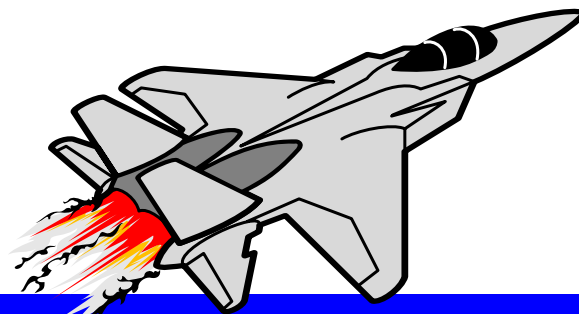


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Super-M Ultra Mobile antenna w/NMO mount	ANT61NMO	\$109.95
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Monitoring the Air Show Experience

The 12th Annual MT Air Show Guide

By Larry Van Horn, MT Assistant Editor
With air show photos by Kevin Burke

Air Show!

It is an event like no other and nothing stirs up the aircraft enthusiasts juices more than those two magical words – Air Show!

Every year, from March through November, millions of people hit the road to watch the excitement and thrills as aerobatic teams put their high performance aircraft through the paces to entertain the crowds at air shows all over the world.

Anyone who has attended one of these events will tell you it is thrilling to watch the close quarter flying of the Blue Angels delta formation or the hair splitting maneuvers of the Thunderbird opposing solos. But there is a way you can add to the visual experience by monitoring the performing teams' radio communications. With a radio scanner in hand, you will experience a whole new perspective of the show that few attendees will get experience – the sounds from the aircraft cockpit.

To indulge in monitoring the air show experience you need a current and well researched list of frequencies that the various performers may use during their performance. That requirement is the reason this feature is presented every year in March in the pages of *Monitoring Times*. What started out as an answer to a question by a *MT* reader in my *Milcom* column 12 years ago has now grown into one of the most eagerly anticipated features in this magazine each year and for good reason. Not only will I give you the frequencies you need to monitor the air show groups, but also my recommended list of radio equipment needed to listen to these events (see this month's *Milcom* column).

So here we are again at the start of another air show. It is time to pack up those radio wagons, charge up the scanner batteries, and get ready for a new season of thrills on your scanner. *Monitoring Times* proudly presents our 12th annual *Milcom Air Show Guide*.

Where do you hear the action?

From time to time, frequencies for air show teams do change, by design or need, so it's important to know where to search for potential new frequencies.

When the U.S. Navy Blue Angel flight demonstration team made some major changes back in 2004, seasoned veterans knew the right bands to target to look for the new frequencies being used by the team.

In 2008, we saw major changes in the VHF frequencies in use by the famed U.S. Air Force Thunderbirds. Again, thanks to veteran monitors who knew where to monitor, we were the first to report on our *Milcom Monitoring Post* blog (<http://mt-milcom.blogspot.com>) these frequency changes in use by the boys in Blue.

You can do the same thing that those milcom veterans did, if you concentrate on the bands listed below. You should be able to locate most air show activity at the event you are attending by searching in the frequency bands below. If you have a scanner that has the Close Call ® or Signal Stalker ® functions, that will help speed up the process of determining the active frequencies in use during the show.

118.000-137.000	25 kHz search steps (AM)
122.700-123.575	25.0 kHz search steps (AM)
138.000-144.000	12.5 kHz search steps (AM/Narrowband FM or NBFM)
148.000-150.800	12.5 kHz search steps (AM/NBFM)
162.000-174.000	12.5 kHz search steps (NBFM)
225.000-380.000	25.0 kHz search steps (AM)
380.000-400.000	12.5 kHz search steps (NBFM)

406.100-420.000 12.5 kHz search steps (NBFM)

Note: All frequencies in this article are in MegaHertz (MHz) and the mode is AM unless otherwise indicated.

U.S. Navy Blue Angels

The premier U.S. Navy/Marine Corps military flight demonstration team on the air show circuit is the Blue Angels flying the F/A-18 Hornet aircraft.

The team is home based at Forrest Sherman Field, Naval Air Station Pensacola, Florida. However, the squadron does spend January through March each year training pilots and new team members at the Naval Air Facility in El Centro, California.

The Blue Angels are scheduled to fly approximately 70 air shows at 35 air show sites in the continental United States during this their 65th season. This year also marks the 25th year the team has flown the F/A 18 Hornet. Since its inception in 1946, the Blue Angels have performed in front of more than 463 million fans.

During their performances the Blue Angels exhibits the skills possessed by all naval aviators. These include the graceful aerobatic maneuvers of the four plane diamond formation, in concert with the fast paced, high performance maneuvers of the two solo pilots. At the close of every show, the team illustrates the pinnacle of precision flying, performing maneuvers locked as a unit in the renowned, six jet Delta formation.

The other major piece of flying hardware in the squadron is their C-130T Hercules transport aircraft, affectionately known as "Fat Albert Airlines." It is the only Marine Corps aircraft permanently assigned to support a Navy squadron and is flown by an all Marine Corps crew of three pilots and five enlisted personnel. "Fat Albert Airlines" flies more than 140,000 miles during the course of a show season. It carries more than 40 maintenance and support personnel, their gear, and enough spare parts and communication equipment to complete a successful air show.

Blue Angel Aero Frequencies

237.800	Solos when not in the show box (Solo #2) and cross country air/air [Channel 8]
251.600	Air/Air nationwide and at NAS Pensacola
255.200	Circle/arrivals discrete and cross country air/air [Channel 17]
265.000	Diamond formation secondary
275.350	Diamond formation when not in the show box, cross country air/air, and their Pensacola squadron common [Channel 9]



Blue Angels "Dirty Diamond" head-on

- 284.250 Show box for diamond, solos, delta and cross country air/air [Channel 16]
- 289.800 Air refueling during cross country trips
- 305.500 Fat Albert "Bert" primary, solo aircraft (west coast), and maintenance officer [Channel 10]
- 305.900 Fat Albert "Bert" New for 2009 – Heard during San Francisco Fleet Week, at the Pensacola homecoming show (no 305.500 MHz), and the solo aircraft used this at Annapolis.
- 346.500 "Checklist Freq" – Pre-show checklist, ground start/roll out and maintenance [Channel 18]

Blue Angel Aircraft Radio Preset Plan
Frequency Usage

Channels 1-7	NAS Pensacola (KNPA) frequencies
Channels 8-10	Team frequencies
Channels 11-15	Show site frequencies
Channels 16-18	Team frequencies
Channels 19-20	Unknown usage

Blue Angel Organization

The Blue Angels' support team is made up of the Events Coordinator, Maintenance Officer, Flight Surgeon, Administrative Officer, Public Affairs Officer, Supply Officer and approximately 110 enlisted Navy and Marine Corps volunteers. Alternating crews of about 45 team members travel to each show site.

