

# Starscope

at sea

Monday, March 14, 1994

Voice of America's Flagship

Vol. 1, No. 20

## Laser beams guide aircraft to safe landing on Connie

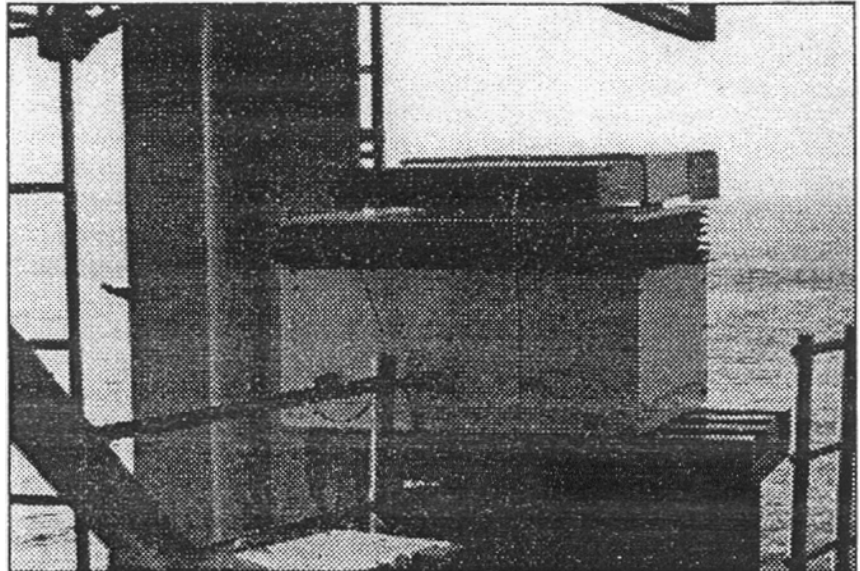
By J03 Jason Emerson

It's a scene right out of the movies. A Mafia hitman, armed with a nickel-plated .38, stalks his victim through an abandoned warehouse. His gun has a steel cylinder mounted to the top of the barrel, and radiating from that is a thin red laser beam. The scene shifts and we see the face of the guy hiding. Sweat pouring, eyes wide -- then suddenly a red dot on his forehead. BAM! He doesn't even know what hit him. No matter how bad a shot the hitman is, there's no missing with the laser sight.

That same principal is used on Constellation, only instead of gun sights, the lasers are used to land aircraft. Constellation is currently the only carrier to use this revolutionary system.

The Laser Centerline Localizer (LCL) is a long-range line-up system for aircraft on landing approach. Pilots are able to align their planes to laser beams generated by the LCL from distances greater than 10 miles. This new system augments the Fresnel Lens Optical Landing System (FLOLS).

When a pilot is on landing approach, he must be aware of several important guides: the size and perspective of the carrier, the centerline and marginal lines outlin-



The LCL sits at the stern of the ship, just below the flight deck. It generates lasers which help pilots in long-range centerline alignment. The LCL is a significant improvement to the safety of night flight operations.

ing the landing area and the FLOLS. He must take in to account all these visual pictures and adjust his aircraft accordingly. There are also several factors which can become dangerous in an instant.

Carrier landings aren't described as "controlled crashes" for nothing. An aircraft on approach is going very fast, has a lot of momentum and a relatively slow control response in the short distance between it and the ship. And the ship sometimes presents the pilots with an unstable platform, as it is constantly moving and turning during flight operations.

Even a small "drift" from the

plane's proper alignment can result in a dangerous misalignment to the arresting cables and landing area.

"(The LCL) is especially nice for the right heading for recovery," said Lt. Cmdr. Tom Gurney of VFA-151. He was a test pilot for the system at Lakehurst and Pax River. "Everytime the ship turns, you've got maybe two or three controllers down there trying to tell everyone what's going on. With the lasers, you can tell right away."

The LCL improves the safety of flight operations at night or in bad weather, when visual guides are absent or impaired. Un-

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# LCL system lights up night skies for aircraft on approach

## "Laser," from Page 1

der these conditions, the FLOLS' effectiveness is limited to under two miles.

That's where the lasers come in. At night, a pilot can see a laser miles before he even sights the carrier.

The LCL projects three different colored beams so the pilot can determine his position with respect to the centerline of the flight deck. Yellow means he's on centerline, red towards port and green towards starboard.

The pilot first sees the beams when he is on a course that is approximately a right angle to the carrier. As he's on initial approach he sees a rapidly-flashing red light. That's the signal to him to initiate a turn.

When he's nearly finished with his turn, he should see a steady red light, and as he completes the turn, the light will turn yellow, his signal that he's on centerline.

With the lasers as guides, if the pilot flies off course or the ship turns, he knows imme-

diately,

"If one minute you're on an amber and all of a sudden you're looking at a green or red, you know the ship turned, and you can take action immediately," Gurney said.

The LCL is a long-range system. It doesn't take the place of visual cues when the pilot's in close to the carrier. Once the pilot is three-quarters of a mile from the ship, the LCL beams disappear from the pilot's view. This is done so they don't distract his attention from the normal visual guides.

"The LCL gives the pilots a start," said Dr. Alan Vetter, Ph.D. Dr. Vetter is the senior partner of the company which built the LCL, and was a major contributor to its existence. "Once the pilot's 'called the ball', his attention is on the Fresnel system. Our business is done at three-quarters of a mile."

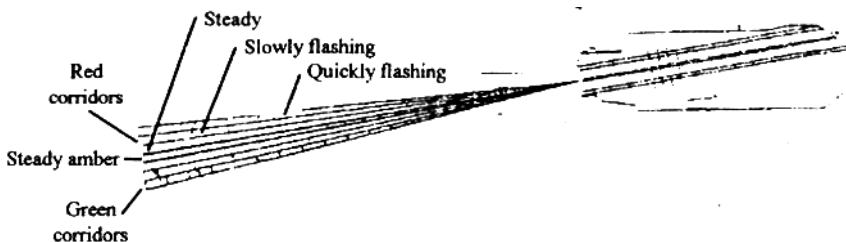
Aircraft can also lineup from long distances using the Instrument Landing system (ILS). That leaves the ship vulnerable, however, to detection of the electronic emissions. Also, if an aircraft's

radars become disabled, the ILS is useless to him.

The beams produced by the LCL have a major tactical advantage over the ILS. The LCL provides signals for a night EMCON (no radio, no radar) approach, which is paramount during wartime exercises.

In field tests performed with the LCL, pilots were able to consistently line up at a range of six miles, starting from their very first approach. Lt. Cmdr. Gurney said he's lined up as far as 13 miles out using the lights. The LCL is 'on loan' from Dr. Vetter during its experimental stage. He and his company receive no money for the LCL's use on Connie. He said eventually all carriers will incorporate it.

The LCL is an extremely precise landing aid which will redefine the nature of night aircraft carrier flight operations. In addition to the Navy's mission, these new landing aids can benefit civilian flight operations, particularly at night and in marginal weather. They will also find uses in aerial refueling and spacecraft docking.



The LCL system produces three different colored lights -- red amber (yellow) and green. When a pilot first intercepts the LCL signal, he sees a flashing red light and initiates a turn. As he completes the turn, he is in the amber corridor, right on centerline. The LCL is currently on loan from Dr. Alan Vetter, Ph.D., of the Humbug Research Laboratories.