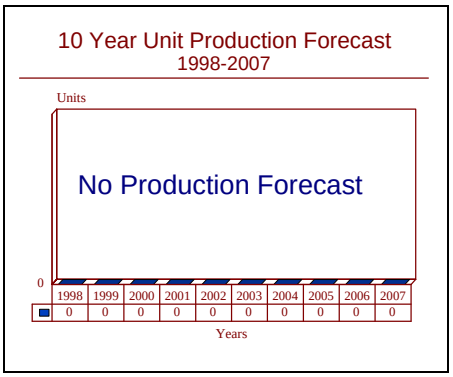
LTN-211/LTN-311 - Archived 11/99

Outlook

- LTN-211 and LTN-311 out of production, out of service
- Omega navigation defunct, replaced by GPS
- **THIS REPORT WILL BE ARCHIVED NEXT YEAR (1999)**



Orientation

Description. Omega/Very Low Frequency (VLF) navigation systems.

Sponsor

US Navy
Naval Air Systems Command (NAVAIR)
Jefferson Plaza Bldg. 1
Washington, DC 20361
USA

Contractors

Litton Industries
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Status. Production complete; out of service.

Total Produced. An estimated 4,900 LTN-211s and 1,300 LTN-311s were produced.

Application. Various military surface vessels, military aircraft, and commercial aircraft.

Price Range. Contractual information has not been specific enough to determine unit prices; however, a good reference point can be found in the May 1990 issue of *Business & Commercial Aviation*, which listed the price of the LTN-211 at about US$46,800, and that of the LTN-311 at about US$46,400 (in 1990 dollars).

Technical Data

Design Features. The LTN-211 Omega/VLF system consists of three units: the receiver/processor; control/display; and antenna coupler. Processing is handled by a TMS 9900 second-generation microprocessor that has a capacity of about 393K of ROM. Output includes track, heading, drift angle, ground speed, cross-track, track-angle error, present-position in longitude/latitude, waypoints, time-to-go, desired track, wind, signal quality and station status.

The receiver/processor is 7.5 in x 7.6 in x 19.6 in, with a weight of 26 lb. The control/display unit is 5.75 in x 4.5 in x 6.2 in and weighs 3.8 lb. The antenna is 18 in x 10.5 in x 1.75 in, with a weight of 8 lb.

Operational Characteristics. The basic LTN-211 uses signals of the three standard Omega frequencies: 10.2 kHz; 11.33 kHz; and 13.6 kHz. This set can be equipped, as an option, to also function in the 11.05 kHz frequency band. This fourth frequency is used in conjunction with a VLF converter to process signals from the VLF transmitters operated by the US Navy at sites in England (two stations), Japan, Australia, and in the US states of Maryland, Hawaii, Maine and Washington.

The LTN-211 receives signals from all eight Omega worldwide stations (at North Dakota [US], Hawaii [US], Norway, Liberia, La Reunion, Argentina, Australia, and Japan), as well as from the Navy VLF chain. The set automatically selects the three most accurate signals and uses these to determine the vessel's or aircraft's position. The TMS 9900 microprocessor computes position, and when initially programmed with date and time, it will compute the speed, distance and time of any position based on data obtained in previous position updates.

Variants/Upgrades

LTN-311. The LTN-311 is the follow-on to the LTN-211. Its compact control/display unit includes a 15-inch-high active display screen that has a capacity of eight lines of 16 LED characters. Also included is an alphanumeric keyboard, four soft keys, and a full menu-driven scenario. The computer and memory are combined on a single card that handles both the memory and processing roles. A spare card slot is included for possible incorporation of Litton's single-card MicroNav GPS. Addition of the MicroNav capability was to provide not only an enhanced navigation capability, but also dual-system operation at minimal cost.

Program Review

Background. Litton Industries began development of the LTN-211 in 1975 to provide a navigation receiver that could use the Omega very low-frequency (VLF) stations for worldwide navigation using the eight Omega stations located in North Dakota (US), Hawaii (US), Norway, Liberia, La Reunion, Argentina, Australia, and Japan. This pattern provides VLF navigation signals from at least three stations to triangulate position anywhere in the world.

