First Responders to Hot Air Balloons

How to safe the system

Goals:

- Render the balloon system safe to handle
- Understand basic Hot Air Balloon fuel systems

FIRST on the Scene

- Inquire if anyone at the scene is familiar with hot air balloon fuel systems and how to make it safe to handle. They can likely help.

The System:

- Liquid draw propane cylinders
- Inter-connecting hoses
- Burner mounted above head height on carriage

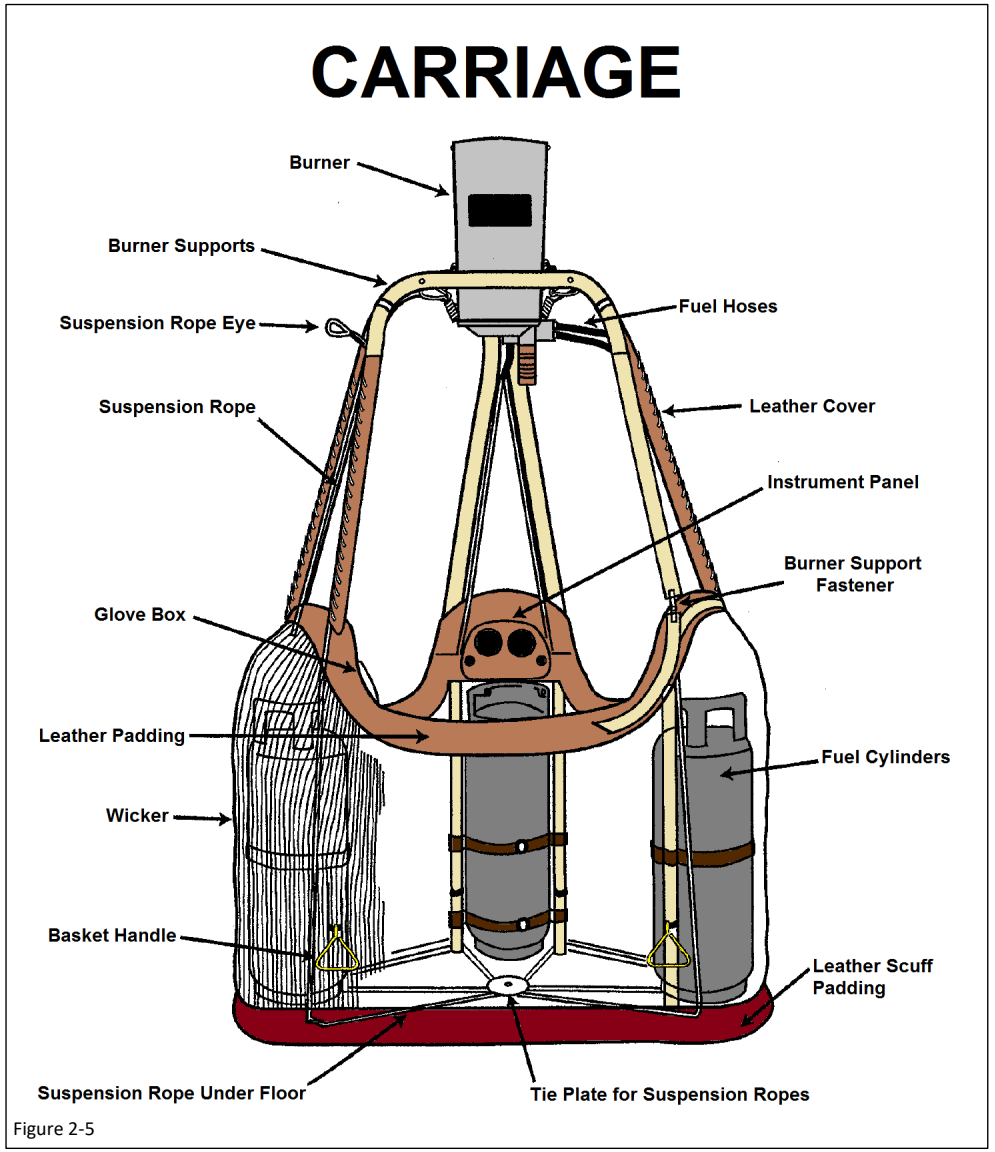


Figure 2-5

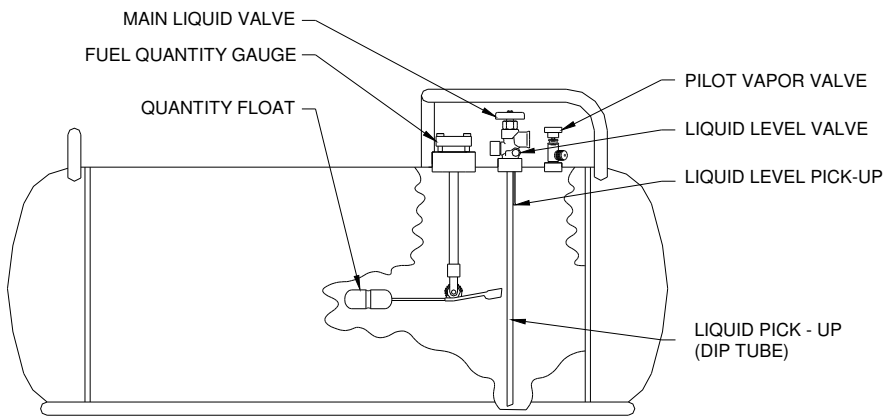
Features:

- All hot air balloon systems are designed for quick shut-down
- All use a standing pilot flame(s) within the burner
- Each tank has a shut-off valve(s) on the top or one end of the fuel cylinders
