

# Stratometer Smart Single

## ALT-II

**Wide range precision aviation altimeter.  
With serial output, compatible with IIMorrow,  
Garmin/Trimble or MGL RS232 protocols.**

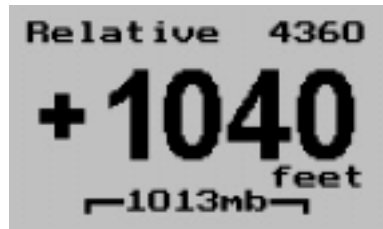


The ALT-II altimeter is a 2.25" instrument that can be used as absolute or relative altimeter. In addition, it offers a wide range VSI (vertical speed) indicator as option.

The altimeter conforms to ANSI standard atmosphere rules from -700 ft up to a minimum of 40,000 ft. Accuracy is ensured by double thermal compensation of the laser trimmed pressure sensor. High resolution is made possible by stable and sensitive electronics. The altimeter can display altitude in feet or meters, local pressure can be set in millibars or inches or mercury.

RS232 serial output, programmable for either IIMorrow, Garmin/Trimble or MGL protocols.

## Absolute mode / Relative mode



Reference  
altitude

Absolute mode: Altitude relative to sea level (MSL)

Relative mode: Altitude relative to some other altitude

Switching between absolute and relative modes is done either by choosing the relevant menu function (see below) or by pressing and holding the Menu key and then pressing "-".

In relative mode, the reference altitude is shown in the upper right hand corner of the display. Setting the reference altitude to your current altitude is done by pressing and holding the Menu key and then pressing "-" if you are in absolute mode. This action also selects relative mode. If you are in relative mode and want to update your reference altitude to your current altitude, press and hold Menu, then press "+".

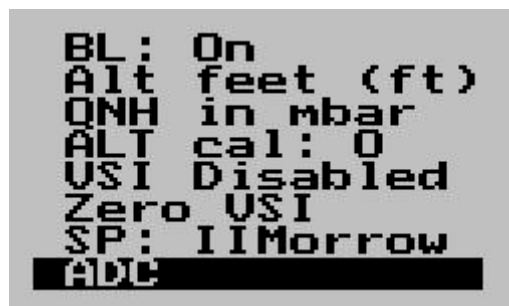
Alternatively, set the reference altitude in the relevant menu function.

If you want to change from absolute to relative mode without changing the reference altitude, use the Menu function to change modes.

## Setting up the ALT-II

Press the Menu key to enter the menu. You can move forward and backwards in the menu by using the + and - keys. To change or select a menu item, move the highlight to the desired item and then press the Menu key. To end an edit or function, press the Menu key again.

To exit the menu and continue normal operation, select the **\*\*\*Done\*\*\*** function and press the Menu key. Note, all changes you have initiated during your session will only be remembered by the instrument if you exit the menu using the **\*\*\*Done\*\*\*** function.



### REL/ABS

Select if you would like the altimeter to display your altitude absolute (relative to mean sea level – MSL) or relative to some other altitude. You can use your current altitude as reference or set any other altitude using the RELALT function.

To set the altimeter from absolute to relative mode and set the current altitude as reference at the same time, from the main display press and hold the Menu key and then press "-". To update the reference altitude to your current altitude press and hold "Menu" and then press "+".

After applying power to the instrument, it will always be in absolute mode.

## **RELALT**

Enter the reference altitude you would like to use in relative mode. Pressing and holding either “+” or “-” will allow you to use a steady increasing increment or decrement so you can set any altitude quickly. The instrument will remember your last selection if you switch it off.

## **Contrast ...**

This function allows you to change the display contrast to your liking. You can select values from about 20 to 45. (can vary depending on display type).

## **BL ...**

This function allows you to switch the display backlight on or off.

## **ALT**

Select if you want your altitude readout in feet (ft) or meters (m).

## **QNH**

Select if you want your local pressure readout in millibars (mB) or inches of mercury (“HgA).

## **ALT cal**

This is a technical function that is used to calibrate your altimeter to an exact reference. On the back of your altimeter you will find the calibration number that has been determined to result in the most accurate reading of your altimeter. This is the value that should be entered here. Should you have access to an accurate reference you may use this function to calibrate your altimeter. Before you do this, ensure that you have your local pressure set to coincide with a calibrated and certified reference.

Your altimeter has been calibrated by the factory to an accuracy of +/- one mB or approximately +/- 30 ft (10m).

## VSI

Select if you want to show the built in VSI (vertical speed indicator). The built in VSI will be shown just above the altitude readout. VSI will be displayed in feet/minute or m/s depending on your unit selection.



Main display showing VSI readout

## Zero VSI

This function is used to set your VSI to read exactly 0ft/min. This is similar to setting the needle on a mechanical VSI to point to zero by turning the adjustment knob on such a VSI.

The electronic VSI generally has much less drift compared to a mechanical VSI and this function will only be used very occasionally. Ensure that you perform this function when no pressure changes due to wind or other reasons are occurring.