The LTN-211 was originally designed primarily for commercial airline navigation across long oceanic routes; the US Navy conducted several RDT&E programs, and determined that the LTN-211 was suitable for surface vessel navigation, in addition to a variety of aircraft platforms. Its accuracy and dependability were indicated by the fact that the LTN-211 was certified by the Federal Aviation Administration (FAA) in 1979 as the sole navigation aid for flight over the North Atlantic. This certification was applicable to several airlines operating Boeing 707s and 727s and Douglas DC-8s, requiring dual LTN- 211s in all cases.

The LTN-311 was introduced in 1985, the same year that the first LTN-211s were installed into US Navy ships. Depending on the class, some ships may have had as many as four LTN-211 sets operating simultaneously, providing primary and immediate backup systems. Backup receivers could be tuned to specific stations to cross-check position against automatically selected VLF transmitters. According to Litton, the Navy continued to procure LTN-211s for installation in a variety of aircraft after procurement for surface vessels was complete.

Procurement of the LTN-211/311 extended beyond the US. In fall 1988, China Eastern Airlines and China Northern Airlines selected the LTN-311 for their MD-80 aircraft. Soon after, France announced that it would fit the LTN-211 to its new C-130 aircraft.

The LTN-211 was fitted aboard the following transport and business aircraft: Boeing 707, 727, 737, and 747 series; British Aerospace HS-125; Cessna Citation; CH/RH-53 helicopters; Dassault Falcon; Fokker F-27; Gulfstream II and III; Lockheed C-130, L-1011; JetStar; McDonnell Douglas DC-8, DC-10, MD-80 and MD-82 series; P-3C ASW; and was offered with the ASW version of the De Havilland Dash-8. The LTN-311 saw service on Boeing 727, MD-80, DC-10, Antonov 32 aircraft.

The advent of the global positioning system (GPS), however, rendered Omega navigation obsolete. By the mid-1990s, the Omega ground stations had been decommissioned and systems like the LTN-211 and LTN-311 were no longer viable technologies. Production of both ended by around 1996, according to Litton.

Funding

Funding specific to the LTN-211/311 is not broken out, as the equipment is no longer in service.

Recent Contracts

No recent contracts were identified.

Timetable

Month	Year	Major Development
	1975	Litton began LTN-211 development
	1979	FAA certified LTN-211 for transatlantic commercial aircraft, sole navigation source
	1980	Navy conducted RDT&E program
	1983	Navy purchased units for aircraft
	1985	First operational ship units installed by Navy LTN-311 introduced
	1987	Peru ordered LTN-311s for its An-32 transport aircraft
	FY87	LTN-211 installations onboard CH-53 A/D/Es and RH-53Ds completed
Fall	1988	LTN-311 selected by China Eastern Airlines and China Northern Airlines as standard fit on their MD-80s
Dec	1988	French announced that LTN-211 will be fitted to its new C-130s
	1996[(a)]	Production of LTN-211 and LTN-311 complete; Omega ground stations decommissioned

[(a)]Estimated

Worldwide Distribution

Customers for the LTN-211 included military and/or commercial users in the **US**, **China**, **France**, and **Saudi Arabia**. The LTN-311 was purchased by military and/or commercial entities in the **US**, **China**, and **Peru**.

Forecast Rationale

The LTN-211 navigation set utilized only Omega technology, which entered obsolescence with the birth of the global positioning system (GPS). The LTN-311 incorporated a GPS capability, and its unit price compared favorably to its predecessor. However, the decommissioning of the eight Omega transmitter stations ensured that not only would this line of systems exit production, but they would no longer be serviceable.

There will be no further production of the LTN-211/311. This report has been issued for the last time in 1998, in order to incorporate final corrections and updates. It will be archived next year (1999).

Ten-Year Outlook

The program has ended permanently. **THIS REPORT WILL BE ARCHIVED NEXT YEAR (1999)**.

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