AZ CAP BEACON HUNTER TABLETOP EXERCISE

This exercise will walk you through creating a mission in AZ CAP Beacon Hunter and then adding bearings provided by an Aircrew. This exercise will walk you through:

1) Connect to AZ CAP Beacon Hunter from CACTUS.
2) Create a new Beacon Hunter mission.
3) Add a new placemark to represent the known location of the practice beacon.
4) Add new bearings to represent data received from an aircrew.
5) View the bearings on the Beacon Hunter map.

1) In CACTUS on the Mission Main Menu page, click “AZ Cap Beacon Hunter”:

To select an existing Beacon Hunter mission, choose from the list.

2) To add a new mission click the “New Mission” link. You should see this:

AZ CAP Beacon Hunter Mission: []

Mission

Property	Value	Note
Wing	AZ	Arizona First!
Mission#:		Example: 20-T-1234 REDROCK COMMAND
Mission Description:		Example: JULY 2020 OPEX
Start Date:	2020-12-18T21:44:08 z	
Approximate Latitude of Center of Search Area:	° ' N	AZ, NM Only
Approximate Longitude of Center of Search Area:	° ' W	AZ, NM Only
Magnetic Declination:	-10	
Active:	☑	
Change Date:	2020-12-18T21:44:08 z	

Description:

Submit

Bearings Map Missions Placemarks New Bearing New Mission New Placemark

Name your mission “TEST <YOUR NAME HERE>” . For this exercise, the center will be located a KDVT.

Enter: Latitude 33 41.28N

Longitude 112 4.95W

Magnetic Declination -10° (10°east)

AZ CAP Beacon Hunter Mission: []

Mission

Property	Value	Note
Wing	AZ	Arizona First!
Mission#:	TEST <YOUR NAME>	Example: 20-T-1234 REDROCK COMMAND
Mission Description:	DEC OPEX TEST <YOUR NAME>	Example: JULY 2020 OPEX
Start Date:	2020-12-18T21:47:17 z	
Approximate Latitude of Center of Search Area:	° ' N	AZ, NM Only
Approximate Longitude of Center of Search Area:	° ' W	AZ, NM Only
Magnetic Declination:	-10	
Active:	☑	
Change Date:	2020-12-18T21:47:17 z	

Description:

Submit

Bearings Map Missions Placemarks New Bearing New Mission New Placemark

The value entered for declination is important and is used by the system in the calculation of the True Bearing of the Lines of Position provided by the aircrew or ground team. Aircrews and Ground Teams shall report Magnetic Bearing to the ELT/practice beacon. Mapping applications use True North, hence the magnetic bearings are converted to True bearings for plotting on the map, as you will see. Do not change declination after bearings have been entered as the bearings will not get updated to reflect the declination. If the declination was significantly incorrect, you will probably need to delete the bearings and reenter after you edit the mission declination.

Here is my “mission” information:

AZ CAP Beacon Hunter Mission: [TEST COMBELLICK]

Mission

Property	Value	Note
Wing	AZ	Arizona First!
Mission#:	TEST COMBELLICK	Example: 20-T-1234 REDROCK COMMAND
Mission Description:	DEC OPEX COMBELLICK	Example: JULY 2020 OPEX
Start Date:	2020-12-18T21:21:15 z	
Approximate Latitude of Center of Search Area:	33 ° 41.28 ' N	AZ, NM Only
Approximate Longitude of Center of Search Area:	112 ° 4.95 ' W	AZ, NM Only
Magnetic Declination:	-10.00	
Active:	☑	
Change Date:	2020-12-18T21:28:14 z	

Description:

put something useful here that descibes the mission

Submit

Bearings Map Missions Placemarks New Bearing New Mission New Placemark

Once you submit, you should be able to view your mission in the list of missions:

3) If you go back to the “Missions” selection page, you should see your mission listed.

