

ICARC Fox Hunting

Presentation by KC0JFQ

Formal Hunt
ICARC FOX (Tx) Equipment
DF (Rx) Equipment
Methodology

http://www.icarc.org/icarc_foxhunt.htm

ICARC Fox Hunting

Classic Competition

5 transmitters sending CW: **MOE MOI MOS MOH MO5**

5 minute cycle, 1 min. allocated minute for each Tx

Minimum separation 400m (we usually don't follow this)

Time Limit 3 hours (we usually don't follow this either)

Finish Beacon (we usually don't have this)

<http://www.ardf-r2.org/>

<http://www.arrl.org/files/file/ARDF/USA%20ARDF%20Rules%209-Feb-2020.pdf>

ICARC Fox Hunting

Classic Competition

We have enough transmitters to conduct a 5 transmitter event

The 102-73161 transmitters are limited radiated power, typically less than 50mW. This limits area over which we can operate.

New 102-73181 transmitters are 500mW or 1000mW are in software development. This would allow up to move out to Kent Park and cover the entire park. Not enough units currently exist.

ICARC Fox Hunting

Classic Competition

Invite other organizations to participate?

We have always invited UIARC.

Local HAMRAD and law enforcement? (John K0GH: could you manage a handful of RX ONLY radios for non-ham guests?)

ICARC Fox Hunting

ICARC FOX (Tx) Equipment

WB6EYV MicroHunt Foxhunting Transmitter

The Original (we have 3)

102-73161

The Original in 3 revisions (we have 8)

102-73176

The first voice capable transmitter (we have 3)

102-73181

The high power transmitter (one software prototype)

ICARC Fox Hunting

ICARC FOX (Tx) Equipment

WB6EYV MicroHunt Foxhunting Transmitter

All have to be activated (battery connected) at once to synchronize.
Programmed with club call (W0JV) and MO? Identifier.

102-73161/73176/73181

Fully programmable. These units can operate any schedule you can think of.
TOY Clock allows quick power-on and deploy.
Synchronization is achieved the night before by setting TOY clock to UT.

Newer units have voice capability to allow operators whoWB6EYV MicroHunt
Foxhunting Transmitter

The Original (we have 3) aren't *CW friendly*.

ICARC Fox Hunting

ICARC FOX (Rx) Equipment

VHF-FM Handi-talkie

So you can hear the Fox Transmitter.

VHF Antenna

Kinda obvious, yes?

Magnetic Compass and Map of the area

Plot *line-of-position* to transmitter?

ICARC Fox Hunting

ICARC FOX (Rx) Equipment

Body

Use your body as an directional attenuator.

NVARC Fox Finder

Crude RF detector: <http://n952.ooguy.com/eagle/#NVARC-FOX-FINDER>
Switchable gain.

Yagi

Use directional antenna to establish *line-of-position*.
Don't depend on front/back ratio!
Switchable attenuator to defeat radio AGC

DTOA switch

The elegant solution <http://n952.ooguy.com/eagle/#ICARC.DTOA.DIRECTION.FINDER>
Works with FM only!
Lots of boards on hand!

ICARC Fox Hunting

Methodology

Keep your head in the game!
It is very easy to loose track!

Transmitters are only one for **one** minute!
Remember the comment about them being programmable,
they can impersonate each other.

BUT

They are **not** programmed to be deceitful about their identity/callsign.
The audible identifiers (i.e. FOX-five, FOX-seven) are unique and unchanging.
The callsign (W0JV/5 W0JV/7) are also unique and unchanging.
Callsign and identifier are announced at the **beginning** of the message.
Callsign is also at the end of the message to comply with the rules.

CW parameters may change (they probably will change)!
CW chipping rate (i.e. WPM) and the audio tone can change in the middle of a message.
Don't let this lead you down the wrong path.

ICARC Fox Hunting

Methodology

Keep your head in the game!
Use a map to record your line of position!

You'll only get 60 seconds to establish the direction to the transmitter.
Walking can take you into and out of multipath,
be aware of metal objects and overhead wires.

When you hear the SK(. -.)
the transmitter is done so record your *line-of-position*.

The fox transmitter verbally sends **callsign** and the **unit name** (identity).
Battery condition in volts/tenths is then reported first using morse
and then using a simple dah/dit encoding.