- All balloon fuel systems are inspected annually by an FAA certified repairman or A&P Mechanic.
- All are built under the FAA rules and inspection

Tanks:

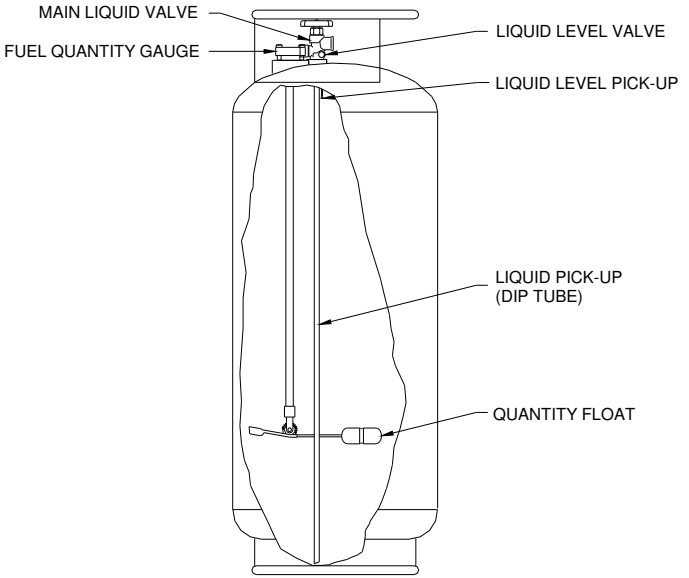
- Tanks are fabricated of Aluminum, stainless steel, carbon steel or a very few of titanium
- All are cylindrical, some horizontal while the majority are vertical
- All have shutoff valves on the top or one end.
- Some have as many as four ports, including pressure safety valve
- Valves may be angle globe, angle ball or straight ball or globe patterns
- Some small valves are toggle style
- All are FAA certified, similar to DOT

Tanks: (Aerostar)



HORIZONTAL FUEL TANKS	
H-20 -	LENGTH - 38.25” DIAMETER - 14.0”
H-25 -	LENGTH - 47.5” DIAMETER - 14.0”