AZ CAP Beacon Hunter Missions

Missions

Mission Number ▲ ▼	Mission Description ▲ ▼	Description ▲ ▼
TEST COMBELLICK	DEC OPEX COMBELLICK	put something useful here that descibes the mission
21-A-3339	F91 check	
TEST1	this is a test	
21-T-3732 NOV OPEX	21-T-3732 NOV OPEX	
20-T-5510	SEPT OPEX 20-T-5510	
20-M-0703	20-M-0703 PIMA COUNTY	RQSTING ASSISTANCE IN LOCATING AN ACTIVE 406 FREQUENCY ELT IN PIMA COUNTY, AZ
21-T-3140 OCT OPEX	2020 OCT OPEX	
20-M-0663	20-M-0663 MZJ	REQUEST CAP ASSISTANCE IN LOCATING AN UNREGISTERED 406 ELT AT MZJ. POC: MSGT COMBS DETECTION FREQUENCY: 406.0369 MHZ

Click on your mission, then click “New Placemark”

A placemark is just a labeled coordinate and is often used to mark the known location of a practice beacon or the SARSAT estimate of the location of a 406Mhz ELT.

AZ CAP Beacon Hunter Mission: [TEST COMBELLICK]

PlaceMark

Property	Value	Note
Latitude:	° ' N	AZ, NM Only
Longitude:	° ' W	AZ, NM Only
Comment:		
Color:	Black	

Submit

Bearings Map Placemarks New Bearing New Placemark

Here is an example from a previous OPEX:

AZ CAP Beacon Hunter Mission: [21-T-3732 NOV OPEX]

PlaceMark

Property	Value	Note
Latitude:	33 ° 54.5400 ' N	AZ, NM Only
Longitude:	112 ° 40.5190 ' W	AZ, NM Only
Comment:	406 beacon	
Color:	Black	

Submit

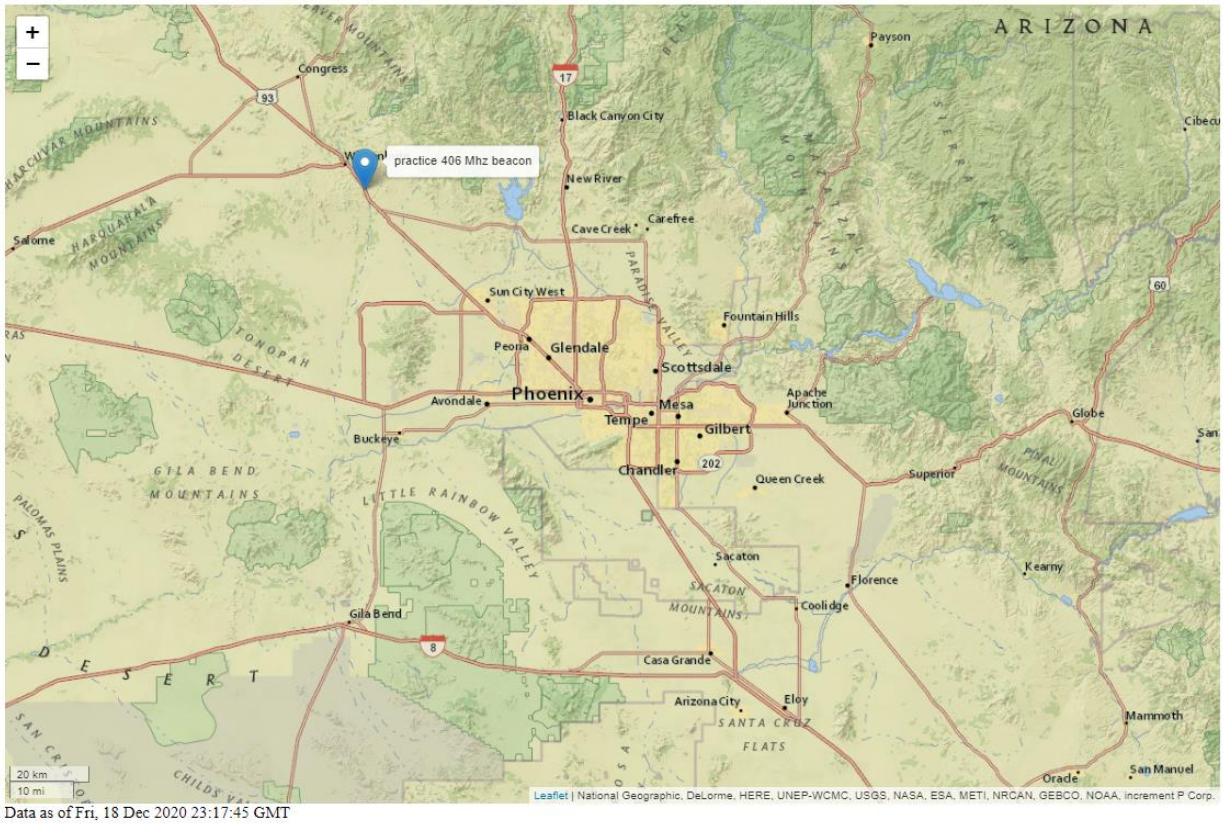
Bearings Map Placemarks New Bearing New Placemark

