

Fox Hunting

Radio's Game of Hide & Seek

Agenda

- ▶ What is Fox Hunting?
- ▶ How does it Work?
- ▶ What's needed to participate?
- ▶ Commercial Systems
- ▶ Activity on LI
- ▶ Bibliography



Note: The term “Bunny Hunting” is used for short-range direction finding, while “Fox Hunting” is used for long-range direction finding. These loose terms are believed to have been originated by British radio engineers.

What is Fox Hunting?

- ▶ The radio version of Hide & Seek
- ▶ The fox conceals a portable radio transmitter at a location in a defined zone.
- ▶ The hidden transmitter periodically sends out a beacon signal
- ▶ The hunters must locate the transmitter by listening for the beacon
- ▶ Who wins the hunt?
 - 1st hunter to find the transmitter
 - Hunter with the least elapsed time to find the transmitter
 - Hunter who found it using the least mileage
 - Hunter with the most number of points
 - All participants gain skills & knowledge
 - Hunter who had the most fun

How Does It Work?

▶ Fox

- A foxbox contains a transmitter, battery, antenna, and controller/timer unit. The transmitter is often an old hand-talkie or mobile radio. 2 or 3 watts of power is plenty.




▶ Hunter

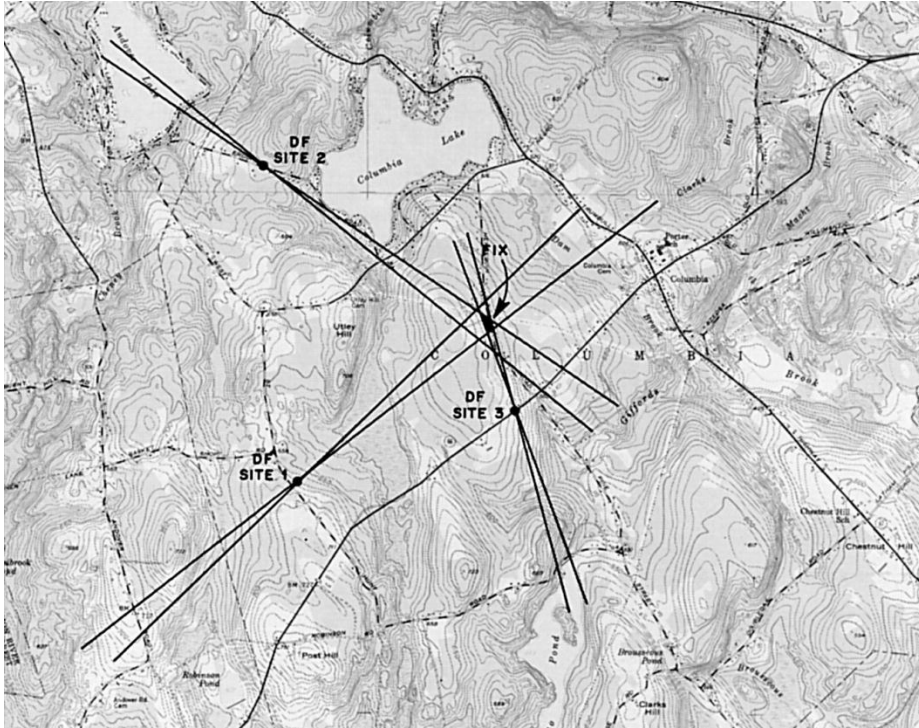
- Directional Antenna
- Receiver with “S” meter
- Attenuator for close-in hunting
- Map of zone containing the fox’s den
- Compass (or GPS device)



What's Needed to Participate?

