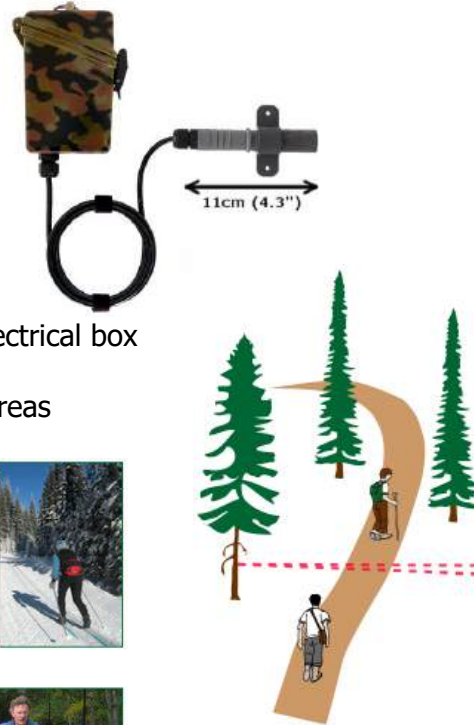# TRAFx Infrared Trail Counter Instructions
(For Generation 2, 3 and 4)

Key Info
- Counts people on trails, paths and sidewalks
- Advanced microelectronic design
- High-quality infrared scope
- Compact, unobtrusive, camouflaged design
- Very long battery life (G4.1: up to 10 years)
- Large storage capacity (millions of counts)
- Built for outside: -40C (-40F) to +55C (131F)
- Very low operating costs (<$1/year for batteries)
- Mount on a tree, or put inside a low-cost, lockable electrical box
- Field-proven, Generation 4 design (>10 year history)
- Used from Alaska to Australia, in remote and urban areas

11cm (4.3")

A   OVERVIEW

These instructions apply to Generation 2, 3 and 4 TRAFx Infrared Trail Counters (2005 – 2025+).
CAREFULLY READ THESE INSTRUCTIONS BEFORE USING THE COUNTER.

This counter detects and counts people (hikers, joggers, cyclists, horseback riders, snowmobilers, etc.) on trails, paths and sidewalks. It continually monitors the amount of infrared energy within its field of view and when there is a significant change from the ambient amount, it records a count.
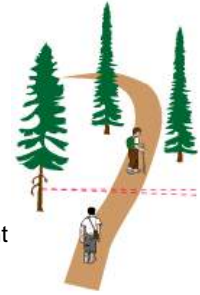
PREPARATION

Finish TRAFx Manual – Part I first. Refer to its **Quick Guide** (p. 5) to understand the overall process. Download the latest version at *trafx.net/support*
Here is the sequence:

You are here
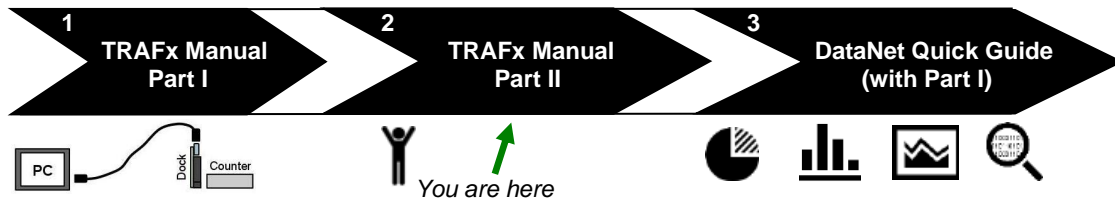
WIRE GUIDE

(Note: The counter ships assembled.)
Five wires connect to the counter's screw block, as shown below. Ensure wires are fully inserted and the screws are tight. Gently tug test each wire. Incorrectly connected wires could cause damage and void the warranty.

