Stratomaster Flight

Owner's Manual

&

Installation guide

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1. INTRODUCTION

The Stratomaster Flight is a digital multifunction instrument intended for small aircraft. Using the latest available microprocessor technology, it uses state-of-the art sensors and digital signal processing to provide a huge array of functions available to the pilot.

All this is packaged into a device that is simple and easy to use. The Stratomaster Flight has been designed to provide accuracy that exceeds that of ordinary aviation instruments by a wide margin. The altimeter of the Stratomaster Flight may be used as a calibration reference for other altimeters. Owing to the accuracy of the internal pressure sensor, the barometer may be used as absolute laboratory gas pressure meter providing maximum pressures are not exceeded. The accuracy of the barometer exceeds typical laboratory equipment and is comparable to a mercury manometer.

The Stratomaster Flight includes the following functions:

- Altitude to 40.000 ft (12 195 m) calibrated, 1ft dynamic resolution
- Airspeed ASI or TAS
- Engine temperature to 120 degrees C (248 degrees F)
- Stopwatch
- RPM to 9999 revs
- Glide ratio to 1/99
- Climb ratio 1/99
- QNH 960 to 1060 mb (28.3 - 31.3 Inch of Hg)
- QNE 1013 mb quick select (29.9 Inches of Hg)
- Time of day, Date for flight log entries
- Air time since take-off (or lesson time)
- Ambient temperature using external sensor
- Fuel level using flow sender or optional level sender
- Fuel flow using optional flow sender
- Current range estimate (range at current speed and fuel burn)
- Fuel bingo estimate (time until tank empty)
- Air distance made good
- Voltage. Supply to unit. Usually 12V battery.
- VSI +/- 9990 ft/minute (50.7 meters per second) range
- Flight log (or lesson log)
- Hobbs meter
- Density altimeter
- Barometer for ambient pressure
- Displaying aircraft registration number
- Maintenance timer
- Warnings for temperature, speed high, speed low, maximum altitude and low fuel level
- Instructor mode
- Master and slave for dual instrument setup
- Measuring take-off run to 50 ft (15.24 m) above ground level
- Air talk link for connection to:
- A) PC's and Laptops using optional cable
- B) Stratomaster "Black Box" flight recorder
- C) Stratomaster Flight secondary instrument
- D) Key ring flight log download device

2. SPECIFICATIONS:

2.1 General specifications

Size: 224x64 mm. Mounting depth 65mm (including connectors and wiring). Panel cutout 204x54 mm.

Weight: 480 grams. Excluding external senders.

Power supply requirements: 12V DC nominal. Range 7.5V DC to 28V DC.
Internally protected to 40 V DC.

Current consumption: 50 mA without backlight, 150 mA with backlight.

Rev counter input: High impedance. Accepts signals up to 100V RMS.
Maximum frequency 10 Khz. Internally protected against over voltage.

External temperature sensor input: Optimized for National Semiconductor LM335 temperature sender.

Fuel flow sender connection: Optimized for RS 256-225 flow sender. Will accept other senders with a 5 volt TTL output.

Engine temperature sender: Optimized for Rotax water/oil temperature sender.

Fuel level sender: Optimized for standard automotive level senders from 100 to 500 ohms resistance, any slope (increasing resistance with level or decreasing resistance with level).

Alarm contacts: Uncommitted read relay output. Recommended not to exceed 500 mA DC current. Maximum voltage 50 volts. Please note: heavy inductive loads must be protected by means of a reverse polarity diode in order to prevent sparks from destroying the read relay contacts.

Air-talk link: Two Air-talk links are provided. These are used to connect to other Air-Talk compatible devices. Standard audio RCA cable and connectors are used as medium. Air-talk is intended as a short distance, multi master communications link allowing Air-talk compatible devices to share information. The Stratomaster Flight uses the Air-talk link to connect to another Stratomaster Flight slave unit, a PC, Flight data recorder (black box), and key download devices (for transfer of the log to a remote PC).

2.2 Technical specifications

2.2.1 Altimeter

Range 0-40.000 ft (12 195 m), 1ft (or 1 m) dynamic resolution, 7.5 ft (or 2 m) static resolution at sea level. Dynamic resolution applies with the aircraft in flight. Dynamic resolution is measured by mathematically evaluating the turbulence created around the aircraft.

Basic accuracy at 20 degrees C (68 degrees F) +/- 30 ft (9 m) based on calibration to mercury manometer at +/- 1 mb (0.0295 Inch of Hg).

Maximum theoretical error factor +/- 1.5% over temperature range 0-40 degrees C (104 degrees F). Typical error factor over temperature range 0-40 degrees C (104 degrees F) is less than 0.5%

Note: The altimeter can be operated to altitudes above 40.000 ft. Range and accuracy above the 40.000 ft level are dependant on individual units. The achievable range is in the region of 45.000 to 60.000 ft depending on manufacturing tolerances of the pressure sensor.

2.2.2 Airspeed indicator

Range 0-200 mph (322 Kph or 174 Knots), 1 mph (1Kph or 1Knot) resolution. Theoretical accuracy 1% at 20 degrees C (68 degrees F), subject to installation of pitot tube and airflow pattern around aircraft.

2.2.3 VSI

Range +/- 9990 ft. (3045 m) Resolution truncated to 10 ft/minute. Internally 1 ft/minute. Accuracy +/-5 %, Please note: The VSI is compensated for altitude.

2.2.4 Rev counter

Range 0 to 9999 revs. Resolution is dependant on rev counter setup in instrument. Example resolutions: Rotax DCDI: 20 revs, Rotax Points ignition: 60 revs. Accuracy: +/- 0.0005% + resolution.

2.2.5 Fuel flow sender input

Accuracy of measurement is +/-0.05% subject to accuracy of fuel flow sender used. Example sender is RS 256-225: +/- 3% uncalibrated, typically less than 1% calibrated.

2.2.6 External temperature probe

Display resolution 1 degree C or 1 degree F. Accuracy 0.5 degrees typical. Range –50 to +99 degrees C (-58 degrees F - 210 degrees F).

2.2.7 Water temperature sender input

Measurement accuracy +/- 2% subject to accuracy of sender. Note: Senders are manufactured with a tolerance of up to +/- 20%. We based our measurement of a sample quantity of Rotax water/oil temperature senders and calibrated using a laboratory thermometer.

2.2.8 Fuel level sender input

Measurement accuracy of input: +/-2%. Overall measurement accuracy of fuel level is subject to quality and installation of chosen fuel level sender as well as complexity and form of tank shape.

Using the prescribed calibration procedure we find we can calibrate within 5% of actual level for most tank shapes.

2.2.9 Power supply

The Stratomaster Flight unit is optimized and intended for operation on a 12V DC supply such as a motorcycle battery. However, it can be operated on any power supply down to about 7 volts as well as aircraft power supplies of 24 or 28V DC.

Current consumption may vary slightly between units but is typically in the region of 50 mA without display backlight and 150 mA with display backlight. Please note that when connecting external sensors such as the fuel level sender, this is supplied from the unit and the current consumption of the sender has to be added to the consumption of the basic unit.

The unit is internally protected against temporary over voltage loads such as those that can be produced by a cranking starter motor.

It is advisable to power the unit via a fuse or circuit breaker. A fuse rating of 500 mA (slow blow) is recommended.

3. HOW IT WORKS

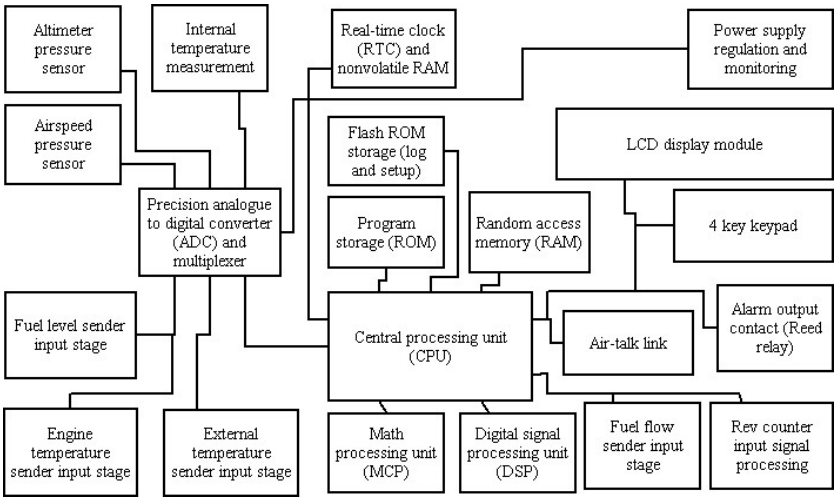
The Stratomaster Flight instrument is based on a highly integrated microprocessor. Combined on a single piece of silicon are a powerful and fast microprocessor core, program storage, random access memory, a mathematical processing unit, digital signal processor, and many peripherals.

Two silicon diaphragm pressure sensors are used to convert pressure into altitude and speed readings. These are very sensitive and accurate devices which represent the best of available analogue sensors available today.

A specially manufactured LCD display is used. This display provides outstanding daylight readability while at the same time providing a wide viewing angle and wide temperature range of operation.

The electronics are housed in a light-weight ABS housing that has been internally coated with a metal film to provide good EMI performance (Electromagnetic Interference).

Block diagram of the Stratomaster Flight



4. FUNCTIONS

4.1 Altitude

Altitude can be displayed either in feet (ft) or in meters (m) (Refer 5.1 setup instructions).

Altitude measurement has been calibrated to 40 000 ft (12 195 m).

Altitude can be measured in a resolution of 1 ft or 1 m while in flight (Dynamic resolution). Altitude can be measured in a resolution of 7 ft or 2 m at sea level while the aircraft is at rest in still air (Static resolution).

Altitude is displayed permanently during flight and the display field is updated twice a second.

4.2 ASI (Airspeed indicator)

The Stratomaster Flight can display either ASI or TAS. (Refer 5.12 setup instructions). It is not possible to change from ASI to TAS during flight.

Airspeed can be displayed in Miles per hour (Mph), Kilometers per hour (Kph) or Knots (Kn) (Refer 5.3 setup instructions).

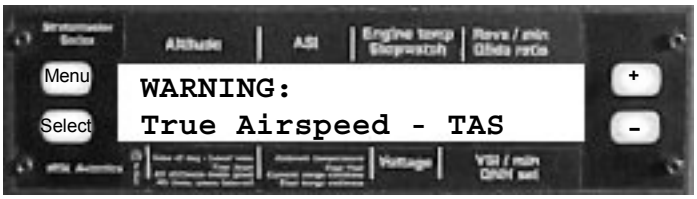
Airspeed can be measured up to 200 Mph, 322Kph or 174 Knots.

Airspeed can be measured in a resolution of 1 Mph, 1 Kph or 1 Knot.

ASI is displayed permanently during flight and the display field is updated twice a second.

4.3 TAS (True airspeed)

The Stratomaster Flight can display either TAS or ASI. (Refer 5.12 setup instructions). It is not possible to change from TAS to ASI during flight. The Stratomaster Flight will warn you that it has been set to TAS when switched on.



You should familiarize yourself fully with the dangers of using TAS. True airspeed is adjusted for density altitude e.g. temperature and altitude. You should therefore take in to account the effects of temperature and altitude on the stall speed of the aircraft. TAS can be displayed in Miles per hour (Mph), Kilometers per hour (Kph) or Knots (Kn). (Refer 5.3 setup instructions).

TAS can be measured up to 200 Mph, 322Kph or 174 Knots.

TAS can be measured in a resolution of 1 Mph, 1 Kph or 1 Knot.

TAS is displayed permanently and the display field is updated twice a second.

4.4 Engine temperature

Engine temperature can be displayed in degrees Fahrenheit or degrees Celsius. The Stratomaster Flight can only display engine temperature if an engine temperature sensor has been fitted. (Refer 5.6 setup instructions).

Engine temperature shares a display field with the stopwatch function and these two readings alternate. Should you have opted not to display the stopwatch the engine temperature will be displayed permanently.

Temperature can be measured between 20 degrees Celsius (68 degrees Fahrenheit) and 120 degrees Celsius (248 degrees Fahrenheit).

Should the aircraft be fitted with a water cooled engine it is recommended to display the water temperature.

Should the aircraft not be fitted with a water cooled engine you can determine which temperature you wish to display. It is important to remember that both CHT and EGT temperatures will be higher than the maximum reading.

4.5 Stopwatch

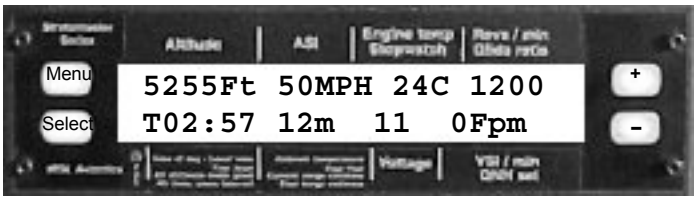
This function is ideal for timing of a leg for either cross country or competition flying.

Time is displayed as minutes and seconds for the first hour. After one hour only hours and minutes are displayed.

The stopwatch shares a display field with engine temperature and these two readings alternate. Should you have opted not to display the stopwatch the engine temperature will be displayed permanently.

Should you opt not to display the stopwatch the following steps should be followed to switch it off:

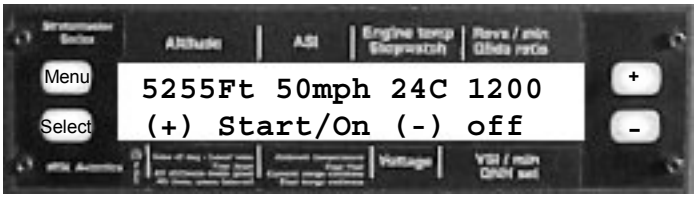
Step one: Press Menu



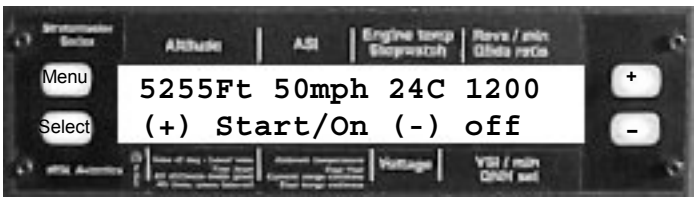
Step two: Press Select

(Note: Depending on your setup it might be necessary to press the plus once or twice before the wording Set stopwatch will appear).

Step three: Press - to switch off



Step four: Press Select to confirm and exit



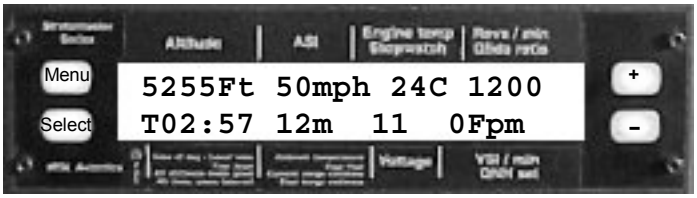
The stopwatch can be used in one of two ways:

Method one:

Clearing the stopwatch to zero and timing the current leg only.

Activating the stopwatch

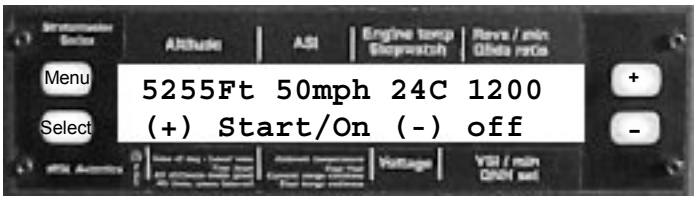
Step one: Press Menu



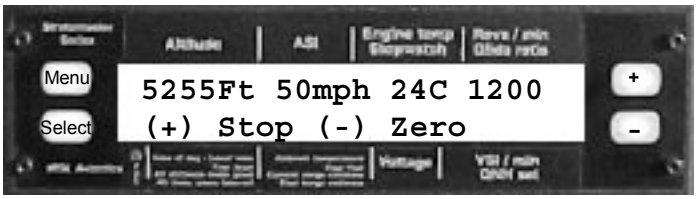
Step two: Press Select

(Note: Depending on your setup it might be necessary to press the plus once or twice before the wording Set stopwatch will appear).

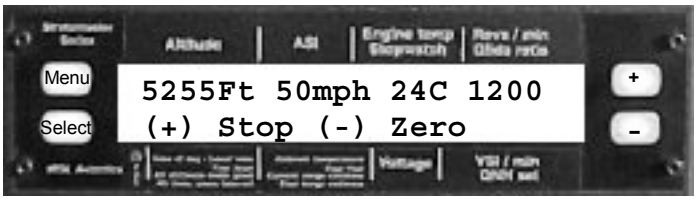
Step three: Press + Start



Step four: Press - to Zero

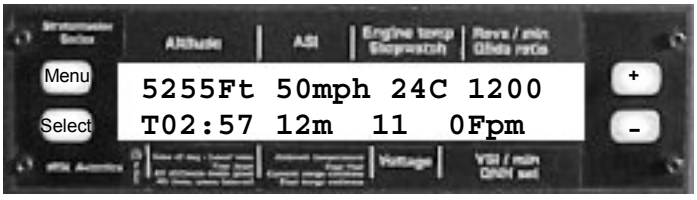


Step five: Press Select to confirm and exit



Deactivating the stopwatch

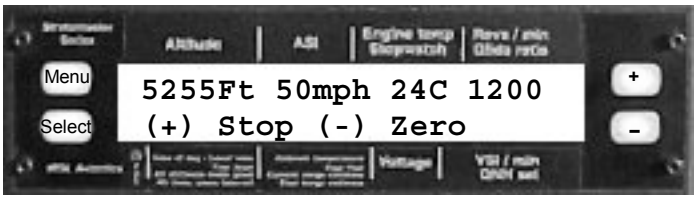
Step one: Press Menu



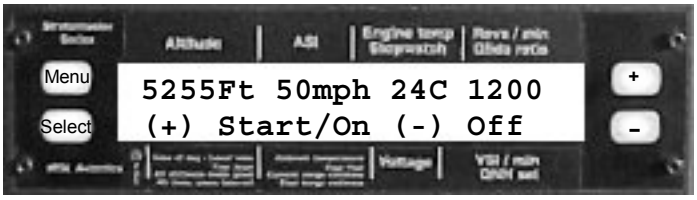
Step two: Press Select

(Note: Depending on your setup it might be necessary to press the plus once or twice before the wording Set stopwatch will appear).

Step three: Press + to stop



Step four: Press Select to confirm and exit

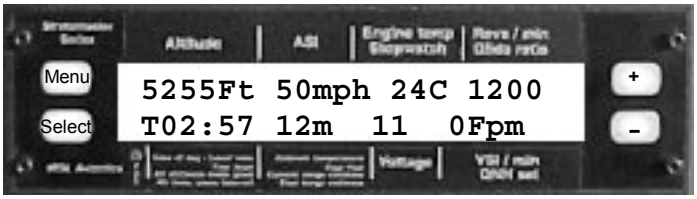


Method two:

Not clearing the stopwatch to zero and adding the time of the current leg on to the time already stored.