Figure 1.2.2 Horizontal Fuel Tank

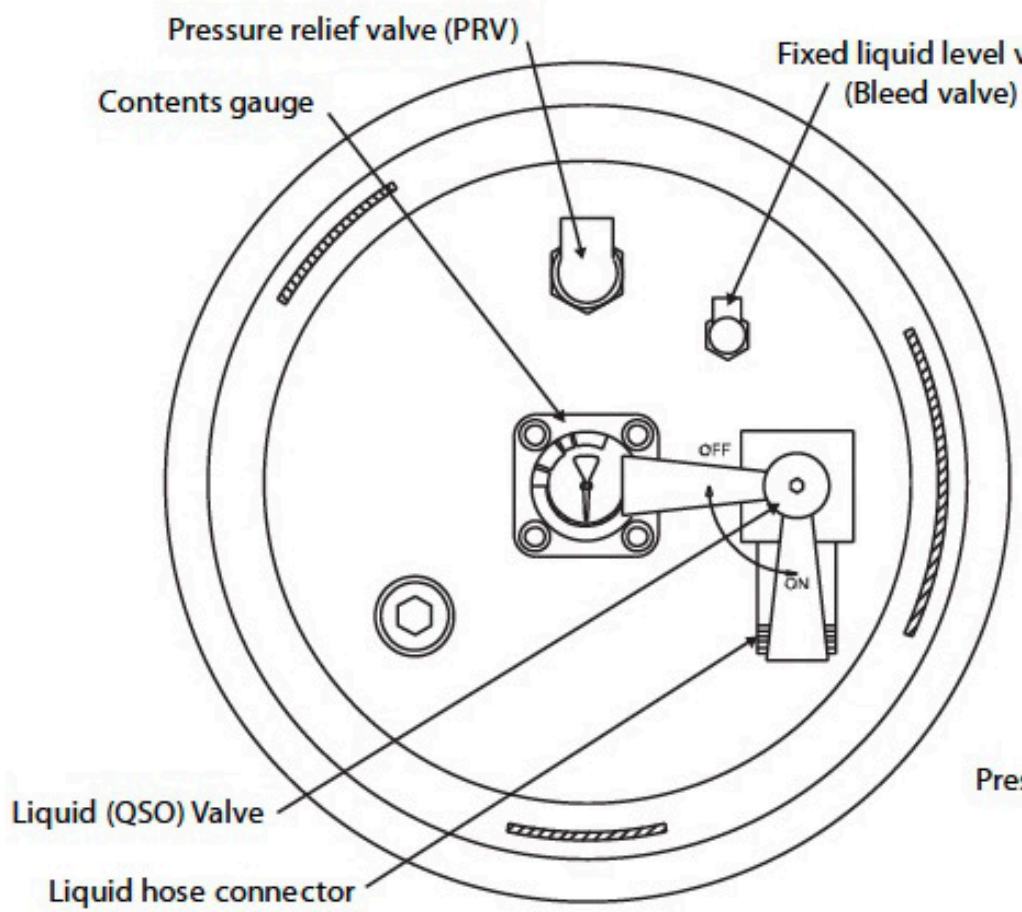


VERTICAL SINGLE SERVICE FUEL TANK	
15 GAL. -	HEIGHT – 35.0” DIAMETER – 14.0”
18 GAL -	HEIGHT – 40.25” DIAMETER – 14.0”
23 GAL -	HEIGHT – 48.375” DIAMETER – 14.0”

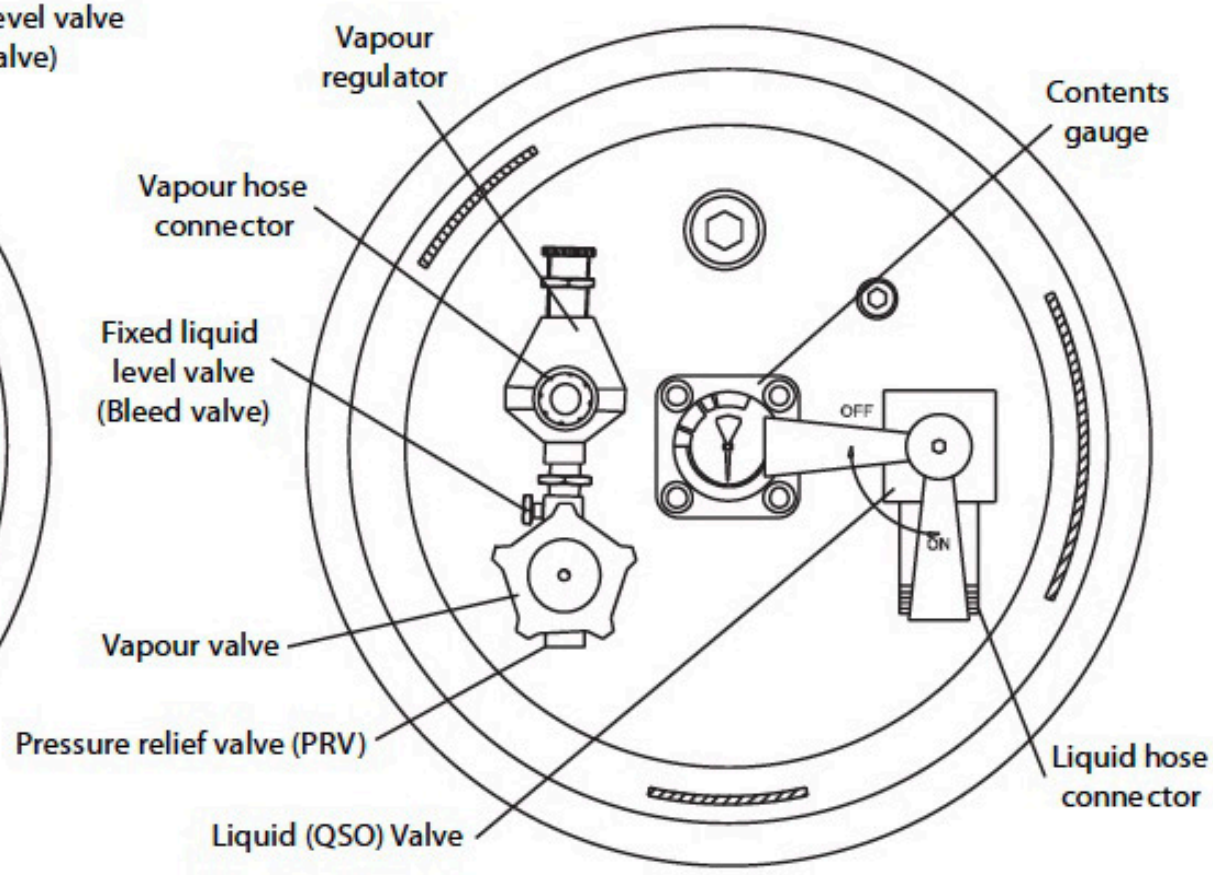
Figure 1.2.1 Vertical Fuel Tanks

Tanks: (Aerostar)