The squadron consists of seven distinct departments that are jointly responsible for guaranteeing the team's readiness. A tribute to this dedicated team is the fact that the Blue Angels have never cancelled an air show due a maintenance problem.

Administration: The Administration Department is responsible for executive and official correspondence, squadron records, pay and travel orders. Administration maintains instructions and notices, handles promotions and awards, and controls legal and security concerns.

Aviation Medicine: The Aviation Medicine Department is responsible for the health and wellness of each team member. The medical team performs annual physical examinations and emergency medical procedures, keeps medical and dental readiness up to date, and acts as a liaison for advanced medical care.

Events Coordinator: The Events Coordination Department schedules pre-season visits with show site sponsors and secures accommodations and ground support for each demonstration show.

Fat Albert Airlines: As mentioned previously, the all-Marine flight crew assigned to the squadron's Lockheed-Martin C-130 Hercules is responsible for transporting road-crew personnel, supplies and equipment to and from each show site throughout the season.

Maintenance: The Maintenance Department consists of the airframes, avionics, corrosion control, crew chiefs, life support, maintenance control, power plants, quality assurance and video shops. The maintenance team is responsible for all aircraft upkeep.

Public Affairs Office: The Public Affairs Office documents and promotes the Blue Angels. It designs, writes, photographs, edits, publishes and distributes all promotional materials. The Public Affairs Office also coordinates coverage and interviews with local, national and international media, and manages the VIP rider program.

Supply: The Supply Department researches, procures, stores, and issues spare parts, tools, and uniforms. Supply also researches future squadron logistical needs and initiates contracts for services required to support daily operations.

The Blue Angel ground maintenance crews have their own set of communication frequencies in support of their mission. During the 2004 show season, the Blues started using a new communications cart "comcart" for their ground maintenance net. As a result I have removed all of the old 162-174 MHz VHF frequencies used by their old cart from this guide.

The two confirmed frequencies used by this cart include:

- 139.8125 Ground maintenance crews and equipment checks [Bravo] NBFM 67.0 Hz PL tone
- 142.6125 Ground maintenance crews and equipment checks [Alpha] NBFM 67.0 Hz PL tone

In 2007, 141.5625 MHz was reported as an additional comcart fre-

quency. In 2009, I received another report that this frequency was used at a West Coast air show. Since this frequency has been reported sporadically, I believe that it is used only at locations where one of the two regular comcart frequencies listed above are in regular use at an air show site.

Previously used UHF frequencies that have not been reported in recent years include:

- 250.975 This diamond formation frequency was first heard in 2008, but it was not reported in 2009 or 2010. This is one of my infamous UHF military air spectrum hole frequencies.
- 264.550 Reported as an extra frequency by several monitors.

U.S. Air Force Thunderbirds

The U.S. Air Force has a flight demonstration team of their own known as the Thunderbirds. This year marks the 58th season that the T-Birds have performed air shows and they will conduct nearly 70 shows in 25 states, one U.S. territory and 10 European countries. They will kick-off the 2011 season by performing a flyover for the 53rd running of NASCAR's Daytona 500 on February 20.

During each show the team performs formation flying and solo routines. Like the Blue Angels, the four aircraft diamond formation demonstrates the training and precision of Air Force pilots, while the solos highlight the maximum capabilities of the F-16 aircraft. The Thunderbirds recently completed a swap of their older F-16 Block 32 Fighting Falcon for more advanced and powerful F-16 Block 52 aircraft.

A Thunderbirds' aerial demonstration is a mix of formation flying and solo routines. The pilots perform approximately 40 maneuvers in a demonstration. The entire show, including ground and air, runs about one hour. Like the Blue Angels, the T-Bird air show season lasts from March to November, with the winter months used to train new members at their home base at Nellis AFB, Nevada.

The U.S. Air Force Air Demonstration Squadron is an Air Combat Command unit composed of eight pilots (including six demonstration pilots), four support officers, four civilians and approximately 110 enlisted Airmen performing in more than 29 Air Force specialties.

Thanks to field reports from hobbyists who attended air shows in 2010, we have been able to tighten up our list of valid Thunderbird show frequencies presented below.

U.S. Air Force Thunderbird Aero Frequencies

Frequency	Usage
139.225	Diamond formation [Victor 1]
139.800	Diamond formation [Victor 2]
140.700	Diamond formation [Victor 1]
141.075	Diamond formation [Victor 2]
235.250	Pre-engine start/solo aircraft on/off show center/linked to PA system [Uniform 1]
235.350	Thunderbirds air/ground and air/air training at Nellis AFB
318.850	Thunderbirds air/ground and air/air training at Nellis AFB
322.950	Engine starts/solo aircraft (5-6) air/air [Uniform 2]

Thunderbirds "Knife Cross"



Thunderbird Maintenance/Ground Teams Frequencies (Mode NBFM)
 216.725 Announce PA feed - Music and show narration [Channel 55]
 216.775 Announce PA feed - Music and show narration [Channel 56]
 216.975 Team air show frequency feeds/mix air/air simulcast [Channel 60]
 413.275 Ground maintenance – Analog (DCS 431)
 413.325 Ground maintenance – Analog (DCS 503)
 413.375 Ground maintenance – Analog (monitored in Hawaii)
 901.500 Comm cart headset
 905.350 Comm cart headset

Previously reported frequencies used by the team are listed below. If you hear any of these frequencies in 2011, please contact us at our email address listed in the Milcom column masthead.

