A good rule of thumb is to take no more time than is necessary to complete the fill. This is especially true in windy conditions.

Launch

With the use of a checklist, confirm that all required equipment items and pilots are on board. A launch master is usually assigned to direct removal of excess inflation ballast until the system is neutrally buoyant. Desired ascent rate determines how much additional ballast is removed to attain the proper amount of positive buoyancy. The launch master should be an experienced gas balloonist and direct crew to allow the balloon to rise several feet off the ground several times to test the buoyancy before instructing the crew to bring it back to the ground one last time before final release. If the ascent rate is too slow, additional ballast are removed until the proper rate is achieved. After a final check for airspace clearance above, the "Hands off!" command is given and the balloon is allowed to fly free. *[Figure 11-10]*

Figure 11-10. *A gas balloon, shortly after the weigh off procedure, ascends into the sky.*

Inflight Procedures

All other things being equal, a gas balloon's natural tendency is to find its equilibrium altitude and to fly level at that altitude. By contrast, a hot air balloon's natural tendency to descend must be counteracted with periodic infusions of heat. In a gas balloon, pilot action is only required to initiate or arrest an ascent or descent or to counter atmospheric or other disturbances. A gas balloon may fly for an hour or longer with no intervention by the pilot. Pilot initiated altitude changes with gas balloons tend to occur at a slower rate over a longer time period as compared to hot air ballooning.

Ascents are initiated by jettisoning ballast (usually sand or water) while descents result from releasing lifting gas from a valve at the top of the envelope.

Significant midflight altitude changes are often undertaken as part of a long-term strategic plan rather than for short term tactical reasons. The consequences of any maneuver should be considered carefully before being undertaken. It is often stated that ballast is the fuel of a gas balloon and well before all ballast has been expended, the aircraft must be safely back on the ground. Use of large amounts of ballast to execute a major ascent invariably shortens the potential duration of a flight.

For example, in a distance competition, an ascent from the surface to 12,000 feet MSL may be executed to enter more favorable winds. This may take 1 hour to accomplish but that altitude may then be maintained for the next 8 hours if weather conditions are stable.

Two additional concepts that must be understood to pilot gas balloons are solar heating and lifting gas purity.

Solar Heating

Solar heating (also called super-heating) occurs when the heat of the sun is trapped inside the balloon's envelope and causes the temperature of the lifting gas to exceed the outside air temperature. As the heated lifting gas expands, one of two things will happen. If the envelope is flaccid, the less dense gas occupies a larger fraction of the envelope's volume and displaces more air and the system's gross lift temporarily increases. This causes the balloon to rise towards its pressure ceiling and it also temporarily causes the pressure ceiling to drop. When the envelope becomes full (i.e., reaches its pressure ceiling), gas is expelled and a new ceiling is established.