Anabat is:
- high frequency detection device
- uses frequency division to ~~di~~ reduce high freq echolocation into sounds conventional tape recorders can actd record (or laptop or new digital equip)
- uses zero crossing analysis to create time/freq graphs (sonograms) - picture of the bat call
- from this sonogram; some additional data, you can ID SPECIES (NOT ALL SPECIES!)

PROS
- little experience necessary to use (pres/abs)
- unobtrusive survey method
- convenient to use when other methods cannot be deployed (small, lightweight, portable)

CONS
- takes practice; experience to get good, useful data
- Myotis sp. issues
- need a complete sonogram library

The detector:

① low battery indicator → 9V
② sensitivity control (alone vs many
people vs. much noise vs. quiet)
  – max sensitivity enables greater
distance detection : initial freq detection)
③ division ratio control : 116 for most microbats
④ volume control, the lower the better
⑤ calibration tone – 40khz tone calibrates
call freq recorded to the tape recorder. Must
be pressed after each call, creates individual
calls when downloaded into ANABAT software
⑥ remote control - triggers the tape to begin
recording when toggled on
⑦ microphone control : microphone
  External features:
  ① data cable socket → connects to
recorder or Zcain for laptop.
  ② timer control for delay timer
  ③ headphones
  ④ 12 volt → for external power source,
must build cable, cannot purchase from Titley
  ⑤ HF output ?
  ⑥ battery case

Zcaim (mini)
- plugs into USB
- on/off - 9v

Wires
Anabat to tape recorder
Zcaim to tape recorder

Delay timer:
- for remote detection
- must have external 12v power source and connecting wires (must build)
- has light sensitive diode to turn on/off at dusk/dawn
- stores a call in a memory buffer while it triggers the recorder to start running

PROS
- surveys remote areas
- situations where time, equip; people are limited, no attendance needed

CONS
- picks up everything - a lot of junk

- subject to vandalism : acts of god
- stationary - increases doppler effect

1. on/off light
2. night sensor light
3. on/off/ns
4. low battery (external 12v)
5. clock (for recording call times)
6. data indicator lights (indicates when calls are being detected
7. calibration tone indicator
8. time indicator light

External
1. data cable socket
2. timer socket
3. 12 volt input

<u>Kinds of survey techniques:</u>
① Walking/stationary detection
- minimum of equipment; training
- most used survey technique
- walking: relative abundance on a transect
- stationary: emergence surveys; relative abundance on a point count
<u>Need</u>: detector; tape recorder
(Equip)
- Operator presses calibration tone after each call or every 15 seconds if activity in constant
  * cal tone adjusts for fluctuation due to battery power in the tape recorder which may cause calls to appear at higher/lower freq.
<u>PROS</u>
- 1 person job, can hike considerable dist.
- can orient detector for higher quality calls.
- can minimize extraneous noise by moving or reorienting detector
- can standardize sampling protocols

CONS:
- only 1 site/night/detector
- not suitable for wet weather
- effects of bright light (flashlight use)
may alter bat activity

(2) Vehicle Detection
- calls can be recorded directly
into laptop plugged into cigarette socket
- detector can be mounted atop vehicle
or held out of window by hand
- no calibration tone is necessary
since files can be saved using 's'
command on the computer
- time ; distance covered s/b recorded
to indicate sampling effort
Equip Need: Anabat, 2carm, laptop,
cigarette adapter, cables, vehicle (w/ roof rack),
protected container for Anabat, bungees or
rope for fixing Anabat to roof.
PROS:
- large distances can be covered
- calls are recorded directly to laptop
(reduces noise ; recorder fluctuation)
- cover many habitat types
- standardize sampling effort

CONS:
- need at least 2 people
- relies on road proximity
- not good for wet weather
- a little more training; experience necessary
- more equip
- greater Doppler shift
- more noise in calls (us freq from engine)

③ Remote Detection
- does not need an operator in attendance
- uses delay switch w/ ext'nal power source
- records automatically to tape recorder
- convenient survey method for hard to reach places or sites you don't want to hike out from in the dark
Equip Need: AnaBat, tape recorder, delay switch, cables, 12 v battery, protective covering
    PROS:
    - less labor intensive - 1 person setup
    - can be done independently of other sampling sessions

- all night detection
- surveys difficult to reach locations
- suitable for moderate weather
- human presence won't alter bat bhavior