Add a New Placemark using this same information. As a note, if you do not see a mission number on the header line in the brackets, you are entering a "Global" placemark, which is visible to all missions. Make sure to select your mission before entering this placemark.

After entering your placemark, you can view it on the Map. Click the "Map" link:

AZ CAP Beacon Hunter Mission: [TEST COMBELLICK]

Map



Data as of Fri, 18 Dec 2020 23:17:45 GMT

Zoom in on the map to get a closer look:

AZ CAP Beacon Hunter Mission: [TEST COMBELLICK]

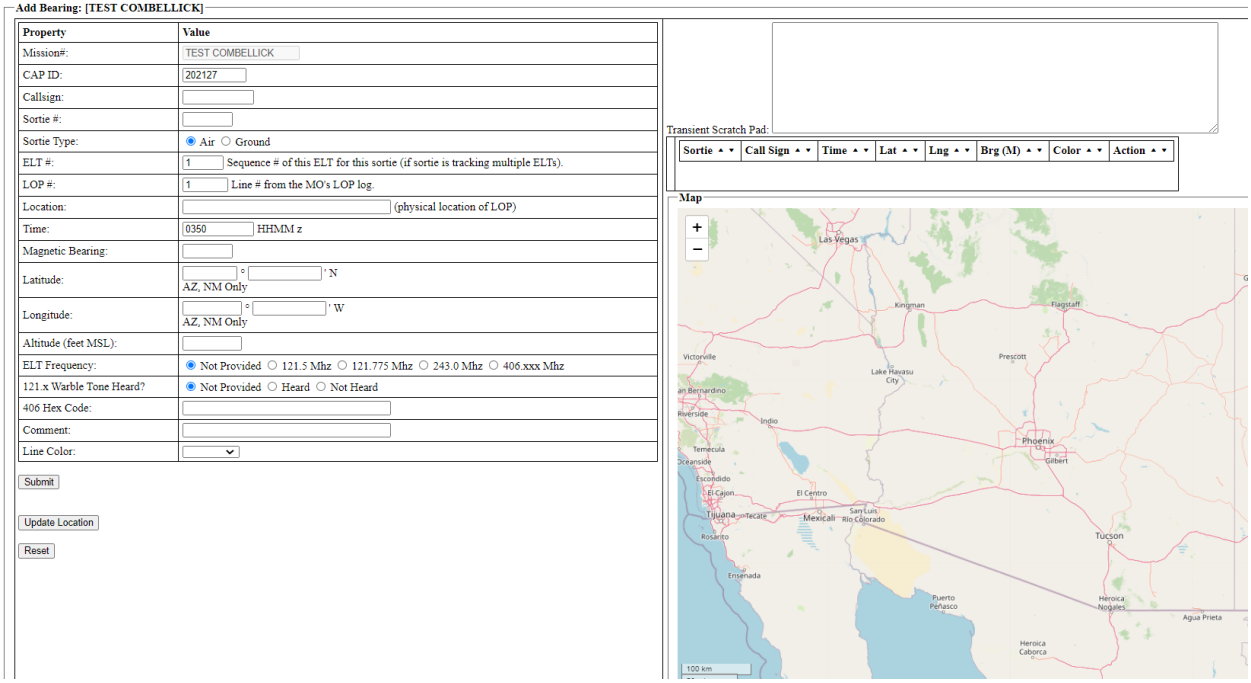
Map

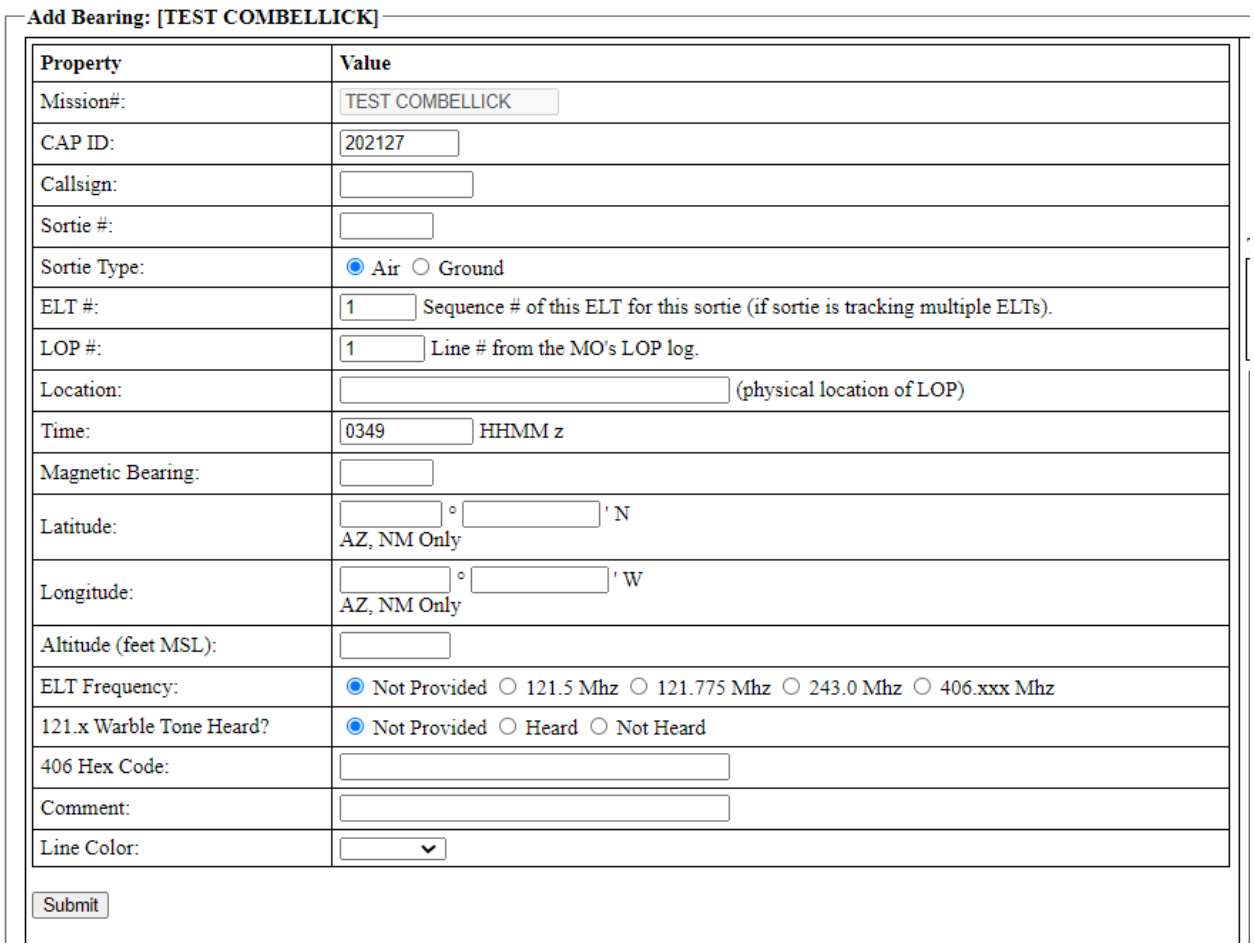
Data as of Fri, 18 Dec 2020 23:18:46 GMT

4) Add new bearings.

Make sure that your mission is selected. If not, Click on “Missions” then select your mission.

