button to reset the lap counter display. The current lap number is set to one and the time reset to zero. The lap timing starts to run from the first pass of the beacon after the reset button has been pressed. Each subsequent pass increases the lap number by one, restarts the time from zero and displays time from the preceding lap in the last lap position. If the lap time is better than any of the preceding laps in the session it will be displayed as the best lap.

WARRANTY

The BlackBoxCamera™ Company Ltd. warrants its products to be free of defects in materials and workmanship under normal use and service for a period of twelve months from the date of original purchase. The obligations of The BlackBoxCamera™ Company shall be limited within the warranty period, at its option, to repair or replace the product or any part thereof. The company shall not be responsible for dismantling and/or installation charges. To exercise the warranty the product must be returned carriage paid and insured. Under this limited warranty the maximum liability of The BlackBoxCamera™ Company shall not in any case exceed the purchase price of the product, which shall be fixed as liquidated damages and not as a penalty, and shall be the complete and exclusive remedy against The BlackBoxCamera™ Company.

This warranty does not apply in the following cases: Improper installation, misuse, failure to follow installation and operating instructions, alteration, abuse, accident or tampering, and repair by anyone other than The BlackBoxCamera™ Company.

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