Vertical Tank Head: (Ultramagic)



STANDARD SLAVE CYLINDER



STANDARD MASTER CYLINDER

Tanks: (Ultramagic)

Bleed valve, outage gauge

Main liquid valve, angle ball

Tanks: (FireFly)

Toggle valve

Liquid valve, angle globe type

Burners:

- Nearly all have a local shut-off for the pilot flame
- Valves may be toggle, globe or ball styles.
- Pilot burners can be liquid or vapor fed.
- A few liquid fed burners have a venting valve that dumps the downstream propane to allow quick extinguishing.
- After all flame is out and feeds from the tanks are off, the trapped liquid in the hoses can be vented to cool the vaporizing preheat coils. (Aim the burner away from people and to open air if you vent off the liquid.)

Burners: Aerostar & FireFly

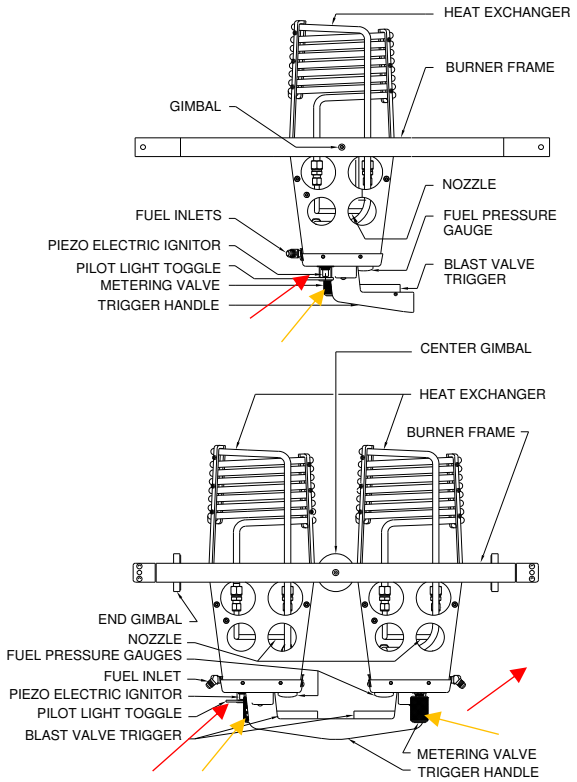


Figure 1.2.4 HPIII Single and Dual Burners
(optional glow valve not shown for clarity)

1-17

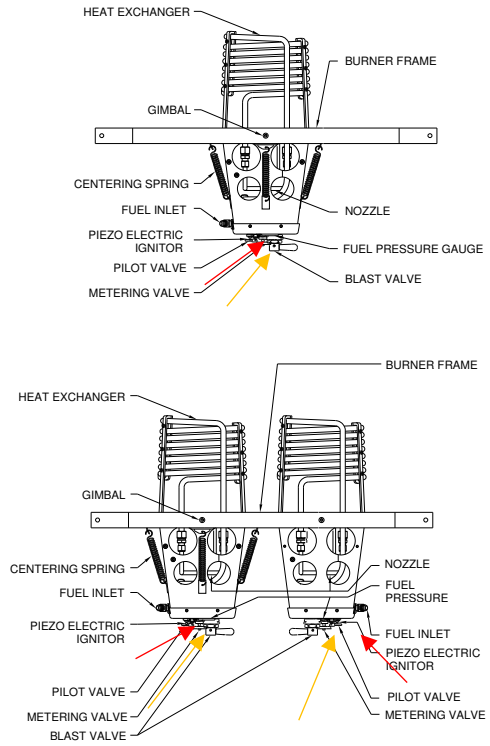


Figure 1.2.3 HPII Single and Dual Burner Systems
Note: Depiction for update burners slightly different.