CONS
- more equipment; more expensive sampling technique
- lots of noise and junk files
- increases Doppler effect
- large processing time b/c of # of files generated
- analysis is time consuming

④ Stationary computer detection
- similar to vehicle detection
- record at sites of high bat activity
- useful for hand release of bats which guarantees species ID

Equip Need: AnaBat, 2 cam, laptop. power source (cig adapt/12V), cables

PROS:
- records directly to laptop, reduces file warping + flux
- can orient detector to reduce Doppler - creates higher quality calls
- very useful when used in conjunction w/ trapping → hand release bats
- reduces later file processing b/c you can process as you record

CONS:
- more training, equip, expense
- not good for wet weather

Additional Considerations:
Weather: moon, rain, wind, temp, pressure Δs

    Optimum: $0 \to$ < 3/4 moon

             $0 \to$ light rain

             $0 \to$ light breeze < 5 km/hr

             $> 20°C$

             pressure $\Delta \simeq$ dusk

Season should survey in many seasons

Survey length: multiple nights

Insect noise: learn to recognize difference,
Keep sensitivity 7+

* Whispering bats
   - low amplitude calls, hard for
AnaBat to detect
   - calls aren't carried far; detection
range is small
      ie: Townsend's, Pallid to a lower degree

* Doppler Shift
   - happens when bats; detector are
moving towards or away from each other
      the Δ in distance between the source
and the receiver can cause an alteration
in call freq.
      - this can make ID even more difficult
      - freq can appear higher if bat is moving
towards detector. lower when bat is
moving away from detector

Tips for Good Recording:
① Keep equip in good working conditions (don't drop, keep dry, etc.)
② Scan an area by waving detector slowly from side to side or keep pointed @ a 45° angle perpendicular to mine or cave entrance
③ When a bat is detected, follow it w/ the AnaBat
④ Give a ½ second calibration tone after each call or every 15 seconds in constant activity
⑤ Always replace low batteries before use
⑥ When recording at a high activity site, maintain ≈10m distance and try to record approaching or leaving site b/c when too many bats are recorded @ the same time, ID is difficult.

<u>Bat Calls</u>:   pg 46 in manual
   Pulse shapes
   Call freq
      -bandwidth
      -prolonged freq → equates to
the highest freq in bats that emit
constant freq and lowest ~~freq~~ in
freq modulated bats (our 10 bats)
      ~~final~~ final freq
      -alternating pulses → some sp
emit pulses of alternating freq. which produce
consecutive higher or lower freq. pulses. This
has been found to be a diagnostic characteristic
for some species and can be measured when
applicable.
   Temporal Parameters
      -pulse duration
      -pulse interval
      -interpulse interval

SOFTWARE

Chris Corben → www.hoarybat.com

Gannon (UNM) → call library

http://talpa.unm.edu/batcall

Repairs: http://pweb.netcom.com/~t-rex/
NevadaBat.html

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Div Rat = 16

[C] - configure menu

Saw on Cal N/Y   toggle w/ [V]

freq scale 0-80KHz use [+] or [-]

Headers → [F1] to [F8] (or + shift)

[SPACE] - exits Record Mode

[CTRL] + [N] - Monitor Mode

[CTRL] + [F1] - △ in slope split screen feature
    ↳ can help ID between similar sp

[CTRL] + [F2] TBC splitscreen

[ALT] + [T] - generates a Tif

[Q] Data display

② Filters (3)

Call Intep Problems
1. Dopplar shift
2. Fragments
3. Echoes (over water)
4. Harmonics - a bat call usually
does not produce 1 freg - consists of
several harmonics, each of which is a
whole-number multiple of the fundamental
freg (2nd harm is 2x the freg of fund freg)
* COTO calls often show up at
fund; 2 harm / can be detected @ on or the
40-25   80-50 / other or both, may look like 2 bats
5. Multiple bats
6. Social calls

Alt + T - Tiff file
Cnt + D - delete file
F1 - F9 time expansion
T - text mode
S - Save
Home - back to beg. of seg
[ ] - next; prev files
Shift L - load file
Delete
U - Undo
R ; Shift + R - Recalibration
Cnt F10 - Default header

Analook

Cnt B - Dots
Alt O - Options (Colors)
Alt B - Custom filters