Stratomaster Maxi Single

ALT-3, ALT-4, ALT-5

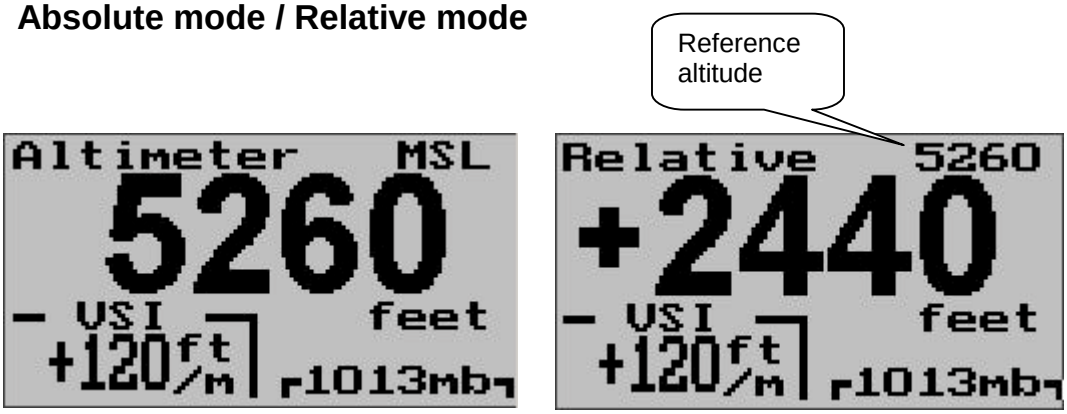
ALT-3: Wide range precision aviation altimeter
ALT-4: Encoding altimeter with Gillman code transponder output
ALT-5: Encoding altimeter with serial output, compatible with IIMorrow, Garmin/Trimble or MGL RS232 protocols.

The ALT-3 altimeter is a 3.5” instrument that can be used as absolute or relative altimeter.
In addition, it offers a wide range VSI (vertical speed) indicator as standard option.

ALT-4 and ALT-5 models include a gillman code and serial transponder interface.

The altimeter conforms to ANSI standard atmosphere rules from –700 ft up to a minimum of 40.000 ft. Accuracy is ensured by 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.

Absolute mode / Relative mode



Absolute mode: Altitude relative to sea level (MSL)
Relative mode: Altitude relative to some other altitude

Switching between absolute and relative modes is done using the “Enter” key when you see the main screen.
As you switch from absolute to relative mode you can set the current altitude as the new reference altitude. You do this by holding the “Enter” key down for two seconds as you switch from absolute to relative mode.
Alternatively, you can set the reference altitude in the menu. This you would do if you need to set a reference that is not obtainable through your current flight profile.

Setting up the ALT-2,3,4

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 Select (Enter) key. To end an edit or function, press the Menu key again.

The Menu functions listed in the following section is based on the ALT-5. For ALT-3 and ALT-4 variants, ignore the serial protocol settings.

These images show the available menu functions. Note that the “SP:” function is available in the ALT-5 only.

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).

Backlight …

This function allows you to switch the display backlight on or off.
The backlight is normally left on. Should you need to reduce current consumption of the instrument for special applications you can switch the backlight 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 or 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 disabled

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 occuring.
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 the following protocol section for available protocols and their exact definition. You must select the correct protocol for the device connected. Note that only the ALT-5 supports serial protocols.

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.

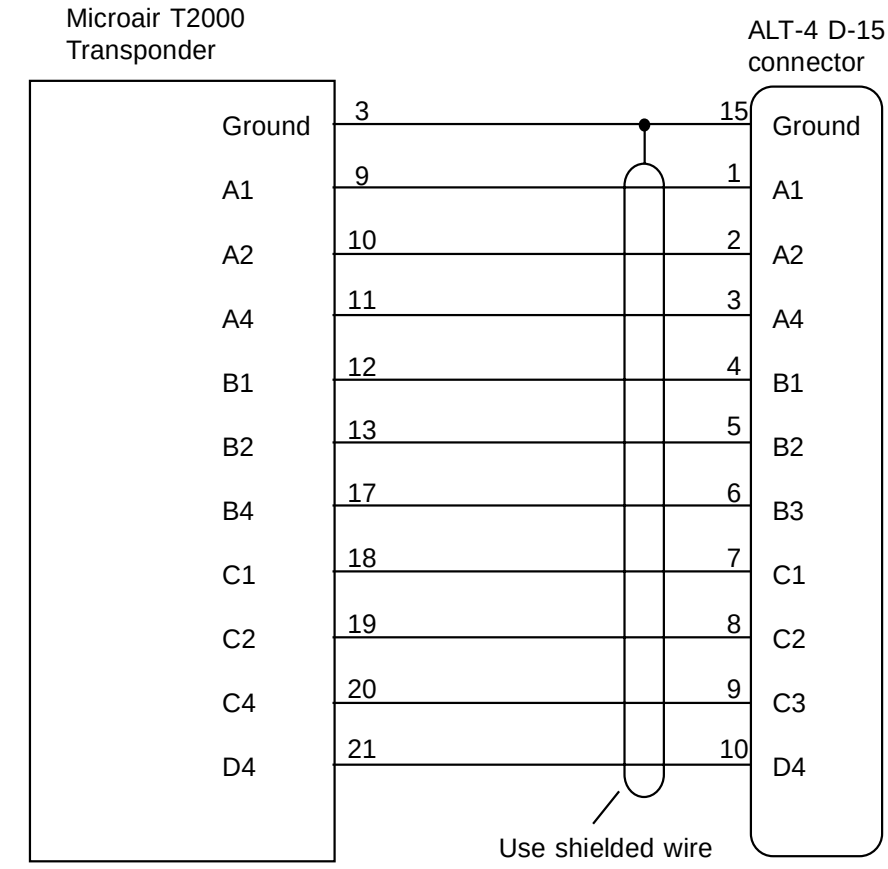
Example altitude message for 10500 ft:

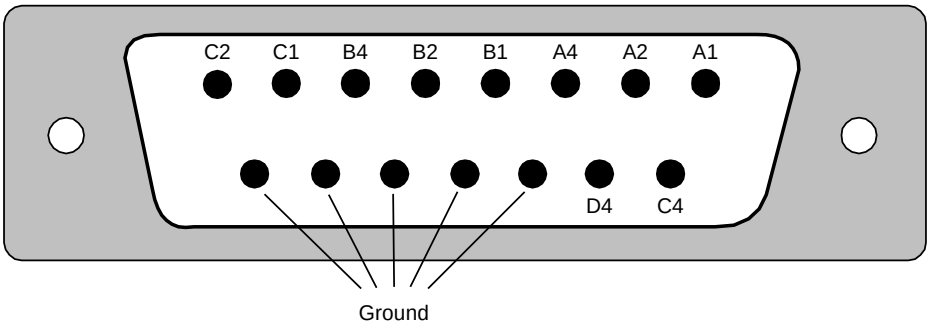
ALT+10500C+10500L1013+0000XBAcr

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.

Connecting the Gillman code transponder interface (ALT-4 only)

The connection to the transponder consists of 10 or 11 connections, many transponders accept only codes A1 to C4, in this case you will leave signal D4 unconnected. This example shows the required connection to a Microair T2000 transponder. Other transponders are similar.





View of the encoder output connector of the ALT-4 from behind the instrument. Pin 1 of the D15 connector is on the upper right hand corner (signal A1).

Should you use the included D15 connector harness the layout of the signals on the grey ribbon cable is as follows:

A1 → This signal is on the cable with the red marker band
C4
A2
D4
A4
Ground
B1
Ground
B2
Ground
B4
Ground
C1
Ground
C2

The ALT-4 altimeter will measure altitudes typically to around 42000 ft, however, this requires a transponder that uses signal D4. Transponders that do not have D4 can only transmit altitudes up to 35000 ft.

The ALT-4 produces inverted Gillman codes as required by virtually all transponders. The outputs are open collector types and will sink currents up to 0.5A but this is not recommended in praxis. Typical sink currents with transponders are only a few mA at the most.

It is recommended to use shielded cable for the connection between encoding altimeter and the transponder if a long cable needs to be used. The shield should be connected to ground at one point only (either on the encoding altimeter side or on the transponder side).

Following is a table of commonly used transponders and their Gillman code connections.
Please consult your transponders installation manual on the physical position of every contact.
Ensure that you wire the Gillman codes correctly and securely.

Installation of the wiring requires solder work. This needs to be done using electronic resin flux solder wire and proper temperature controlled soldering stations. Do not attempt this if you are unfamiliar with electronic soldering techniques. Please get professional assistance to do this. Bad connections can result in your transponder broadcasting incorrect altitude codes.

Function	Bendix TPR2060	Bendix TR641A/B	Cessna RT359T, RT459A, RT859A	Garmin GTX300 Series	Honeywell KT70/71 (Connector JKT701)	Honeywell KT76A/78A	Honeywell KXP	Narco AT50/A, AT150	Narco AT5, AT6/A	UPSAT SL70	Wilcox 1014A
D4	No Connection	N	10	18	8	No Connection	V	No Connection	No Connection	35	C
A1	4	A	14	3	M	M	G	7	2	13	k
A2	6	B	13	5	K	K	H	6	4	31	c
A4	8	C	15	6	J	J	J	8	8	12	W
B1	9	D	19	9	E	E	K	12	9	33	T
Strobe/Enable	Aircraft Ground	Aircraft Ground	11	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	5	12	Aircraft Ground	Aircraft Ground
Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground
Aircraft Power	Note 1	Note 1	9 or per Note 1	Note 1	Note 1	Note 1	Note 1	18 or per Note 1	13 or per Note 1	Note 1	Note 1
B2	10	E	17	11	C	C	L	10	10	14	L
B4	11	F	16	12	B	B	M	9	11	32	D
C1	3	H	21	10	D	D	P	14	1	16	P
C4	7	K	20	7	H	H	S	13	5	15	Z
C2	5	J	18	4	L	L	R	11	3	34	f
Aircraft Power	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground

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.
Gillman code port: Open collector darlington drivers.
Weight: 180-200 grams depending on type.