Then click “New Bearing”. The “New Bearing” screen should look like this:





Add Bearing: [TEST COMBELLICK]

Property	Value
Mission#:	TEST COMBELLICK
CAP ID:	202127
Callsign:	
Sortie #:	
Sortie Type:	◉ Air ○ Ground
ELT #:	1 Sequence # of this ELT for this sortie (if sortie is tracking multiple ELTs).
LOP #:	1 Line # from the MO's LOP log.
Location:	(physical location of LOP)
Time:	0349 HHMM z
Magnetic Bearing:	
Latitude:	° ' N AZ, NM Only
Longitude:	° ' W AZ, NM Only
Altitude (feet MSL):	
ELT Frequency:	◉ Not Provided ○ 121.5 Mhz ○ 121.775 Mhz ○ 243.0 Mhz ○ 406.xxx Mhz
121.x Warble Tone Heard?	◉ Not Provided ○ Heard ○ Not Heard
406 Hex Code:	
Comment:	
Line Color:	

Submit

CAP ID: Enter your CAP ID. (Who do we talk to about data entry questions?)

Callsign: Enter the callsign of the aircraft or ground team.

Sortie#: Enter the sortie number. If not available, request the sortie number from the aircrew. It is common for an aircraft to have multiple sorties during an OPEX.

Sortie Type: choose air or ground as appropriate.

ELT #: 99% of the time this should be 1. However, it is possible that a single sortie may track multiple ELTs (or practice beacons).

LOP #: Line # from the Mission Observer's bearing log.

Location: Descriptive physical location when the bearing position was recorded.

Time reported by the aircrew.

Magnetic Bearing: This is the Magnetic Bearing to the ELT. Non-pilot MOs often make an error here and they report heading. Magnetic Heading is the same as Magnetic Bearing only if the Rho-theta shows a zero relative bearing. It is possible to configure the G1000 to display True heading. If unclear what was reported, request clarification from the aircrew. It is NOT the responsibility of the MRO to resolve this ambiguity.

Latitude: Degrees and decimal minutes of latitude of the location that the aircrew recorded the Magnetic Bearing.

Longitude: Degrees and decimal minutes of longitude of the location that the aircrew recorded the Magnetic Bearing.

Altitude (MSL): Altitude when the bearing was recorded. Nice to have but not critical.

Frequency: What frequency was ELT heard on? This is important, especially on an OPEX. It must be clear that the aircrew is tracking a practice beacon or an actual ELT. It is also important to know whether this bearing is based upon the 406 Mhz data or the 121.x analog signal for assessing the quality of the data.

Warble tone heard? If tracking an analog ELT, did the aircrew hear the ELT warble tone? If the mission focus is an analog ELT, then a warble tone is definitely expected as the warble tone is the only mechanism to alert AFRCC to an ELT.

406 HEX Code: 406Mhz ELTs transmit a data block that includes a "serial number". It is important to know if this is the 406 Mhz ELT that caused the AFRCC mission alert. It is possible that multiple 406 Mhz ELTs are transmitting. The only way to know for sure is if the aircrew reports the HEX code with every bearing.

Comment: free form text field. Often used to show the bearing #, for future reference.

Color: Bearing Line color on the map. Generally, use the same color for all bearings for a single sortie. For a busy OPEX, this is important. For an actual mission with a single sortie and a single ELT, color is not so important.

Add these bearings:

Edit Bearing: [TEST COMBELLICK]

Property	Value
Mission#:	TEST COMBELLICK
CAP ID:	1
Callsign:	CAP247
Sortie #:	14
Sortie Type:	(•) Air ( ) Ground
ELT #:	1 Sequence # of this ELT for this sortie (if sortie is tracking multiple ELTs).
LOP #:	1 Line # from the MO's LOP log.
Location:	near Morristown (physical location of LOP)
Time:	2020-12-20T21:20:28.193 z
Magnetic Bearing:	291
Latitude:	33 ° 51.60 ' N AZ, NM Only
Longitude:	112 ° 30.00 ' W AZ, NM Only
Altitude (feet MSL):	3000
ELT Frequency:	( ) Not Provided ( ) 121.5 Mhz ( ) 121.775 Mhz ( ) 243.0 Mhz (•) 406.xxx Mhz
121.x Warble Tone Heard?	( ) Not Provided (•) Heard ( ) Not Heard
406 Hex Code:	
Comment:	CAP247 LOP#1
Line Color:	Cyan

