THE AIRSHIP:

An Idea That Lifts Vertically "Out of the Box"

Cmdr. H. C. Schramm, USN

What is old can be new again: Lighter-than-air craft have returned to the Navy in the form of the airship MZ-3A. Airships could fulfill a wide range of missions and once again take their place in the fleet. (Photo by Naval Research Laboratory)

If you want to have a new idea, read an old book. The old books I've been reading lately are about airships. They made me wonder if there is a future for airships in the Navy. I asked myself, "if someone handed me an airship and told me to employ it, how would it be useful? The last time the Navy had airships in any number was back in 1961. Today, the Navy operates a single major airship test program, the MZ-3A, which is currently funded on a one-year contract through the U.S. Army and based at Aberdeen Proving Grounds, Md.

I am a helicopter pilot with approximately 2,200 flight hours. When I first heard the suggestion that we bring airships back into the fleet, I had to suppress a small giggle. Airships—as in clip off your right wing? After some discussion—and a bit of research—I stopped giggling. I came to the unexpected conclusion that airships should be considered as a future component of Naval Aviation.

Aside from being a pilot, I'm also an operations analyst, and this article constitutes my professional opinion as both. There is wide variance in the claims of future capabilities for airships; many of the high-end estimates originate from an advocacy position. My assumptions are:

- Long endurance: Airships—with endurance conceivably on the order of weeks—can truly "loiter" in a way that heavier-than-air craft cannot.
- Fuel economy: Because they do not need to burn fuel to remain aloft, they are more fuel efficient.
- Moderate speed: They can attain a top "sprinting" speed of 160 knots indicated air speed (KIAS) and a cruising speed on the order of 60 KIAS.
- High altitude: It is possible to have airships reach high altitude—greater than 60,000 feet—with the understanding that substantial penalties are paid by the physics of high-altitude lifting as well as the additional weight of very-high-altitude life support.
- Cargo capacity: An airship can conceivably carry as much as a C-2 Greyhound, roughly 10,000 pounds.
- Hover ability: Although airships can be neutrally buoyant at any altitude, effects such as wind, turbulence, or the pick up/drop off of personnel or cargo will require some force to keep the airship in place.
- Safety: Because airships are lighter than air they have two potential safety advantages over other aircraft. First, they are less prone to controlled flight into terrain/water because they do not seek the ground in unpowered flight. Second, because they do not require power to remain aloft, running out of fuel does not mean they need to land immediately.
- Stealth: With appropriate design adjustments, an airship can be made stealthy, but this will require considerable thought. A low-signature airship will likely be very slow, but a fast airship will likely have a high signature.

There are a few things we do not credit airships with at this time:

- Aggressive maneuver capability (specifically, high g-loading): No break turns in the airship.
- Full shipboard compatibility: It will be difficult to perform extensive maintenance or hangar an airship under way, although they may be able to experience non-hangared maintenance (similar to "daily/turnaround" inspections.)

If someone handed me a platform today with some mix of the capabilities listed above and said "go use this," here are some applications that come to mind:

Large-Deck Search and Rescue

An airship can execute permissive search and rescue, such as plane guard. During carrier operations, the requirement to refuel and re-crew a helicopter creates a "break" in the deck cycle, slowing operations. An airship with long endurance would be able to stay aloft during the entire flight operations cycle. With appropriate design, it may act more like a small airborne ship than an airplane, with crew and supplies for several days of operations aboard.

Assuming a hover capability, we can be nearly certain that the noise and downwash from an airship will be significantly less than a helicopter, simplifying recovery for both the downed pilot and the swimmer. Even without a hover capability, it may be possible for an airship to land, or "alight," in the water near the downed personnel and recover them like a small boat. Helicopters and other solutions will still be required for tactical recovery of aircraft or combat search and rescue missions.

Fleet Logistics

An airship can perform non-combat logistics missions currently performed by large helicopters and C-2s. Airships are assumed to be alighting compatible with carriers and amphibs. They will almost certainly be incompatible for landing with small surface combatants such as CGs, DDGs, and LCSs. That's okay— current logistics mission platforms (C-2 and H-53) are not compatible with these ships either. The efficiency airships bring to logistics is that they will have practically unlimited loiter time and thus give an air boss greater flexibility on when and how to cycle them. Airships can simply wait until it is convenient for the ship to recover them. Cost savings therefore may be realized both by the lower operating costs (and, admittedly, lower speed) of the airship as well as by the increased efficiency by the rest of the wing.

Command and Control

An airship can be used as a persistent communications relay, manned or unmanned (i.e., an aerostat). As a "CIC in the Sky," an airship can have a larger crew than an E-2 and more space for computers, displays, and general habitability. The reduced noise and vibrations of an airship would increase controller effectiveness. An airship "running quiet" with engines off also may be more difficult to detect than a conventional aircraft. Again, the loiter time of the airship is long, allowing for multiple crews, multiple days, and for the command-and-control functions to be away from the carrier's deck. A closely related mission is persistent surveillance over fixed points or convoys, a role airships filled during World War II. With appropriate sensors, this could be expanded to anti-submarine warfare and early detection of small, fast surface combatants.

Mothership for UAVs

If carrier/unmanned aerial vehicle (UAV) integration is a concern, we may want to consider operating UAVs from airships. Recovery may be affected by flying the UAV at low (relative) airspeed into a net, or more traditionally recovered on a carrier or other ship for transfer to the airship. Launching a UAV from an airship aloft at sufficient altitude does not require catapults—the UAV can be launched by being released (dropped) in a dive and pulling out when flying airspeed is reached.

Carrier aviators will note that the end result of these potential mission areas for the airship is to help take everything that's not a jet off the carrier. For airships to be viable options for the fleet, a few issues need to be worked out:

- Maintenance: Shipboard hangar compatibility is probably infeasible. Therefore, airships should be designed such that they would not need to land or have extensive maintenance for extended periods of time. They also should have maintenance support in theater for practical voyage repair.
- Organization: An airship is just what the name implies—a ship that moves through the air. When thinking about them, it's not at all clear if they should be considered as ships or as airplanes for command and organizational purposes. This uncertainty speaks to their flexibility.

In conclusion, while there are a number of engineering challenges to be overcome with employing modern airships, the greatest difficulty may be cultural—accepting the "one wing" fliers back into the fleet. These difficulties notwithstanding, if someone handed me an airship today and said "go fly this," I would be able to find a number of useful, tactically relevant places to use them. Airships need to be considered—seriously—as part of our future aviation force.

Cmdr. Schramm is a member of the military faculty at the Naval Postgraduate School operations research department. *The author would like to thank retired Navy Capt. Jeff Kline for his assistance with this topic.*