The rest of the transmit period is filled with CW or voice traffic.
A carrier is generated continuously through the transmitting period.

ICARC Fox Hunting

Methodology

Keep your head in the game!
Use a map to record your line of position!

Your lines-of-position should converge on the transmitter.

Currently the fox transmitters all have an orange rubber-ducky antenna that is about 8" long.
It may be sitting behind a tree or other obstruction so as not to be readily visible.

Record the **event validation code** and the **ID** from the bottom of the transmitter on your score card.
This label is generated with unique identification fields for each fox hunt.
You will also note that this label has the transmitters name.

ICARC Fox Hunting

Methodology

Keep your head in the game!

FOX TRANSMITTER

W0JV/8

Nickname: FOX8 144.285 MHz 102_73161_25

ID: 025953 Power 5.0mW Ref Xtal:20.000

Valid 7 days from Sat May 6 08:36:48 2023

Iowa City Amateur Radio Club

Hickory Hill Park FOX HUNT

Event Validation Code: 144.150/SF759DJG

ICARC Fox Hunting

Methodology

Practice transmitters!
It is very easy to track these!

Remember I said they are programmable.
We may have one of two channel hogs turned on!

These run on their own frequency transmitting almost 100% of the time.
You may find these useful to familiarize yourself with your equipment.

ICARC Fox Hunting

Happy Hunting

I'm at the end!

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http://www.icarc.org/icarc_foxhunt.htm

Here we go again

A short list of “keeping your head in the game”

Will try to run through things in this order

ICARC Fox Hunting

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ARRL defines a 'standard' fox hunt.

Seems this was built in the days when computer resources were more difficult to deal with. Small SOC devices with limited memory. Transmitter control implemented in small memory footprint severely limiting what the transmitter has to say.

i.e. callsign for hosting organization and a 3 character identifier.

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New 102-73181 transmitters are 500mW or 1000mW are in software development. This would allow up to move out to Kent Park and cover the entire park. Not enough units currently exist.

On the fox transmitter side, we can do better.

Very low power for small area hunt. Such as Hickory Hill Park.

Medium power (500mW or 1000mW) for larger area like F.W.Kent Park.

All the newer transmitters are voice capable, so they can be identified easily for those not familiar with CW.

ICARC Fox Hunting

Classic Competition

Invite other organizations to participate?

We have always invited UIARC.

Local HAMRAD and law enforcement? (John K0GH: could you manage a handful of RX ONLY radios for non-ham guests?)

Once we have more 73181 transmitters (like a full set of 5), we can operate a formal hunt (in a large area like Kent Park).

In the meantime, we tend to run small area (Hickory Hill) events.

John ???

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Our transmitter inventory:

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Foxhunting Transmitter

The Original (we have 3) aren't *CW friendly*.

WB6EYV transmitters are *micropower* devices. Less than 50mW (probably less than 10mW).

The 73161 boards range up to 50mW. They vary as they use a digital gate for the RF amplifier and 145MHz is at the extreme edge of their capability, Not all gates are *hot enough* to drive at 50mW.

73176 boards also range up to 50mW as they use same RF amplifiers. These are Raspberry-PI based. Power hungry, so I plan to retire them.

73181 boards can use same RF amplifier or the DRA818/SA818 1W transceiver module. Software is in development. Think Kent Park event!

ICARC Fox Hunting

ICARC FOX (Rx) Equipment

VHF-FM Handi-talkie
So you can hear the Fox Transmitter.

VHF Antenna
Kinda obvious, yes?

Magnetic Compass and Map of the area
Plot *line-of-position* to transmitter?

The modulation scheme is FM. Haven't tried AM or CW, but at 145MHz, that should make no difference.

Antenna selection becomes important for the close-in events. Even a few mW is substantial when you are close to the transmitter. The nulls in a Yagi pattern can still hear the transmitter very well. Receive AGC gets in the way!

An area map and a compass are vital to track your progress as the transmitter is only on for a minute at a time. Establish line of position (ahead AND behind) when transmitter is on and plot it!

ICARC Fox Hunting

ICARC FOX (Rx) Equipment

Body

Use your body as an directional attenuator.

NVARC Fox Finder

Crude RF detector: <http://n952.ooguy.com/eagle/#NVARC-FOX-FINDER>
Switchable gain.

