Supplement 15 - MK 21 Burner, Butane Fuel

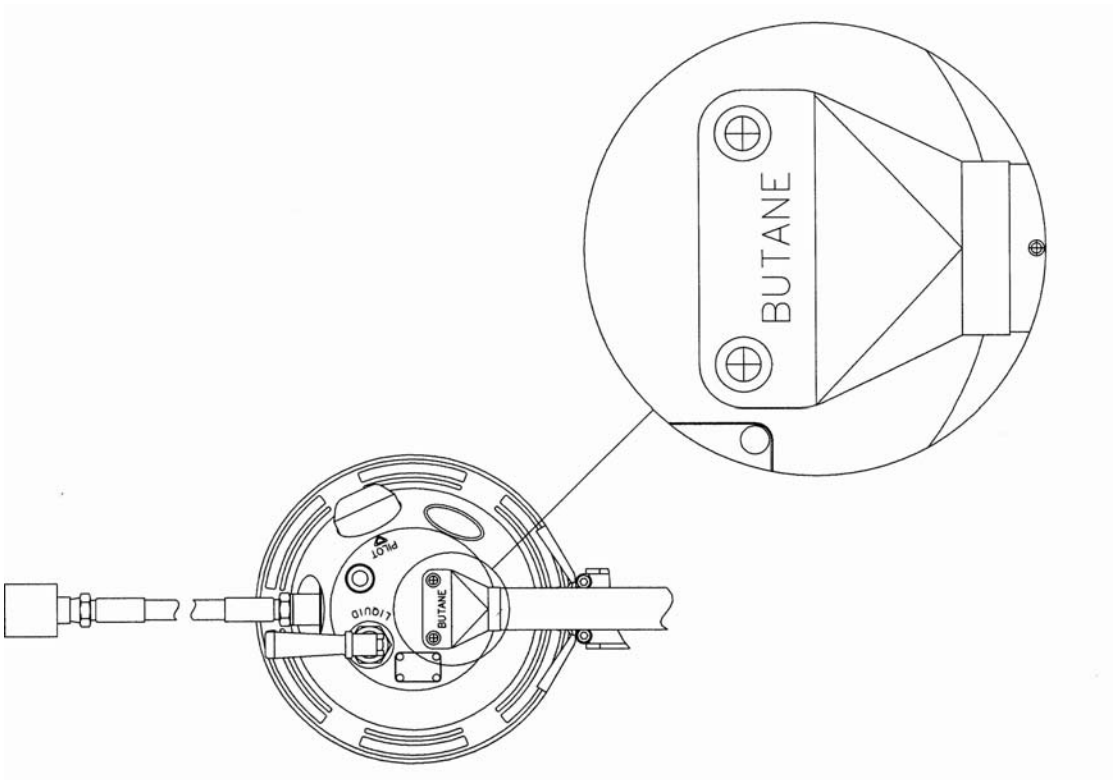
15.1 General Information

This supplement details the instructions and limitations necessary to ensure the safe operation, maintenance and continued airworthiness of the Ultramagic MK 21 Burner when configured for use with liquid butane fuel.

When specified for use with butane fuel, the burner is supplied with a different jet configuration to the standard configuration when used with propane. In addition, the jet configuration depends upon the method adopted to increase the fuel cylinder pressure.

The cylinder fuel pressure may be increased either by heating the cylinder using an electrically powered heating jacket (contact Ultramagic for details) or by the use of nitrogen, injected directly in to the cylinder. When nitrogen is used, the cylinder is considered to be nitrogen pressurised.

When configured for use with butane fuel, the burner is identified by the word “BUTANE” engraved on the handle post adjacent to the burner handle. Cylinders also will be labelled with the word “BUTANE”, when filled with butane.



15.1.1 Controls and Control Functions

No change.

15.2 Operational Limitations

15.2.1 Use of Propane

WARNING : When the burner is configured for use with butane fuel, propane fuel must not be used.

15.2.2 Use of Nitrogen Pressurised and Heated Butane Fuel

When a burner has been configured for use with nitrogen pressurised butane fuel, do not use heated butane fuel as this may result in a loss of power. Burners configured for use with nitrogen pressurised fuel are identified with a label attached to the fuel hose.

15.2.3 Cylinder Pressurisation

The fuel cylinders may only be pressurised by heating the cylinder with a suitable electrically powered jacket approved by Ultramagic or by injecting nitrogen gas. Only nitrogen gas must be used for this purpose.

The cylinder fuel pressure must never exceed 12bar.

Note that heating the cylinder causes the fuel inside the cylinder to expand. Depending upon the conditions of the fuel during refuelling, it is possible that the fuel can expand to such an extent that the cylinder vapour space be completely replaced by liquid fuel (liquid lock). Under these conditions, the pressure inside the cylinder will rise rapidly. Thus, care must be taken during the cylinder heating process to ensure that the cylinder pressure never exceeds 12bar.

15.2.4 Compatibility with MK21 Burner Electric Variant

Butane fuel must not be used with the MK21 optional fit, electrically operated main blast valve.

15.2.5 Altitude

When operating the burner with butane fuel, do not exceed an altitude of 5000m (16400ft).

15.3 Emergency Procedures

No change.

15.4 Normal Procedures

The following procedures are additional to those already contained in the Flight Manual.

15.4.1 Preparation for Flight

Since the natural vapour pressure of butane is considerably less than for propane at similar temperatures, it may be necessary to pressurise the fuel cylinders in advance of the flight. This may be achieved by injecting nitrogen into the fuel cylinder or by heating the fuel cylinders using electrically powered heating jackets approved by Ultramagic.

15.4.2 Cylinder Heating

If cylinder heating is the preferred method of achieving cylinder pressurisation, then the cylinder should be heated prior to flight using a suitable, electrically powered heating jacket approved by Ultramagic. Note that electrically powered heating jackets draw significant electrical current. It is likely therefore that an electrical spark will be generated when connecting or disconnecting the jacket from the power supply. To eliminate the risk of explosion, make sure that cylinder heating is carried out in well-ventilated areas away from fuel vapours.

After heating, the heating jacket must be removed and the cylinder must be fitted with the standard padded jacket. The padded jacket insulates the cylinder with the result that the pressure will be maintained for longer periods of time.

15.4.3 Nitrogen Pressurisation

When pressurising with nitrogen, the initial charged cylinder pressure rapidly decays as fuel is drawn from the cylinder. The decay characteristics are roughly in accordance with Boyle's Law, i.e. as the vapour space inside the cylinder doubles, the nitrogen pressure is halved. This reduction in cylinder pressure continues until the natural vapour pressure of the butane becomes the predominant factor.

When pressurising fuel cylinders with nitrogen gas, ensure the correct equipment is used. Check that the bottle contains only nitrogen. The use of different gasses can be very dangerous.

Note that cylinder pressures in excess of 8 bar will not significantly increase the burner output power but higher initial pressures will be required to ensure that the cylinder pressure remains within a useable range throughout the flight duration.

To achieve this, it is recommended that the cylinder be pressurised to a maximum of 12 bar.

Although the burner is designed to operate at low pressure, charging the cylinder to a pressure less than the recommended levels will result in low final cylinder pressures with a corresponding loss of burner output power.

15.5 Loading

No change.

15.6 Balloon and Systems Description

No change.

15.7 Balloon Maintenance, Handling and Care

No change.

15.8 Other Manufacturers Equipment

No change.