Activating the stopwatch

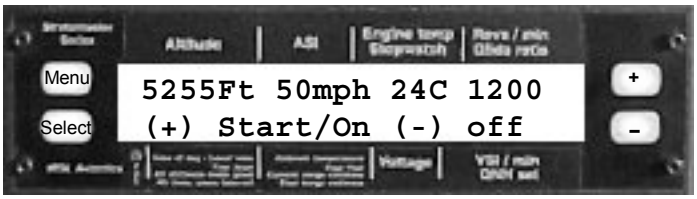
Step one: Press Menu



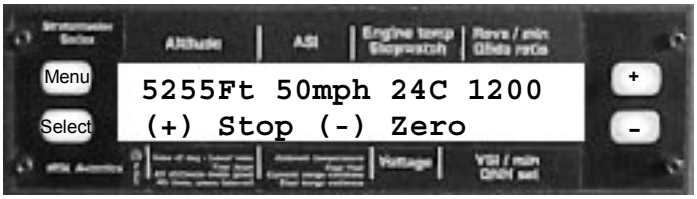
Step two: Press Select

(Note: Depending on your setup it might be necessary to press the plus once or twice before the wording Set stopwatch will appear).

Step three: Press + to start

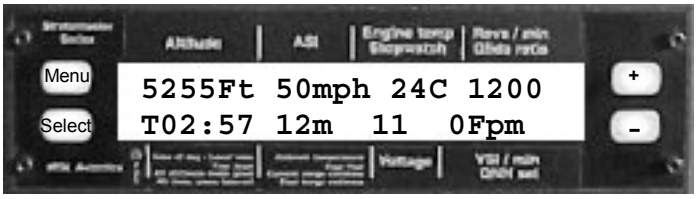


Step four: Press Select to confirm and exit



Deactivating the stopwatch

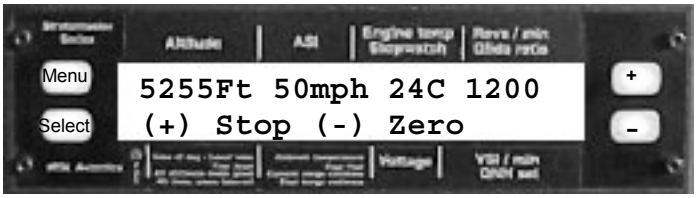
Step one: Press Menu



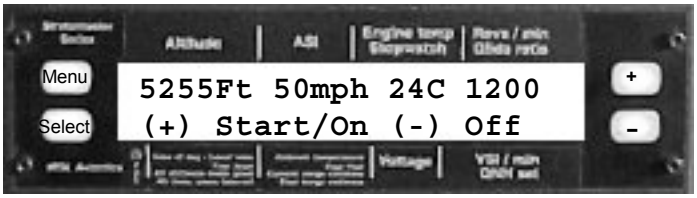
Step two: Press Select

(Note: Depending on your setup it might be necessary to press the plus once or twice before the wording Set stopwatch will appear).

Step three: Press + to stop



Step four: Press Select to confirm and exit



4.6 RPM (Revolutions per minute)

A maximum of 9999 RPM can be displayed.

The resolution in which RPM will be displayed is dependant upon the number of pulses per second generated by the ignition system (Refer 5.24 setup instructions) E.g. A Rotax engine with a Ducati ignition generates 6 pulses per second, which will result in RPM being displayed in a resolution of 20 revs. A Rotax engine with a points ignition generates 2 pulses per second which will result in RPM being displayed in a resolution of 60 revs.

RPM shares a display field with glide ratio. Should the conditions for displaying glide ratio apply (refer 4.7 below) then glide ratio will be displayed permanently. If the conditions for displaying glide ratio do not apply then RPM will be displayed permanently. The data is updated twice a second with any changes.

RPM shares a display field with climb ratio. Should the conditions for displaying climb ratio apply (refer 4.8 below) then RPM and climb ratio will alternate. If the conditions for displaying climb ratio do not apply then RPM will be displayed permanently. The data is updated twice a second with any changes.

4.7 Glide ratio

Glide ratio can be measured up to 1:99.

Glide ratio will only be displayed when the engine RPM drop below a predetermined level (Refer 5.27 setup instructions) in which case the glide ratio will be displayed permanently. The data is be updated twice a second with any changes.

Glide ratio is measured as a ratio between forward movement of the aircraft vs. vertical sink rate. Please note that the forward movement of the aircraft is not synonymous with horizontal forward movement relative to the earth surface but is a function of airspeed.

4.8 Climb ratio

Climb ratio can be measured up to 1:99.

Climb ratio will only be displayed if the option "show climb ratio" has been selected under climb ratio mode (Refer 5.15 setup instructions) and only if the VSI is greater than 200 ft per minute (3 meters per second). Climb ratio shares a display field with RPM and these two readings alternate. The data is be updated twice a second with any changes.

Climb ratio is measured as a ratio between forward movement of the aircraft vs. vertical climb rate. Please note that the forward movement of the aircraft is not synonymous with horizontal forward movement relative to the earth surface but is a function of airspeed.

4.9 QNH / QNE

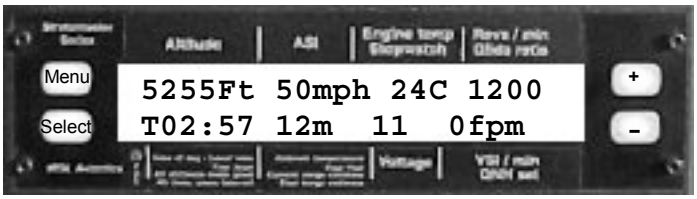
Qnh / Qne can be displayed in millibar or Inches of Mercury (Inch/Hg). (Refer 5.2 setup instructions).

Qnh can be measured between 960 - 1 060 millibar or 28.3 - 31.3 Inch/Hg.

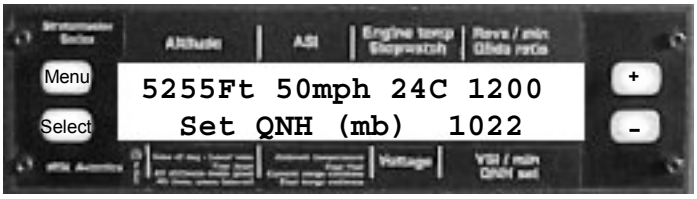
Qnh is displayed if either the + or the - is pressed while on the flight data display.

To change QNH:

Step one: Press either the + or the -



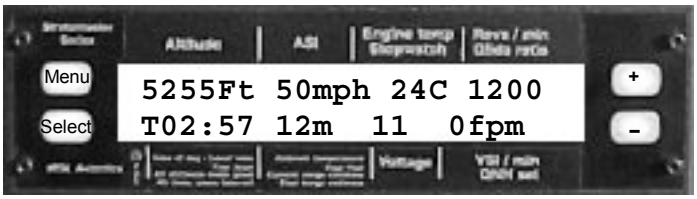
Step two: Press + to increase or - to decrease



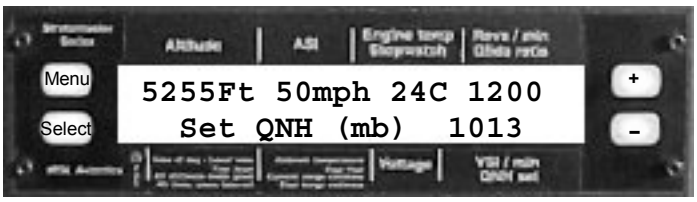
The Stratomaster Flight will return automatically to the flight data display.

To select QNE:

Step one: Press the + or the -



Step two: Press the + and the – simultaneously



The Stratomaster Flight will automatically set QNE at 1013.2 Millibar or 29.9 Inch/Hg.

The Stratomaster Flight will automatically return to the flight data display.

4.10 Time of day

Time is displayed as a 24 hour clock. Only hours and minutes are displayed.

Time of day shares a display field with fuel level, air distance made good and air time since take-off and these four readings alternate. Time of day is displayed when the clock symbol appears as the first item in the bottom row while in flight. Time of day further is displayed in a ground display whilst the aircraft is not in flight. The data is updated twice a second with any changes.

Time of day is often displayed as UTC or Greenwich time as it required by ATC. You may elect to set your time to local time if you prefer and do not operate within controlled airspace. The Stratomaster Flight ships with decals indicating either choice.

4.11 Air time since take-off

Flight time since take-off is displayed in hours and minutes.

Air time since take-off shares a display field with time of day, fuel level and air distance made good and these four readings alternate. Air time since take-off is displayed when the "T" appears as the first item in the bottom row. The data is updated twice a second with any changes.

Flight time is calculated from the time at which the engine RPM increases above a preset limit as determined by you (Refer 5.25 setup instructions), as well as from the time at which the airspeed increases to above 30 mph, 48 Kph or 26 Knots.

Flight time ends when the airspeed decreases to below 20 mph, 32 Kph or 17 Knots for longer than 30 seconds.

All flights longer than one minute will be logged.

Should your Stratomaster Flight be set to instructor mode then air time since take-off will display the time since the start of a lesson.

Should you set your instrument to manual flight detect mode and you are not using the instructor mode then the time displayed is the time since you started the flight manually.

4.12 Ambient temperature

Your aircraft must be equipped with an external temperature sensor to enable the Stratomaster Flight to display external ambient temperature. An external temperature sensor was included with your Stratomaster Flight at the time of purchase. This sensor should be installed (Refer installation manual). Should this sensor not be installed the

Stratomaster Flight can display the internal temperature within the instrument if you disable the "external temp sender" item in the Mode menu.

Ambient temperature can be displayed as either degrees Celsius or degrees Fahrenheit (Refer 5.5 setup instructions)

Ambient temperature is displayed in a resolution of 1 degree.

Ambient temperature shares a display field with fuel flow, current range estimate and fuel bingo estimate and these four readings alternate. Ambient temperature is displayed when the clock symbol appears as the first item in the bottom row. Ambient temperature is further displayed in one of the ground displays whilst the aircraft is not in flight. The data is updated twice a second with any changes.

4.13 Fuel level

To enable the Stratomaster Flight to calculate fuel level the aircraft must be equipped with either a fuel level sender or a fuel flow sender.

Fuel level can be displayed in liters, Imperial gallons or US gallons (Refer 5.4 setup instructions).

Fuel level shares a display field with Time of day, air distance made good and air time since take-off and these four readings alternate. Fuel level is displayed when the "F" appears as the first item in the bottom row while in flight. Fuel level is further displayed in a ground display while not in flight. The data is updated twice a second with any changes. Should the aircraft not be equipped with a fuel level sender or a fuel flow sender the display field will be blanked. (Refer 5.8 and 5.9 setup instructions).

Aircraft equipped with a fuel level sender

Should your aircraft be equipped with a fuel level sender the function to set the fuel level will not be available, as the Stratomaster Flight will obtain the fuel level directly from the fuel level sender.

The accuracy of the fuel level as displayed by the Stratomaster Flight is dependant on the accuracy of the calibration of the fuel level sender. It is therefore of extreme importance that the fuel level sender be calibrated accurately. (Refer 5.23 setup instructions).

The Stratomaster Flight should never be used as the sole determination of fuel level. A second determination of fuel level should be used as well e.g. visual reference to the aircraft's tank.

Aircraft equipped with a fuel flow sender

Should your aircraft be equipped with a fuel level sender the function to set the fuel level will not be available, as the Stratomaster Flight will obtain the fuel level directly from the fuel level sender. The message "Fuel flow disabled" will appear when the menu item set fuel level is selected.

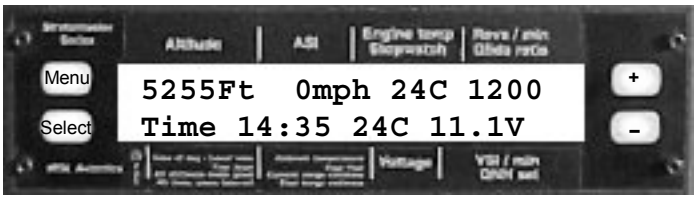
You can estimate the amount of fuel in the tank and enter this estimate. A maximum of 999 liters, 219 Imperial gallons or 263 US gallons can be entered. Fuel flow as

determined by the fuel flow sender will then be deducted from this original estimate. The Stratomaster Flight will display the estimated remaining fuel level.

The Stratomaster Flight should never be used as the sole determination of fuel level. A second determination of fuel level should be used as well e.g. visual reference to the aircraft's tank.

To set the estimated amount of fuel in the tank the following steps should be followed:

Step one: Press Menu

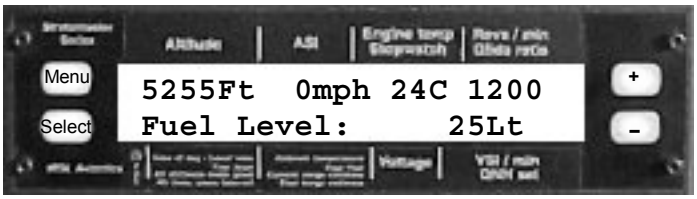


Step two: Press + until the following is displayed:

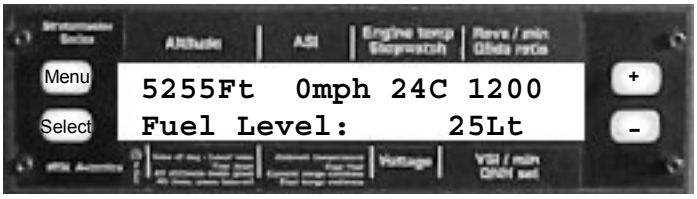
Step three: Press Select

Step four: Press + to change fuel level:

(Note: Should you wish to reset the fuel level to nil press the + and - simultaneously).



Step five: Press Select to confirm and exit



4.14 Fuel flow

To enable the Stratomaster Flight to calculate fuel flow the aircraft must be equipped with a fuel flow sender.

Fuel flow e.g. current fuel consumption can be displayed in liters, Imperial gallons or US gallons (Refer 5.4 setup instructions).

Fuel flow can be measured in a resolution of 0.1 Liters, 0.1 Imperial gallons or 0.1 U.S. gallons.

Fuel Flow shares a display field with ambient temperature, current range estimate and fuel bingo estimate and these four readings alternate. Fuel flow is displayed when the "F" appears as the first item in the bottom row. Fuel flow is further displayed in one of the ground displays while the aircraft is not in flight. The data is updated twice a second with any changes. Should the aircraft not be equipped with a fuel flow sender the display field will be blanked. (Refer 5.8 setup instructions).

We at MGL avionics recommend that you make use of the fuel flow functions available with the Stratomaster Flight instrument. The fuel flow sender is not supplied as standard with the instrument but is an optional item. Fuel flow is useful to calculate your aircraft's remaining fuel level, and using airspeed as a factor the unit is able to calculate your remaining range and fuel bingo time taking your current power settings into account. As this information is updated as you change your power and aircraft's speed you have a very valuable indication on your aircraft's fuel efficiency at various power settings.

In addition, we recommend that you include your fuel flow indication in your pre-flight take-off power checks (engine run up). You will soon learn your engine's fuel burn rate at various power settings. Should your engine or fuel system (such as the fuel pump) experience malfunction your fuel flow rate will most likely under or over-read, giving you an instant indication of possible trouble **BEFORE** you take-off.

The fuel burn rate can also be used to check for stuck chokes and fuel bypasses.
The Stratomaster Flight instrument can interface to a wide variety of fuel flow senders and you should be able to locate a unit that can be used with your aircraft.

While not an aviation certified unit, we can recommend the RS 256-225 liquid flow sender. We have used this sender extensively and have had very good experience with it over a number of years.

Please check the relevant rules and regulations pertaining to aircraft parts and fittings in your country to ensure which fuel flow senders you are permitted to use.

4.15 Current range estimate

To enable the Stratomaster Flight to calculate the current range estimate the aircraft must be equipped with a fuel flow sender.

Current range estimate can be displayed in kilometers, miles or nautical miles (Refer 5.3 setup instructions).

Current range estimate shares a display field with ambient temperature, fuel flow and fuel bingo estimate and these four readings alternate. Current range estimate is displayed when the "D" appears as the first item on the bottom row. The data is updated twice a second with any changes. Should the aircraft not be equipped with a fuel flow sender the display field will be blanked. (Refer 5.8 setup instructions).

Current range is calculated by taking in to account the current true airspeed, fuel flow and the calculated remaining fuel level i.e. remaining fuel excluding fuel reserve, if any. (Refer 5.23 setup instructions). Should any of these factors change the current range estimate will change.

The accuracy of the current range estimate as displayed by the Stratomaster Flight is dependant on the accuracy of the calibration of the fuel level sender. It is therefore important that the fuel level sender be calibrated accurately. (Refer 5.23 setup instructions).

The Stratomaster Flight should never be used as the sole determination of range. Pilots should calculate their own range estimates taking all known factors, including weather and airspace regulations into account.

4.16 Fuel bingo estimate

To enable the Stratomaster Flight to calculate fuel bingo estimate the aircraft must be equipped with a fuel flow sender.

Fuel bingo estimate is the calculated remaining time until the fuel runs out in hours and minutes. Should you have opted for a fuel reserve when calibrating the fuel tank this fuel

reserve will be excluded from the fuel bingo estimate calculation. (Refer 5.23 setup instructions).

Fuel bingo estimate shares a display field with ambient temperature, fuel flow and current range estimate and these four readings alternate. Fuel bingo estimate is displayed when the "T" appears as the first item in the bottom row. The data is updated twice a second with any changes. Fuel bingo estimate is always displayed as hours and minutes irrespective of the setup selected under hour fraction mode.

Should the aircraft not be equipped with a fuel flow sender the display field will be blanked (Refer 5.8 setup instructions).

The accuracy of the fuel bingo estimate as displayed by the Stratomaster Flight is dependant on the accuracy of the calibration of the fuel level sender. It is therefore important that the fuel level sender be calibrated accurately. (Refer 5.23 setup instructions).

The Stratomaster Flight should never be used as the sole determination of the fuel bingo estimate. A second determination of fuel bingo estimate should be used as well e.g. visual reference to the aircraft's tank.

4.17 Air distance made good

Air distance can be displayed either in kilometers, miles or nautical miles (Refer 5.3 setup instructions).

Air distance made good shares a display field with Time of day, fuel level and air time since take-off and these four readings alternate. Air distance made good is displayed when the "D" appears as the first item in the bottom row. The data is updated twice a second with any changes. If preferred the Stratomaster Flight can be setup not to display air distance made good while in flight. (Refer 5.14 setup instructions). Air distance made good will still be displayed while the aircraft is not in flight.