143.250 Pre-engine start
 143.700 Heard at air show in Wyoming, same audio as 235.250 MHz
 148.850 Alternate diamond [Victor 2]
 150.150 Alternate diamond [Victor 2]

One question that pops up from time-to-time is who is using the Thunderbird 14 call sign? This is normally used by an Air Mobility Command transport aircraft carry the team maintenance/ground crew personnel and their equipment to the various shows. Typically this is one of the huge C-17 transport aircraft operated by the U.S. Air Force Air Mobility Command.

Other U.S. DoD Military Flight Demo Teams

In addition to the Blues Angels and Thunderbirds mentioned above, the Department of Defense (DoD) sponsors other flying units that perform at air shows and various civic functions. These units also use a wide variety of VHF and UHF frequencies during their performances. The most commonly reported units and possible frequencies that they use are listed below.

US Military Flight Demo Teams

Air Force ACC A-10 Thunderbolt Demonstration Teams:
 East Coast Demo Team – 23 Wing based at Moody AFB, Georgia
 136.575 138.150 138.275 138.425 138.875
 139.275 139.700 139.725 140.200
 140.425 141.650 142.600 143.000
 143.150 143.600 143.750 226.100
 227.800 227.850 228.075 233.475
 234.025 240.100 242.150 251.200
 251.975 268.100 271.100 275.650
 275.900 283.700 289.300 292.100
 295.000 327.300 371.200 375.650
 379.500 376.025 384.550

West Coast Demo Team – 355 Wing based at Davis Monthan AFB, Arizona
 136.575 139.2875 139.600 139.625 139.700
 139.725 141.050 141.775 143.550
 229.050 233.475 238.500 283.700
 326.775 327.700 372.175 384.550

Air Force ACC F-15E Strike Eagle Demonstration Team:
 East Coast Demo Team – 4 FW Seymour-Johnson AFB, North Carolina
 370.025 375.925 376.025 376.100 377.850
 384.550

Air Force ACC F-16CJ Viper Demonstration Teams:
 East Coast Demo Team – 20 FW Shaw AFB, South Carolina
 123.150 136.475 136.575 136.675 138.150
 138.950 139.825 139.900 140.200
 140.275 140.375 141.025 141.150
 141.175 141.550 141.650 141.675
 141.700 141.900 141.950 142.225
 142.400 149.875 252.100 273.700
 311.200 376.025 384.550

West Coast Demo Team – 388 FW Hill AFB, Utah, Call signs: Viper 1 and Viper 2
 136.475 136.575 136.675 138.150 138.4375 138.750 138.950
 139.1125 140.450 141.150 141.650 141.950 142.1125 142.600
 142.700 142.900 142.9625 143.250 143.625 143.700 252.100
 369.000
 376.025 376.100 384.550

Air Force ACC F-22A Raptor Flight Demonstration Team:
 East Coast Demo Team – 1 FW Langley AFB, Virginia
 233.225 236.550 252.775 308.600 375.925 376.025 384.550

Air Force ACC Heritage Flight
 122.475 123.150 123.475 136.475 136.575 136.675 375.925
 376.025 384.550

Air Force AFRC C-130 Dobbins ARB, Georgia – Air Drop Demonstration
 239.975 379.525

Air Force B-2 Bomber Flyover/Static Displays: 509 BW Whiteman AFB, Missouri
 233.025 257.100 260.250 265.825 267.000 320.525 354.350
 375.925 376.025 388.850

Air Force B-52 Bomber Flyovers 376.025

Air Force Combat Search and Rescue (SAR) Demonstrations
 236.000 [SAR Bravo] 251.900 [SAR Alpha] 282.800

Army Sky Soldiers Demonstration Team (Army Aviation Heritage Foundation)
 123.025 123.450 234.500 242.400

Coast Guard Aircraft/SAR Demonstrations (Air frequencies)
 237.900 282.800 326.150 345.000 379.050

Coast Guard Aircraft/SAR Demonstrations (VHF marine frequencies, NBFM mode)
 157.050 Show Control/Show Center Boats [Channel 21]
 157.075 Search and Rescue Demo/Command Post [Channel 81]
 157.100 Show Warning Broadcast [Channel 22]
 157.125 Unknown usage [Channel 82]
 157.150 Show Control/Show Center Boats/HITRON Drug Interdiction Demonstration [Channel 23]
 157.175 Boats to Show Center [Channel 83]

Maine Corps AV-8B II Flight Demonstration Teams:
 East Coast – MCAS Cherry Point, North Carolina 363.300
 West Coast – MCAS Yuma, Arizona Frequency information is needed for the west coast harrier units

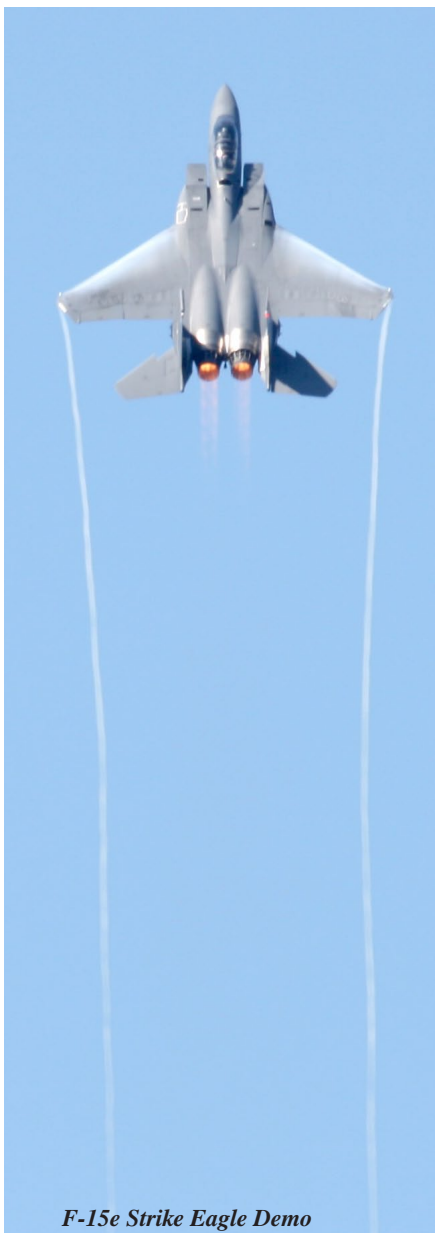
Marine Corps Helicopter Demonstrations
 315.375 315.400