Wire Guide

+	= Battery positive (red)
-	= Battery negative (black)
Y	= Yellow
W	= White
R	= Red
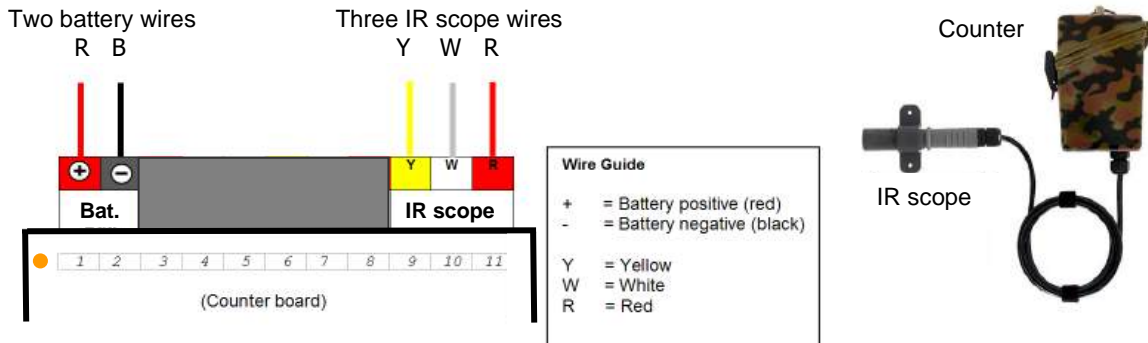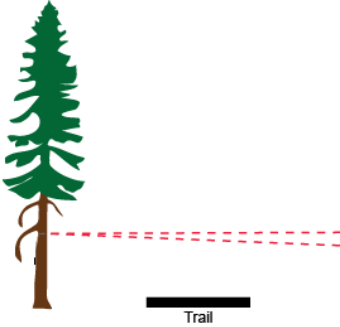
STUDY DESIGN

Study design is beyond the scope of this document, but key questions include: Which trails? How many counters? How long? Is the sample size and study period sufficient statistically?

B INSTALLATION OPTIONS

There are two main installation options: (A) point the IR scope across a trail, or (B) point it down and across the trail.

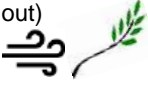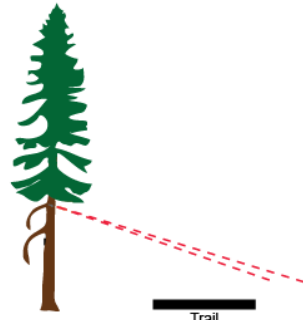|	
POINT ACROSS Trail	Point across trail (most common installation) 1. Install within 3m (10ft.) of where people pass (for best results) 2. Aim waist high (1m / 3.3ft.) 3. Point IR scope slightly down (so water drains out) 4. Don't point at wind-prone trees or branches
POINT DOWN Trail	Point down and across the trail. (Points 1, 2, 3 and 4 above still apply) ❖ Recommended for these situations: o Wind-prone trees or branches in the background o A road is in the background o Hot climates (ground is an effective reference) o High snowfall areas (allows higher installation)

The IR scope has a 10 degree field of view that widens with distance, like a narrow spot light. Maximum detection distance for people is approximately 6m (20ft.).

Distance away	2m (6.5 ft.)	4m (13 ft.)	6m (20 ft.)	Max.
Field of view diameter	*0.3m (1 ft.)*	*0.7m (2.3 ft)*	*1.0m (3.3 ft.)*	

IR scope
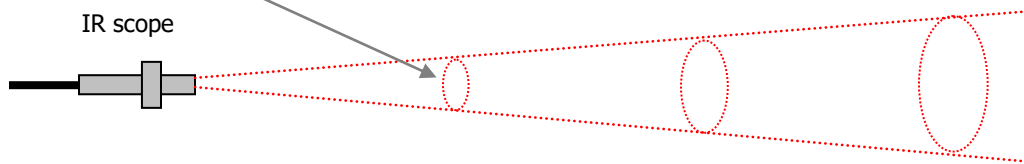
In forested environments, where the counter can be hidden well, and vandalism risk is low, simply mount the counter on a tree (see p. 5). However, in busy, open areas, consider putting the counter inside a lockable box (see Appendix 1) or inside a post (see Appendix 2).