It is normal for the VSI to show short, small positive or negative readings when your aircraft is standing still on the ground. The digital VSI is very sensitive and will show very small changes in pressure.

## SP ...

Select the protocol you would like to use for the serial output. Please see protocol section for available protocols and their exact definition. You must select the correct protocol for the device connected. Note that the ALT-II supports serial protocols. The parallel line protocol used with older transponders is not supported.

## ADC

This function is for technical personal. It is not used for ordinary operation of the unit.

## **IIMorrow serial protocol**

The IIMorrow protocol uses RS232, 1200 baud, 8 data bits, one stop bit, no parity. Message transmission rate is once per second.

Example altitude message for 10500 ft:

```
#AL +10500T+25D7cr
```

The message consists of #AL followed by a space.

This is followed by a "+", then five digits for the altitude in feet relative to 1013mB local pressure setting. The altitude is padded with leading zeros if required to make up five digits.

This is followed by the letter "T", a "+", the two digits "25" and a single byte checksum over all the characters in the message up to and excluding the checksum. The checksum is a simple modulo 256 sum of the binary values of the individual characters. The checksum is sent as two characters in hexadecimal format. The message ends with a carriage return (0x13).

Negative altitudes are transmitted as 00000. Altitudes are transmitted in feet.

## **Trimble/Garmin protocol**

The Trimble/Garmin protocol uses RS232, 9600 baud, 8 data bits, one stop bit, no parity. Message transmission rate is once per second.

Example altitude message for 10500 ft:

```
ALT 10500cr
```

The message consists of the three letter "ALT" followed by a space. This is followed by a five digit altitude relative to a local pressure setting of 1013mB. The altitude is padded with leading zeroes if required to make up five digits. Finally the message is terminated with a carriage return (0x13).

Negative altitudes are transmitted as 00000. Altitudes are transmitted in feet.

## **MGL protocol**

The MGL protocol uses RS232, 9600 baud, 8 data bits, one stop bit, no parity. Message transmission rate is once per second.

Example altitude message for 10500 ft:

```
ALT+10500C+10500L1013+0000XBACr
```

The message starts with "ALT" followed by six characters altitude. The first character is either a "+" or "-" if the altitude is negative. This altitude is relative to a local pressure of 1013mB.

This is followed by the character "C" and a further six character altitude. This altitude is corrected for the current local pressure setting of the instrument. Note that it is possible for the first altitude to be positive and the second altitude to be negative or vice versa.

This is then followed by the character "L" and a four digit local pressure setting in millibars (mB).

Finally, a five character field shows the current positive or negative VSI reading in ft/min.

This is followed by the character "X" and a two byte checksum in hexadecimal format. Please see the IIMorrow protocol for checksum details.

The final character is a carriage return (0x13).

Altitudes are transmitted in feet.

## Technical specifications:

Display temperature range (operational): -20 to +80 degrees C  
Supply voltage: +8 to +18V. +24/28V with optional pre regulator.  
Supply current: 35mA/70mA (backlight off/on)  
Altimeter range: -700ft to 40.000ft (45.000ft typical, not guaranteed)  
Altimeter resolution: 10ft at sea level.  
Measurement accuracy: +/- 1mB, +/- 30ft at sea level.  
VSI range: +/-10.000ft/min, dead band 20ft/min, resolution 10ft/min.  
Serial port: RS232, transmit only, RCA connector.  
Weight: 90 grams.

### Warranty:

MGL avionics warrants their products for a period of one year from date of purchase against faulty workmanship. Warranty is limited to the replacement of faulty components and includes the cost of labor. Shipping costs are for the account of the purchaser.

Note for operation on supplies with inductive loads:

Any operation of electronic instrumentation on power supplies that are subject to high voltages caused by operation of inductive loads (starter motors, solenoids, relays) are required to be fitted with suitable protection.

All Smart Singles are guaranteed to withstand temporary over voltage up to 40V without additional protection. We recommend that measures are taken to prevent voltage transients in excess of this limit.

MGL Avionics recommends the fitment of a fuse in line with a 33V transorb (available from MGL Avionics at low cost) to protect electronic instruments, radios and intercom systems. Only one such arrangement is required for a cluster of instruments.