- ▶ Motor vehicle and driver, navigator
 - ▶ Detail scaled area map and compass
 - ▶ Hunters need a directional antenna and a receiver with a signal strength meter that's tuned to the fox's beacon
 - ▶ Hunters triangulate the fox's location within the zone by taking bearings from different locations using the directional antenna
 - ▶ The signal gets stronger as the hunters converge on the fox
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Charting a Course



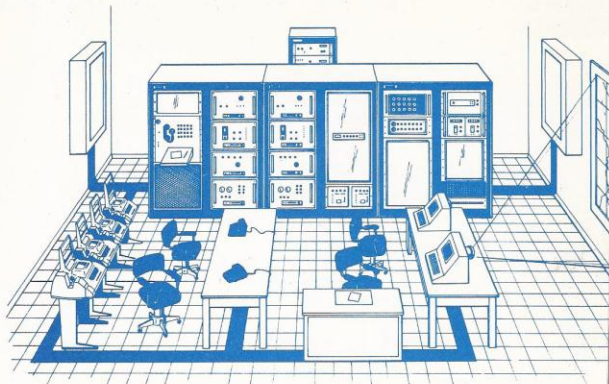
Bearing sectors from three RDF positions drawn on a map for triangulation. In this case, bearings are from loop antennas, which have 180° ambiguity

Equipment



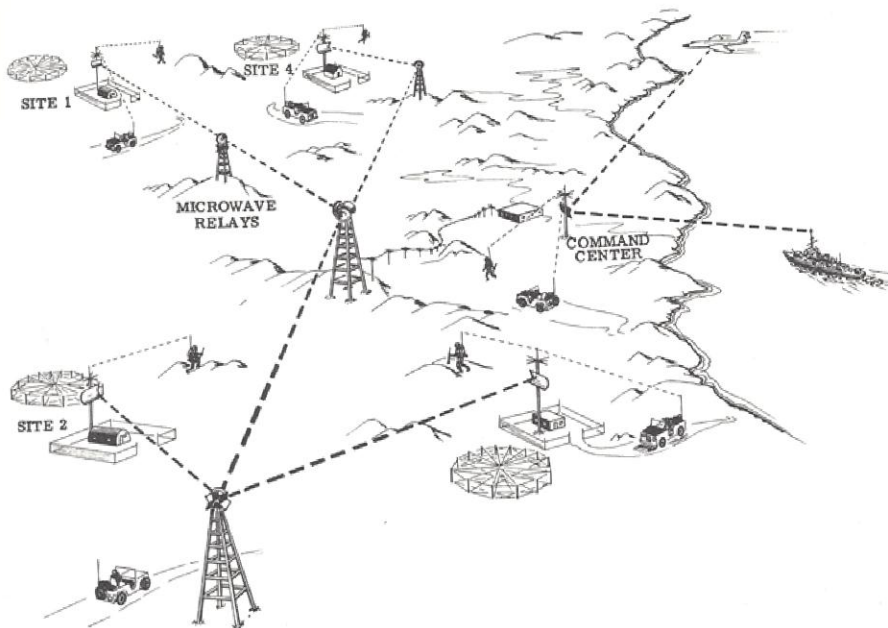
Equipment





FAIRS

FAIRCHILD AUTOMATIC INTERCEPT AND RESPONSE SYSTEM

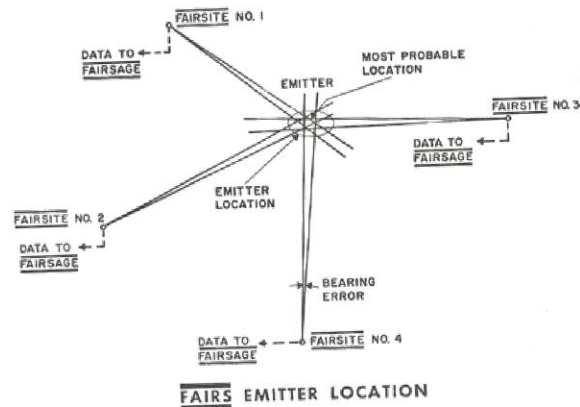


Any or all sites can be synchronized on a particular target. This multi-site DF allows the FAIRS to accurately locate a particular emitter.