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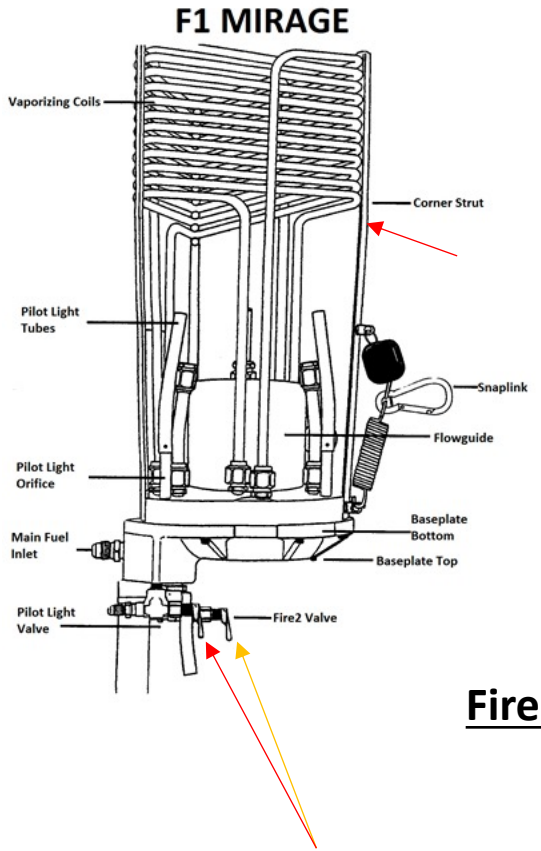
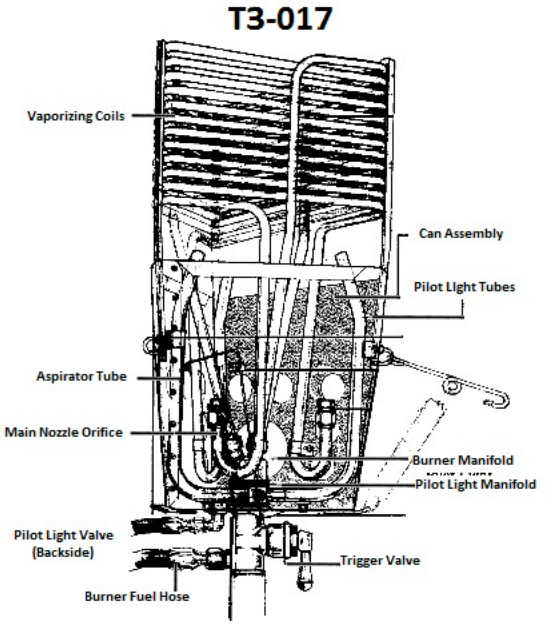
Aerostar