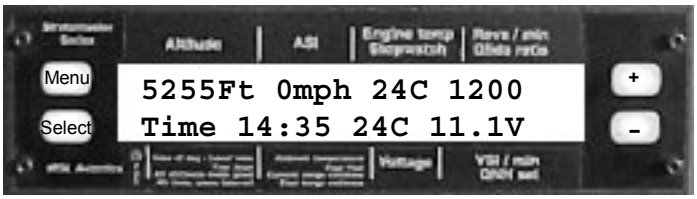
Air distance is calculated taking in to account true airspeed and time since take-off.

The Stratomaster Flight can be setup to either automatically reset air distance to zero at the beginning of a flight or you can manually decide when you want to reset air distance to zero. (Refer 5.13 setup instructions).

The steps for manually resetting air distance are:

(Note: Air distance can be reset at any time during flight irrespective of whether set to manual or automatic resetting (Refer 5.13 setup instructions).

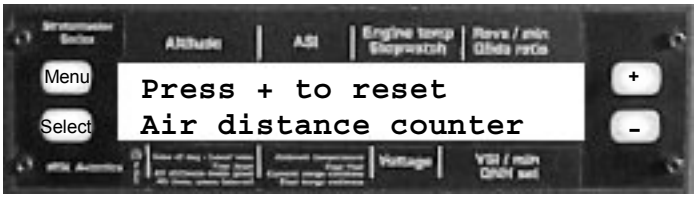
Step one: Press Menu



Step two: Press the + until the following appears

Step three: Press Select

Step four: Press the + to reset and exit



Should you at this point wish not to reset the air distance counter press any key other than the plus. The Stratomaster Flight will then exit from this menu without resetting the air distance counter.

4.18 Voltage

Voltage as indicated is the voltage supplied to the Stratomaster Flight instrument.

Voltage (without any decimal places) is displayed permanently during flight. The voltage shown is rounded to the nearest integer. For example 12.5 volts is shown as "13" while 12.4 is shown as "12". Voltage with one decimal place is displayed in one of the ground menus while not in flight. The data is updated twice a second with any changes.

The minimum voltage required for the Stratomaster Flight to operate is 7 Volts. The instrument will function at lower than 7 Volts but this is not recommended, as the accuracy of certain readings can be affected as well at the brightness of the display.

The main purpose of the voltage reading is to enable the pilot to verify the charging of the aircraft's battery system.

Most light aircraft such as microlights and ultralights are fitted with a lead-acid battery, such as used on motorcycles or sealed lead-acid batteries such as used in many stand-by power supplies.

These batteries are fully charged when the charging current reaches zero while the charging voltage is held at 13.8 volts. Unfortunately many regulators do a poor job of holding that voltage at 13.8 volts and typically allow the voltage to rise above 14 or even 15 volts. This is often compounded by the input voltage to the regulator which may rise if your apply full engine power. The effect of too high charging voltage is overcharging of your expensive battery. This greatly reduces the lifetime of your battery.

Charging voltages below 13.8 volts will result in under-charging of your battery. This is not as serious as over-charging but may lead to poor cranking performance if you use the battery to power a starter motor.

4.19 VSI/min (Vertical speed indicator)

VSI can be displayed in feet per minute (fpm) or meters per second (mps). The altitude setup e.g. feet or meters will determine which is used.

VSI can be displayed to a maximum of 9 990 fpm or 50.7 mps.

VSI/min is displayed permanently while in flight, excluding manual QNH setting.

The VSI has been given a dead-band of +\- 20 ft (range where the instrument will read zero – 0 ft/min). Resolution is 10 ft/min.

The VSI is a very sensitive and fast reacting instrument. It does not have the lag typically found with conventional instruments. It can be used by the skilled flyer to locate thermals.

4.20 Flight log or Lesson log

Perhaps on of the most useful features of the Stratomaster Flight instrument is the ability to record a flight log. Using on of several methods, the Stratomaster Flight will record flight details suitable for entry into a flight and engine log.

You can setup your Stratomaster Flight to record a log entry in one of the following ways:

1. Automatic flight log. This will automatically detect the start of a flight and end of a flight. The unit uses engine revs in combination with airspeed to detect a flight. This is the way most pilots prefer to operate the Stratomaster Flight.
2. Manual flight log. In this case the pilot manually starts a flight and ends it. This mode is used mainly if no rev counter input to the instrument is available.
3. Instructor mode. In this case the log is used to record "lessons" rather than "flights". A lesson is started by the instructor and lesson time is accumulated according to the instruments lesson mode setup. A single lesson may consist of more than one flight.

The Stratomaster Flight will log all flights/lessons of longer than one minute. Any lessons or flights with less than one minute accumulated time are not stored in the log.

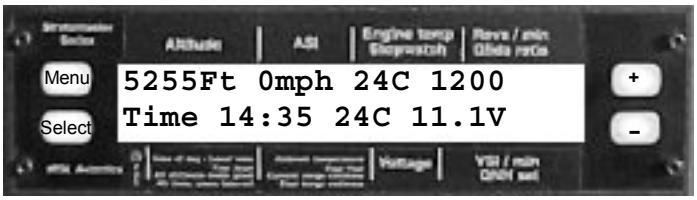
The Stratomaster Flight will store the last 236 to 240 flights or lessons in the log.
The log can be viewed at any time. Please also note that the log may be downloaded to a PC using a direct cable connection or key-ring download device (optional extras).

The following information pertaining to a flight/lesson will be logged:

- Date (DD/MM) of take-off
- Take-off time or Lesson Start time.
- Flight or Lesson time. Displayed in either hours and minutes or hours and fraction of hours depending on setup.
- Highest altitude reached (In ft or meters depending on setup)
- Maximum airspeed obtained. Displayed airspeed depends on whether ASI or TAS is selected. (Displayed in kilometers, miles or nautical miles depending on setup).
- Hobbs meter reading at end of flight/lesson (Displayed in either hours and minutes or hours and fraction of hours depending on setup)
- Student number (Instructor mode only)

The steps for viewing the flight log/lesson log are:

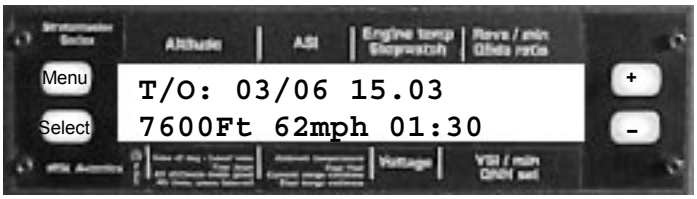
Step one: Press Menu



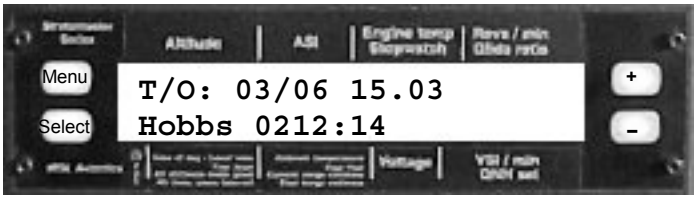
Step two: Press + until the following is displayed

Step three: Press Select

Step four: Press + or - to scroll through the flight log



Step five: Press Select to exit



Flight log examples

Definition start of flight: The point in time when engine RPM increases above a preset limit as determined by you (Refer 5.25 setup instructions), as well as from the time at which the airspeed increases to above 30 mph, 48 Kph or 26 Knots.

Definition end of flight: The point in time when the airspeed decreases to below 20 mph, 32 Kph or 17 Knots for longer than 30 seconds.

Example one:

Stratomaster Flight setup:

Instructor mode:	Normal
Flight detect mode:	Automatic
Hour fraction mode:	Hour has minutes
Altitude	Feet
Distance	Miles
Airspeed	ASI

Time of day	Action
13h06	Increase revs to higher than hobbs revs
13h08	Increase revs to higher than take-off revs
13h09	Airspeed as per start of flight definition
13h29	Airspeed as per end of flight definition

Log results:

T/O 05/07 13:09
4636Ft 183mph 00:21
Hobbs 0155:51

Day/Month Take-off time as per start of flight definition
Highest altitude Highest airspeed Duration of flight
Hobbs reading at end of flight

(Note: Take-off revs only determines the start of the flight. Revs for the remainder of the flight are not taken into account).

Example two:

Stratomaster Flight setup:

Instructor mode:	Normal
Flight detect mode:	Automatic
Hour fraction mode:	Hour has decimals
Altitude	Feet
Distance	Miles
Airspeed	ASI

Time of day	Action
13h06	Increase revs to higher than hobbs revs
13h08	Increase revs to higher than take-off revs

13h09 Airspeed as per start of flight definition
13h29 Airspeed as per end of flight definition

Log results:

T/O 05/07 13:09
4636Ft 183mph 00.35
Hobbs 0155.85

Day/Month Take-off time as per start of flight definition
Highest altitude Highest airspeed Duration of flight
Hobbs reading at end of flight

(Note: Take-off revs only determines the start of the flight. Revs for the remainder of the flight are not taken into account).

Example three:

Stratomaster Flight setup:

Instructor mode:	Normal
Flight detect mode:	Manual
Hour fraction mode:	Hour has minutes
Altitude	Feet
Distance	Miles
Airspeed	ASI

Time of day Action

12h36 ` Manual input - Start new flight
12h37 Increase revs to higher than hobbs revs
12h41 Increase revs to higher than take-off revs
12h42 Airspeed as per start of flight definition
12h55 Airspeed as per end of flight definition
13h00 Manual input - End current flight
Log results:

T/O 05/07 12:36
4636Ft 183mph 00:23
Hobbs 0155:21

Day/Month Take-off time as per start of flight definition
Highest altitude Highest airspeed Duration of flight
Hobbs reading at end of flight

(Note: Flight time calculated from manual starting of flight to manual ending of flight).

Lesson Log Examples

Definition: Start of lesson. Such time as the engine revs increases above either hobbs or take-off revs (Refer 5.17 setup instructions).

Definition: Lesson time. Lesson time accumulates if engine revs are above hobbs revs or if the aircraft is in flight.

A lesson ends when the "End current lesson" menu item is selected. At this point in time the lesson details are written to the log.

Example one:

Stratomaster Flight setup:

Instructor mode:	Instructor
Flight detect mode:	Automatic
Hour fraction mode:	Hour has minutes
Lesson timer mode	Hobbs revs
Altitude	Feet
Distance	Miles
Airspeed	ASI

Time of day/Action

16h17	Manual input - Start new lesson	(P Flashing)
16h19	Increase revs to higher than hobbs revs (A Flashing)	
16h22	Increase revs to higher than take-off revs (A Flashing)	
16h25	Airspeed as per start of flight definition	
16h31	Decrease revs to lower than take-off revs	
16h37	Decrease revs to lower than hobbs revs	
16h40	Airspeed as per end of flight definition (A Flashing)	
16h45	Manual input - End current lesson	
	Student number: 1	

Log results:

T/O 05/07	16:19	
4626Ft	166mph	00:21
Hobbs 0155:21	St 1	

Day/Month	Time -Start of lesson	
Highest altitude	Highest airspeed	Duration of lesson
Hobbs reading	Student number	

(Note: Lesson time calculated from higher than hobbs revs to airspeed as per end of flight definition e.g. 16h19 - 16h40).

Flashing P = Lesson has been primed
Flashing A = Lesson has been activated

Example two:

Stratomaster Flight setup:

Instructor mode:	Instructor
Flight detect mode:	Automatic
Hour fraction mode:	Hour has decimals
Lesson timer mode	Hobbs revs
Altitude	Feet

Distance	Miles
Airspeed	ASI

Time of day/Action

16h17	Manual input - Start new lesson (P Flashing)
16h19	Increase revs to higher than hobbs revs (A Flashing)
16h22	Increase revs to higher than take-off revs (A Flashing)
16h25	Airspeed as per start of flight definition
16h31	Decrease revs to lower than take-off revs
16h37	Decrease revs to lower than hobbs revs
16h40	Airspeed as per end of flight definition (A Flashing)
16h45	Manual input - End current lesson
	Student number: 1

Log results:

T/O 05/07	16:19	
4626Ft	166mph	00.35
Hobbs 0155:35	St 1	

Day/Month	Time – Start of lesson	
Highest altitude	Highest airspeed	Duration of lesson
Hobbs reading	Student number	

(Note: Lesson time calculated from higher than hobbs revs to airspeed as per end of flight definition e.g. 16h19 - 16h40).

Flashing P = Lesson has been primed
Flashing A = Lesson has been activated

Example three:

Stratomaster Flight setup:

Instructor mode:	Instructor
Flight detect mode:	Automatic
Hour fraction mode:	Hour has minutes
Lesson timer mode	Take-off revs
Altitude	Feet
Distance	Miles
Airspeed	ASI

Time of day/Action

16h55	Manual input - Start new lesson (P Flashing)
17h00	Increase revs to higher than hobbs revs (P Flashing)
17h03	Increase revs to higher than take-off revs (A Flashing)
17h04	Airspeed as per start of flight definition
17h11	Decrease revs to lower than take-off revs
17h14	Decrease revs to lower than hobbs revs
17h16	Airspeed as per end of flight definition (A Flashing)
17h20	Manual input - End current lesson
	Student number: 2

Log results:

T/O 05/07	17:03	
4583Ft	200mph	00:13
Hobbs 0159:08	St 2	

Day/Month	Time - Start of lesson	
Highest altitude	Highest speed	Duration of lesson
Hobbs reading	Student number	

(Note: Lesson time calculated from higher than take-off revs to airspeed as per end of flight definition e.g. 17h03 - 17h16).

Flashing P = Lesson has been primed
Flashing A = Lesson has been activated

Example four:

Stratomaster Flight setup:

Instructor mode:	Instructor
Flight detect mode:	Manual
Hour fraction mode:	Hour has minutes
Lesson timer mode	Hobbs revs
Altitude	Feet
Distance	Miles
Airspeed	ASI

Time of day/Action

17h26	Manual input - Start new flight
17h29	Manual input - Start new lesson
17h31	Increase revs to higher than hobbs revs
17h36	Increase revs to higher than take-off revs
17h38	Airspeed as per start of flight definition
17h45	Decrease revs to lower than take-off revs
17h52	Decrease revs to lower than hobbs revs
17h56	Airspeed as per end of flight definition (A Flashing)
17h58	Manual input - End current flight
18h00	Manual input - End current lesson
	Student number: 3

Log results:

T/O 05/07	17:31	
4572Ft	82mph	00:27
Hobbs 0159:29	St 3	

Day/Month	Time – Start of lesson	
Highest altitude	Highest airspeed	Duration of lesson
Hobbs reading	Student number	

(Note: Lesson time calculated from higher than hobbs revs to manual ending of flight i.e. 17h31 - 17h58).

Flashing P = Lesson has been primed
Flashing A = Lesson has been activated

Example five:

Stratomaster Flight setup:

Instructor mode:	Instructor
Flight detect mode:	Manual
Hour fraction mode:	Hour has minutes
Lesson timer mode	Take-off revs
Altitude	Feet
Distance	Miles
Airspeed	ASI

Time of day/Action

19h06	Manual input - Start new flight
19h16	Manual input - Start new lesson
19h19	Increase revs to higher than hobbs revs
19h24	Increase revs to higher than take-off revs
19h25	Airspeed as per start of flight definition
19h30	Decrease revs to lower than take-off revs
19h37	Decrease revs to lower than hobbs revs
19h40	Airspeed as per end of flight definition
19h42	Manual input - End current lesson
	Student number: 5

(Note: Ending a lesson automatically ends the flight)

Log results:

T/O 05/07	19:24	
4557Ft	200mph	00:18
Hobbs 0160:17	St 5	

Day/Month	Time – Start of lesson	
Highest altitude	Highest airspeed	Duration of lesson
Hobbs reading	Student number	

(Note: Flight time calculated from higher than take-off revs to manual ending of lesson e.g. 19h24 - 19h42).

Example six:

Stratomaster Flight setup:

Instructor mode:	Instructor
Flight detect mode:	Manual
Hour fraction mode:	Hour has minutes
Lesson timer mode	Take-off revs
Altitude	Feet
Distance	Miles
Airspeed	ASI

Time of day/Action
16h32 Manual input - Start new flight
16h34 Manual input - Start new lesson
16h37 Increase revs to higher than hobbs revs
16h39 Increase revs to higher than take-off revs
16h40 Airspeed as per start of flight definition
16h45 Decrease revs to lower than take-off revs
16h53 Decrease revs to lower than hobbs revs
16h56 Airspeed as per end of flight definition
16h59 Manual input - End current flight
17h02 Manual input - End current lesson
Student number: 6

Log results:

T/O 06/07 16:39
Ft4859Ft 85mph 00:19
Hobbs 0163:41 St 6

Day/Month Time – Start of lesson
Highest altitude Highest airspeed Duration of lesson
Hobbs reading Student number

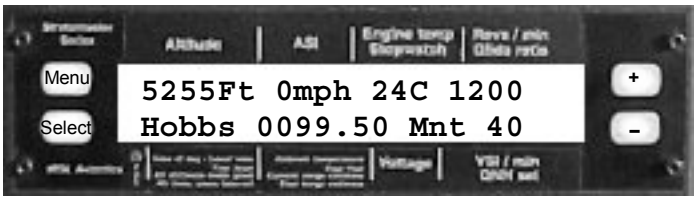
(Note: Flight time calculated from higher than take-off revs to manual input end of flight e.g. 16h39 - 16h59).

4.21 Hobbs meter

Total engine running time is reflected as hours and minutes or as hours and fraction of hours depending on setup (Refer 5.10 setup instructions).

Operation of the hobbs meter requires a rev counter input to the unit.

Total engine running time is only displayed whilst the aircraft is not in flight. This field is displayed automatically.



Engine running time will only be added on to the hobbs meter when the RPM's are higher than a predetermined RPM . (Refer 5.26 setup instructions). Hobbs revs can be entered in increments of 100 from 100 to 9900 RPM.

The Stratomaster Flight allows for an opening number of engine hours to be entered e.g. where the instrument is installed on an existing aircraft. (Refer 5.29 setup instructions).

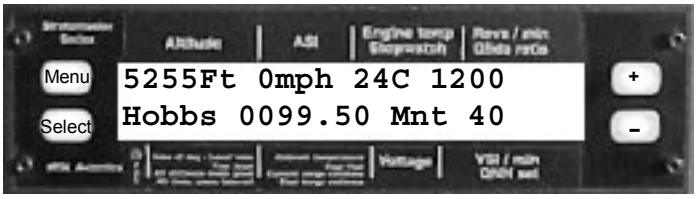
The Stratomaster Flight allows for the engine hours to be cleared e.g. where a new engine is installed. (Refer 5.29 setup instructions).

4.22 Maintenance timer

The purpose of this function is to assist you in determining remaining hours until maintenance will be required. It is not intended as a replacement for the aircraft's maintenance log. It is therefore important that the aircraft's maintenance log be maintained in the normal manner. You should further use your own discretion in performing maintenance earlier than indicated should any aircraft performance problems arise.