Navy F/A-18C Hornet and Navy F/A-18F Super Hornet Flight Demonstration Teams:
 East Coast – VFA-106 NAS Oceana, Virginia 237.800
 West Coast – NAS Lemoore, California Frequency information is needed for the west coast units

Military Parachute Demonstration Teams

One of the fan favorites on the air show circuit is the U.S. Army Golden Knights based out of Fort Bragg, North Carolina. Look for their communications on the frequently reported frequencies of 122.775, 123.150, 123.400, 123.475 or 123.500 MHz. The team aircraft used during air shows is either the C-31A Friendship or UV-18A Twin Otter.

The Golden Knights aren't the only para-



F-15e Strike Eagle Demo

chute teams that perform around the country. The U.S. Army Special Operations Command has a parachute team known as the Black Daggers (see *MT Milcom* May 2004). Several frequencies have been uncovered for them during the last few seasons including 123.150, 123.450, 136.000, and 136.500 MHz.

Another performing U.S. Army parachute team is the Silver Wings based out of Fort Benning, Georgia. They were recently heard using 34.650 and 44.900 MHz (NBFM). However, both these frequencies were common landing zone frequencies in the area they were performing in. So if neither of these two frequencies above is heard at the event you are attending, I suggest you initiate a search for them in VHF-low band military frequency subbands.

In addition to the VHF low band frequencies mentioned above, ground and safety personnel associated with this team have also been heard using 467.6125 MHz (FRS Channel 10/GMRS NBFM) for communications. There was also one report that the team was even using an Intra Squad radio frequency of 397.500 MHz.

The famed 101st Airborne Division has a parachute demonstration team known as the Screaming Eagles. They are based out of Fort Campbell, Kentucky and have been reportedly using 44.200 MHz (NBFM).

The U.S. Army has several more teams, but we still do not have frequency information for them. We would appreciate your field reports on the following U.S. Army teams if you catch them performing this air show season.

82 nd Airborne All American Free Fall Team	Fort Bragg, North Carolina
Black Knights Parachute Team	US Military Academy, West Point, New York
Green Beret Parachute Team	Fort Bragg, North Carolina

The U.S. Special Operations Command has a parachute demonstration team based out of MacDill AFB in Florida. They have been heard using 122.450, 123.450, and no, this is not a misprint 151.625 MHz (NBFM), a nationwide business itinerant frequency.

The U.S. Air Force Academy has a parachute team called the Wings of Blue and it is based at the academy in Colorado. Two frequencies that are reportedly used for air-to-ground jump coordination are 121.950 and 407.500 MHz (NBFM).

And last, but certainly not least, the colorful U.S. Navy Seal Parachute Team, known as the Leap Frogs, are frequent visitors around the country at various sporting/civic events and air shows. This team has been regularly reported on 270.000 and 407.500 MHz (NBFM 131.8-Hz PL tone) over the last several years.

This year this team will conduct several jumps in the San Diego area and monitors in that area are asked to submit any reports of frequencies used by this team to our *MT* email address.

Foreign Military Flight Demonstration Teams

The U.S. military doesn't have an exclusive when it comes to military demonstration teams. Several countries have teams and some of those teams have even performed here in the United States. I have included a list of the teams that we have received recent reports on below.

Belgium: Swallows – Belgian Air Force Display Team	130.725
Brazil: Esquadilha da Fumaça (The Smoke Squadron) – Brazilian Air Force Air Demonstration Squadron	127.050 130.450 130.550 130.650 132.250
Canada: 15 Wing, Moose Jaw, CT-156 Havard II Trainers, Call sign: Viking #	275.800
Chile: Escuadrilla de Alta Acrobacia Halcones (Falcons High Aerobatics Squad) – Chilean Air Force	136.175
Finland: Midnight Hawks – Finnish AF Academy Demo Team	140.625
France: Patrouille Acrobatique de France – French Air Force Military Flight Team	121.850 123.600 138.450 141.825 (Main formation) 143.100 (Main formation) 143.850 242.650 (Solos) 242.850 (Solos) 243.850 (Team Transport) 263.350 266.175
Ireland: Silver Swallows – Irish Air Corps	130.550
Italy: Freccia Tricolori – Italian Military Flight Team	123.475 140.600 263.250 (Displays) 307.800 362.625 387.525 (Displays) 440.450 (NBFM) (Ground Support Team/Commentator)