See Appendix 1   See Appendix 2
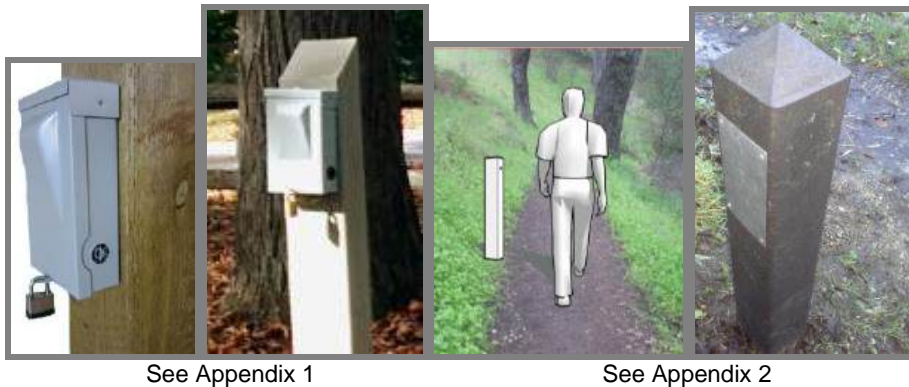
C SETTINGS

The counter has default settings (see black area below). Normally, only change these if a star below applies to you.

★

Settings	Mode	Notes
	IR	
=TIME	*--*	*TIME - automatically set by a dock in Shuttle Mode.*
=START	*--*	*START - automatically set by a dock in Shuttle Mode to:*
PERIOD	**001**	• *top of the hour after Launch for hourly totals*
DELAY	**030**	• *5 minutes after Launch for timestamps*

MODE SETTINGS	

PERIOD **(1/24/0)**	PERIOD refers to the data format: hourly totals, daily totals, or timestamps (all are records) ▪ 14 000 is the maximum number of records (lines of data) ▪ Totals are much more memory efficient and download much faster than timestamps **001** = Hourly totals (default; recommended); stores 19 months of data (448 million counts max.) 024 = Daily totals (rarely used); whole days only; counting starts and stops at mid-night 000 = Timestamps (seldom used); each event creates a timestamp (14 000 counts max.)
	yy-mm-dd,hr:mm,total yy-mm-dd,hr:mm:ss,sensor_1 25-03-17,10:00,00435 ←— Hourly totals 25-03-17,14:15:50,1,0,0,0 25-03-17,11:00,00473 (11 spans 11 to 12) 25-03-17,14:15:56,1,0,0,0 ←— Timestamps 25-03-17,12:00,00530 25-03-17,14:19:08,1,0,0,0 25-03-17,13:00,00481 25-03-17,14:19:22,1,0,0,0

DELAY	DELAY refers to "delay after event" ▪ During DELAY, other events (triggers) are ignored ▪ DELAY values (and seconds) are shown below

DELAY	Seconds	
020	1.0	When a person enters the IR scope's field of view, a count is initiated. However, it takes time for a person to completely pass through the counter's view, and for the sensor to re-stabilize. Therefore, a DELAY is used to avoid multiple counts from the same person.
025	1.25	
030	1.5	
035	1.75	
040	2.0	
050	2.5	
060	3.0	
080	4.0	
100	5.0	

★ If trail traffic typically moves very slowly, increase DELAY to 035 or 040
★ If trail traffic is dense and/or fast (e.g., busy walking or bicycle path) decrease DELAY to 020 or 025

Change settings
Here are the main steps to change settings.

