ULTRAMAGIC FLIGHT MANUAL SUPPLEMENT Nº37

'FUELTek' FUEL CONTROL SYSTEM

37.1 General Information

This supplement details the instructions necessary to ensure the safe operation of the "FuelTek" electronic fuel gauge designed for use with the range of Ultramagic standard fuel cylinders.

It will be kept the same numbering of the different sections with the §37.X to know at which sections correspond of the Main Manual, accepting they are substituted or appended by the indicated in this supplement.

37.1.1 Overview

The "FuelTek" electronic fuel gauge is an optional fit. It may be used in all standard stainless steel Ultramagic flight cylinders. The gauge provides some significant features not available with the mechanical gauge such as zero to 120% fuel monitoring, digital electronic readout and audio warnings at 20% and 10% fuel levels. The digital display is provided with backlight illumination allowing it to be read during low-light conditions.

When fitted, the mechanical fuel gauge is completely removed from the fuel cylinder and is replaced with a special Dip Sensor Assembly and float. A small cable fitted with 2.5mm jack plugs at each end links the Dip Sensor Assembly to a special Readout Assembly. The Readout Assembly consists of a bespoke plastic moulded box containing a rechargeable PP3 battery, an advanced electronic circuit board fitted with the electronic sensing circuitry, a digital display, a multi-function pushbutton, an audio alarm, a Battery Selector Switch, low battery warning indication and a 3.5mm jack socket to allow connection of a remote power supply.

When the fuel level in the cylinder varies, the float triggers special sensors fitted inside the dip sensor tube. This in turn provides the change in electrical signal which is detected by the electronics in the Readout Assembly. A digital indication of the remaining fuel contents is then provided on the Readout display.

The Readout Assembly is designed to be attached to an existing boss mounted on the top of the standard range of Ultramagic cylinders using a simple thumb-screw arrangement. In this arrangement, one Readout Assembly is dedicated to an individual cylinder. However, a single Readout may be dedicated to more than one cylinder, even of different capacity, using a simple switching arrangement which may be supplied by Ultramagic.

The "FuelTek" electronic Fuel Gauge Assembly may be seen in Figure 1 below.

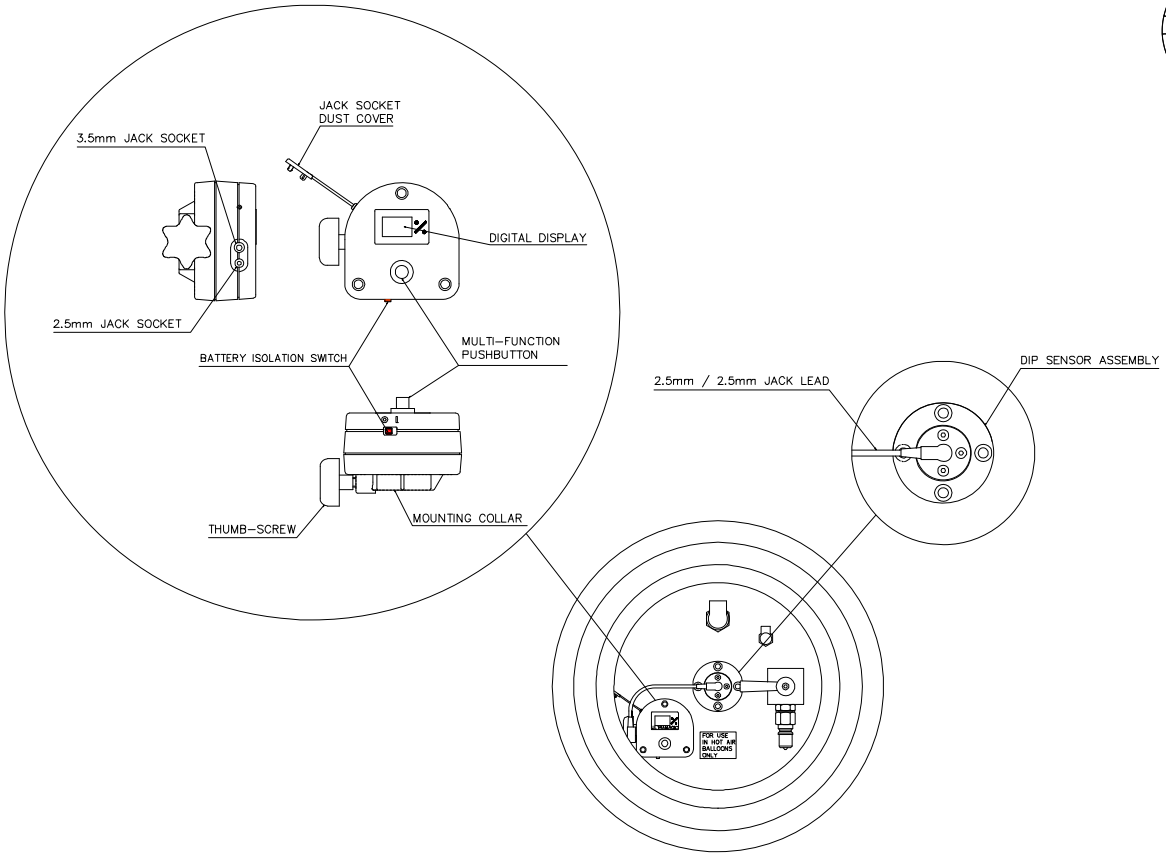


Figure 1

37.1.2 Functional Description

37.1.2.1 Setup

Prepare the equipment for use as follows:

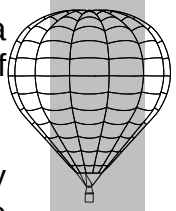
Place the Readout Assembly over the spare cylinder boss on the upper surface of the cylinder and tighten the thumb-screw to secure it in place. Ensure the Readout Assembly is secure but take care not to over-tighten the thumb-screw.

Connect the 2.5mm Jack Lead to the correct socket on the side of the Readout Assembly and connect the other end to the socket in the Dip Sensor Assembly. Ensure the connectors are fully engaged.

37.1.2.2 Equipment Features

The equipment is powered by a rechargeable 9V PP3 battery fitted inside the Readout box.

The Readout is designed to provide a digital display of the remaining fuel contents in the cylinder to which the Readout is dedicated. Note that the Readout Assembly will display the total cylinder fuel contents from zero to 100%. Fuel levels in excess of 100% will also be displayed.



The individual sensors fitted inside the Dip Sensor Assembly are mounted on a 20mm pitch. Thus the Readout display will monitor fuel contents in increments of approximately 3%.

The equipment has been designed to allow the use of the Readout Assembly with any of the Ultramagic standard 20kg, 30kg and 40kg cylinders without the need for re-calibration, provided the cylinders have been fitted with the Dip Sensor Assembly. Note that the Dip Sensor Assembly is different for each of the 20kg, 30kg and 40kg cylinders.

The display may also be used to provide an indication of approximate battery level. When the Jack Lead is disconnected from the side of the Readout Assembly, the display automatically switches to a display of approximate battery voltage in dV (decivolts).

The Readout Assembly is moded such that in the event of a failure of the 2.5mm Jack Lead such as a broken wire, the display will register zero fuel contents. This is provided as a safety measure but is only operational when the Jack Lead is fully connected to the Readout Assembly.

There are two audio alarms set to trigger when the fuel level falls to approximately 20% and 10%. The 20% alarm sounds for approximately two seconds and then cancels automatically. The 10% alarm is permanent and may be cancelled manually by the pilot by operating the pushbutton. The audio alarm takes the form of a continuous “beep”.

A “Low Battery Level Warning LED” is provided. This red LED is located behind the translucent upper cover of the Readout Assembly box. In the event that the internal battery voltage falls below approximately 8.1 Volts the LED illuminates and flashes. When the low Battery Warning LED is illuminated, the battery requires re-charging. If the Low Battery Warning LED flashes during flight a remote power supply must be connected to the 3.5mm jack socket.

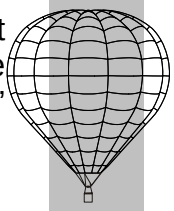
37.1.2.3 Battery Isolation Switch

The red Battery Isolation Switch is located on the lower side face of the Readout Assembly. The switch operates in two modes. The modes are determined by how the Readout Assembly is powered and are as follows:

Readout Powered by Internal Battery (No Remote Supply Connected)

When no remote supply is connected to the Readout, power is automatically drawn from the internal battery.

When the switch is in the “0” position, the internal battery becomes completely isolated and all functions of the electronic gauge are terminated. Moving the switch to the “1” position, takes the gauge into “standby” mode. In this mode, the equipment awaits further activation by the operation of the pushbutton control (see 37.1.2.4).



NOTE: In standby mode, the equipment continues to draw a very small current from the battery, even when the display is blank. It is recommended therefore that when the gauge is not in use, the Isolation switch be moved to the "0" position.

Readout Powered by Remote Power supply

When a remote power supply is connected to the 3.5mm jack socket on the side of the Readout Assembly, the unit automatically draws power from the remote supply.

When the Isolation Switch is in the "0" position and a remote supply is connected, the internal battery is completely isolated. However the unit remains powered from the remote supply and the Readout continues to operate. All battery-health-monitoring functions now relate to the remote supply. It is recommended therefore that whenever a remote supply is connected during flight, the Battery Isolation Switch be moved to the "0" position.

Note that when a Remote supply is connected, the unit cannot be completely switched off and power will continue to be drawn from the remote supply until such time as it is removed. The unit may however be switched to standby mode by prolonged operation of the Pushbutton.

When the Isolation Switch is in the "1" position and a remote supply is connected, the internal battery is no longer isolated and all battery-health monitoring functions now relate to the internal battery.

37.1.2.4 Multifunction Pushbutton Switch

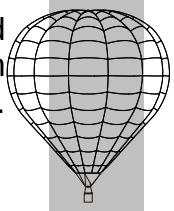
There are several functions associated with the Multifunction Pushbutton Switch.