Solos Cross-up

Jordan: Le Royal Jordanian Falcons – Sponsored by Royal Jordanian Airlines and Air Force	123.500 126.800 456.4625 (NBFM) Ground Crews
Morocco: Marche Verte [Green March] – Royal Moroccan Air Force	135.000 (Ground) 135.500 (Air/Air) 135.925 (Ground) 135.975
Netherlands: Dutch Air Force F-16	142.475 281.800 (Air/Air)
Netherlands: Grasshoppers – Royal Air Force Helicopter Team	281.100
Netherlands: Team Apache	128.450 130.000 135.925 138.325 138.450
Poland: Team Iskry – Polish Air Force Team	123.600
Poland: Team Orlik - Polish Air Force Team	Frequency reports are requested
Portugal: Asas de Portugal, Esquadra 103 (Wings of Portugal 103 Squadron) Flight Team	This team was deactivated in 2010 before the start of the air show season. Future activity unknown.
Slovak Republic: Biele Albatrosy or White Albatroses Display Team – Slovakian Air Force Aerobatic Team	Frequency reports are requested
Spain: La Patrulla Aguila – Spanish Fixed Military Flight Team	130.300 130.500 241.950 (ex-252.500) 337.975
Spain: La Patrulla Aspa – Spanish Military Helicopter Flight Team	119.000
Sweden: Team 60 – Swedish Air Force Aerobatic Team	Frequency reports are requested
Switzerland: Patrouille de Suisse – Swiss Military Flight Team	244.300 266.1750 288.850 312.350 359.450 375.450 388.075
Switzerland: Swiss PC-7 Display Team – Swiss Air Force	Frequency reports are requested
Turkey: Turkish Stars Display Team – Turkish Air Force	141.475 142.325 225.750 235.250 243.450 264.400 279.600
United Kingdom: Army Air Corps Historic Aircraft Flight (AHAF)	380.200
United Kingdom: Battle of Britain Memorial Flight (BBMF)	1 2 0 . 8 0 0 122.700 380.200
United Kingdom: Black Cats – Royal Navy Helicopter Display Team	280.475
United Kingdom: Blue Eagles – Royal Army Air Corps Helicopter Flight Team, Call sign: Blue Eagles	44.650 (NBFM) 135.950 135.975 136.975 [VHF-1] 143.600 237.800 252.000 259.600 275.350 284.250 305.500 382.800 [UHF-1]
United Kingdom: Falcons – Royal Air Force Parachute Jump Team	255.1000 (Drop Zone Air/Ground) 256.9000 445.3375 (NBFM) 465.1000 (NBFM)
United Kingdom: Red Arrows – Royal Air Force Flight Team, Call sign: Red #	120.800 242.000 242.050 (Primary) 242.200 243.450 253.450 370.600
United Kingdom: Red Devils – British Army Parachute Team	462.6250 (Ground Support) 462.925 [Ch 3 Ground Support] 464.250 [Ch 1 Drop Zone A/G] 464.550 [Ch 2 Drop Zone A/G]
United Kingdom: Royal Navy Historic Flight	Frequency reports are requested
United Kingdom: The Great War Display Team (GWDT)	Frequency reports are requested

Canadian Flight and Parachute Demonstration Units

The Royal Canadian Forces flight demonstration team, the 431 Air Demonstration Squadron Snowbirds, is based with the 15 Wing at RCAF Moose Jaw and are regulars on the U.S./Canada air show circuit.

The following frequencies have been recently reported for this popular aerial demonstration team: 123.150 (Solos) 227.600 242.600 [13] 243.400 245.500 245.750 272.100 (Primary) [11] 284.900 299.500 333.300 [14] 340.100 MHz. A strange VHF frequency in the navaid segment of the civilian aircraft band has been used by this team's solo aircraft in recent

years –116.000 MHz.

Some additional Snowbird frequencies that have been reported and need further confirmation by field reports include: 227.650 236.800 239.900 240.500 245.000 245.700 266.300 316.500 321.700 378.500 MHz.

The Canadian Forces also has a CF-18 flight demonstration team. A few of years ago Brian “Check your Six” Topolski in Connecticut passed along the frequencies below for this team.

128.975 129.025 130.075 245.500 263.500 263.700 264.600 (East Ops) 274.450 285.975 312.550 (Air/Air) 316.550 323.300 333.300 335.600 340.200 (West Ops) 341.700

The Canadians also have a parachute jump team – the Skyhawks. Frequencies that have been reported for them include 123.000 and 294.700 MHz.

Civilian Air/Parachute Demonstration Teams

At most air shows, the military flight demonstration units aren’t the only aerial performers. Civilian organizations, companies, and individuals sponsor a host of aerobatics teams and parachutist teams. A wide variety of civilian aeronautical frequencies are used by these organizations. Load your scanner with the following frequencies and you should be able to catch most of the communications used by the civilian aero acts.

Aircraft (air carrier and private)	122.825	122.875
Aircraft (air carrier and private)/Aviation support	122.775	123.300
	123.500	
Aircraft (air carrier and private)/Flight test		
123.125	123.150	123.175
123.200	123.225	123.275
123.325	123.350	123.375
123.400	123.425	123.450
123.475	123.525	123.550
123.575		
MULTICOM	122.850	122.900
122.925		
Private aircraft helicopter	123.025	
Private fixed wing aircraft air/air communications	122.750	
UNICOM	122.700	122.725
122.800	122.950	122.975
123.000	123.050	123.075

Some specific frequencies recently reported to us for select foreign and U.S. civilian demonstration teams are listed below.

Civilian Flight Demonstration Teams and Air Show Companies

Aeroshell Aerobatics Team (AT-6 Texans)	122.775	123.150
Aerostars CJ-6/YAK-52 Flight Formation Team (UK)		
118.700	122.475	122.775
122.950	123.350	124.450
129.925		
Breitling Jet Team (France)	118.325	127.350
129.050	130.200	
Breitling Wingwalkers (ex-Team Guinot) – AeroSuperBatics Ltd (UK)		
Call sign: Wingwalk	118.000	
Civilian Air Show Discrete Common	123.150	
Dave Schultz Air Shows	118.700	(Ground Ops) 132.950
(Operations)	135.650	(Airboss) 238.150
(Airboss)	350.300	
Flight for Diabetes (Michael Hunter)	123.425	
Firecat (Rich Perkins)	123.500	
Flying Colors Hang Glider Aerobatic (Dan Buchanan)		1 2 3 . 1 5 0
	123.300	123.450
Geico Extra 300 (Tim Weber)	123.150	
Hamster Biplane (Ed Hamill)	123.150	
Iron Eagles Aerobatic Team	122.925	123.150
123.475		
John Klatt Air shows	123.475	
Julie Clark’s (T-34) American Aerobatics	135.925	
Lima Lima Flight Team	123.150	123.175
123.425	123.575	
Manfred Radius Glider Aerobatics Team	123.1500	
Matt Chapman/Michel Mancuso Aerobatics		136.975
Oreck Vacuum Cleaners Aerobatic Demo (Frank Ryder)		1 2 2 . 8 2 5
	123.425	123.450
Otto the Helicopter	123.150	123.300
Patty Wagstaff Air Shows Inc	122.750	123.475
Red Eagles Aerobatic Team	122.125	123.150
123.425	123.475	
Ritchie’s Pyro	467.6375	(NBFM 233.6 Hz PL)
Robosaurus – World’s First CAR-NIVOROUS Monster Spotter		4 6 2 . 7 1 2 5
(NBFM DCS464)		
Sean Tucker Power Aerobatics	122.8750	122.950
123.150	123.450	
123.475		
SIAl Marchetti SF260 (Debbie Gary)	123.150	
Showcopters	123.150	
Skytypers Team	122.750	122.775
123.425	(Formation) 122.775	
123.150	123.425	123.450
(Solos)		
Super Decathlon (Greg Koontz)	123.150	
Swift Magic Aerobatic Team	122.775	122.925
Team Red	123.350	
The Blades Aerobatic Display Team (UK)	121.175	136.175



