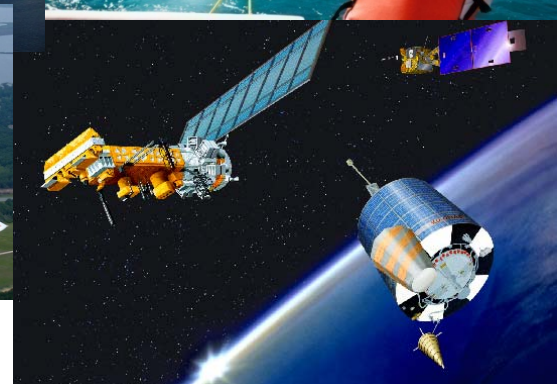
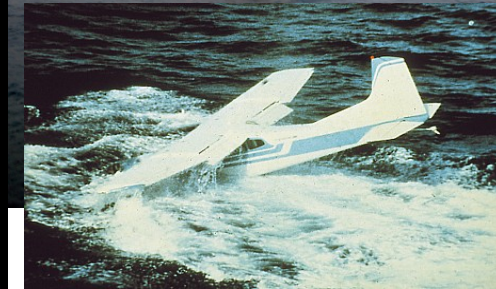




USCG 406 MHz DF Capabilities



2008 Beacon Manufacturers Workshop
San Diego, California



USCG 406 MHz DF Capabilities



Overview

- 406MHz DF capability on USCG Aircraft
- 406MHz DF capability from shore-side towers
- 406MHz DF capability on USCG cutters and boats
- Portable 406MHz DF equipment



406 MHz Beacons

At the end of 2007, there were approx 191,000 registered 406 MHz beacons in the U.S.:

- 143,000 EPIRBs carried on comm & rec vsls;
- 18,000 Emergency Locator Transmitters (ELTs) carried on aircraft;
- 30,000 Personal Locator Beacons (PLBs) carried by individuals in harsh environments;
- 175 Ship Security Alert System beacons.



EPIRB



PLB



ELT



SSAS



USCG 406 MHz DF Capabilities



- A 406 MHz EPIRB emits:
 - ❑ A low power, 25 milliwatt sweeping-tone signal constantly on 121.5 MHz.
 - ❑ A 5 watt burst every 52 seconds on 406 MHz.

This emission is 200 times stronger than the 25 milliwatt sweeping-tone signal and is not easily degraded by environmental obstacles.



USCG 406 MHz DF Capabilities

The Problem

- When initially developed, the electronic signal from a factory EPIRB or ELT emanated at 75 milliwatts on the 121.5 frequency. The electronic detection equipment installed on CG aircraft at that time was sufficient to detect this signal.
- However, the FCC subsequently mandated that the power be reduced to 25 milliwatts on the 121.5 MHz homing signal due to interference at the higher power on aircraft emergency frequencies.
- Unless in very close proximity (less than 5 NM), this lower 25 milliwatt power falls below the threshold of effective detection with the legacy CG aircraft DF equipment.
- This DF equipment never had the capability of detecting a 406 MHz signal.



USCG 406 MHz DF Capabilities



The Coast Guard Solution

- The USCG is in the process of equipping their search aircraft with 406 MHz homing capability.
- Deepwater awarded \$2.6 Million in Dec 06 to outfit C-130H fleet; 27 Rockwell Collins DF-430-F sets ordered; Entire C-130H fleet estimated complete end of CY 2008
- HU-25 Falcon fleet awarded \$300K in July 2007, \$1M funds provided for remainder of 20 Falcons
- CASA aircraft are coming with factory-installed 406MHz DF capabilities
- USCG helicopters are getting 406MHz DF equipment as the electronics systems in them are being upgraded.