Submit

Edit Bearing: [TEST COMBELLICK]

Property	Value
Mission#:	TEST COMBELLICK
CAP ID:	202127
Callsign:	CAP247
Sortie #:	14
Sortie Type:	(•) Air ( ) Ground
ELT #:	1 Sequence # of this ELT for this sortie (if sortie is tracking multiple ELTs).
LOP #:	2 Line # from the MO's LOP log.
Location:	south of Wickenburg (physical location of LOP)
Time:	2020-12-20T21:21:04.347 z
Magnetic Bearing:	70
Latitude:	33 ° 54.00 ' N AZ, NM Only
Longitude:	112 ° 47.40 ' W AZ, NM Only
Altitude (feet MSL):	2589
ELT Frequency:	( ) Not Provided ( ) 121.5 Mhz ( ) 121.775 Mhz ( ) 243.0 Mhz (•) 406.xxx Mhz
121.x Warble Tone Heard?	( ) Not Provided ( ) Heard (•) Not Heard
406 Hex Code:	
Comment:	warble not reported heard/not heard
Line Color:	Cyan

Submit

Edit Bearing: [TEST COMBELLICK]

Property	Value
Mission#:	TEST COMBELLICK
CAP ID:	202127
Callsign:	CAP247
Sortie #:	14
Sortie Type:	(•) Air ( ) Ground
ELT #:	1 Sequence # of this ELT for this sortie (if sortie is tracking multiple ELTs).
LOP #:	3 Line # from the MO's LOP log.
Location:	(physical location of LOP)
Time:	2020-12-21T04:01:16.453 z
Magnetic Bearing:	6
Latitude:	33 ° 41.40 ' N AZ, NM Only
Longitude:	112 ° 45.60 ' W AZ, NM Only
Altitude (feet MSL):	2526
ELT Frequency:	( ) Not Provided ( ) 121.5 Mhz ( ) 121.775 Mhz ( ) 243.0 Mhz (•) 406.xxx Mhz
121.x Warble Tone Heard?	( ) Not Provided ( ) Heard (•) Not Heard
406 Hex Code:	
Comment:	
Line Color:	Cyan