Synchronized Scanning

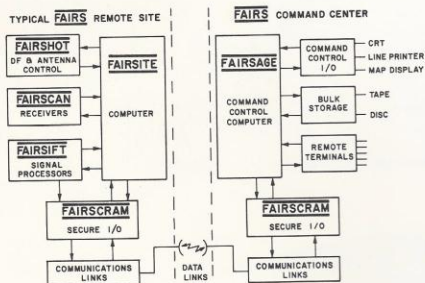
The FAIRSAGE software can be provided to do a number of different tasks simultaneously. Examples of these tasks are:

- Direction-finding in several different directions simultaneously
- Direction-finding on several different frequencies simultaneously
- Tracking a mobile emitter



FAIRS

FAIRCHILD AUTOMATIC INTERCEPT AND RESPONSE SYSTEM

**SYSTEM DIAGRAM**

FIXED GROUND STATION CONFIGURATIONS

FAIRSCAN	- RECEIVER SUBSYSTEMS HF BRT-30 5KHz-50MHz HF/VHF BRT-35 5KHz-1 GHz HF/VHF/UHF/SHF BRT-35/MXB-135 5KHz-12.5 GHz
FAIRSHOT	- ANTENNAS HF PHASED ARRAY VHF/UHF LOG PERIODIC SHF LOG PERIODIC & DISH
FAIRSITE	- SITE COMPUTER
FAIRSIFT	- SIGNAL PROCESSING SIGNAL RECOGNITION DEMODULATION DATA RECORDING
FAIRSCRAM	- COMMUNICATIONS SECURITY SYSTEM
FAIRSAGE	- COMMAND & CONTROL COMPUTER

The Fairchild Automatic Intercept and Response System (FAIRS) is a multi-site/multi-purpose electromagnetic data acquisition and processing system. The basic FAIRS concept is to acquire and process data from a number of remote sites or mobile units and provide pre-processed data to a central command center or remote users for decision making. The collection system is extremely flexible and expandable. The entire system may consist of a single site or may be composed of a dozen or so fixed stations, land mobile units, or airborne platforms.

Several unique features of the FAIRS concept make it extremely flexible:

- The system utilizes off-the-shelf subsystem components.
- Subsystem components are basic building blocks and can be easily configured or reconfigured.
- The system can perform many tasks simultaneously.
- Changes in system mission profiles are essentially software changes and do not require new hardware.
- A wide frequency range, 5 kHz to 12.5 GHz, can be covered.
- Site-to-site command and control require only telephone lines; traffic on data links is minimized by utilizing site computers to perform functions asynchronously.
- Direction finding (DF) may be accomplished from a single site or from multiple sites for improved probability of location.
- DF is possible at frequencies as low as 500 kHz.

Fairchild/Electro-Metrics Division's BRT/MXB Series Broadband Receiving System is capable of being remotely controlled, either by special circuitry or directly from a digital computer. All functions of the BRT/MXB, such as attenuator setting, frequency selection (by digitally controlled frequency synthesis), and bandwidth (continuously variable from 500 Hz to 20 MHz) are remotely controllable. Thus, the BRT/MXB can be the key element in receiving systems which completely adapt to the electromagnetic environment at the antenna terminals.

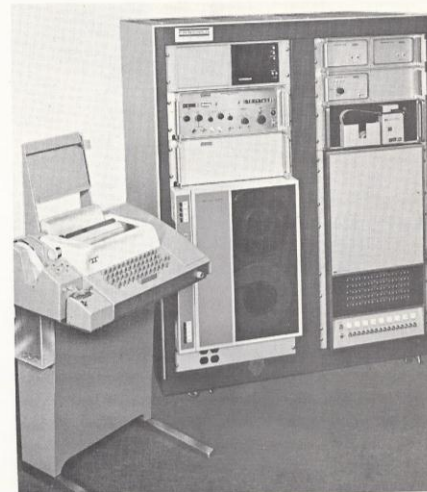
The state-of-the-art in direction-finding antennas now makes possible broadband electronically-steerable arrays which provide simultaneously good sensitivity, rapid response, and accurate direction finding.