1. Confirm your dock is in PC Mode
2. Connect: PC---cable(s)---dock---counter
3. Open TRAFx Communicator and click GO!
4. Enter C to configure counter's settings

See TRAFx Manual Part I, p. 10 for details. Download at *trafx.net/support*

Trail counters produce trail use estimates. They are rarely 100% accurate. This applies to all types and brands. Counter calibration is recommended for these situations: (1) trails where people often travel side by side and/or in tight groups; (2) busy, wide trails; (3) when higher accuracy is desired.   Calibration involves comparing counter totals with those observed by a person, ideally over several hours. It is also a good opportunity to collect user type data (walker, jogger, skateboarder, cyclist, dog walker, etc.). For detailed instructions, download "How to calibrate a counter" at *trafx.net/support*

D   SET UP IN FIELD – STEPS

Preparation: Before going to the field, see the equipment checklist on next page.

STEP 1 — SELECT SITE

<u>Before</u> selecting a site to install the counter, review p. 3 and installation "do and don't" on the next page! A well selected site can be used for many years. Take the time to do it well.

STEP 2 — INSTALL COUNTER

1. For best results, install the IR scope within 3m (10ft.) of where people pass. Aim waist high (1m / 3.3ft.). There are 3 dots engraved on the black cable where it enters the IR scope; ensure these are <u>oriented upwards</u> (i.e., skywards).
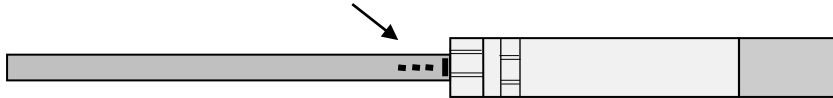
2. If installing on a tree, use wire or cord to hang the field case upright from its eyelet, on the backside of a tree, out of view. <u>Do not bury the field case (under soil, snow, etc.), or hang it upside down from the cable---it will leak this way</u>, and void the warranty.

IR scope

Hang case from wire

3. If installing the counter in a busy area (i.e., a city park) see Appendix 1 and 2.

STEP 3 — LAUNCH COUNTER

1. `Launch` the counter using your dock in Shuttle Mode. Use Shuttle Mode's checklist (next page).
2. Add a fresh desiccant pack and close the counter's case (ensure its lid seal stays perfectly clean).
3. Take 2 photos, close and far (for your DataNet account / technical support purposes).
4. Take GPS reading (to find the counter, and for your DataNet map).
5. If this is a new installation, return in about a week and download the counter's data
6. When downloading a counter always use the checklists on the next page.

Tips

1. To reduce risk of tampering, add a sticker. Example

> ***Trail counter (not a camera)***
> Its data helps support trails
> Please do not disturb. Thank you!
> Questions? Call 123-4567

2. Apply camo duct tape to IR scope (or metal box on p. 10) to help camouflage it. Google "camo duct tape".

USE DESICCANTS!
Without desiccants, damaging condensation (moisture) forms when the air <u>inside</u> the counter's case cools.

Replace desiccant packs <u>each time</u> you open the counter's case to download data.
- Store <u>and transport</u> in well sealed bag or container! (otherwise they expire in hours)
- Visit *trafx.net/support* regarding type, size and where to buy
- Use two in wet or humid climates

E CHECKLISTS

Equipment checklist
✓ TRAFx manual: Part I and Part II ✓ Counters, dock, etc. ✓ Desiccant packs (in sealed bag); spare batteries for counter; Ziploc bags ✓ Items you'll need for installation (enclosure, screws, screwdriver, etc.) ✓ <u>Tape measure</u>, camera, GPS, shovel, toothbrush, umbrella, safety equipment, etc

| Installation do and don't	
Do: ✓ install where people pass by without stopping ✓ install within 3m (10ft.) of where people pass ✓ aim waist high (1m / 3.3ft.) ✓ install at a funnel point in trail (if possible) ✓ orient three dots skywards (p. 5) ✓ tilt IR scope slightly down (so water drains)	**Don't:** × point at wind-prone trees or branches × point at a road or a train line × point at water or other reflective surfaces × bury or hang case upside down (leakage risk) × install on a tree that sways in the wind × install behind plexiglass, glass, etc. × let sunlight or car lights reach the lens (false counts)