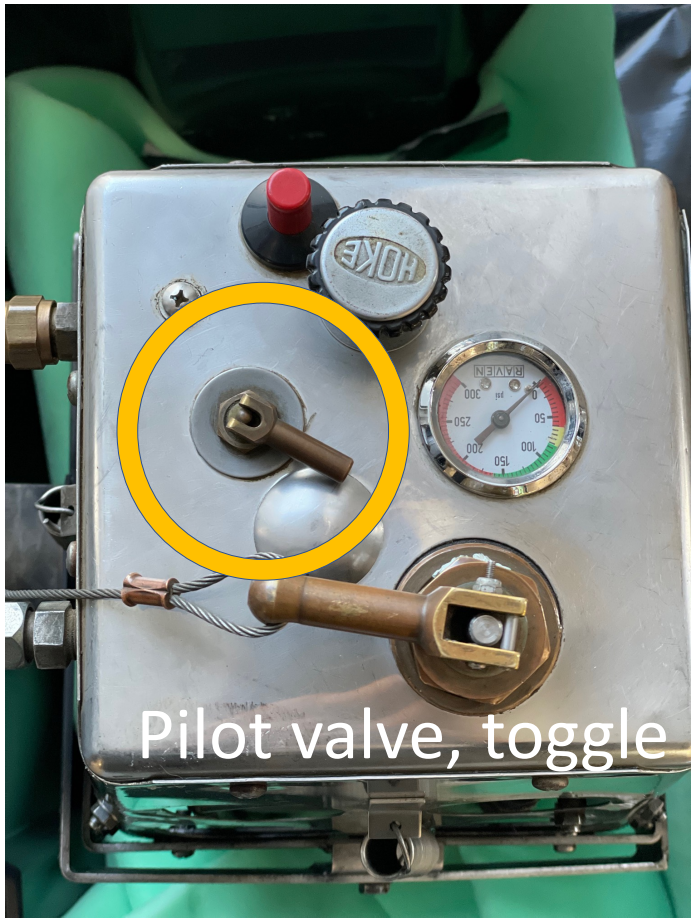
Toggle valves



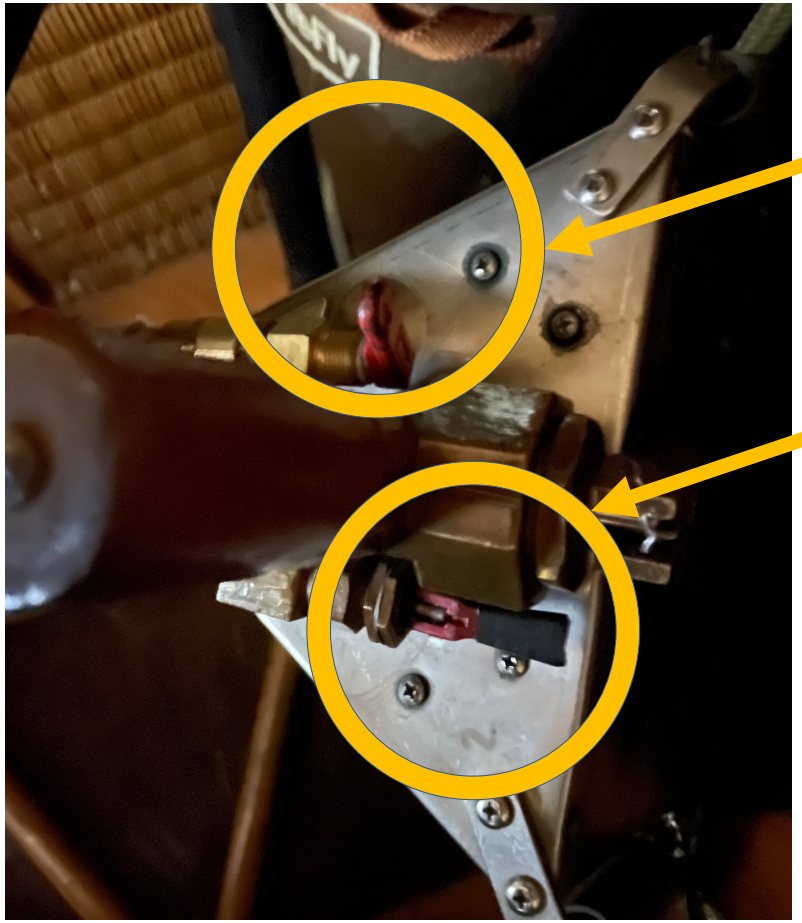
FireFly

Older model, most have toggle for pilot, some for auxiliary burner

Burners: (Aerostar)



Burner: (Fire Fly)



Auxiliary burner valve, Toggle

Pilot valve, Toggle

Model: T3-017 shown; F1 Mirage valves are similar

Burner: (Ultramagic)

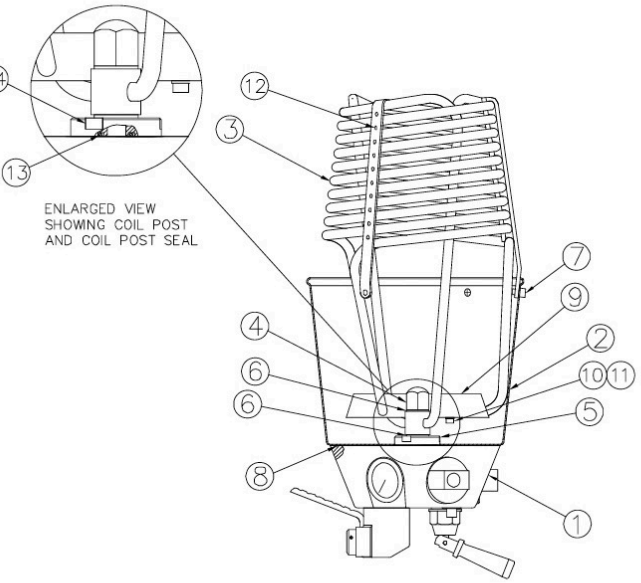


FIGURE 2
COIL MOUNTING ARRANGEMENT

ITEM	DESCRIPTION	PART NUMBER
1	VALVE BLOCK	2022-0311 (RH) 2022-0411 (LH)
2	BURNER CAN	2022-0600
3	VAPORISATION COIL	2022-0500
4	COIL POST NUT	2022-0319
5	COIL POST	2022-0318
6	3/8" BSP COPPER WASHER	MA-FE-0610
7	M6 X 8 CAP HEAD SCREW	MA-FE-0506
8	169 ID X 1.5 NITRILE "O" SEAL	MA-FE-0601
9	JET RING	REFERENCE
10	M5 X 5 CAP HEAD SCREW	MA-FE-0507
11	M5 COPPER WASHER	MA-FE-0611
12	COIL SUPPORT SCREW	MA-FE-0508
13	COIL POST "O" SEAL	MA-FE-0612
14	M6 X 10 CAP HEAD SCREW	MA-FE-0509

