



Projects in Electrical & Computer Engineering 2007-2008



87' Patrol Boat Near Vertical Incident Skywave Antenna

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Sponsor: TISCOM

Outline

- ◆ HF communications for 87' CPB
 - ◆ Problems
 - ◆ How it affects the mission
- ◆ Near Vertical Incident Skywave (NVIS) Antennas on 87' CPB
 - ◆ Design
 - ◆ Results
 - ◆ Future Work

Introduction

- ◆ HF is point to point
- ◆ Long range communications
- ◆ NVIS technology can improve communications
- ◆ Communications are necessary for mission completion



Problems With 87' CPB HF

- ◆ Without HF, 87' CPB must use SATCOM
 - ◆ Very Expensive
- ◆ Many HF communications in 50-500 NM range are weak and difficult to comprehend
- ◆ Need for better systems
 - ◆ NVIS

Background

- ◆ NVIS Antenna tested on three 110' WPBs
- ◆ Test results were very encouraging
- ◆ Hope for success on 87' CPB



Design Problem

- ◆ Design an NVIS Antenna for use on the 87' CPB.



NVIS

- ◆ Near Vertical Incident Skywave (NVIS)
- ◆ High takeoff relative to the horizon

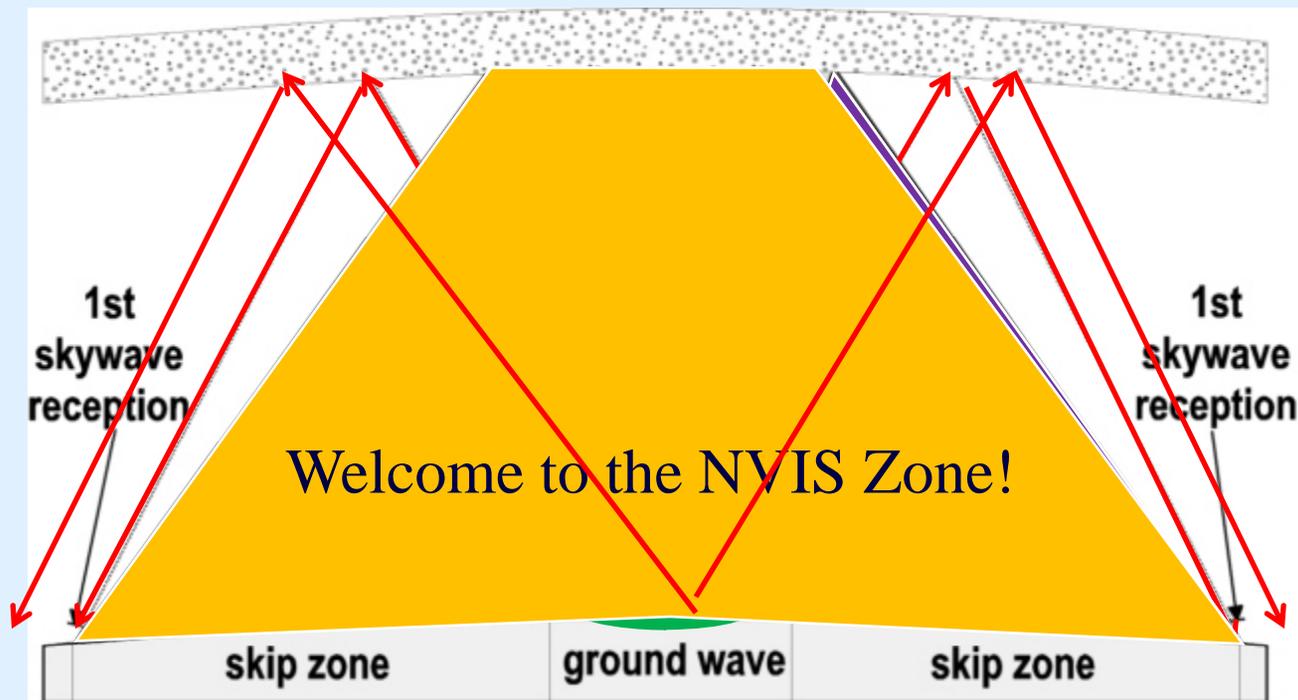


Image from: www.moonraker.com

Why the 87' CPB?