A maximum of 250 hours can be entered as a maintenance interval. The Stratomaster Flight will deduct actual engine running time from the maintenance interval hours as set and will display the remaining hours until maintenance will be required. Engine running time for the purpose of the maintenance timer is defined as the run time where the engine RPM is greater than the preset RPM for the hobbs meter. (Refer 5.26 setup instructions).

Remaining maintenance hours are only displayed whilst the aircraft is not in flight.



Remaining maintenance hours are displayed automatically.

4.23 Density altimeter

Density altitude is a perceived altitude that pertains to your current altitude and temperature (and to a lessor extent on your current moisture content of the air). Density altitude is relevant for performance calculations of your aircraft. Density altitude affects the performance of your engine, propeller and airfoils. The most noticeable affects of density altitude are length of take-off and landing runs and the ability of your aircraft to carry weight.

There are several methods to calculate density altitude, all result in readings that are very close to each other. We decided to implement a popular formulae that is often used by pilots to calculate density altitude at their location.

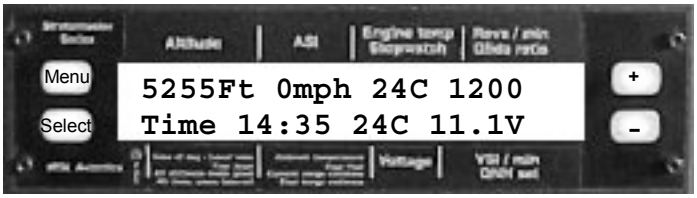
Da = Density altitude
Pa = Pressure altitude
T = ambient temperature in degrees C

Da = Pa+118.6 * (T+0.85)

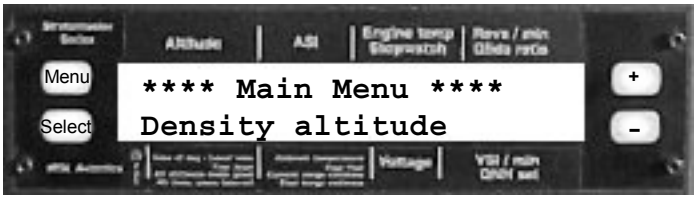
Density altitude can be displayed in feet (ft) or meters (m). (Refer 5.1 setup instructions). Density altitude is displayed in a resolution of 1 ft or 1 m. Density altitude can be displayed either during flight or on the ground.

Density altitude is not displayed automatically. The steps for displaying density altitude are:

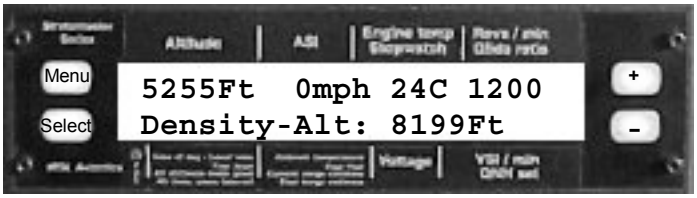
Step one: Press Menu



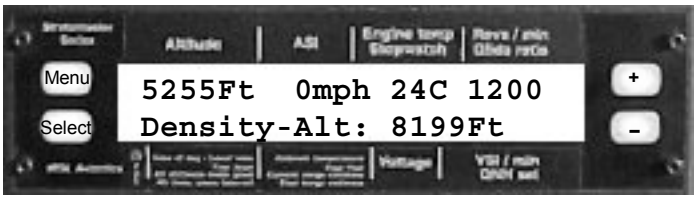
Step two: Press the + until the following is displayed



Step three: Press Select



Step four: Press Select to exit



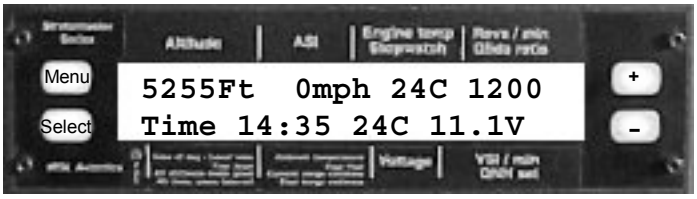
4.24 Barometer function - Ambient pressure

Ambient pressure can be displayed in either millibar or Inches of Mercury (Inch/Hg). The setup for QNH will determine which.

If you intend using the Stratomaster Flight instrument barometer function as a manometer to measure pressure in non-aviation related applications, please observe maximum pressure limitations to prevent permanent damage to the instrument. Never pressurize the static port above 2 bars absolute. Observe maximum pressure differential between static and pitot tube ports. Media compatibility is limited to materials compatible with silicon, flourosilicon and polyester.

Ambient pressure is not displayed automatically. The steps for displaying ambient pressure are:

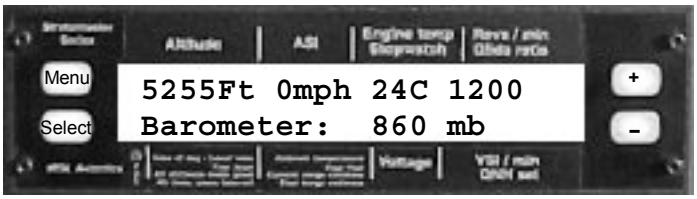
Step one: Press Menu



Step two: Press the + until the following is displayed

Step three: Press Select

Step four: Press Select to exit



Please note: The display of your local ambient pressure may differ greatly from the QNH setting you may receive from your local airfield. The airfield will give you an altimeter correction figure, the QNH that is based on sea level pressure at "standard atmospheric conditions". The Stratomaster Barometer gives you a direct, accurate readout of the actual air pressure surrounding the instrument.

For example, Johannesburg - South Africa is at an altitude of just over 5000 ft (1 524 m) resulting in an air pressure that is about 20% less than you would expect at sea level. As a result you can expect displays like the above example in Johannesburg.

The barometer function is useful to track changes in your local weather. You can get advanced warnings of approaching cold fronts (low pressure systems).

The barometer can also be used in a laboratory environment to measure pressures. In this case be sure not to exceed the instruments maximum pressure rating of about 1250 mb (36.9 Inch/Hg). The unit may be used to measure pressures down to about 150 mb (4.4 Inch/Hg).

4.25 Aircraft registration number

The Stratomaster Flight makes 6 digits available for entering the aircraft registration number (Refer 5.31 setup instructions).

The Aircraft registration number will only be displayed at the time the instrument is switched on.

The registration number or other text you might enter in this field is used to personalize and identify your instrument. It is used with the key ring download device if you operate multiple aircraft and would like your log to operate accordingly.

4.26 Altitude alarm

The Stratomaster Flight will warm you once your aircraft's altitude exceeds a predetermined level. (Refer 5.32 setup instructions) by flashing the altitude display field. The altitude will remain flashing until the aircraft descend below the predetermined altitude.

Altitude alarms can be set in increments of 500 ft (152.4m) to a maximum of 60 000 ft (18 287 m). When setting the alarm all factors should be taken into account. It is the pilot's responsibility to ensure that the alarm is correctly set prior to take-off.

The altitude alarm can be switched off should you wish not to make use of this function. (Refer 5.32 setup instructions).

An active alarm will result in the Stratomaster Flight alarm output switching at a rate of once per second. This is normally used to switch a warning lamp or indicator in the cockpit. The indicator will flash until the alarm has been acknowledged or the alarm condition no longer exists. To acknowledge the alarm, press any key. This will switch off the alarm indicator but the display field will continue flashing until the alarm condition no longer exists.

4.27 Temperature alarm

The Stratomaster Flight will warm you once your aircraft's engine temperature exceeds a predetermined level (Refer 5.33 setup instructions) by flashing the engine temp display field. The engine temperature will remain flashing until the aircraft's engine temperature drops to below the predetermined temperature.

Temperature alarms can be set in increments of 1degree Celsius (1.8 degrees Fahrenheit) between the ranges of 50 degrees Celsius (122 degrees Fahrenheit) and 99 degrees Celsius (210 degrees Fahrenheit). When setting the alarm factors such as engine type etc. should be taken into account. It is the pilot's responsibility to ensure that the alarm is correctly set prior to take-off.

The temperature alarm can be switched off should you not wish to make use of this function. (Refer 5.33 setup instructions).

An active alarm will result in the Stratomaster Flight alarm output switching at a rate of once per second. This is normally used to switch a warning lamp or indicator in the cockpit. The indicator will flash until the alarm has been acknowledged or the alarm condition no longer exists. To acknowledge the alarm, press any key. This will switch off the alarm indicator but the display field will continue flashing until the alarm condition no longer exists.

4.28 Speed low alarm

The Stratomaster Flight will warm you once your aircraft's airspeed falls below a predetermined level (Refer 5.34 setup instructions) by flashing the ASI (TAS) display field. This display field will remain flashing until the aircraft's speed increases to above the predetermined speed. When landing the speed low alarm will also flash but only for as long as the aircraft is deemed to be in flight e.g. for 30 seconds. (Definition of in flight:

When the airspeed decreases to below 20 mph, 32 kph or 17 Knots for longer than 30 seconds).

Speed alarms can be set in increments of 1 mile, 1 knot or 1 kilometer. The minimum speed, which can be entered is 20 mph, 32 kph or 17 Knots and the maximum speed which can be entered is 120 mph, 193 kph or 104 knots. When setting the alarm factors such as aircraft type etc. should be taken into account. It is the pilot's responsibility to ensure that the alarm is correctly set prior to take-off.

The speed low alarm can be switched off should you not wish to make use of this function. (Refer 5.34 setup instructions).

An active alarm will result in the Stratomaster Flight alarm output switching at a rate of once per second. This is normally used to switch a warning lamp or indicator in the cockpit. The indicator will flash until the alarm has been acknowledged or the alarm condition no longer exists. To acknowledge the alarm, press any key. This will switch off the alarm indicator but the display field will continue flashing until the alarm condition no longer exists.

4.29 Speed high alarm (Over speeding alarm)

The Stratomaster Flight will warm you once your aircraft's airspeed increases above a predetermined level (Refer 5.35 setup instructions) by flashing the ASI (TAS) display field. This display field will remain flashing until the aircraft's speed decreases to below the predetermined speed.

Speed alarms can be set in increments of 1 mile, 1 knot or 1 kilometer. The lowest speed, which can be entered is 30 mph (48 Kph or 26 knots) and the highest speed which can be entered is 250 mph (402 Kph or 217 Knots). When setting the alarm factors such as aircraft type etc. should be taken into account. It is the pilot's responsibility to ensure that the alarm is correctly set prior to take-off.

The speed high alarm can be switched off should you not wish to make use of this function. (Refer 5.35 setup instructions).

An active alarm will result in the Stratomaster Flight alarm output switching at a rate of once per second. This is normally used to switch a warning lamp or indicator in the cockpit. The indicator will flash until the alarm has been acknowledged or the alarm condition no longer exists. To acknowledge the alarm, press any key. This will switch off the alarm indicator but the display field will continue flashing until the alarm condition no longer exists.

4.30 Fuel low alarm

Fuel low alarm is only available is your aircraft is equipped with a fuel flow sender or fuel level sender.

The Stratomaster Flight will warm you once your aircraft's fuel level falls below a predetermined level (Refer 5.36 setup instructions) by flashing the wording "Fuel level low" across the bottom row of the display every eight seconds for eight seconds. This display field will remain flashing and it is not possible to acknowledge the alarm.

Fuel low alarms can be set in increments of 1 liter, 0.2 Imperial gallons or 0.2 US gallons. The highest fuel level, which can be entered is 250 liters (54.9 Imperial gallons or 65.9 US Gallons). When setting the alarm factors such as engine type etc. should be taken into account. It is the pilot's responsibility to ensure that the alarm is correctly set prior to take-off.

The fuel low alarm can be switched off should you not wish to make use of this function. (Refer 5.36 setup instructions).

Should your aircraft not be equipped with either a fuel low sender or a fuel level sender then the fuel low alarm should be switched off to prevent the fuel low alarm from flashing during flight.

4.31 Instructor mode

The Stratomaster Flight can be set to either instructor mode or normal mode. (Refer 5.16 setup instructions) When set to instructor mode it enables instructors to time and log lessons instead of flights. A lesson could consist of multiple flights. Provision is further made for a student number, thus by viewing the log the student who flew the lesson can be identified. A maximum of 250 student numbers can be entered.

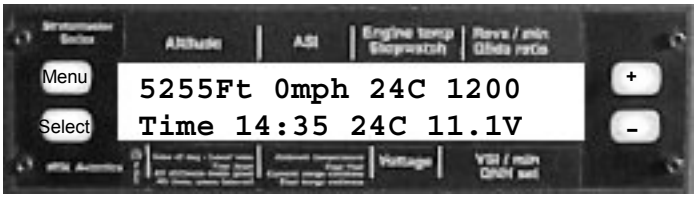
Air time since take-off field shall now display lesson time.

A lesson will have to be started and ended manually. Should the letter "P" flash in the ASI field this indicates that a lesson has been primed. Should the letter "A" flash in the ASI field this indicates that a lesson has been activated. Should your Stratomaster Flight be set to manual detection of flight and the flight be started manually before a lesson is started then no flashing A or P will appear.

Primed: Lesson has started but no time has accumulated yet. The instrument is now waiting for revs to reach hobbs revs or take-off revs depending on setup.
Active: Conditions for starting time accumulation has been met. Time is now accumulating if revs are higher than hobbs revs setting.

The steps for starting a lesson are:

Step one: Press Menu

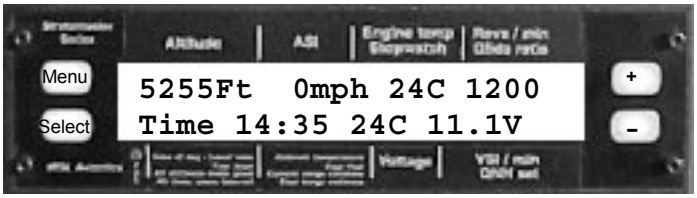


Step two: Press the + until the following is displayed

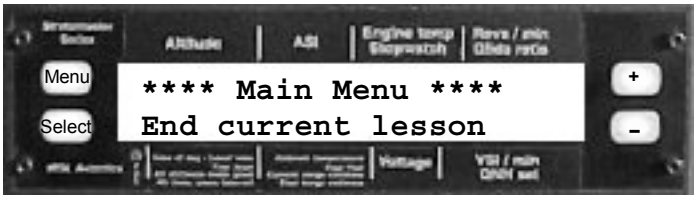
Step three: Press Select to start the lesson and to exit

The steps for ending a lesson are:

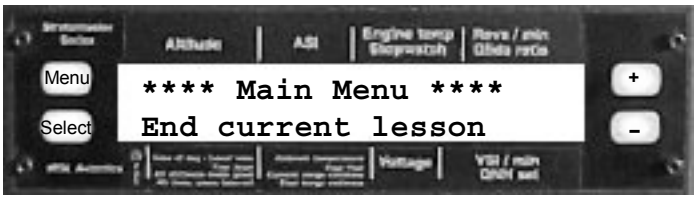
Step one: Press Menu



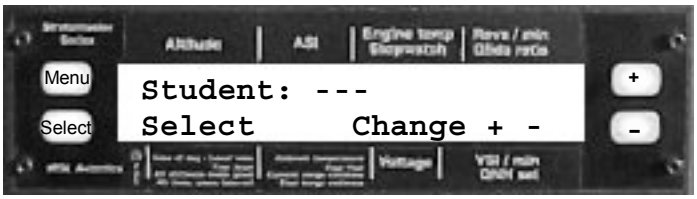
Step two: Press the + until the following is displayed



Step three: Press Select to end the lesson



Step four: Press plus or minus to change. Press Select to exit.



(Note: Student number can be from 1 - 250. Should you not wish to enter a student number press select without a number being entered).

Student numbers are relevant for the lesson accounting software available for the Stratomaster Flight. Should you not enter a student number, the lesson is deemed not chargeable to a student. You might use this to log demonstration or check flights etc.

4.32 Lesson timer mode

This function allows instructors to determine the starting point of a lesson e.g. the start up of the engine or the take-off.

Should an instructor prefers the starting point of a lesson to be the start up of the engine then hobbs revs should be selected. If an instructor prefers the starting point of a lesson to be the take-off then take-off revs should be selected. In this case a lesson would typically start with the engine run up. (Refer 5.17 setup instructions).

4.33 Master or slave

Your aircraft can be equipped with two Stratomaster Flight instruments, which may be interconnected using the Air-Talk link. In such a case it would be necessary to determine which Stratomaster Flight is the Master (Primary) instrument and which Stratomaster Flight is the Slave (Secondary) instrument. At such time, when the slave instrument is switched on, it will obtain the QNH from the master instrument. This is the only difference between the master and slave instruments. The slave instrument is a fully functional instrument in all aspects. (Refer 5.18 Setup instructions)

Please see installation manual for details on sensor connections for two instruments. Please note here that it is not possible to reliably connect a fuel level sender to two instruments simultaneously. You should setup at least one of the two instruments to calculate fuel remaining from a fuel flow sender.

4.34 Take-off distance

The Stratomaster Flight contains a semi-automatic take-off distance measuring mode. This is the distance traveled through the air from the point at which a minimum speed of 16 mph (26 Kph or 14 Knots) is reached to the aircraft gaining 50 ft of altitude (15.24 m). The result is shown in meters regardless of any mode setups. Pilots should familiarize themselves with the term air distance.

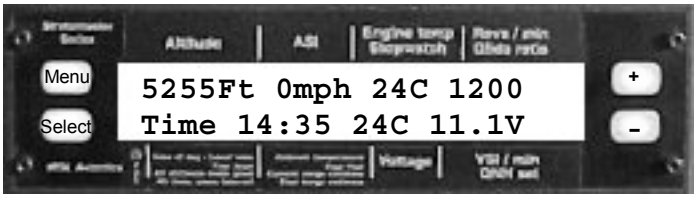
Please note that take-off distance is dependant of many factors such as weight of the aircraft and density altitude. The result of one take-off run is valid only for the exact take-off configuration of the aircraft at that point in time.

This function is very useful to determine your aircraft's take-off performance under varying conditions. Please use this function with care and responsibility. Never use the results of this function to determine whether you have enough runway length in situations where you have a runway that is too short for safe aircraft operations.

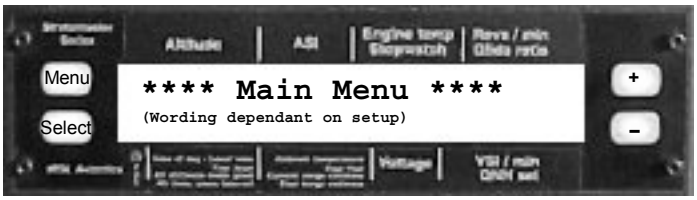
The steps for measuring take-off distance is:

Align your aircraft with the runway in readiness for your take-off run.