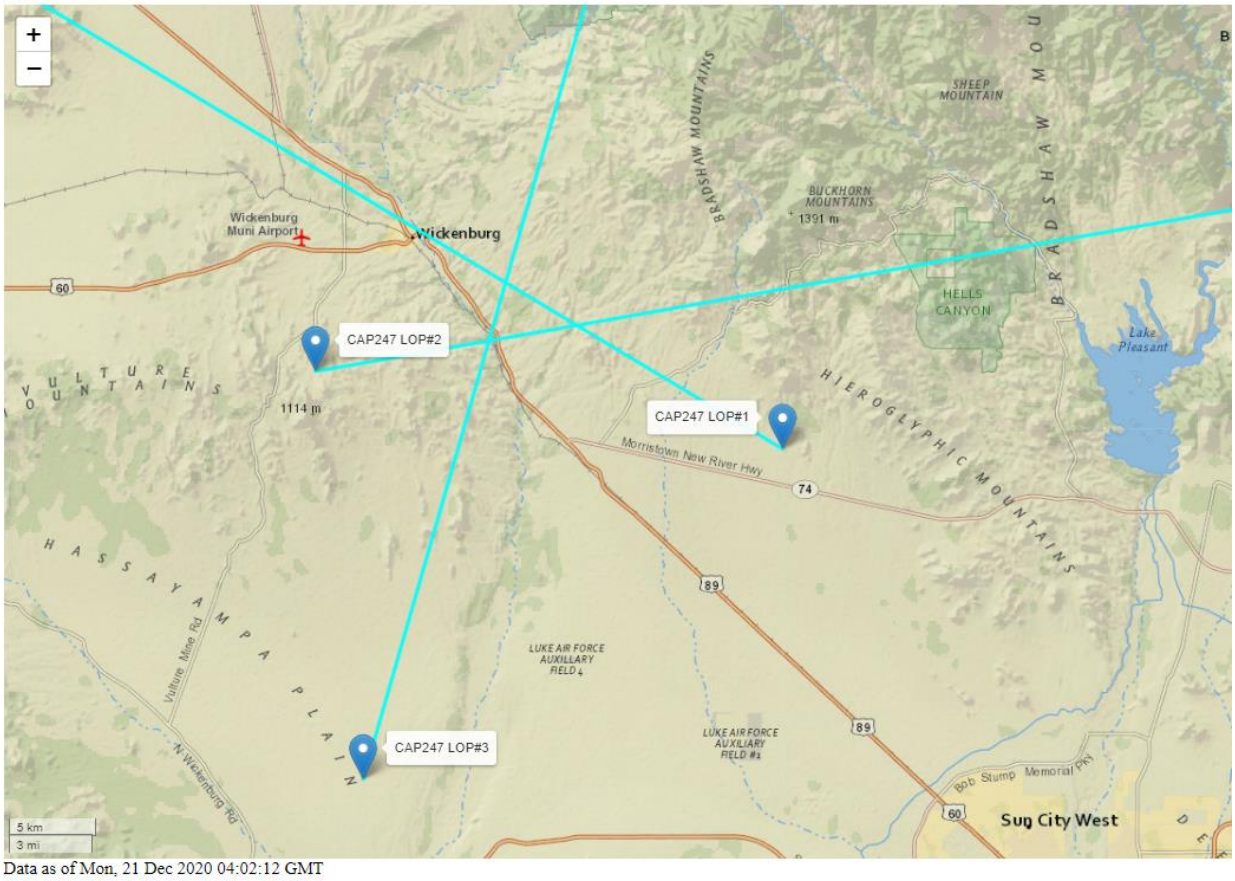
Submit

This should be your results:

View the Map for your mission:

AZ CAP Beacon Hunter Mission: [TEST COMBELLICK]

Map



Data as of Mon, 21 Dec 2020 04:02:12 GMT

Mouse: N33° 43.79' W112° 7.14'

View the bearings list for your mission:

AZ CAP Beacon Hunter Mission: [TEST COMBELLICK]

Bearings

Sortie	Call Sign	ELT #	LOP #	Location	Time	Brg (T)	Brg (M)	Latitude	Longitude	Altitude	Frequency (Mhz)	Warble Tone	HEX Code	Comment	Color	Action	Edit	Delete	Map
A14	CAP247	1	1		9:20 PM z	301	291	N33° 51.60'	W112° 30.00'	3000	406.000	Yes		CAP247 LOP#1	Cyan	Hide	Edit	Delete	Map
A14	CAP247	1	2	south of Wickenburg	4:00 AM z	80	70	N33° 54.00'	W112° 47.40'	2589	406.000	No		warble not reported heard/not heard	Cyan	Hide	Edit	Delete	Map
A14	CAP247	1	3		4:01 AM z	16	6	N33° 41.40'	W112° 45.60'	2526	406.000	No			Cyan	Hide	Edit	Delete	Map

Map Mission Missions Placemarks New Bearing

Notice that it is possible to “hide”, “edit”, or “delete” a questionable bearing. It is also possible to sort on any of these columns by clicking on the column header.

Notice the spread of the bearings. An effective beacon search has the bearings at least 20 $^{\circ}$ offset from each other. This is obvious from looking at the bearings table which might not be obvious if you are looking at the bearings in a busy comm log.

View the placemarks list for your mission:

AZ CAP Beacon Hunter Mission: [TEST COMBELLICK]