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.

Important information:

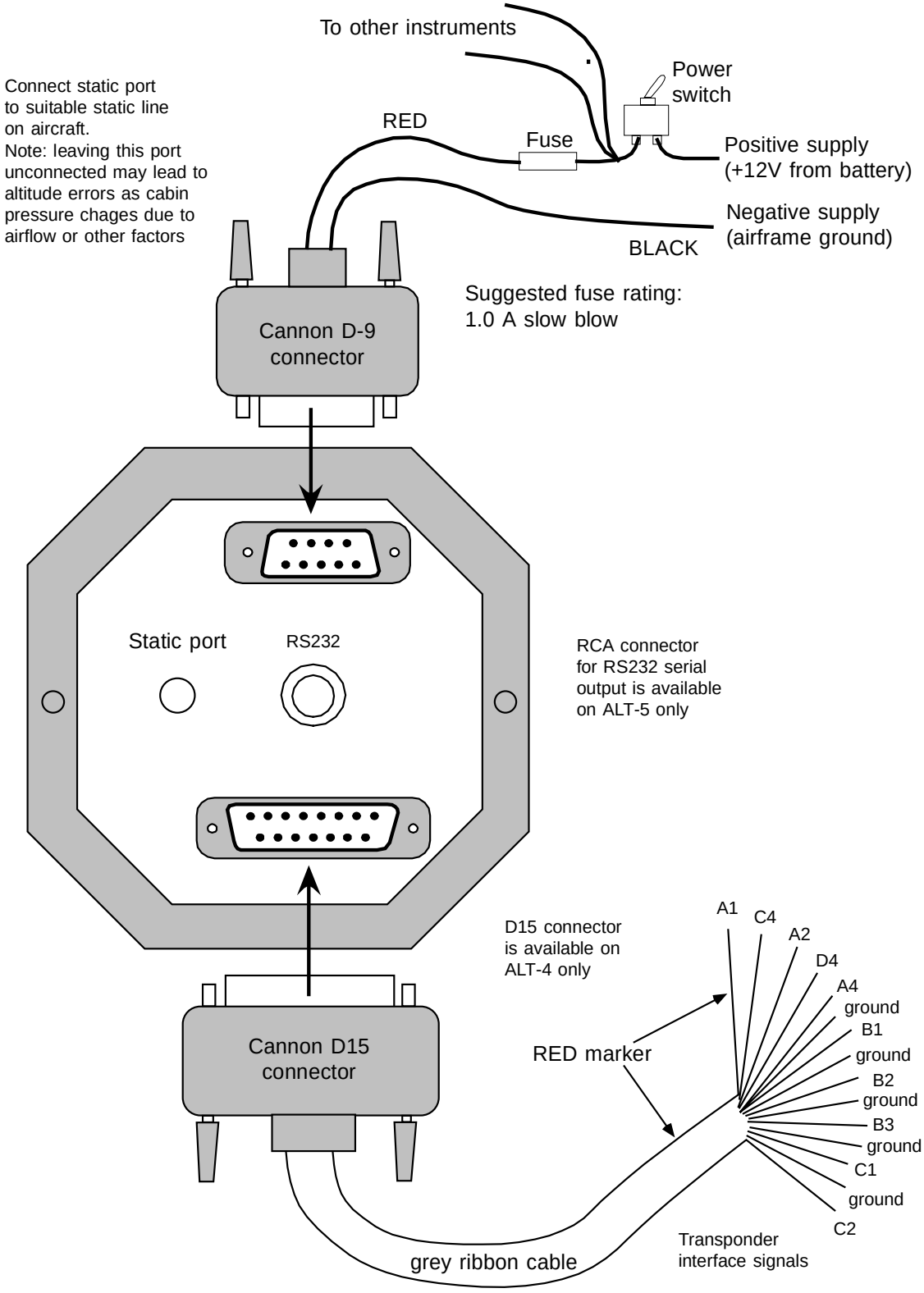
Depending on laws and regulations in your country you may not be allowed to install a transponder and associated equipment yourself. This work may have to be done by a certified AMO or instrument technician.
Please check with your relevant authorities.

The ALT-4 encoding altimeter is uncertified equipment and may normally only be used in uncertified aircraft, homebuilt aircraft and microlights (ultralights). Special operations permits for other aircraft may be required.

Please be very aware that any wiring mistake related to the application of Gillman codes to your transponder will result in incorrect altitudes broadcast by your transponder.
Any installation involving the CNV-ALT2 must be checked by a suitably equipped aircraft instrument maintenance outfit before operation. Failure to do this may be a criminal offence in your country.

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.

Installing the ALT-3, 4 or 5 altimeter



Connect the supply terminals to your aircrafts power supply (you need a dropping resistor or pre-regulator for 24/28V systems). Without pre-regulator the voltage on the power supply connector should not exceed 18V.
Internal protection will cause high current flow if voltage exceeds 33V as the instrument will attempt to dump excess voltage.
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 were 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.