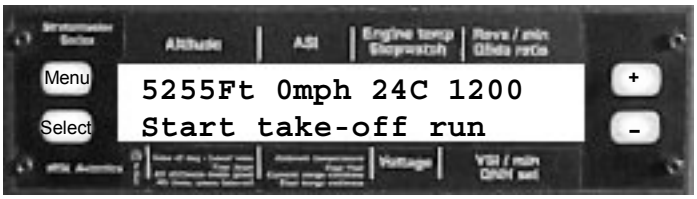
Step one: Press Menu and hold it down (do not release).



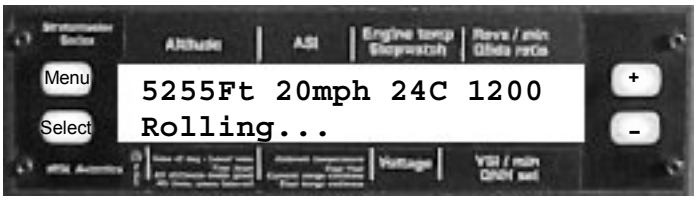
Step two: Press Select key while the Menu key is being held down.



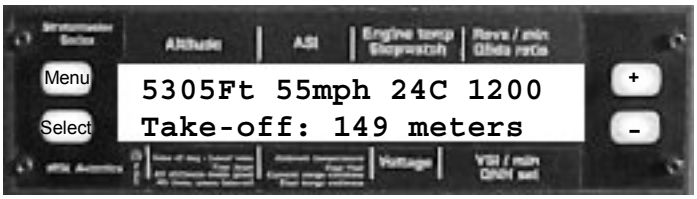
Step three: Start the take-off run when prompted



The unit shows the following when 16 mph (26 Kph or 14 Kn) has been exceeded:



Step four: Press any key to return to flight displays.



Please note:
The ultimate accuracy of this measurement depends on your installation of the Stratomaster Flight Instrument. Should you not have installed a static port, it is possible for pressure changes to occur in the instrument pod as your aircraft gains speed. This may lead to a slight under- or over reading of the altimeter. This in turn will affect the instrument's determination of the 50 ft (15.2 m) obstacle.

The Stratomaster Instrument uses TAS (true airspeed) calculations to determine the distance the aircraft traveled through the air.

This measurement should be performed on days with low wind speeds. Wind speeds as such are canceled out of the measurement by default as the instrument can only measure actual distance traveled through the air. However, be aware that if your aircraft performs a take-off run into stronger wind it will leave the ground at a lower ground speed. This means less friction of your wheels on the ground. The result of this is a decreased take-off run even if only air-distance is measured.

5. SETUP INSTRUCTIONS

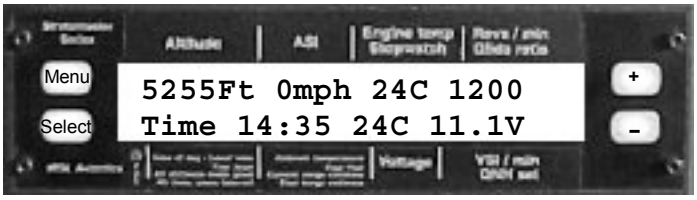
We recommend that you setup the mode menu first as certain items within the user menu are dependant on setups done in the mode menu.

Mode menu

The following items are setup under mode menu:

Altitude, QNH, distance, fuel measurement, temperature, engine temp sensor, external temp sensor, fuel flow sender, fuel level sender, hour fraction mode, flight detect mode, airspeed, air distance setup, air distance mode, climb ratio mode, instructor mode, lesson timer mode and master or slave mode. To set any of these items (5.1 - 5.18) the under mentioned four steps should be followed as the first four steps:

Step one: Press Menu and hold it down (do not release).



Step two: Press the - whilst the Menu key is being held down

(Note: Menu key may now be released)

Step three: Press Select

Step four: Press + until Menu as described in step five of individual setup instructions appears

5.1 Altitude

Options: Feet (Ft)
Meters (m)

Step five: Press Select

Press: Plus or Minus to change

Step six: Press Select to confirm and exit

5.2 QNH

Options: Millibar (mb)
Inches of Mercury (Inch/Hg)

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change.

Step seven: Press Select to confirm and exit

5.3 Distance

Options: Miles (m)
Kilometers (km)
Nautical Miles (nm)

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change.

(Note: The Stratomaster Flight will only display two of the three options available at any time. Should you wish to choose the option that is not being displayed the plus should be pressed to make that option available. The minus should be pressed to choose between the two given options).

Step seven: Press Select to confirm and exit.

5.4 Fuel measurement

Options: Liters
Imperial gallons
US gallons

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change

(Note: The Stratomaster Flight will always display liters as one of the options. The other option will be either Imperial gallons or US gallons. Should you wish to select the gallon option that is not being given then press the plus whilst the other gallon option is being shown. The minus should be pressed to choose between the two given options).

Step seven: Press Select to confirm and exit.

5.5 Temperature

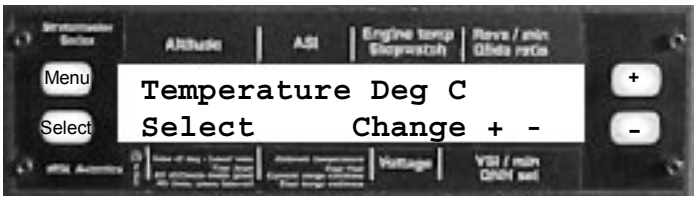
Options: Degrees Celsius
Degrees Fahrenheit

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change

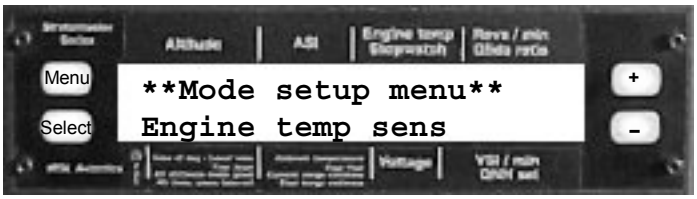
Step seven: Press Select to confirm and exit



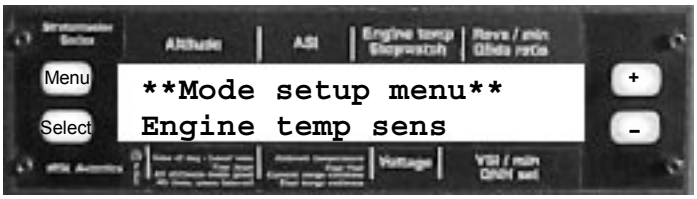
5.6 Engine temperature

Options: Has engine temperature sensor
No engine temperature sensor

Step five: Press + until the following is displayed

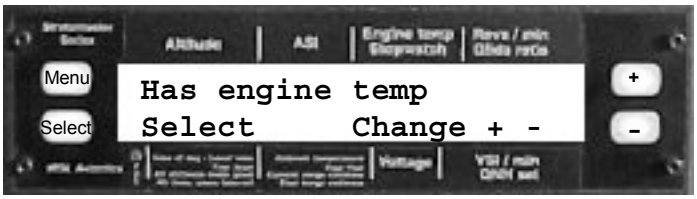


Step six: Press Select



Press Plus or Minus to change

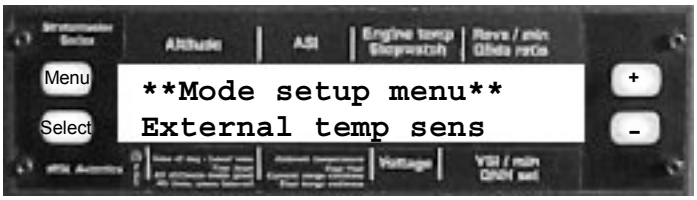
Step seven: Press Select to confirm and exit



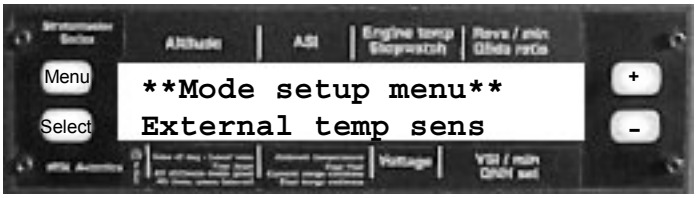
5.7 External temperature

Options: Has external temperature sensor
No external temperature sensor

Step five: Press + until the following is displayed

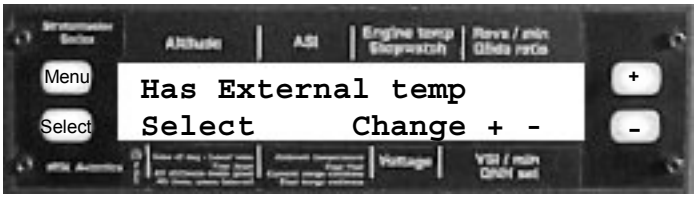


Step six: Press Select



Press Plus or Minus to change

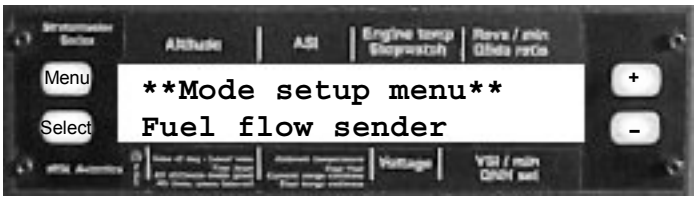
Step seven: Press Select to confirm and exit



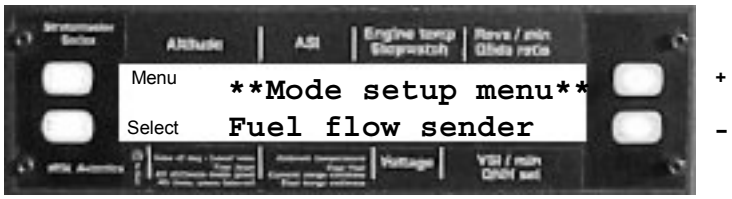
5.8 Fuel flow sender

Options: Has fuel flow sender
No fuel flow sender

Step five: Press + until the following is displayed

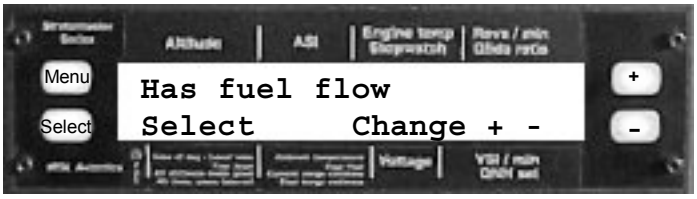


Step six : Press Select



Press Plus or Minus to change

Step seven: Press Select to confirm and exit



5.9 Fuel level sender

Options: Has fuel level sender
No fuel level sender

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change

Step seven: Press Select to confirm and exit

5.10 Hour fraction mode

Options: Hour has minutes
Hour has decimals

Example: Should the option hour has decimals be selected then 1 hour 30 minutes will be displayed as 1.50. Should the option hour has minutes be selected then 1 hour 30 minutes will be displayed as 1:30.

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change

Step seven: Press Select to confirm and exit

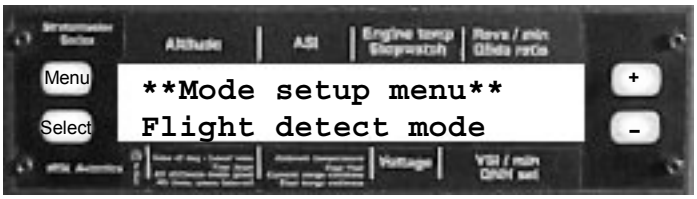
5.11 Flight detect mode

Options: Manual
Automatic

MGL recommends that flights be detected automatically as non manual starting or non manual ending of flights will result in flights not being logged or flights being incorrectly logged.

Step five: Press + until the following is displayed

Step six: Press Select



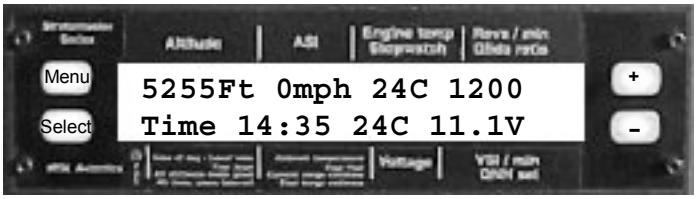
Press: Plus or Minus to change

Step seven: Press Select to confirm and exit

Manual starting and ending of flights

To start a flight:

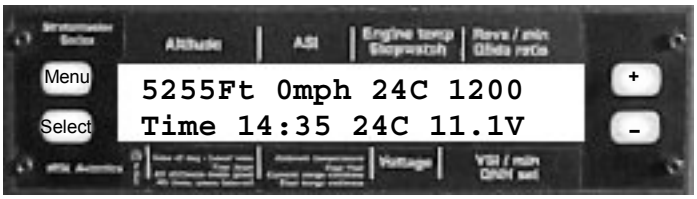
Step one: Press Menu:



Step two: Press Select:

To end a flight:

Step one: Press Menu:



Step two: Press Select:

5.12 Airspeed

Options: ASI (Indicated airspeed)
TAS (True airspeed)

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change

Step seven: Press Select to confirm and exit

5.13 Air distance setup

Options: Manual reset only
Reset flight start (automatic)

Step five: Press + until the following is displayed

Step six: Press Select

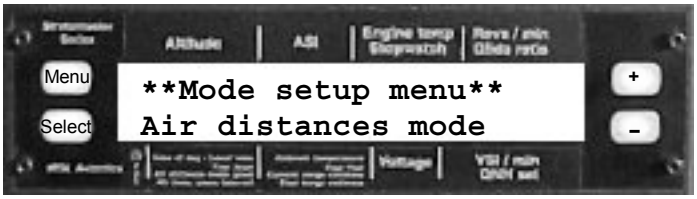
Press Plus or Minus to change

Step seven: Press Select to confirm and exit

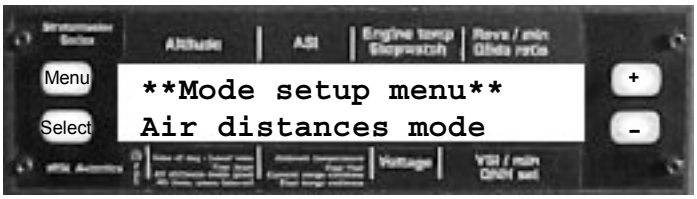
5.14 Air distances mode

Options: Show air distances
No air distances

Step five: Press + until the following is displayed



Step six: Press Select



Press Plus or Minus to change

Step seven: Press Select to confirm and exit

5.15 Climb ratio mode

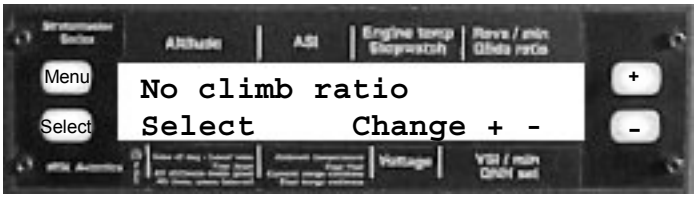
Options: No climb ratio
Show climb ratio

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change

Step seven: Press Select to confirm and exit



5.16 Instructor mode

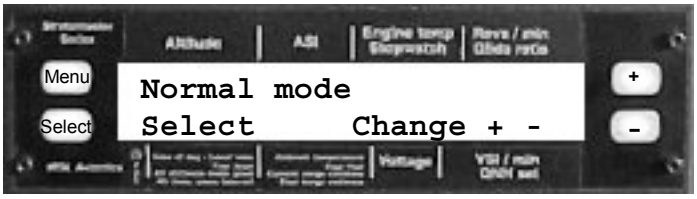
Options: Normal mode
Instructor mode

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change

Step seven: Press Select to confirm and exit



5.17 Lesson timer mode

Options: Hobbs revs
Take-off revs

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change

Step seven: Press Select to confirm and exit

5.18 Master or slave mode

Options: This unit is master
This unit is slave

Step five: Press + until the following is displayed

Step six: Press Select

Press Plus or Minus to change

Step seven: Press Select to confirm and exit

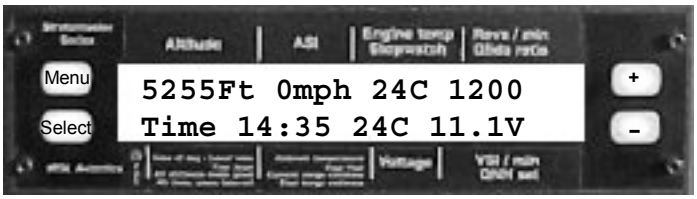
Device menu

The following items are setup under device menu:

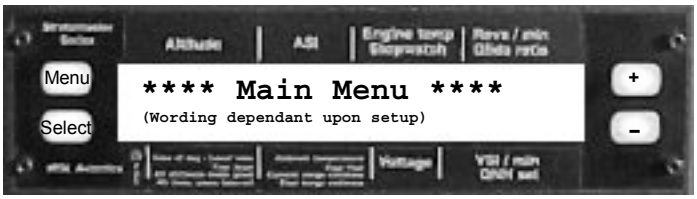
Set ASI gain, Zero ASI/VSI, Set altimeter, Set fuel flow, fuel tank, rev counter, take-off revs, hobbs revs and glide ratio revs. To set any of these items (5.19 - 5.27) the under mentioned four steps should be followed:

Set ASI gain, Zero ASI/VSI and set altimeter calibration settings. Changing these could result in your Stratomaster Flight displaying incorrect readings. (Refer calibration certificate).

Step one: Press Menu and hold it down (do not release).



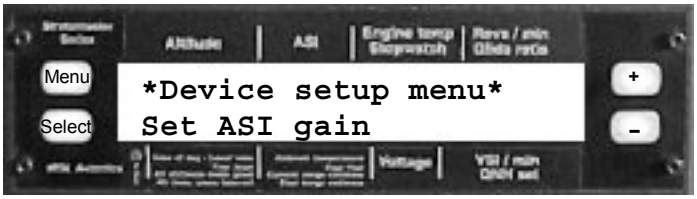
Step two: Press the - whilst the Menu key is being held down



(Note: Menu key may now be released)

Step three: Press +

Step four: Press + until the wording as in step five of the individual setup menu appears



5.19 Set ASI gain

The Stratomaster Flight will allow you to correct the ASI or TAS for the position error caused by the placement of the pitot tube and/or static port on the aircraft.

An easy method to determine the amount of position error on your aircraft would be to wait for a wind still day, set the Stratomaster Flight to display TAS, equip your aircraft with a GPS and take a flight. The ground speed as reflected by the GPS and the TAS as reflected by the Stratomaster should agree if there is no position error. Any difference between these two readings would be the position error.

It should be remembered that if you enter an incorrect adjustment here all airspeed readings would reflect this error. It is thus important that the amount of error be determined accurately.