PlaceMarks

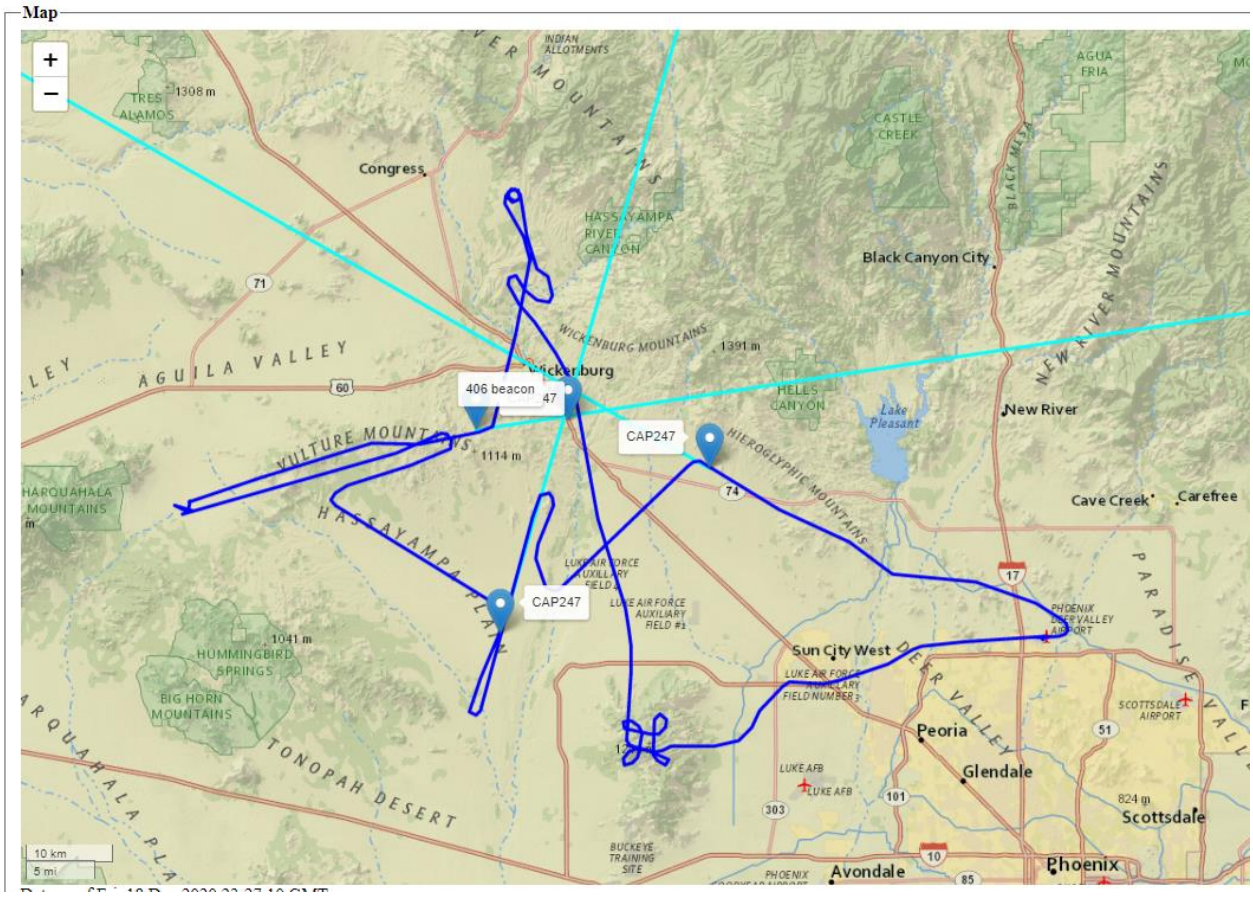
DateTime	Latitude	Longitude	OuterColor	InnerColor	Comment	Action	Edit	Delete
2020-12-18T22:57:33.480	N 33 54.5400'	W -112 40.5190'	#000000	#000000	practice 406 Mhz beacon	Hide	Edit	Delete

Bearings Map Missions New Bearing New Placemark

Notice that it is possible to “hide”, “edit”, or “delete” a questionable placemark.

Here is an example of the actual sortie in the Nov OPEX showing bearings and ADSB ground track:

AZ CAP Beacon Hunter Mission: [21-T-3732 NOV OPEX]



The dark blue line is drawn from the ADSB data collected by the AZCAPTracker application. The cyan lines are the bearings provided by the sortie. Notice that the origin waypoint for the bearing lines, fall on top of the ADSB track. This is a good validation that the coordinates provided, make sense. Often, coordinates are transposed by the aircrew, MRO, or Bearing Hunter data entry person. As part of the sortie debrief, the AOBD/briefer should check the bearing log worksheet uploaded to WMIRS by the aircrew, with the CACTUS CAPF110 COMM log and the actual coordinates entered in Beacon Hunter. Any discrepancies should be investigated.

20 Dec 2020