USCG 406 MHz DF Capabilities

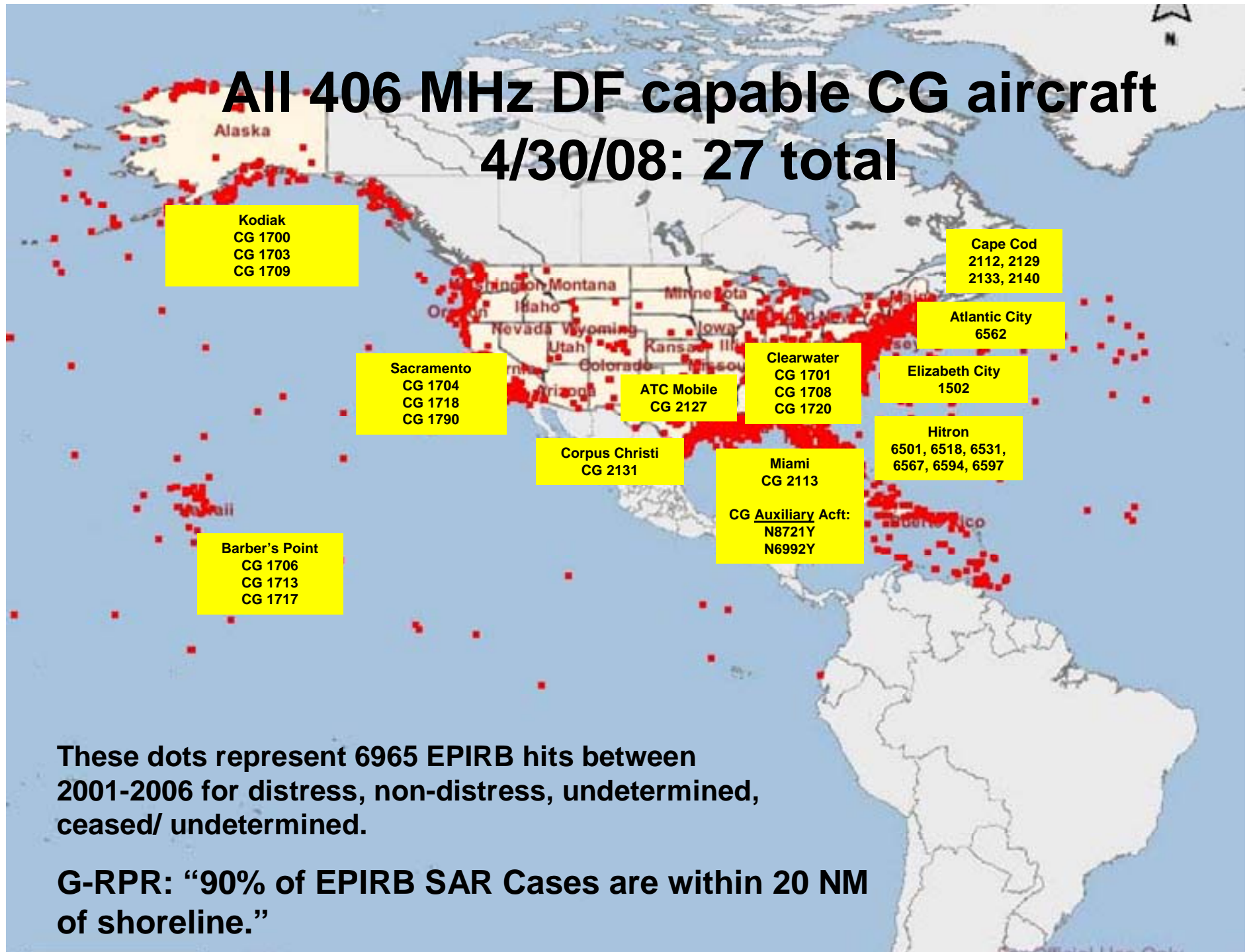


USCG Aircraft w/ 406MHz DF (as of 30Apr08)

Clearwater: 3 C-130s
Sacramento: 3 C-130s
Kodiak: 3 C-130s
Cape Cod: 4 HU-25s
Miami: HU-25, Aux a/c
Corpus Christi: HU-25
Mobile: HU-25
Hawaii: 3 C-130s
Elizabeth City: 1 CASA
Atlantic City: 1 HH-65
Hitron: 6 HH-65s



All 406 MHz DF capable CG aircraft 4/30/08: 27 total



These dots represent 6965 EPIRB hits between 2001-2006 for distress, non-distress, undetermined, ceased/ undetermined.

G-RPR: "90% of EPIRB SAR Cases are within 20 NM of shoreline."



USCG 406 MHz DF Successes to Date



18 LIVES SAVED OR ASSISTED

Many of these were after legacy aviation assets without 406 MHz DF capability were not able to locate survivors.