Yagi

Use directional antenna to establish *line-of-position*.
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Works with FM only!
Lots of boards on hand!

You are an (minimally) effective RF shield. Receiver close to your chest will shield signal from behind (but not from the side!)

NVARC design is a simple RF detector. Broadband, but probably better than handy-talkie with a Yagi. Selectable gain.

Yagi is directional, but not so useful when the radio AGC masks signal strength.

DtoA switch is almost magical :-). Switches between two antennas. Hear Fox Tx when *normal* to source. DtoA switching introduces a *squeal/whine* into the audio from the receiver as the antenna array moves of of normal. Audio amplitude changes with direction. Some direction sensitivity even when DtoA is off.

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CW parameters may change (they probably will change)!
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Don't let this lead you down the wrong path.

Take notes of what you see/hear during the transmitter on-time (map!). Time is short!

The ICARC transmitters must comply with FCC identification rules. They are not deceitful in that respect.

BUT. They are programmable. Everything about the is programmable. Audio pitch, CW chipping speed, they can talk. They can be programmed to sound different each time they come on!

Power Output for the DRA818/SA818 module is pin selectable, **but**, no plans to allow that to change as the extra 500mW affects battery life significantly.

ICARC Fox Hunting

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When you hear the SK(-.-)
the transmitter is done so record your *line-of-position*.

The fox transmitter verbally sends **callsign** and the **unit name** (identity).
Battery condition in volts/tenths is then reported first using morse
and then using a simple dah/dit encoding.

The rest of the transmit period is filled with CW or voice traffic.
A carrier is generated continuously through the transmitting period.

As mentioned, you will find plotting a *line of position* on a map a useful method to keep track of your observations. Note that this *line of position* extends in front of you as well as behind you. Yagi has gain in both front and behind direction.

You should get to the point that you recognize the **CQ CQ CQ** announcement at the beginning of the message as well as the **SK SK SK** at the end. CQ is easy, the SK is useful to let you know when it's time to mark your observation on your map.

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It may be sitting behind a tree or other obstruction so as not to be readily visible.

Record the **event validation code** and the **ID** from the bottom of the transmitter on your score card.
This label is generated with unique identification fields for each fox hunt.
You will also note that this label has the transmitters name.

As you cycle through several time, you *LOPs* should start to converge on the transmitter location.

Note the obnoxious orange antenna on the ICARC transmitters. I have to be able to pick them up at the end, so you can look for the out-of-place color when you get close.

The Fox Transmitter should be positioned so you can easily read the validation code. That code is regenerated for each hunt so it will be unique for each hunt. Simply record it on you log card. Both codes on the transmitter are unique. Either one is acceptable.

The transmitters name is also visible on the label with the validation code. This name should match the outgoing message.

ICARC Fox Hunting

Methodology

Keep your head in the game!

FOX TRANSMITTER **W0JV/8**
Nickname: FOX8 144.285 MHz 102_73161_25
ID: 025953 Power 5.0mW Ref Xtal:20.000
Valid 7 days from Sat May 6 08:36:48 2023
Iowa City Amateur Radio Club
Hickory Hill Park FOX HUNT
Event Validation Code: 144.150/SF759DJG

Sample Label

In the upper right is the callsign that the Fox Transmitter sends (FCC identification).

The *Nickname* may be vocalized by the transmitter. You'll notice that the numeric part matches the Callsign suffix.

The **ID:** field is generated just before the labels are printed, as is the **Validation Code**.

The 144.150 in the **Validation Code** field is the frequency on which the Fox Transmitter sends its startup message. This is used when setting the transmitters out in the field (all transmitters used in the event use the same startup frequency).

ICARC Fox Hunting

Methodology

Practice transmitters!
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Remember I said they are programmable.
We may have one of two channel hogs turned on!

These run on their own frequency transmitting almost 100% of the time.
You may find these useful to familiarize yourself with your equipment.

We also have plans to setup a few of the oldest transmitters to transmit almost continuously.

If this is your first event (or if you want to familiarize yourself with your equipment), this should provide a means to figure out how your equipment works without things shutting down 58 seconds after you start :-)

They operate on their own frequency so they don't interfere with the formal hunt.

These older transmitters lack audio capability, so they're strictly CW.

ICARC Fox Hunting

Happy Hunting

I'm at the end!