Sea search and rescue demo



KC-10 on arrival day at the air show

The Horseman P-51 Aerobatic Team 122.925 136.675
 The Patriots (L39) Jet Team 127.300
 The Red Star Formation 127.050 (Pease Air Show)
 Tora Tora Tora Warbirds Team (Commemorative Air Force)
 122.850 122.875 123.150 123.425 123.450 469.500 (NBFM)
 469.550 (NBFM)
 Vintage Thunderbird (T-33) Aerobatics (Fowler Cary) 123.150
 Yakovlevs Team (UK) 124.450 130.900

GMRS Frequencies

During the 2001 and 2002 seasons I received several reports that the Golden Knights were using GMRS (General Mobile Radio Service) frequencies 462.6250, 467.5625 and 467.6125 MHz NBFM. In addition to hearing air show demo crews, monitors have found vendors, exhibitors, air show companies, and military ground units using GMRS frequencies. You should make these frequencies part of your scanner load-out prior to the air show. The frequency pair of 462.675/467.675 MHz NBFM are allocated as a national emergency frequency pair for the GMRS service.

A	B	C
462.550	467.550	462.5625
462.575	467.575	462.5875
462.600	467.600	462.6125
462.625	467.625	462.6375
462.650	467.650	462.6625
462.675	467.675	462.6875
462.700	467.700	462.7125
462.725	467.725	

Legend:

- A Base station, mobile relay, fixed station, or mobile station
- B Mobile station, control station, fixed station operating in duplex mode.
- C Interstitial frequencies, base and portable simplex

Family Radio Service and Intra-Squad Radio Frequencies

Ground pyrotechnics personnel from the Tora Tora Tora and Warbirds flight demonstration teams have been monitored at air shows using FRS or Family Radio Service handhelds for communications during shows. In fact, quite a few people and organizations use FRS at air shows. So load up FRS frequencies below (NBFM mode) in your scanner or better yet, carry a FRS radio to the show. If you are lucky, one of these FRS frequencies might help you make a new milcom monitoring friend or give you a chance to meet one of those high tech radio enthusiasts dragging around one of those fancy radio wagons at the show.

462.5625 [Ch 1] 462.5875 [Ch 2] 462.6125 [Ch 3] 462.6375 [Ch 4]
 462.6625 [Ch 5] 462.6875 [Ch 6] 462.7125 [Ch 7] 467.5625 [Ch 8]
 467.5875 [Ch 9] 467.6125 [Ch 10] 467.6375 [Ch 11] 467.6625 [Ch 12]
 467.6875 [Ch 13] 467.7125 [Ch 14]

The government version of the Family Radio Service is known as the Inter-Squad Radio or ISR. There have been numerous reports over the last few years of military units, including the Civil Air Patrol (CAP), using ISR frequencies at air shows. I highly recommend programming these frequencies (NBFM mode) into your scanner and also making them

a permanent part of your regular monitoring frequency load out.

In the last year I have confirmed that there are now only 12 ISR frequencies, instead of the 14 that were originally allocated by DoD several years ago. So ISR channels 13/14 (399.925/399.975 MHz) can be removed from your scanner load out.

396.875 [Ch 1] 397.125 [Ch 2] 397.175 [Ch 3] 397.375 [Ch 4] 397.425 [Ch 5]
 397.475 [Ch 6] 397.550 [Ch 7] 397.950 [Ch 8] 398.050 [Ch 9]
 399.425 [Ch 10] 399.475 [Ch 11] 399.725 [Ch 12]

U.S. Civil Air Patrol Frequencies

Finally, you should also program U.S. Air Force Civil Air Patrol frequencies in your scanner. We have received field reports of CAP frequencies (repeater and simplex) being used for ground support at several air shows.

The Civil Air Patrol frequency plan has been in transition to their new narrowband allocations / equipment over the last year. At this time per CAP Headquarters at Maxwell AFB, Alabama, all units should have made the transition to their new frequency assignments and equipment as listed below.

Repeater out/in	PL Tone	Usage [Channel]
141.5750 Simplex	127.3 Hz	Command control 1 [CC1]
141.0000 Simplex	131.8 Hz	Command control 2 [CC2]
149.2750 Simplex	141.3 Hz	Air/Air [Air 1]
150.5625 Simplex	151.4 Hz	Air/Air [Air 2]
150.2250 Simplex	162.2 Hz	Back up guard channel [Guard 1]
139.8750 Simplex	173.8 Hz	Tactical use (Miscellaneous use) [TAC 1]
148.1250 Simplex	100.0 Hz	Primary talk-around [PA TA]
148.1500 Simplex	100.0 Hz	Secondary talk-around [PB TA]
148.1375/143.6250	203.5 Hz	Airborne/Tactical repeater
148.1375/143.6250	192.8 Hz	Airborne/Tactical repeater
148.1375/143.6250	131.8 Hz	Airborne/Tactical repeater
148.1375/143.6250	162.2 Hz	Airborne/Tactical repeater
148.1250/143.5500	Various PLs	National repeater pair
148.1500/143.7000	Various PLs	National repeater pair

There are more frequency designators built around the nationwide repeater pairs mentioned above. That list of nationwide repeater pairs and private line (PL) tones was published in the May 2010 *Milcom* column in *Monitoring Times*.

In Closing

It is always difficult to predict what changes a new air show season will bring, so I strongly encourage readers to watch my *Milcom Blog*, my **new Twitter feed (MilcomMP)** or the *Monitoring Times* Blog RSS feed on the *MT* home page for any late breaking news or frequency information during the 2011 air show season.

