

Frequency Hopping Multiplexer (FHMUX)



Overview

Northrop Grumman's Frequency Hopping Multiplexer (FHMUX) is a four radio to one antenna multicoupler developed for the U.S. Army Communications Electronic Command (CECOM) as an accessory to the Single Channel Ground-Air Radio System (SINCGARS) tactical VHF frequency hopping radios deployed by the US Army and other military elements.

FHMUX simultaneously reduces the number of antennae required on a command and control platform while suppressing and managing the effects of cosite interference on collocated radios.

These combined FHMUX capabilities serve to reduce the visual antenna signature of command and control assets making them a less vulnerable target, reduce command post set-up and teardown time, and maximize the communications range of collocated radios making command and control more effective.

FHMUX supports a variety of users in tactical command and control environments including combat vehicles and command post shelters where multiple radios must operate in close proximity.

FHMUX is currently in production and supported with over 3,000 systems delivered to the US Army, US Navy, and international customers. Variants of FHMUX have been delivered for airborne and other international radios.

Key Features

- 4:1 Antenna Reduction
 - Minimizes visual antenna signature
 - Disguises command post
 - Reduces remote antenna set-up and tear-down
 - Reduces electronic parasitic effects
- Cosite Interference Protection
 - Filters out RF interference
 - Manages/arbitrates frequency conflicts
 - Restores lost communications range
 - Protects receivers from damage caused by collocated on-channel interference
- Fully Qualified and in Production:
 - Nomenclature: TD-1456/VRC
 - NSN: 5820-01-365-2721
 - LIN: F99520
 - BOIP: C141CA

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In addition to reducing the number of antennas required to support command and control missions on the move, FHMUX minimizes cosite interference.

The Cosite Interference Problem

- Command and control vehicles and shelters with multiple radios have external antennas in close proximity.
- High level transmitter fundamental signals, noise, spurious, and inter-modulation products couple over to nearby antennas and interfere with sensitive receivers.
- The communication range of a receiver on a command and control vehicle is dramatically reduced as the number of collocated transmitters operating on the command and control vehicle increases.
- The impact on receiver range with as few as four collocated radios can be 60 to 90%.

The FHMUX Solution to the Cosite Problem

- FHMUX reduces cosite interference by simultaneously "cleaning-up" the transmit spectrum and "protecting" the receiver.
- FHMUX "Reactive Combining" incorporates a series of band-pass filters connected to a common antenna node.
- As transmit signals pass through these filters, FHMUX removes much of the undesired interference.
- As receive signals pass through these filters, FHMUX improves receiver selectivity.
- FHMUX restores up to 50% of the lost range.

FHMUX Improves Range in Cosite Environments

# of Active Transmitters	Receiver Range Without FHMUX	Receiver Range Using FHMUX
0	100%	100%
1	40%	90%
2	25%	77%
3	9%	54%

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