- ◆ Only white hulled cutter without NVIS.



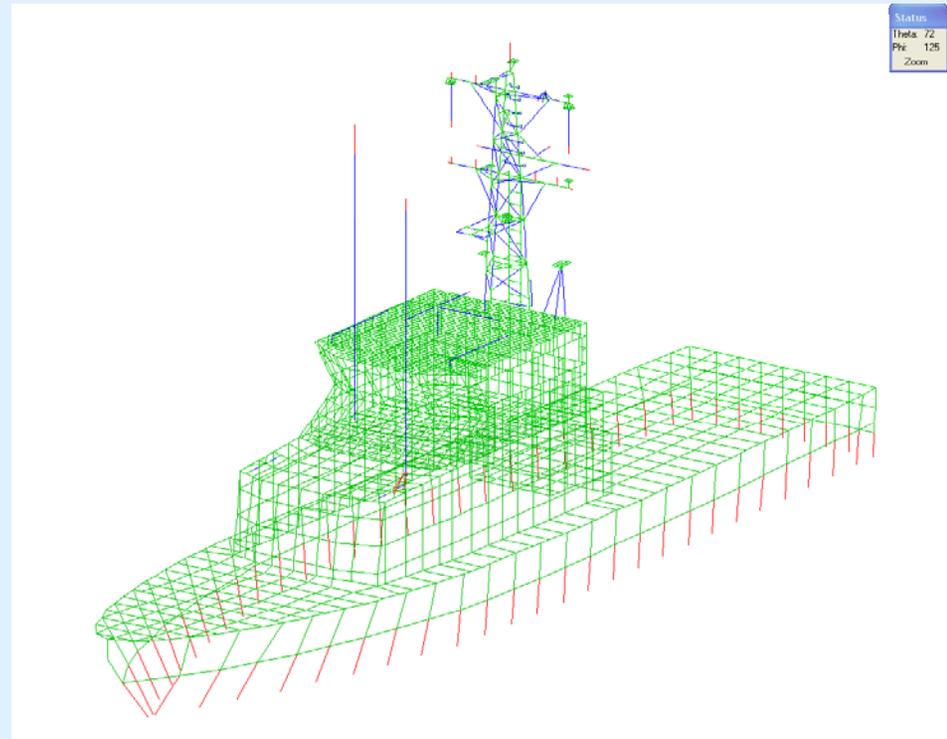
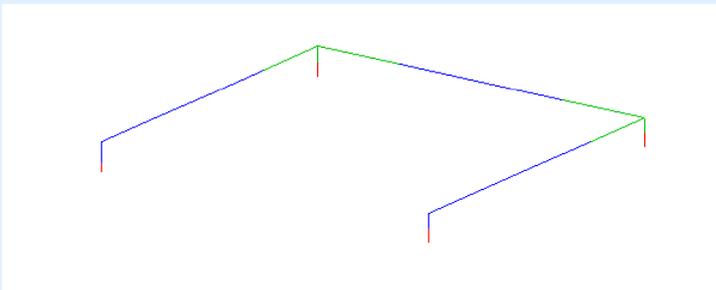
Design

◆ Multiple designs simulated

- ◆ Forwards “U”
- ◆ Backwards “U”
- ◆ Forwards “L”
- ◆ Backwards “L”
- ◆ Towelbar
- ◆ On top of pilot house
- ◆ Below pilot house
- ◆ Fore
- ◆ Aft
- ◆ Port
- ◆ Starboard
- ◆ High
- ◆ Low