Examples:

Stratomaster Flight under reading

TAS as indicated by Stratomaster Flight	= 53 mph
Ground speed as indicated by GPS	= 55 mph
Difference	= 2 mph

Express difference as a % of TAS.

(2*100)/53 = 3.77 % rounded to 4 %

Enter (100+4) = 104 under SPD Correct.

Stratomaster Flight over reading

TAS as indicated by Stratomaster Flight	= 60 mph
Ground speed as indicated by GPS	= 55 mph
Difference	= 5 mph

Express difference as a % of TAS.

(5*100)/60 = 8.3 % rounded to 8 %

Enter (100-8) = 92 under SPD Correct.

Stratomaster Flight reading correct

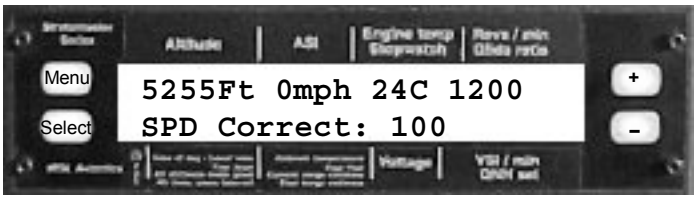
Enter 100 under SPD Correct.

To enter ASI gain the following steps should be followed:

Step five: Press Select:

Press Plus or Minus to change

Step six: Press Select to confirm and exit:



Step seven: Reset instrument to display ASI if preferred.

5.20 Zero ASI, VSI

This is a calibration function which is only to be used on the ground and whilst the aircraft is not moving. Its purpose is to reset the ASI and VSI readings to nil. We recommend that the pitot tube be covered at the time of calibration unless you have zero wind speed at the time.

The following steps should be followed:

Step five: Press + until the following is displayed:

Step six: Press Select to calibrate and exit

(Note: Should you not wish to calibrate press any key other than the Select key to exit).

5.21 Set altimeter

This function was used by MGL to calibrate your Stratomaster Flight at the time of manufacture. Changes should not be made to this setting as this would cause the altitude to be inaccurate.

MGL Recommendation = Leave setting unchanged.

5.22 Set fuel flow

This function is for the perfectionists amongst us. Factors e.g. temperature, amount of oil added, type of oil added etc. will influence the viscosity of the fuel used. Viscosity of the fuel in turn influences the fuel flow measurement which in turn effect readings e.g. fuel level, fuel bingo estimate and current range estimate. Without any adjustment your Stratomaster Flight should be accurate within 3 %.

Your Stratomaster Flight would have been set to Fuel: Calib 130 at time of purchase. This setting is the recommended starting value for the RS 256-225 liquid flow sender. You may alter this reading, however you should have a clear understanding of e.g. by how much it should be changed, how this change will effect measurements and calculations made by the Stratomaster Flight before making any change.

5.23 Set fuel tank

Should your aircraft be equipped with a fuel level sender it will be necessary to calibrate the actual fuel level in the tank to the fuel as measured by the fuel level sender. Accuracy is of great importance as this will determine the accuracy of readings e.g. fuel level, fuel bingo estimate and current range estimate as calculated by the Stratomaster Flight.

The Stratomaster Flight can be used in one of two ways.

Method one:

The Stratomaster Flight can reflect that the tank is empty when there is no more fuel left in the tank i.e. no fuel reserve

Method two:

The Stratomaster Flight can reflect that the tank is empty once a predetermined fuel reserve level has been reached. E.g. if you select to have a 10 liter fuel reserve the Stratomaster Flight will reflect zero fuel remaining once the 10 liter reserve has been reached.

Set up method one:

We will use an example of a 50 liter tank without any predetermined reserve.

Step one:

Ensure that your Stratomaster Flight is set up to reflect that the aircraft is equipped with a fuel level sender.

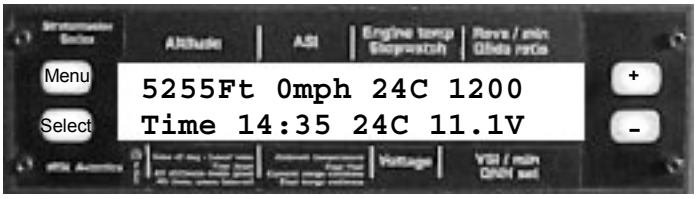
Ensure your aircraft's tank is empty and that the fuel level sender is in the empty position.

(Note: The fuel level sender will have two mechanical stops i.e. one at the empty position and another at the full position. Ensure that the movable arm is in the empty position when you start and only reaches the full stop position when you add the last bit on fuel.)

Step two:

The aircraft should be placed in the same attitude as which it assumes in flight. E.g. a trike's nose wheel should be raised and a tail dragger's rear should be raised.

Step three: Press Menu and hold it down (do not release).



Step four: Press the - whilst the Menu key is being held down

(Note: Menu key may now be released)

Step five: Press +

Step six: Press + until the following is displayed:

Step seven: Press Select:

Step eight: Press + or - to change:

Step nine: Press Select

Step ten:

This step calibrates the fuel level sender to the level where the fuel tank is empty. As we have chosen not to have any reserve fuel we shall press select without adding any fuel.

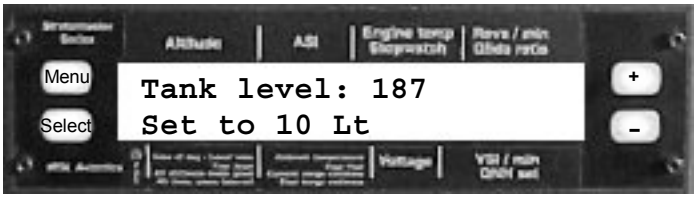
(Note: The "Tank Level" reading can be any number it does not have to be 130 as used in this example).

Step eleven:

This step calibrates the fuel level sender to the level where it registers that there is 20 % fuel remaining in the fuel tank.

(Note: The display will reflect 20 % of your tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 187 as used in this example).



Add fuel. (In our example it would be 10 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 10 lt minus Set to 0 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for

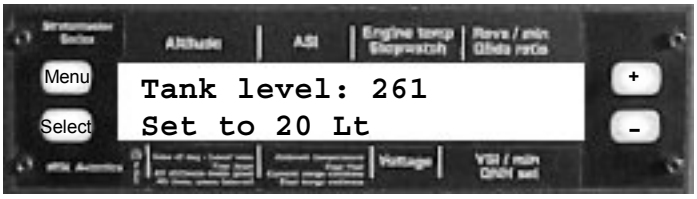
the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

Step twelve:

This step calibrates the fuel level sender to the level where it registers that there is 40 % fuel remaining in the fuel tank.

(Note: The display will reflect 40 % of your tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 261 as used in this example).



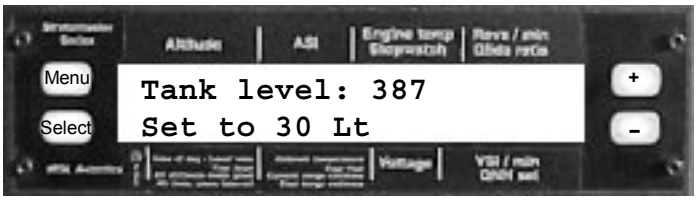
Add fuel. (In our example it would be 10 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 20 lt minus Set to 10 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

Step thirteen:

This step calibrates the fuel level sender to the level where it registers that there is 60 % fuel remaining in the fuel tank.

(Note: The display will reflect 60 % of your tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 387 as used in this example).



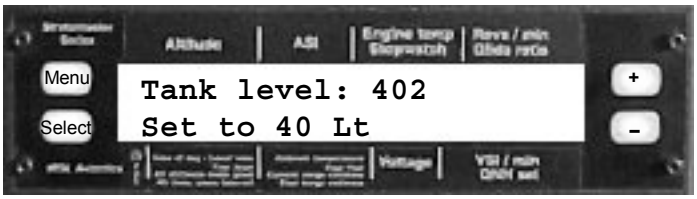
Add fuel. (In our example it would be 10 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 30 lt minus Set to 20 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

Step fourteen:

This step calibrates the fuel level sender to the level where it registers that there is 80 % fuel remaining in the fuel tank.

(Note: The display will reflect 80 % of your tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 402 as used in this example).



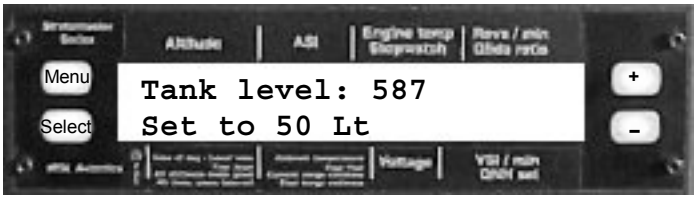
Add fuel. (In our example it would be 10 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 40 lt minus Set to 30 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

Step fifteen:

This step calibrates the fuel level sender to the level where it registers that there is 100 % fuel remaining in the fuel tank.

(Note: The display will reflect 100 % of your tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 587 as used in this example).



Add fuel. (In our example it would be 10 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 50 lt minus Set to 40 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

(Note: The fuel level sender will have two mechanical stops i.e. one at the empty position and another at the full position. Ensure that the movable arm only reaches the full stop position once you add the last bit of fuel.)

Set up method two:

We will use an example of a 50 liter tank with a predetermined reserve of 10 liters.

Step one:

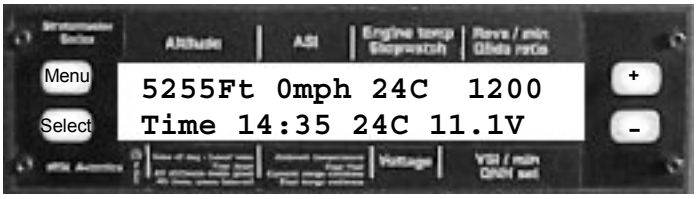
Ensure your aircraft's tank is empty and that the fuel level sender is in the empty position.

(Note: The fuel level sender will have two mechanical stops i.e. one at the empty position and another at the full position. Ensure that the movable arm is in the empty position when you start and only reaches the full stop position once the last bit of fuel is added).

Step two:

The aircraft should be placed in the same attitude as which it assumes in flight. E.g. a trike's nose wheel should be raised and a tail dragger's rear should be raised.

Step three: Press Menu and hold it down (do not release).



Step four: Press the - whilst the Menu key is being held down

(Note: Menu key can now be released)

Step five: Press +

Step six: Press + until the following is displayed:

Step seven: Press Select:

Step eight: Press + or - to change:

(Note: The tank capacity should be calculated as the total tank capacity less the predetermined reserve. In our example it is 50 liters - 10 liters).

Step nine: Press Select

Step ten:

This step calibrates the fuel level sender to the level where the fuel tank is empty. As we have chosen to have a fuel reserve, fuel totaling the chosen fuel reserve should be entered in to the fuel tank at this time. (10 Liters in our example). The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

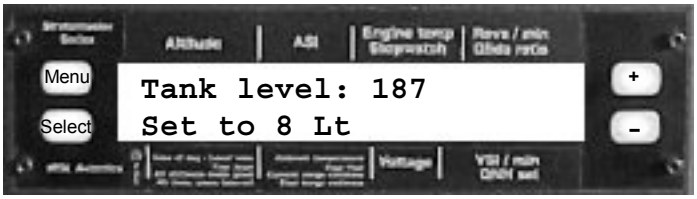
(Note: The "Tank Level" reading can be any number it does not have to be 130 as used in this example).

Step eleven:

This step calibrates the fuel level sender to the level where it registers that there is 20 % fuel remaining in the fuel tank excluding the fuel reserve.

(Note: The display will reflect 20 % of your inputted tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 187 as used in this example).



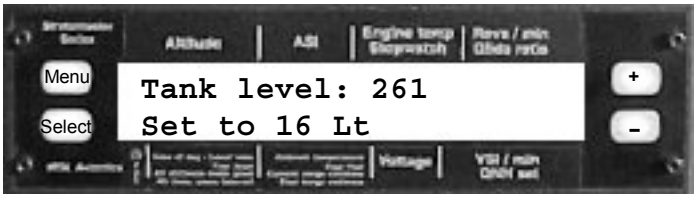
Add fuel. (In our example it would be 8 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 8 lt minus Set to 0 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

Step twelve:

This step calibrates the fuel level sender to the level where it registers that there is 40 % fuel remaining in the fuel tank excluding the fuel reserve.

(Note: The display will reflect 40 % of your inputted tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 261 as used in this example).



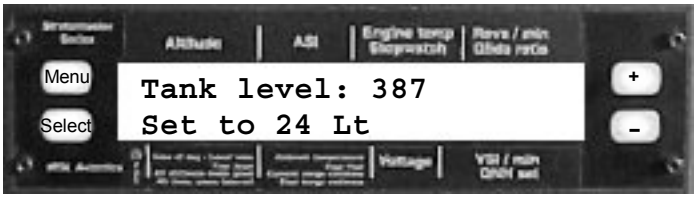
Add fuel. (In our example it would be 8 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 16 lt minus Set to 8 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

Step thirteen:

This step calibrates the fuel level sender to the level where it registers that there is 60 % fuel remaining in the fuel tank excluding the fuel reserve.

(Note: The display will reflect 60 % of your inputted tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 387 as used in this example).



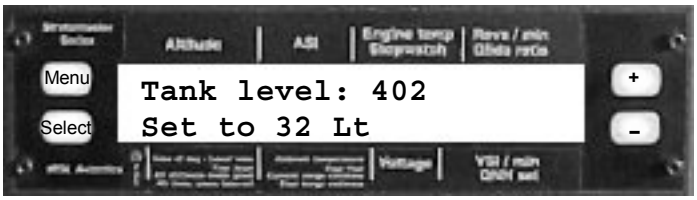
Add fuel. (In our example it would be 8 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 24 lt minus Set to 16 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

Step fourteen:

This step calibrates the fuel level sender to the level where it registers that there is 80 % fuel remaining in the fuel tank excluding the fuel reserve.

(Note: The display will reflect 80 % of your inputted tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 402 as used in this example).



Add fuel. (In our example it would be 8 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 32 lt minus Set to 24 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of**

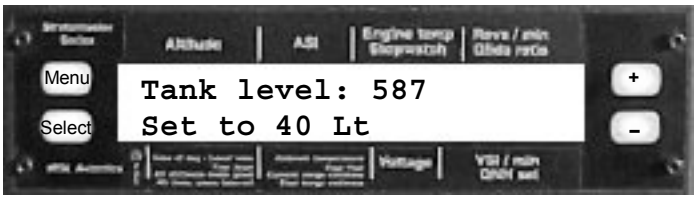
calculations performed by the Stratomaster Flight. Only press Select once the tank level reading has stabilized.

Step fifteen:

This step calibrates the fuel level sender to the level where it registers that there is 100 % fuel remaining in the fuel tank excluding the fuel reserve.

(Note: The display will reflect 100 % of your inputted tank capacity)

(Note: The "Tank Level" reading can be any number it does not have to be 587 as used in this example).



Add fuel. (In our example it would be 8 liters which is calculated by deducting the previous set to menu value from the current set to menu value e.g. Set to 40 lt minus Set to 32 lt. The Tank level reading will start fluctuating whilst the fuel is being added. Wait for the tank level reading to stabilize (this can take up to a minute). **If you do not wait for the tank level reading to stabilize this will impact negatively on the accuracy of calculations performed by the Stratomaster Flight**. Only press Select once the tank level reading has stabilized.

(Note: The fuel level sender will have two mechanical stops i.e. one at the empty position and another at the full position. Ensure that the movable arm only reaches the full stop position once the last bit of fuel is added).

Notes on tank level / Slope dir error

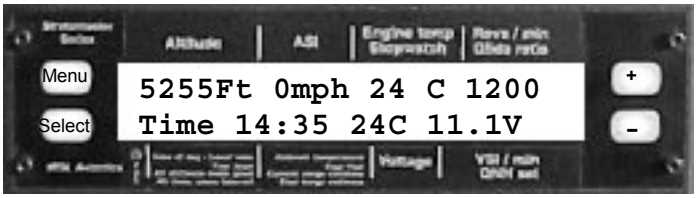
Tank level is a value determined by the Stratomaster Flight. It is used to calculate e.g. fuel level, fuel bingo estimate and current range estimate. The tank level reading can either increase in value as fuel is added on decrease in value if fuel is added. This is dependant on the type of fuel level sender used. However should the second reading be larger than the first reading all readings will have to be larger than the previous reading. Likewise should the second reading be smaller than the first reading all readings will have to be smaller than the previous reading. If this is not the case the wording "Slope dir error" will be displayed. This could happen when fuel was removed instead of added between steps, no fuel was added between steps or when the fuel level sender was moved in the wrong direction e.g. moving the fuel level sender manually when it is not inserted in to the fuel tank.

Should you get a slope dir error message determine the cause of the error e.g. select was pressed before the fuel was added. In this case you can add the fuel and carry on. If you do not know the cause of your error it is best to start from scratch. It should be remembered that accuracy is the fuel tank calibration is extremely important to enable your Stratomaster Flight to display the correct data.

5.24 Rev counter

The Stratomaster Flight determines RPM by counting the number of pulses generated by the ignition systems for every 10 revs. Your Stratomaster Flight would have been set to 60 pulses at the time of purchase, which is the number of pulses generated by the Ducati ignition system which is used in the majority of Rotax engines today. You have to ensure that this setting is correct for your engine. If not the setting can be changed by following the under mentioned steps:

Step one: Press Menu and hold it down (do not release).

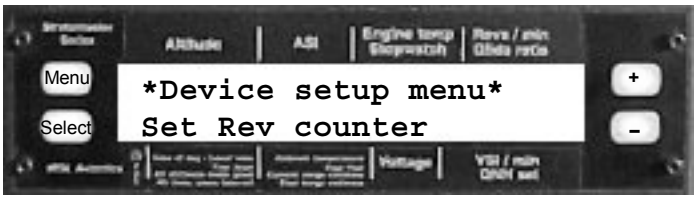


Step two: Press the - whilst the Menu key is being held down

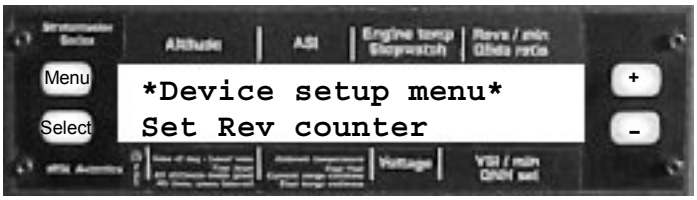
(Note: Menu key may now be released)

Step three: Press +

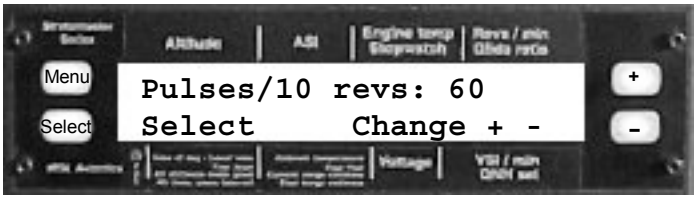
Step four: Press + until the following is displayed:



Step five: Press Select:



Step six: Press + or - to change:

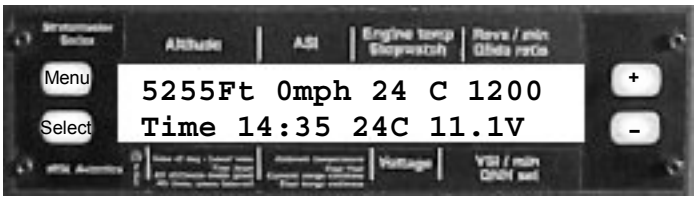


Step seven: Press Select to confirm and exit:

5.25 Take-off revs

This function determines the take-off revs which should be reached to enable the Stratomaster Flight to determine the start of a flight for the purpose of logging the flight.