- Gauge "wakeup". When the Battery Isolation switch is moved to the on "1" position, "press and hold" operation of the pushbutton switch (for approximately four seconds) will cause the equipment to enter "operational" mode and the digital display will be visible.

- Backlight Illumination. When the gauge is in operational mode, operation of the pushbutton switch will cause the display backlight to illuminate. The backlight will automatically extinguish after a period of several seconds once the button is released.

- Audio Alarm Cancel (10% fuel contents). In the event that the 10% remaining fuel audio alarm sounds, operation of the pushbutton switch will cancel the audio alarm.

- Audio Alarm Cancel (Jack Lead disconnection). In the event that the jack lead becomes disconnected from the side of the readout during operation, the audio alarm will sound continuously. Operation of the pushbutton switch will cancel the audio alarm.



- Return to Standby. When the gauge is in operational mode, “press and hold” operation of the pushbutton switch will place the equipment in standby mode which will be indicated by the display returning to blank. When in standby mode, the gauge functions are terminated.

37.1.2.5 Dust Cover

A dust cover is provided to protect the two jack sockets on the side of the Readout Assembly. The dust cover must be inserted into the sockets whenever the readout is not in use.

37.1.2.6 Thumb-Screw

A thumb-screw is provided on the side of the Readout Assembly. Use the thumb-screw to secure the readout to the cylinder boss.

37.1.2.7 Battery

The equipment is by default operated from a rechargeable 9 Volt PP3 battery fitted inside the Readout Assembly. The internal battery must be rechargeable. Refer to Ultramagic Maintenance Manual Supplement Number 19 for battery replacement instructions.

NOTE: Please refer to Standard Procedures concerning battery re-charging.

NOTE: In order to re-charge the battery inside the Readout Assembly, the “Battery Isolation” switch must be set to the (I) position.

NOTE: If a multiple readout charger is used, always plug the 3.5mm jack connectors to the readouts before connecting the adaptor to the mains supply.

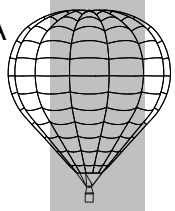
There are many different types of rechargeable PP3 batteries available in the market place. However, due to its discharge characteristics, it is strongly recommended that the battery used is supplied by Ultramagic. A battery charger is available. Contact Ultramagic for details.

37.1.2.8 Jack Socket Connections

Two jack sockets are provided on the side of the Readout Assembly box. The sockets are different sizes to prevent incorrect connection. The 2.5mm jack socket is used only to connect the Readout Assembly to the Dip Sensor Assembly using the 2.5mm jack lead.

The 3.5mm jack socket has three associated functions:

- To allow connection of an auxiliary power supply.
- To allow the connection of a battery re-charger (see Standard Procedures section).



- To provide an output for connection to a remote device such as a PDA (contact Ultramagic for details).

Auxiliary power supplies and battery chargers are available from Ultramagic.

37.2 Limitations of use

No change.

37.3 Emergency procedures

No change.

37.4 Standard procedures

If the “FuelTek” is installed, the use of filter is strongly recommended when refuelling from bulk tanks, and mandatory when refuelling from consumer or industrial cylinders. Suitable filters are available from Ultramagic.

Perform an “A-Type” inspection prior to take off as per Supplement Nr.19 of the Ultramagic Maintenance Manual, Section 6.1 (Pre-Flight Checks).

Internal battery recharging must be carried out away from fuel vapour or explosive atmospheres.

Pilot must ensure before take-off that a minimum of two working readouts are carried on board and are ready for flight.

At the take-off, all the readouts on board must have the low battery voltage warning LED off, so that a minimum life of the internal battery is warranted.

At least one auxiliary power supply must be free, available and fully charged at the take-off to power the electronic fuel gauge if necessary. For details relating to the auxiliary power supply, contact Ultramagic.

During flight, do not attempt to disassemble any part of the equipment. In the event of a flat battery, connect an auxiliary supply to the 3.5mm jack socket located on the side of the Readout Assembly box or simply replace the Readout Assembly. The auxiliary power supply must not be used for normal operation and may only be used when the internal battery has become exhausted.

The equipment may be used during cylinder re-fuelling. However, when the equipment is in the presence of fuel vapour, do not operate any of the switches or connect/disconnect the jack lead.

37.5 Loading

No change.

37.6 Balloon and Systems Description

No change.

37.7 Balloon Maintenance, Handling and Care

It is strongly recommended that the Readout Assembly be removed from the cylinder for the purposes of cylinder handling and transportation. When transporting cylinders, ensure they are orientated vertically.

As with any other electronic component, prevent its exposure to extreme conditions such as rain, moisture and extreme temperatures. It is recommended to remove the internal battery from the readout when it is stored for a long period of time.

For further details concerning maintenance and inspections refer to the Ultramagic Maintenance Manual Supplement Number 19.

37.8 Other manufacturer's equipment

NOTE: Ultramagic FuelTek system may be only used on Ultramagic cylinders.