The completely computer-controlled receiver, coupled with electronically-steerable surveillance and direction-finding antennas, makes possible high-speed systems for detection, identification of signals, and location of the source of the emitter. A system which uses a digital computer to directly control receivers, antennas (both surveillance and direction-finding), signal processing equipment, data transmission, and other necessary functions can be provided with presently available state-of-the-art components.

In addition, computer-controlled data communications make possible direct communications between computers at remote operational sites and a central command computer. Thus, a complete system of operational sites and a command and control center all tied together by data links are readily attainable and can provide a heretofore unknown level of effectiveness in detection, identification, and location of radio frequency emitters.

The FAIRS system has been designed to provide a wide range of flexibility. One of the specific tasks which can conveniently be performed by the system is frequency management. With the appropriate input, output, and storage units, the FAIRSAGE computer can perform a number of tasks needed for proper frequency allocation and scheduling.

The FAIRSAGE portion of the FAIRS systems provides communication command and control functions which allow the system to perform automatic DF and surveillance. FAIRSAGE also performs message switching and priority selection for the FAIRS system. FAIRSAGE can perform analytical work on a time-shared basis. As part of the overall mission of FAIRS and the user agency, frequency management capability has been incorporated into the FAIRS system. Both software and hardware to accomplish the desired task are provided.



SYSTEM CONFIGURATION

FAIRSABER	PORTABLE MONITORING SYSTEMS MANPACK BRIEFCASE
FAIRSTALK	MOBILE MONITORING SYSTEMS VAN MOUNTED UNITS SHELTER MOUNTED UNITS
FAIRSOAR	AIRBORNE MONITORING SYSTEMS
FAIRSAIL	SHIPBOARD MONITORING CONFIGURATIONS
FAIRSTA	FIXED GROUND STATIONS REMOTE SITES COMMAND CENTER
FAIRSWAT	AUTOMATIC RESPONSE SYSTEM

Long Island Transmitter Hunters Seek New Participants

- ▶ A group of Long Island transmitter hunting enthusiasts conduct 2 meter hunts on Friday nights (with an occasional Sunday event) and they'd like new participants to join in.
- ▶ Anyone interested in learning more about the activity of radio direction finding and radio "fox hunting" is invited to participate as a hunter, a rider, or a fox.
- ▶ A LITHARC discussion group, [Long Island Transmitter Hunters ARC](http://groups.yahoo.com/group/LITHARC/), is established on Yahoo Groups as a central information and communications site, and all are welcome to sign up for information about upcoming events.
- ▶ If you would like our group to conduct a hunt in your area and include members of your radio club, please let us know.
- ▶ For more information, contact Larry, WA2SUH at wa2suh@aol.com
- ▶ The Yahoo Group link is:
<http://groups.yahoo.com/group/LITHARC/>

LI Area Details

- ▶ An active group of Western Suffolk County and Nassau County Long Island, NY hams enjoying and promoting hidden transmitter or "Bunny/Fox" hunting on LI. All hams and members of this Group are welcome to join for mostly night-time hunts and occasional daytime hunts year round. They always try to have at least 3 hunters, so sometimes it is hard to get a hunt together. The goals are to have fun, to become technically proficient, and to keep up the tradition of transmitter hunting.
- ▶ The hunt will be centered on the parking lot of the Micro Center (655 Merrick Avenue, Westbury,) across the street from Eisenhower Park. Bob, N2DET will be within 3 1/2 miles of that point. So, we will meet on the 146.640 Plaza repeater (Mineola) at 7:45 PM and the hunt will be on 145.555 simplex at 8 PM. Normally there is no PL on the repeater but 100.0 is used sometimes if there is a band opening. See you there. *Details from hunt on 03/11/2011*

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