Step one: Press Menu and hold it down (do not release).



Step two: Press the - whilst the Menu key is being held down

(Note: Menu key may now be released)

Step three: Press +

Step four: Press + until the following is displayed:

Step five: Press Select:

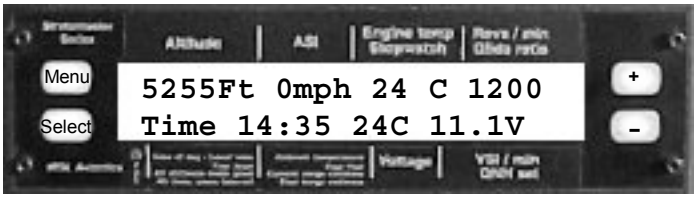
Step six: Press + or - to change:

Step seven: Press Select to confirm and exit:

5.26 Hobbs meter revs

This function determines the minimum engine revs before the Stratomaster Flight will start adding engine running time to the current hours as reflected by the hobbs meter. Hobbs revs are further used for the maintenance timer and for instructor mode lesson time accumulation.

Step one: Press Menu and hold it down (do not release).



Step two: Press the - whilst the Menu key is being held down

(Note: Menu key may now be released)

Step three: Press +

Step four: Press + until the following is displayed:

Step five: Press Select:

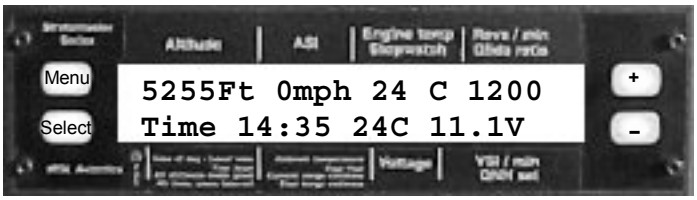
Step six: Press + or - to change:

Step seven: Press Select to confirm and exit:

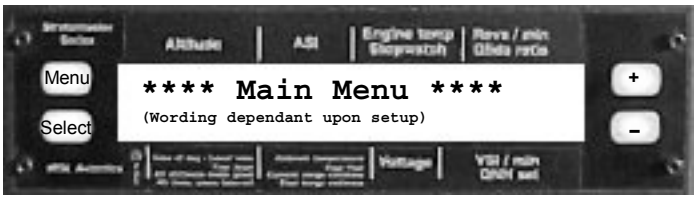
5.27 Glide ratio revs

The Stratomaster Flight will only display glide ratio if the engine revs fall below a preset number of revs.

Step one: Press Menu and hold it down (do not release).



Step two: Press the - whilst the Menu key is being held down



(Note: Menu key may now be released)

Step three: Press +

Step four: Press + until the following is displayed:

Step five: Press Select:

Step six: Press + or - to change:

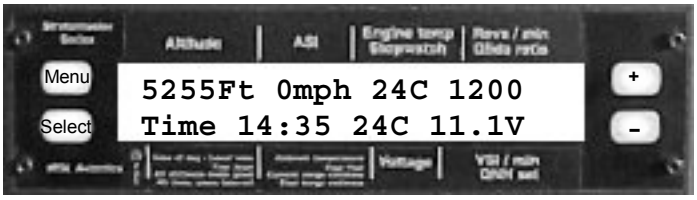
Step seven: Press Select to confirm and exit:

User menu

The following items are setup under the user menu:

Date and time, hobbs meter, maintenance meter, aircraft registration number, altitude alarm, temperature alarm, speed low alarm, speed high alarm and fuel low alarm. To set any of these items the under mentioned three steps should be followed as the first three steps:

Step one: Press Menu and hold it down (do not release).



Step two: Press the + whilst the Menu key is being held down

(Note: Menu key may now be released)

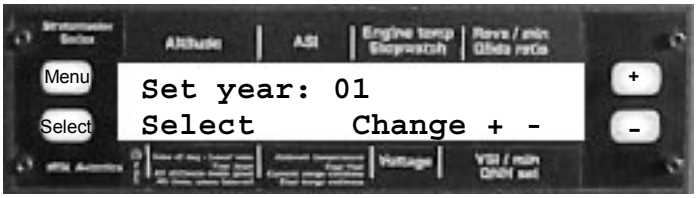
Step three: The following wording will be displayed. Press the + until the wording as in step four of the individual setup instructions (5.28 to 5.36) is displayed.

5.28 Date and time

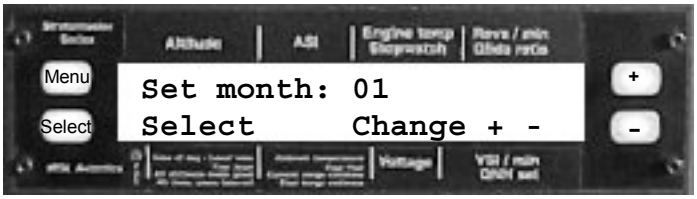
Date and time is used for your flight or lesson log. Time of day is a display available both during flight and on the ground. Please note: The year is never stored in the log. The only reason for entering the year is to be able to correct for leap years. The internal real-time clock contains a year based counter that can count from 0 to 3 for leap year correction.

Step four: Press Select

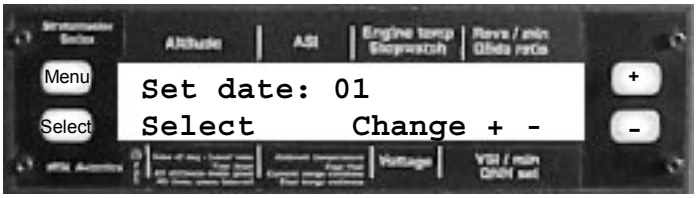
Step five: Press + or - to change. Press Select to confirm and continue



Step six: Press + or - to change. Press Select to confirm and continue

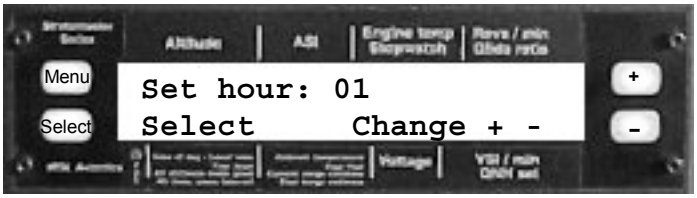


Step seven: Press + or - to change. Press Select to confirm and continue

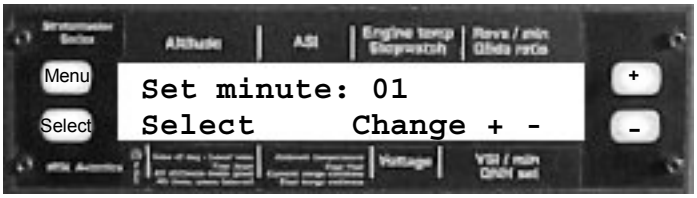


Step eight: Press + or - to change. Press Select to confirm and continue

(Note: The Stratomaster Flight uses a 24 hour clock)



Step nine: Press + or minus to change. Press Select to continue



5.29 Hobbs meter

Step four: Press + until the following is displayed

Step five: Press Select

Step six: Press + or - to change. Press Select to confirm and continue

(Note: Enter thousand hours and hundred hours here)

Step seven: Press + or - to change. Press Select to continue

Step eight: Press + or - to change. Press Select to confirm and exit

(Note: If you have selected "hour has minutes" when setting up the hour fraction mode then minutes should be entered here. If you have selected "hour has decimals" when setting up the hour fraction mode then decimals should be entered here).

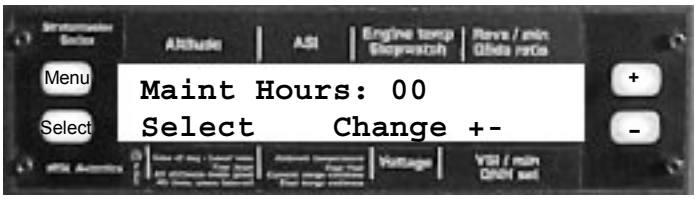
5.30 Maintenance meter

The maintenance meter can be viewed as a hobbs meter "in reverse". It counts engine running time down instead of up. This timer is used to control engine maintenance times, for example spark plug changes or MPI's. The maintenance timer is subject to the setting of the hobbs revs.

Step four: Press + until the following is displayed

Step five: Press Select

Step six: Press + or - to change.



(Note: The Stratomaster Flight will add one onto the amount entered)

Step seven: Press Select to confirm and exit

5.31 Aircraft registration

Step four: Press + until the following is displayed

Step five: Press Select

Step six: Enter registration by referring to notes below.

Notes:

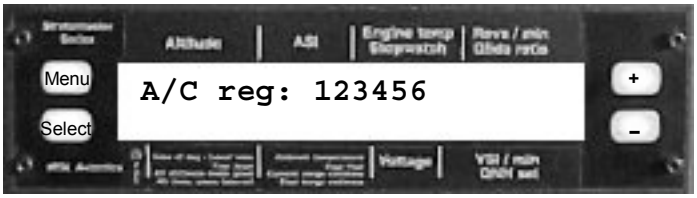
^ Indicates the field that you are about to change

Press + and - to select the required letter etc. Once the required letter has been entered move to the next entry field by pressing select.

Available characters:

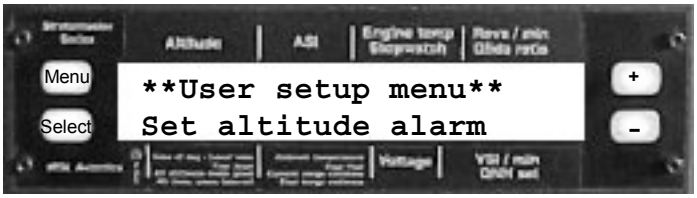
Alphabet in capital letters
Alphabet in small letters
Numbers 0 - 9
Symbols:
! " # $ % & ' ( ) * + , . - . / : ; < = > ? @ [¥] ^ _ ` { | } ? ?

Step seven: Enter Menu to exit

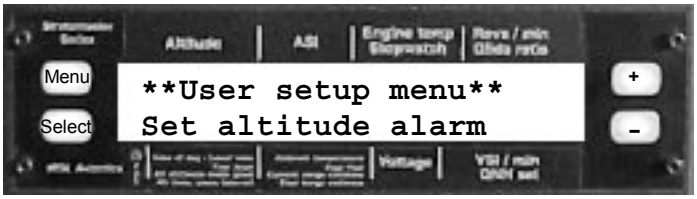


5.32 Altitude alarm

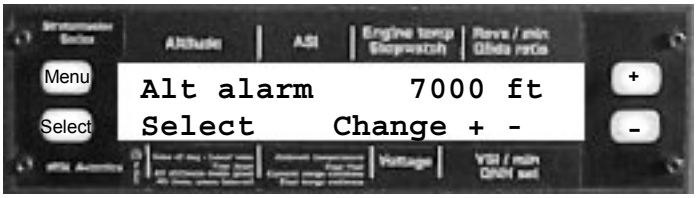
Step four: Press + until the following is displayed



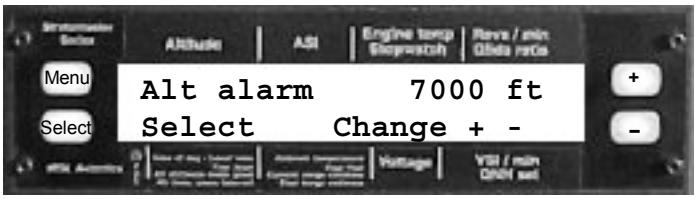
Step five: Press Select



Step six: Press + or - to change

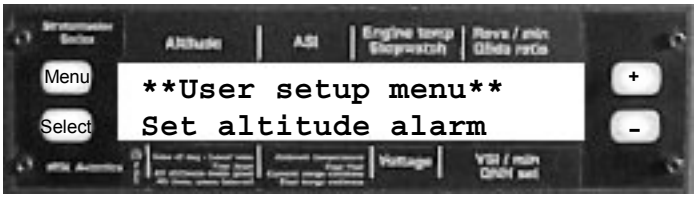


Step seven: Press Select to confirm and exit

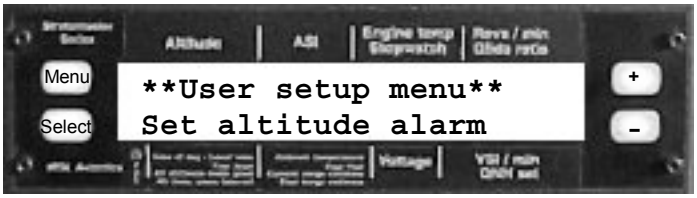


The steps for switching the altitude alarm off are:

Step four: Press + until the following is displayed



Step five: Press Select



Step six: Press - until the following is displayed

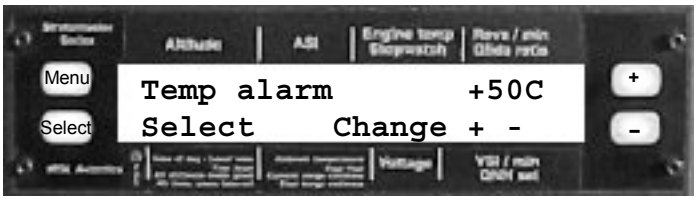
Step seven: Press Select to confirm and exit

5.33 Temperature alarm

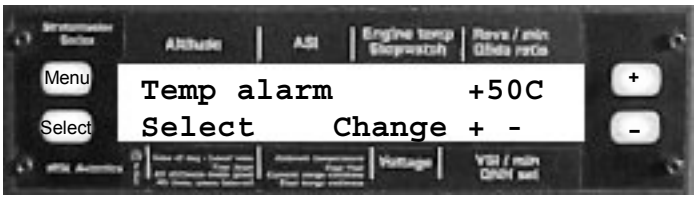
Step four: Press + until the following is displayed

Step five: Press Select

Step six: Press + or - to change



Step seven: Press Select to confirm and exit



The steps for switching the temperature alarm off are:

Step four: Press + until the following is displayed

Step five: Press Select

Step six: Press - until the following is displayed

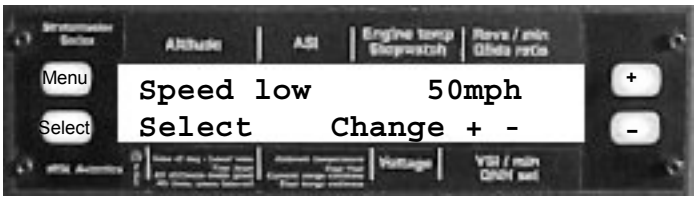
Step seven: Press Select to confirm and exit

5.34 Speed low alarm

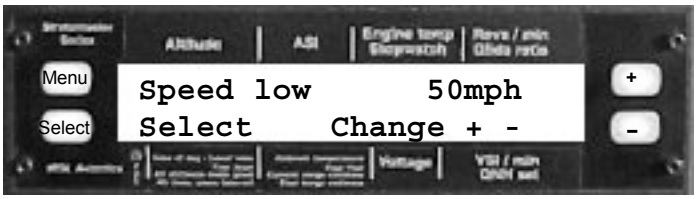
Step four: Press + until the following is displayed

Step five: Press Select

Step six: Press + or - to change



Step seven: Press Select to confirm and exit



The steps for switching the speed low alarm off are:

Step four: Press + until the following is displayed

Step five: Press Select

Step six: Press - until the following is displayed

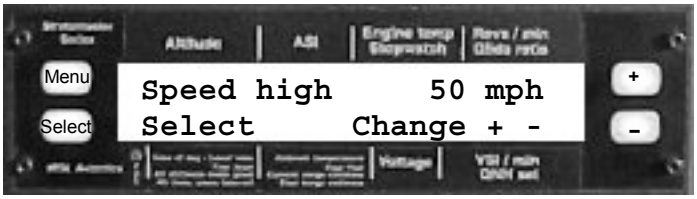
Step seven: Press Select to confirm and exit

5.35 Speed high alarm

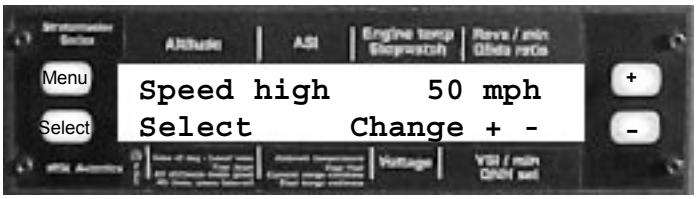
Step four: Press + until the following is displayed

Step five: Press Select

Step six: Press + or - to change



Step seven: Press Select to confirm and exit



The steps for switching the speed high alarm off are:

Step four: Press + until the following is displayed

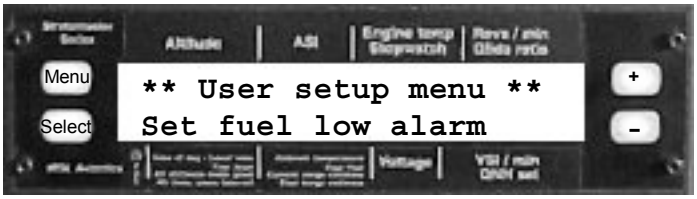
Step five: Press Select

Step six: Press - until the following is displayed

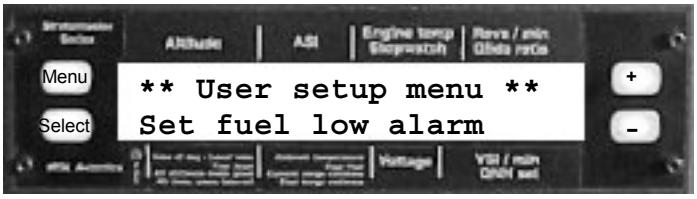
Step seven: Press Select to confirm and exit

5.36 Fuel low alarm

Step four: Press + until the following is displayed



Step five: Press Select

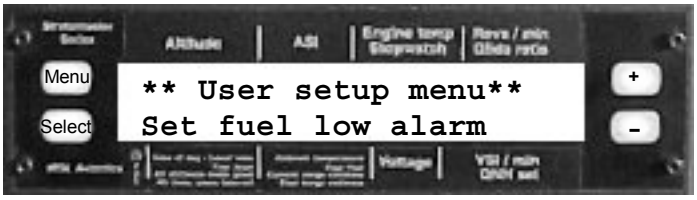


Step six: Press + or - to change

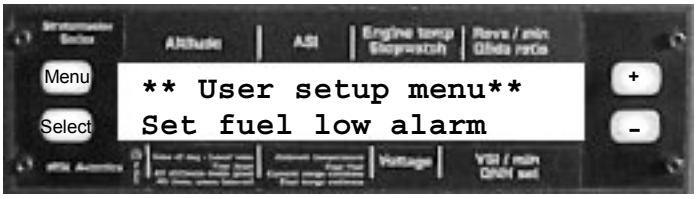
Step seven: Press Select to confirm and exit

The steps for switching the fuel low alarm off are:

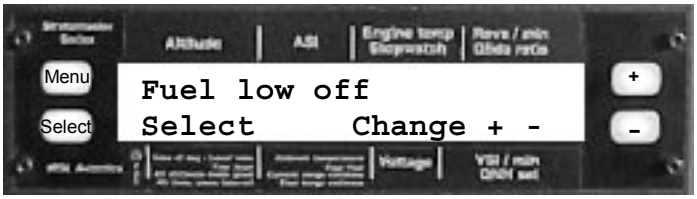
Step four: Press + until the following is displayed:



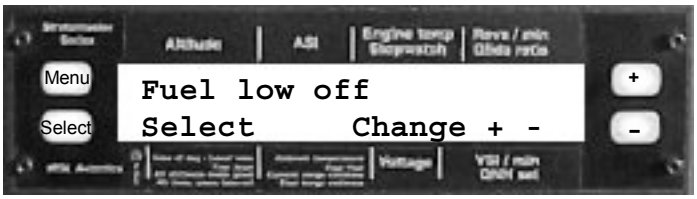
Step five: Press Select



Step six: Press - until the following is displayed



Step seven: Press Select to confirm and exit



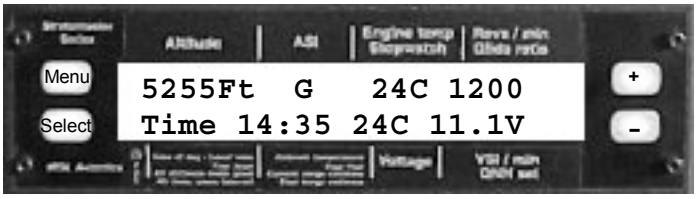
6. DISPLAYS

6.1 Ground displays (Not in flight displays)

Not in flight displays can easily be distinguished from in flight displays as the letter "G" will alternate with the ASI reading when not in flight.