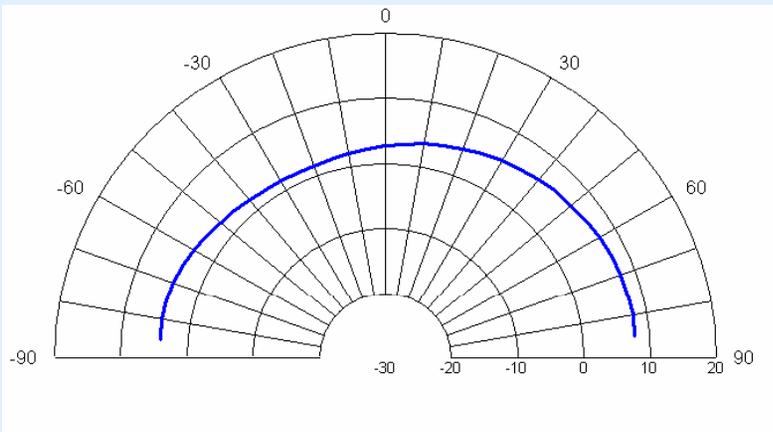
Design

- ◆ NEC Software
- ◆ Final Design

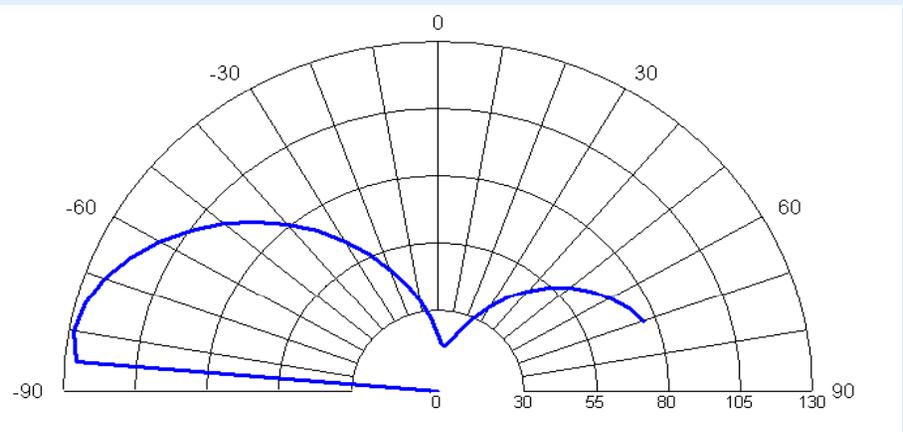


Results

- ◆ Simulation Results
- ◆ 5 MHz 000°R Radiation Pattern



NVIS



Whip

Results

- ◆ Contracted construction of antenna
 - ◆ Watrous Prototype-Machine Shop (Mystic)
- ◆ Prototype built for 87' CPB and McAllister Hall



Results

- ◆ No on-air data available for McAllister Hall prototype
- ◆ Did not complete paperwork for underway testing on CGC CHINOOK



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Future Work

- ◆ Underway testing of antenna on 87' CPB
- ◆ Coordination with multiple units to schedule testing (HQ, ELC, ESU, ESD, TISCOM)
- ◆ Possible future cadet project

Summary

- ◆ Coast Guard needs HF
- ◆ NVIS is one solution
- ◆ Most project work was completed
- ◆ Additional testing necessary



Thank You!

- ◆ CGA
 - ◆ Prof McKaughan
 - ◆ ETCS O'Connell
 - ◆ ET2 Koula
 - ◆ DC1 Pals
- ◆ USCGC CHINOOK
 - ◆ LT Spector
- ◆ USCGC ABBIE BURGESS
 - ◆ BMCS Ellis
 - ◆ ET1 Krueger
 - ◆ EM2 Lawrence
- ◆ ESD New Haven
 - ◆ ETC Roberts
- ◆ Watrous Machine-Prototype Shop
- ◆ TISCOM
 - ◆ Mr. Randall
 - ◆ Mr Robish
 - ◆ LT Bailey

Questions?