Before I close, I would like to publicly thank the real heroes of this annual air show guide – the hundreds of radio monitors who took the time to share with me what they have heard at the air shows. Without these caring radio hobbyists, there would be no guide. So to each of you, I want to dedicate this latest edition of *MT's Air Show Guide*.



Monitoring the Air Show Experience

Equipment and Tips

Now that you've read our cover story and you know who are the crack military flight demonstration teams and where to find the frequencies they use for air-ground coordination and other communications, let's turn to another important consideration for successful monitoring: the equipment required to monitor air show communications.

I am frequently asked which scanner I recommend for air show monitoring. While I don't have a favorite, I have prepared the list of receivers and scanners that meet all the requirements as outlined below.

Most of the scanners sold in the marketplace today are suited for air show monitoring. On the other hand, most of the older scanners on the used market are *not* suitable for air show monitoring. There are certain requirements your air show radio has to meet in order to successfully monitor the two major military aerial demonstration teams – the Blues and T-Birds.

If you are going to a Thunderbird team event, then you will need a scanner that can monitor the 138-150 MHz military land mobile band in the AM mode. Most of the older Uniden scanners cannot be used for air show monitoring due to their lack of independent transmission mode selection.

In addition to the civilian aircraft band (118-137 MHz), you will also need a scanner that has the 225-400 MHz military aeronautical band in it. Most of the action (especially the Blues) will be heard in this military UHF portion of the spectrum. Adding these two criteria to the mix, the list of possible air show scanners is narrowed down even further. Table One is our list of scan-

ners that meet all of the criteria for monitoring all the military flight demonstration teams at air shows worldwide.

MILITARY AIR SHOW CAPABLE RECEIVERS

Handhelds

Alinco DJ-X3, DJ-X7, DJ-X30, DJ-X2000T
AOR AR-8200 MK III, AR-Mini B
GRE PSR-300, PSR-500, PSR-700
Icom IC R-5 Sport, IC R-20, IC-RX7
MFJMFJ-8322

Radio Shack Pro-106, Pro-107, Pro-164
Uniden BC-246T, BC-346XT, BCD-396XT,
HomePatrol-1 (only by using third party
software such as ScanCat and Butel to load
air show frequencies).
Yaesu VR-500

Base/Mobile Units

AOR AR-8600 Mk IIB
GRE PSR-400, PSR-600
Radio Shack Pro-163, Pro-197
Uniden BCT-15X, BCD996XT
Yaesu VR-5000

Computer Receivers

Icom PCR-1500, IC-R1500, PCR-2500, IC-R2500,
R-9500
WinRadio WR-G305e, WR-G305i, WR-G305e/
PD, WR-G305i/PD, WR-G315e, WR-G315i,
WR-3150e, WR-3150i-DSP, WR-3500e,
WR-3500i-DSP, WR-3700e, WR-3700i-DSP

Professional Receivers (Government sales only)

AOR AR-Alpha, AR-One, AR-One-C, SR-2200
Icom IC-R1500, PCR-1500U, IC-R2500, R-8500,
R-9500

Discontinued Radios/Scanners

Alinco DJ-X2T, DJ-X10T
AOR AR-16B, AR-1000, AR-1500,
AR-2515, AR-2700, AR-3000AB,
AR-5000+3B, AR-7000B, AR-8000,
AR-8200B, AR-8600B
Icom IC-R1, IC-R2, IC-R3, R10, R100,
R7000, R7100, PCR-100, PCR-1000,
PCR-1500
Kenwood RZ-1
Radio Shack Pro-2004, Pro-2005,
Pro-2006, Pro-43
Uniden BCT-15, BC-296, BR-330T,
BC-796, BCD-396T, BCD996T
WinRadio WR-1000i/e, WR-1500i/e,
WR-3000i-DSP, WR-3100i-DSP
Yaesu VR-120, VR-120D

❖ Plan Ahead

If you want to have a great time at the air show, you should plan ahead and get some stuff together to take to the event. Here are some tips from my personal list that I use to

gather the things that I take with me to the air show.

Hat - Wearing a hat can make a lot of difference to your comfort level while at the show. Ball caps are ok, but you will have to watch out for sunburn on your lower face and neck if you wear one. Many people prefer to wear hats with wide brims for better protection.

Sunglasses - Polarized lenses are especially good for shows that take place near the water since they reduce glare.

Sun Screen - Speaking of the sun, you obviously want to attend an event with good weather (clear skies and no clouds). This means you'll probably be in the sun a lot. Even if it is on a cloudy or hazy days, beware. You may get more sun than you think. The higher the sun screen SPF the better and be sure to also use lip balm.

Something to sit on - Take something to use as a drop sheet if you are going to be on the ground. You can lean on your backpack for some support. If allowed, you may consider carrying a lawn or camping chair. Keep in mind that you'll be looking up at an angle for most of the show, so a chair that is somewhat reclined may be more comfortable.

Water - You will probably be at the show for several hours and you really don't want to get dehydrated. Refreshments are normally available at these shows, but your own supply of water may come in handy. Alcohol may make your dehydration worse, so if you do visit the "beer tent," then drink in moderation. Don't rely on soda pop to prevent dehydration.

Snacks - Most air shows have food concessions (hamburgers, hot dogs, etc.), but you might want bring along some lighter snacks in case you need a quick fix and don't want to stand in a long line.

Moist towelettes, aka wet wipes - Air shows normally have outdoor bathroom facilities and having a way to freshen up afterwards is a good idea.

Notebook and pen - If you are a collector of aircraft serial numbers, radio frequencies, etc. then a notebook and pen are a must. You may also see something you want to make a note about, like website addresses at displays.

Binoculars - Low and medium power binoculars tend to work well for checking out distant details. I won't carry higher power binoculars, as they are very difficult to use for aircraft in flight.

Camera - Air shows by their nature are very colorful and photogenic events. Many air shows have disposable cameras and film for sale, but you'll probably be happier if you bring along your own. I highly recommend a digital camera, an extra set of batteries, and a couple of extra memory cards since you will probably shoot a lot of pictures. If you bring a video camera, be sure to pack an extra tape and batteries.