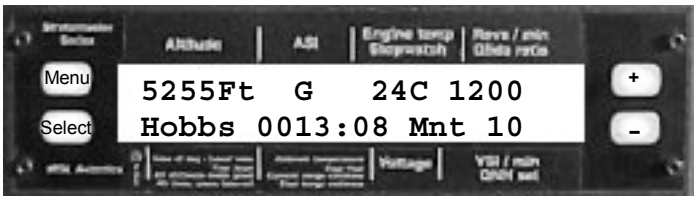
The bottom row of the Stratomaster Flight will alternate, either automatically or manually, between various displays whilst not in flight:

The displays are:

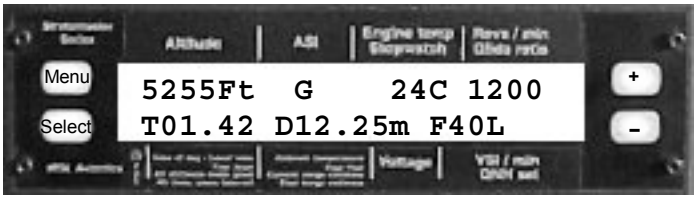


Time, ambient temperature and voltage

(Note: the voltage displayed whilst not in flight contains one decimal character whilst the voltage displayed in flight does not contain a decimal character).

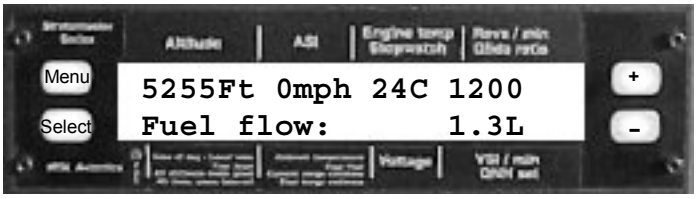


Hobbs meter and remaining maintenance hours



Duration of last flight, Air distance made good and fuel level.

(Note: Should the Stratomaster Flight be set to Instructor mode the time displayed will be the duration of a lesson).



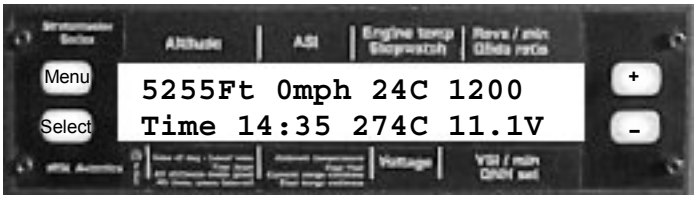
6.2 Alternating of displays

The Stratomaster Flight can be setup to either automatically or manually alternate between the various displays on the bottom row.

Automatic alternating

Time of day, fuel level, air distance made good and air time since take-off etc. shares a display field. Should you prefer that the Stratomaster Flight alternate automatically between the various displays hold the select key down for two seconds

Press Select and hold down for two seconds only



The bottom row of both the in flight as well as ground displays will now alternate automatically.

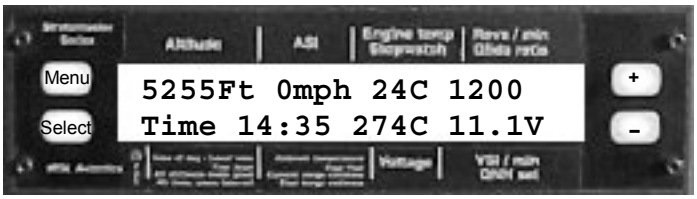
To return to manual alternating press the Select key (without holding it down).

Both in flight as well as ground displays will no longer alternate automatically.

Manual alternating

Time of day, fuel level, air distance made good and air time since take-off shares a display field etc. Should you prefer that the Stratomaster Flight not automatically alternate between the various displays press the Select key.

Press Select (without holding it down)



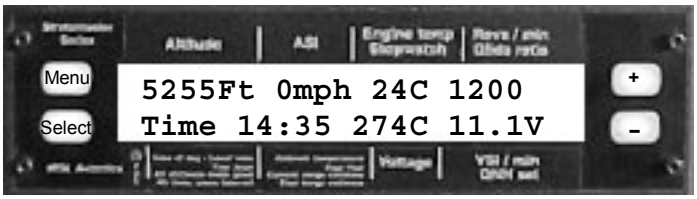
Both in flight as well as ground displays will no longer alternate automatically.

To alternate between the various displays the Select key should be pressed (without holding it down).

6.3 Display blanked

This function disenables the display and is an instruction tool to force student pilots to fly without instrumentation e.g. simulation of instrument failure

Press Select and hold it down for five seconds



To activate the display press any key

7. MENU TREE

Bold text like this means function is a factory test or setup function and should be treated with care. It may be possible to invalidate the calibration of your instrument by unqualified entries to these functions. Some or all of these functions may be removed in future versions of the firmware.

Main Menu

Start new flight/End current flight (Note: Only available if flight detect mode is set to manual)
Start new lesson/End current lesson/Student number (Note: Only available if set to Instructor mode)
Set Stopwatch
    (+) Start/On (-) Off
    (+) Stop (-) Zero
View flight log
Set fuel level (Note: Only available if aircraft is not equipped with a fuel level sender)
Reset air distance
    Press + to reset air distance counter
Density Altimeter
Barometer

Go to User Menu

Set date/time
    Set year
    Set month
    Set date
    Set hour
    Set minute
Set Hobbs meter
    Hobbs HR100's
    Hobbs HR 1's
    Hobbs Mins/Decs
Set Maintenance
    Maint hours
Set A/C reg
    A/C reg: .....
Set altitude alarm
    Select Change + -
Set temp alarm
    Select Change + -
Set speed low alarm
    Select Change + -
Set speed high alarm
    Select Change + -
Set fuel low alarm
    Select Change + -

Go to Device Menu

Go to Mode Menu

- Altitude Ft/m
  - Select Change + -
- QNH Millibar/Inch Hg
  - Select Change + -
- Dist m/km/kn
  - Select Change + -
- Fuel lt/gallons
  - Select Change + -
- Temp deg C/F
  - Select Change + -
- Engine temp sensor
  - Select Change + -
- External temp sensor
  - Select Change + -
- Fuel flow sender
  - Select Change + -
- Fuel level sender
  - Select Change + -
- Hour fraction mode
  - Select Change + -
- Flight detect mode
  - Select Change + -
- Airspeed TAS/ASI
  - Select Change + -
- Air distance setup
  - Select Change + -
- Air distances mode
  - elect Change + -
- Climb ratio mode
  - elect Change + -
- Instructor mode
  - Select Change + -
- Lesson timer mode
  - Select Change + -
- Master/Slave move
  - Select Change + -

Set ASI gain
- SPD Correct

Zero ASI, VSI

Set Altimeter
- **Alt Correct**

Set Fuel flow
- **Fuel Calib**

Set fuel tank
- Tank full at **
- Tank level *** Set to **
- Tank level *** Set to **
- Tank level *** Set to **
- Tank level *** Set to **
- Tank level *** Set to **

Set Rev counter
Select Change + -
Set T/O revs (T/O = take-off)
Select Change + -
Set Hobbs revs
Select Change + -
Set G/R revs (G/R = Glide ratio)
Select Change + -

8. CARING FOR THE STRATOMASTER FLIGHT

8.1 Pitot tube

Dust etc. can cause a blockage in the pitot tube. Such blockage will effect the operation of the pitot tube which will in turn effect the accuracy of the ASI/TAS readings. We recommend that the pitot tube be covered when the aircraft is not in operation.

8.2 Cleaning

The Stratomaster Flight can be cleaned by wiping it with a damp cloth. A mild soap may be used if necessary.

Take care not to wet the instrument excessively.

Do not use chemicals e.g. petrol, spirits, turpentine when cleaning the instrument.

8.3 Calibration

The Stratomaster Flight instrument does not require re calibration if it is used in normal operation.

Stratomaster Instruments used as references to calibrate other instruments may be sent in for periodic calibration to MGL Avionics. For this application we recommend a two year calibration interval. Please contact MGL Avionics for details.

9. Altimetry

This section is intended to clarify how an altimeter works and what determines its accuracy in simple terms.

As you know an altimeter is a simple absolute pressure gauge. This means it measures the pressure of the surrounding air relative to absolute vacuum as you would find in outer space.

Ordinary, well made altimeters are intricate mechanical devices that can achieve very good performance. However, these are subject to a whole host of influences that introduce errors in the readings. Vibrations tend to wear out the tiny gears, temperature has an effect on the elasticity of the materials used and therefor has a direct influence on the reading. The quality of the vacuum has a direct bearing on errors and the maximum altitude the instrument can indicate with a reasonable error.

The Stratomaster Flight is based on a silicon pressure sensor. In principle, these sensors are subject to many of the problems that affect ordinary mechanical instruments and many digital altimeters have poor accuracy and resolution.

What is different in the Stratomaster Flight ?

The Stratomaster Flight employs the most accurate absolute pressure sensor available. This sensor is not cheap or simple. It starts with a tiny cavity in a silicon chip. This cavity is about ¼ mm^3 in size and contains a near perfect vacuum. It is sealed with a very thin membrane that is only a few thousand atoms thick. The air pressure on the one side of this membrane bends the membrane towards the vacuum cavity. This introduces tiny changes in the electrical properties of the membrane. These changes are measured. Temperature effects on the membrane are taken into account by measuring the temperature on the membrane and compensating for known effects. During manufacture of this sensor, the membrane is exposed to a focused electron beam that, atom by atom removes material from the membrane until the sensor reads exactly the correct value.
The Stratomaster Flight then converts this reading into digital form. But the results are not taken for granted. The Stratomaster Flight attempts to measure the signal to levels below those created by thermal noise. This electrical noise is caused by the vibration of atoms. The Stratomaster Flight knows the characteristics of this unwanted signal and eliminates errors caused by this signal. In addition, the Stratomaster Flight measures the temperature surrounding the sensor and compensates for any remaining temperature induced error. This compensation is different from sensor to sensor as it depends on tiny, remaining manufacturing tolerances of the sensors. But your instrument knows the behavior of its sensor and can correct for errors.

Once the pressure of the surrounding air has been accurately determined, how does one calculate the altitude ? Is atmospheric pressure not supposed to change with the local weather as well ?

Well, there you have it: All this accuracy and then a storm comes in and all is lost.

Back in the beginning of flight, (sometime after the Wright Brothers did the silly thing of inventing powered flight), it was thought that it would be a good idea to have some indication as to how high one was flying. Early, primitive altimeters where based on principles much like we use today but were very crude and what was more disturbing, they depended on each manufacturers interpretation as to how pressure changes with altitude.

We all know that pressure gets less as we increase our altitude. But by how much ? The American National Standards Institute and other standards bodies came up with the idea of simply dictating how the atmosphere behaves. So ANSI created the "standard atmosphere" which was valid on a "standard day". The "standard day" was decreed to be a day at mean sea level with a temperature of 15 degrees Celsius (59 degrees Fahrenheit). Further to this it was decided that the temperature would decrease at a certain rate as we increased our altitude. All of this and a portion of maths would now determine how our altimeter should work. Of course, suitable "fudge factors" were used to make the maths agree with what could be implemented using a bunch of mechanical gears.

So, the formulae to use became:

P=P_0*(1-6.8755856*10^6*H)^5.2558797

Were:

P= pressure
P_0= pressure at sea level (1013.25 mb on the "standard day")
H= height in feet above mean sea level

This formulae is used to a level of 36.000 ft (10975 m) . Above that a different formulae is used.

Now what does all of this mean to you ?

It means you have an exceedingly accurate altimeter that implements the ANSI standard in detail. It does not mean that your altitude is correct as indicated !

Your local pressure is determined by many factors, temperature and weather are only a few. All of these influence your altitude reading. Place your Stratomaster Flight on the ground and run it for a whole day. Notice slight changes in the altitude (perhaps up to 60 ft (18 m) or even more ?). These are caused by local changes of atmospheric pressure.

These are some of the reasons the altimeter has a QNH setting. This is simply a correction factor that is entered into your altimeter to correct for current local atmospheric conditions. As long as all altimeters use the same QNH they should all read the same altitude. This is all that aviation requires.

Should you be interested in your actual altitude, we recommend using a GPS. It is probably the most accurate method available today. However, it is not suitable for use on an aircraft due to the inability to display altitude according to ANSI standards and local QNH settings. It is important that all aircraft fly to a common altitude reference, **even if is not correct**.

10. True airspeed (TAS)

The Stratomaster Flight instrument can indicate true airspeed. TAS is used for most internal calculations where air distance is of importance.

What is TAS and how is it calculated ?

TAS is indicated airspeed (ASI) compensated for altitude and temperature. Often pilots ignore the effect of temperature and only take altitude into account when converting ASI to TAS. For practical purposes this is quite accurate and gives a good reflection on your true airspeed. Keeping in mind that ASI measurement is subject to errors caused by airflow around your aircraft, there seems little point in taking this calculation to absolute resolution.

Again, we have decided to use a formulae often used by pilots. This way the instrument reading will agree with what pilots are used to.

Based on Worthingtons 13th edition page 349:

Add 1.75% of IAS per 1000 ft (304.9 m) increase in altitude abvoe sea level.

We assume here that IAS = RAS (rectified air speed).

The Stratomaster Flight applies the above rule but works it at a finer resolution of 100 ft (30.5m).

11. WARRANTY

The Stratomaster Flight is guaranteed against faulty workmanship on the part of MGL Avionics for a period of 6 months from date of purchase. MGL Avionics may at their discretion decide to either repair or replace the instrument. MGL Avionics will provide free labour and parts. Courier costs and postage costs will be for the account of the purchaser.

Please note: Certain parts are subject to breakage by misuse or external influences that cannot be covered by any warranty.

In particular the following possible damages are excluded:

- LCD display – glass cracked due to mechanical damage or freezing of the liquid crystal. The LCD must not be exposed to temperatures below –20 degrees Celsius (-4 degrees Fahrenheit) or above +80 degrees Celsius (176 degrees Fahrenheit).
- Any damage due to unusual events e.g. aircraft crashes, hard landings, dropping the instrument, excessive G forces, excessive vibration.
- Exposing the instrument to incorrect power supply voltages, such as connecting the instrument to mains power supply, any voltage in excess of 30 volts DC, and any AC voltage.
- Connection of unqualified or incorrect devices. Please contact us before you connect anything unusual to this instrument.
- Destruction of the air-talk link due to connecting the unit to PC's with unconnected earth leads or leaky power supplies.
- Damage due to excessive static discharge.
- Damage due to lightning strike.
- Damage due to overpressure of any sensors, in particular ruptured silicon diaphragms due to overpressure or mechanical action.

Any signs of opening the instrument or tampering with any of the internal parts will invalidate the warranty.

MGL Avionics endeavors to repair any faulty unit whether inside or outside of the warranty period speedily and at the lowest possible cost. Your first stop in case of a malfunction should be the dealer were you bought the instrument. It may be possible to repair your instrument without it having to be shipped to us.

12. DISCLAIMER

MGL Avionics cannot be held responsible for incidents or damage by whatsoever nature caused by incorrect fuel level indication. Installation and operation of the instrument and its related parts is outside our sphere of influence and control. We do not manufacture either the fuel level sender or the fuel flow sender and are not appointed agents of either.

MGL Avionics cannot be held responsible for incidents or damage by whatsoever nature caused by incorrect readings, displays, installation or operation of the instrument.

Operation of the Stratomaster Flight instrument is the responsibility of the pilot in command of the aircraft. The pilot in command has to make himself/herself familiar with the operation and limitations of the Stratomaster Flight instrument before commencing ground or flight operations as well as all other aspects of operation.

The Stratomaster Flight intended for operation by a licensed pilot who is the holder of a MPL (Micro light pilot license) or PPL (Private Pilot license) or the equivalent thereof. The pilot should further be rated on the aircraft type on which the Stratomaster Flight is being operated.

The Stratomaster Flight not been submitted to the CAA or FAA or any of its agencies for any form of certification. Operation and installation of this instrument is subject to the relevant rules and regulations of your country and flight authority.

If any of the above is not acceptable to the pilot in command he/she must refrain from operating the aircraft or remove the Stratomaster Flight from the aircraft before commencing aircraft operations.