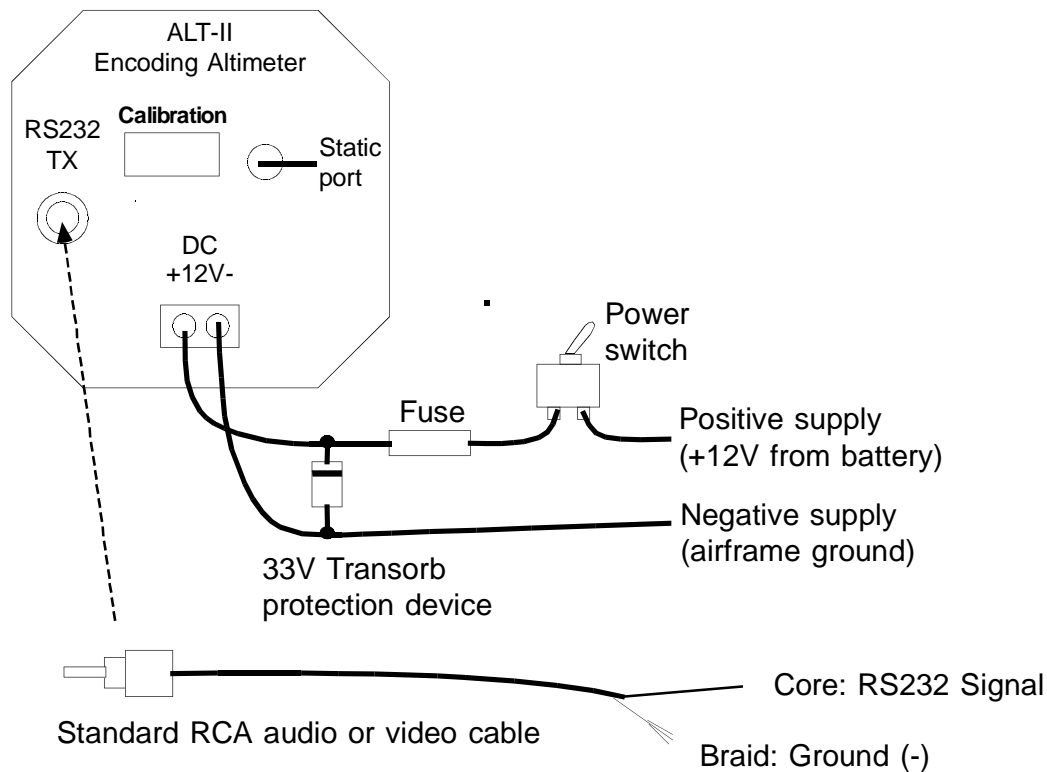
Please note that product warranty excludes damages caused by unprotected, unsuitable or incorrectly wired electrical supplies.

This instrument is not certified by the FAA. Fitting of this instrument to certified aircraft is subject to the rules and conditions pertaining to such in your country. Please check with your local aviation authorities if in doubt.

This instrument is intended for ultralight, microlight, homebuilt and experimental aircraft.

Operation of this instrument is the sole responsibility of the pilot in command (PIC) of the aircraft. This person must be proficient and carry a valid and relevant pilots license. This person has to make him/herself familiar with the operation of this instrument and the effect of any possible failure or malfunction. Under no circumstances does the manufacturer condone usage of this instrument for IFR flights.

## Installing the ALT-2 encoding altimeter



Connect the supply terminals to your aircraft's power supply (you need a dropping resistor or pre-regulator for 24/28V systems).

Install suitable power supply protection if you have a supply that can contain large voltage transients such as can be created by starter motors and solenoids.

Ensure that the supply voltage will not drop below 8V during operation as this may result in incorrect altitude readings.

Connect the static port to a suitable static air pressure line. If you have a slow aircraft or an aircraft where the internal cabin pressure does not change during flight and is equivalent to the outside air pressure you may find that it is not required to connect a static port.

For installations in typical ultralight aircraft pods, be aware of possible pressure changes inside the pod during flight caused by ram air or suction effects. This may lead to a false indication of altitude. Often these effects are dependent on the current angle of attack of the airflow around your pod. You will need to install a suitable static port in these cases.

## Connecting the ALT-2 to your transponder:

The ALT-2 has a RS-232 serial output. Older transponder models only have parallel interface. These older models can be used with this altimeter if you use a serial to parallel converter. Please contact MGL Avionics for details. The converters available from MGL are inexpensive.

It is important that a serial to parallel converter is wired correctly to your transponder. Any wiring fault will lead to the transponder broadcasting an incorrect altitude. This is a **serious** malfunction ! This limitation does not exist with a serial RS232 interface. It is much easier to connect and also will either work or it will not work at all if a fault develops. This makes it generally impossible for your transponder to broadcast false information.

To connect the altimeter to your transponder, source a high quality RCA cable. These are used in hifi and video equipment and are available at low cost. Cut off one connector and expose the braid and core of the cable. The core needs to be connected to the RX pin on your transponder. The braid should be connected to the supply minus on the transponder or to the RS232 ground pin if available. Consult your transponder manual for information on the transponder connector.

You may need to enable the serial input on your transponder and select a protocol. Select a protocol that is supported by both the altimeter and the transponder.

Note: In order to avoid problems with some protocol implementations the ALT-2 altimeter will send any negative altitude as "0". This does not cause any practical problem but does avoid the possibility of some transponders broadcasting incorrect altitude information should your altitude be negative (i.e. below sea level). This does not apply for the MGL protocol which will transmit negative altitudes.

### **Attention:**

**Your country may have regulations that do not allow you to install a transponder or an encoding altimeter yourself. The installation may have to be performed by an authorized person or company. Please check your applicable regulations with your aviation authorities.**