Earplugs - Not only do jets make a lot of noise, but you may find yourself next to an overly loud speaker system used by the air show announcer.

Scanner - I know it is silly to remind you of this,



Photo by Ken Lin

but be sure to bring along the scanner and our air show guide and extra batteries. You might actually enjoy listening to the air show pilots and demonstrations teams.

Small backpack - Yes, security will want to check your backpack before allowing you in to the show, but it is really handy to have some storage space to carry around all the stuff I have mentioned above around the show.

❖ Do's and Don'ts

I have attended a lot of air shows over the years and have developed a list of do's and don'ts you should consider when planning to attend these events.

Do come early and leave late. If you do you will avoid most of the pedestrian and vehicle traffic headaches. Most air shows have static displays of aircraft and other displays so before and after the show will afford you some time to look around.

Don't touch the aircraft. Many aircraft in static displays have bits and pieces that can be damaged, broken, or bent. You could get hurt if you don't know what you're doing. Never touch an aircraft unless someone in authority invites you to do so. Never move a propeller, and keep clear of "props" at all times.

Don't smoke around the aircraft. Planes in a static display sometimes vent fuel as the plane heats up in the sun. Some fabric-covered aircraft have coatings that are highly flammable.

Do find out where you can get medical aid or seek assistance if you need it. If you are in a group and you get separated, where will you meet? If you have children with you make sure they know how to get help if they get lost.

Do consider where you are going to sit. Most people insist on getting as close to "front and center" as they can. While this is fine, you might be just as happy sitting farther back or at the end of the viewing area where it may be less crowded.

Don't litter, as your trash could become a physical hazard to the aircraft (FOD aka foreign object damage). Clean up your viewing area once you are done.

Do stay aware of your surroundings. There are often vehicles or machinery moving around in the public areas such as around the static displays.

Do ask questions. Often there are aircraft owners or representatives at the static displays. Most people are very proud of their airplanes and they'll be happy to answer your questions.

Do appreciate all the aircraft, not just the fastest and the loudest.

Finally, check out the air show website prior to the event to learn about the show hours for the public, any security restrictions (no scanners, backpacks, or coolers, etc), directions in and out of the show, schedules and much more.

On my **Milcom** blog (address in the Resource Guide), I have posted current schedules for all the major teams and any known websites associated with the air show events where they are performing.

❖ DoD VHF High Band The Hidden Aircraft Band

In the last six years, the Department of Defense has completely changed their bandplan for the 138.000 to 150.800 MHz (less 144-148 MHz) military LMR bands. In the past, each frequency was spaced 25 kHz and assigned to a specific military service.

AIR SHOW RESOURCE GUIDE

Milcom Blog	http://mt-milcom.blogspot.com
Milcom Twitter Feed	MilcomMP
MT 2010 Air Show Guide.....	http://tinyurl.com/2bhecks
Canadian Forces Snowbirds 2010-2011 Schedule.....	http://tinyurl.com/39ug9fd
US Air Force Thunderbirds 2011 Schedule.....	http://tinyurl.com/3xu8jy2
US Army Golden Knights 2011 Schedule.....	http://tinyurl.com/39bcuty
US Navy Blue Angels 2011 Schedule	http://tinyurl.com/38es6me
US Navy Leap Frogs 2011 Schedule	http://tinyurl.com/3yz9fhx

Official Websites:

Air Combat Command Aerial Events.....	www.acc.af.mil/aerialevents/
Blue Angels	www.blueangels.navy.mil/index.htm
Golden Knights.....	www.usarec.army.mil/hq/goldenknights/
Leap Frogs	www.leapfrogs.navy.mil/
Navy Office of Community Outreach	www.navy.mil/navco/
Snowbirds	www.snowbirds.dnd.ca/v2/index-eng.asp
Thunderbirds.....	www.airforce.com/thunderbirds

Twitter Feeds:

Air Combat Command Aerial Events.....	http://twitter.com/#!/aerialevents
Blue Angels	http://twitter.com/#!/BlueAngels
Golden Knights.....	http://twitter.com/#!/ArmyGK
Thunderbirds	http://twitter.com/#!/USAFThunderbird

Facebook Pages:

Air Combat Command Aerial Events.....	www.facebook.com/aerialevents
Blue Angels	www.facebook.com/pages/Blue-Angels/34985920343
Golden Knights..	www.facebook.com/usarmygoldenknights
Leap Frogs	www.facebook.com/leapfrogs
Skyhawks	www.facebook.com/group.php?gid=112105354592
Snowbirds	www.facebook.com/pages/The-Canadian-Forces-Snowbirds/23613917381
Thunderbirds	www.facebook.com/pages/US-Air-Force-Thunderbirds/267550469245

In 2004, we heard that DoD would be changing to a 12.5 kHz spacing and the frequencies would be assigned to a particular usage and not a service as in previous plans.

Since these changes were made, the Milcom monitoring team has spent hundreds of hours in locations all over the country documenting the changes that have been made to this frequency range. One of the major changes we have observed are new exclusive frequencies that have AM mode air operations assigned to them.

Air Operations

138.200	138.250	138.825	139.600
139.900	140.200	140.500	141.175
141.250	141.300 (Air Refueling)	141.650	
141.950	142.1125	142.225	142.600
142.700	142.800	142.900	142.9625
143.000	143.150	143.200	143.250
143.600	143.725	143.750	143.825 MHz

Air Defense Combat Air Patrols

139.700 MHz
Pilot-to-Dispatcher
139.300 142.300 MHz

US Air Force Air/Air

141.150 141.400 MHz

US Coast Guard Air/Air

141.550 150.150 MHz

US Marine Corps Air/Air

141.600 150.300 MHz

US Navy Air/Air

140.300 150.250 MHz

We will continue to monitor this portion of the military radio spectrum and report any additional information on the various frequency assignments we uncover in future Milcom columns.

So, if you have the scanner space, program in the frequencies above and let me know what you are hearing. You can send reports to the address in the masthead. I will also report new information on the Milcom blog and late breaking news on the Milcom Twitter feed. See this month's resource

guide for address information.

Until next time, 73 and good hunting.



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