Elizabeth City C-130 (Initial proto-type):

Jun 2005: Locked on at 90 NM from 17,000' (**2 lives saved**)
Dec 2005: Locked on at 102 NM from 21,000' (**2 lives saved**)
Mar 2007: Locked on at 62 NM from 8,000' (**3 lives assisted**); F/V Bandit II.
Apr 2007: Locked on at 15 NM from 10,000' (**2 lives saved**); S/V Paradox.
Jun 2007: Locked on at 85 NM from 10,000' (**5 lives assisted**)

08 Sep 07: Cape Cod HU-25 Locked on at 72 NM from 15,000'; no distress.

06 Oct 07: Cape Cod HU-25 Locked on at 37 NM from 5500'; no distress.

19 Nov 07: Clearwater C-130 Locked on at 50 NM from 10,500'; no distress; F/V Jenna Dawn.

20 Dec 07: Corpus Christi HU-25 Locked on at 150 NM from 25,000' (**2 lives saved**); F/V Silver Wings.

09 Jan 08: Cape Cod HU-25 Locked on at 35 NM from 5500'; no distress; F/V United States.

04 Jan 08: Clearwater C-130 Locked on at 150 NM from 24,000'; no distress; R/V Falcon Explorer.

29 Jan 08: Hawaii C-130 Locked on at 125 NM from 14,500'; no distress; F/V Lady Ann Margaret.

10 Feb 08: Miami HU-25 Locked on at 18 NM from 500'; no distress; M/V Rubecon

25 Feb 08: Hawaii C-130 Locked on at 125 NM from 18,000'; no distress; F/V Princess K

04 Mar 08: Corpus Christi HU-25 Locked on at 70 NM from 7500'; (**2 lives saved**); S/V Air Pirate

15 Apr 08: Cape Cod HU-25 Locked on at 60 NM from 5500'; no distress; given to C.A.P.



USCG 406 MHz DF Capabilities

1st Operational Success with 406MHz DF Equipment

12 Jun 05

10 a/c, 18 sorties, 19 search areas, 13,118 sq. nm searched to locate the 34' P/C Extractor 26 nm off the FL coast.

After thousands of miles of search effort, a C-130H was launched fm E City, NC w/ a 406MHz DF prototype on board. While en-route to the assigned datum, but still 90 NM from scene, the DF locked on to the EPIRB signal.

The C-130H flew directly to the new intercept solution and located 2 hypothermic survivors clinging to the bottom of an overturned craft, thus ending a 20+ hr search.

An HH-65 helo was vectored to the position & hoisted the 2 survivors to safety. They had been holding onto the bottom of the boat for over 24 hrs.



USCG 406 MHz DF Capabilities



- **11 April 07**
- **S/V Paradox**
- **CG 1504**

S/V Paradox
Voyage from Honduras to Florida
HU-25 unable to locate
C-130 w/ new 406 DF located
220nm SW of Tampa, FL





USCG 406 MHz DF Capabilities



SUCCESS FOR NEW 406 EPIRB DF CAPABILITY

- F/V "Silver Wings" (20 December 2007)
- Sank 300 NM E of Corpus Christi
- CG 2131: Locked onto 406 EPIRB signal at **150 NM** from 25,000 ft
- 2 Lives Saved





USCG 406 MHz DF Capabilities



Shore-Side Direction Finding Rescue 21

- On 18 December 2007, approval was given to add 406MHz DF capability to coastal VHF communications towers (the Rescue 21 system).
- Modification will be made on existing towers and new ones will be built to detect and home on the 406MHz signal.
- This capability is essential since the majority of maritime SAR cases occur within 20 NM of the shore





USCG 406 MHz DF Capabilities



406MHz DF on Cutters and Boats

The USCG is currently considering the deployment of 406 MHz DF capability to small boats and cutters due to the proven superiority of this direction finding technology. This upgrade will directly contribute to the saving of lives as well as significant search / cost savings. The USCG is frequently involved with isolating alerting beacons in U.S. harbors and marinas.



USCG 406 MHz DF Capabilities



Portable 406 DF Initiatives

Commandant's Innovation Council approved \$91K to assist in prototyping portable 406 MHz DF packs in D5.



SAR MAN-PACK



The SAR Man Pack features a portable radio direction finder based on the RT-500M which is a fully automatic 4-band precision direction finder that uses the Doppler principle and combines a VHF maritime radio bearing system with a SAR direction finder. It receives all main international emergency frequencies and adjacent frequency ranges in the VHF and UHF air and marine bands.

Main Features



EPIRB & PLB Alert Issues

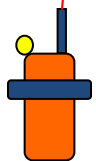


Any Questions???



U.S. Coast Guard Headquarters
Office of Search and Rescue (CG-534)

LCDR Kathy Niles
katherine.m.niles@uscg.mil
(202) 372-2089



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