04 Rev. 10 ULTRAMAGIC, S.A

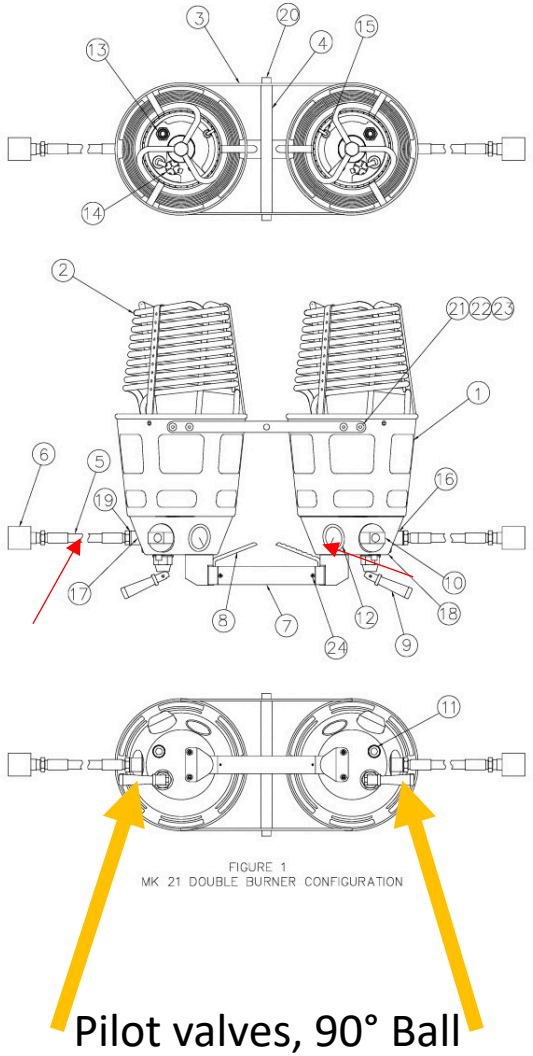


FIGURE 1
MK 21 DOUBLE BURNER CONFIGURATION

Pilot valves, 90° Ball

ITEM	DESCRIPTION	PART NUMBER
1	BURNER CAN	2022-0600
2	VAPOURISATION COIL	2022-0500
3	SUPPORT BAR	2022-0012
4	CROSS TUBE ASSEMBLY	2022-0002
5	FUEL HOSE ASSEMBLY	2022-0001
6	FUEL CONNECTOR	REFERENCE
7	HANDLE TUBE	2022-0011
8	MAIN VALVE ASSEMBLY	2022-1200 (LH) 2022-1400 (RH)
9	LIQUID VALVE ASSEMBLY	2022-1100
10	PILOT REGULATOR VALVE ASSEMBLY	2022-0800
11	IGNITER ASSEMBLY	2022-0900
12	PRESSURE GAUGE ASSEMBLY	2022-1300
13	LIQUID FIRE JET ASSEMBLY	2022-1000
14	PILOT LIGHT ASSEMBLY	2022-0700
15	SLURPER TUBE ASSEMBLY	2022-1500
16	FUEL INLET POST	2022-0313
17	LH VALVE BLOCK	2022-0411
18	RH VALVE BLOCK	2022-0311
19	3/8" BSP BONDED SEAL	MA-FE-0600
20	M10 X 55 ST STL CAP HEAD SCREW	MA-FE-0512
21	M6 X 15 ST STL CAP HEAD SCREW	MA-FE-0513
22	M6 ST ST AEROTITE LOCK NUT	MA-FE-0510
23	M6 ST STL PLAIN WASHER	MA-FE-0511
24	M3 X 6 ST STL C.SINK SCREW	MA-FE-0514

Burner (Ultramagic)

Pilot valve, ball

Okay, the fuel is off, now the envelope…

- All have means to deflate and use a line from the interior.
- Use the thickest line, it’s most likely to the main valve at the top.
- If you pull a smaller turning vent line, deflation will just take longer.
- Keep in mind that the envelope will engulf a lot of space when it comes down. Consider having another person pull the crown line to the side to leave the basket area accessible. GET HELP

Envelopes:

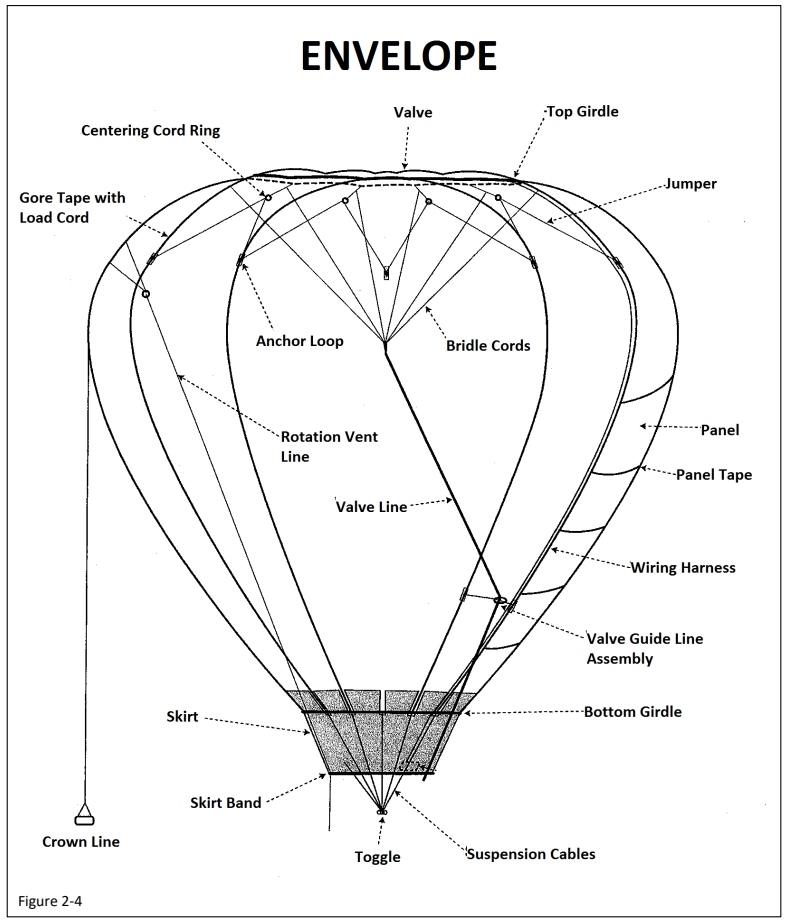


Figure 2-4

The **PARACHUTE TOP** design, figure 1.1.2, employs a parachute style panel covering the deflation port. Cords spaced equally around the circumference of the panel and fastened to the envelope wall will center the parachute and prevent it from exiting through the deflation port. Another set of cords from the edge of the panel is gathered together below the center of the panel and extends with a single line to the basket. Deflation is accomplished by pulling on the line, separating the parachute top from the edge of the deflation port, and allowing the hot air to escape from the envelope.

Venting on parachute top deflation system is accomplished by pulling on the deflation line for a short period of time. When the deflation line is then released, internal envelope pressures will cause the parachute top to close.

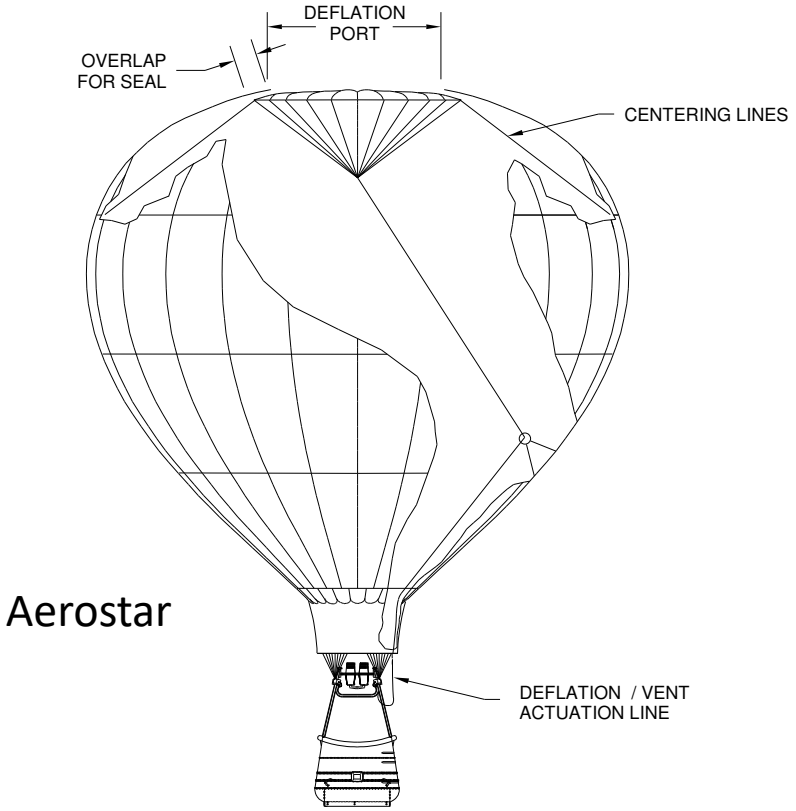


Figure 1.1.2 Parachute Top Envelope Design

Thank You___

- All of us that fly and handle balloons hope you will never need to use this knowledge

- If there is an occasion where there is an emergency and no one else is available that can make the system safe, this information will help you avoid risk of unintentionally actuating a 10 million BTU heater.