Download, launch, etc. checklist

Dock in Shuttle Mode (recommended)	Dock in PC Mode (not recommended)
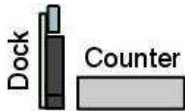
Use your dock in <u>Shuttle Mode</u> to Download / Launch a counter, <u>without a PC</u>.
 	
✓ <u>Before going to the field confirm:</u>
  1. The dock's TIME is correct, (yy-mm-dd and 24 hr time).
  2. The dock's battery voltage is **3.4** or higher (if not, replace dock's batteries and reconfigure TIME).
  3. Erase old data stored in the dock's memory. Enter E.
 	
✓ <u>Go to a counter in the field</u>
  1. Confirm dock is in <u>Shuttle Mode</u>.
  2. Connect to a counter.
  3. Do what the dock's LIGHTs indicate.
    --If the **Replace Counter's Batteries** LIGHT blinks, disconnect, replace the counter's batteries and then reconnect.
★ 4. After disconnecting, the counter's Status LIGHT should be blinking rapidly; this confirms a successful launch. If not, repeat 2 and 3.
  5. Put a <u>fresh desiccant</u> pack inside the counter's case.
 	
Go to the next counter. Repeat 1 to 5.
 	
✓ <u>Back in office</u>
  ✓ Open TRAFx Communicator and follow its instructions
  ✓ Make sure you are in <u>Shuttle Mode</u>
  ✓ Click on **Download+** to download and save Shuttle file
  ✓ Upload Shuttle file to your DataNet account
 	
See TRAFx Manual Part I, p. 13 to 15 for details.
	
	Using a PC to Download / Launch counters is not recommended because it is slower and more prone to human error than Shuttle Mode.
	
	However, these are the main steps:
	
	  1. Confirm dock is in PC Mode.
	  2. Open TRAFx Communicator and follow its instructions.
	  3. Click on **Download+** to download and save data.
	  4. Find saved data file and confirm successful download.
	
	To continue to collect data, you must relaunch the counter by entering "L". Ensure that the counter's TIME is correct. When prompted, erase existing data. Data logging will begin at the START date/time. Also, don't forget to replace the desiccant pack.
	
	★ After disconnecting, the counter's Status LIGHT should be blinking rapidly; this confirms a successful launch. If not, connect up and launch it again.
	
	See TRAFx Manual Part I, p. 10 to 12 for details.
	
	<u>Back in office</u>
	  ✓ Upload file to your DataNet account

Field inspection and maintenance reminder: (1) inspect IR scope's "eye" for blockage or punctures; (2) keep the white optical lens clean with cotton swab, and (3) keep the field case lid seal free of dirt and organic material with a toothbrush.
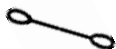
F   LIGHTS, BATTERIES, NOTES

LIGHTS

Two small lights indicate which state a counter is in. There are four counter states.

State	Status LIGHT Red	Not applicable	Detection LIGHT Green
1 Sleeping	2x/sec	na	2x/sec
2 Launched	4x/sec (rapid!)	na	na
3 Counting	1x per 4 secs	na	blink = count
4 Not blinking	(a) counter is waiting to be launched, or (b) no battery power; it's not counting		

1 – Sleeping – counter is waiting to be launched; it is not counting; Status and Detection LIGHTs blink in unison 2x/sec

2 – Launched – counter was successfully launched; counting begins at START time/date (normally top of the hour)

3 – Counting – counting state; always follows #2; counter is counting; Detection LIGHT blinks when a count occurs

BATTERIES

Battery Info		Battery Life
Three 1.5V alkaline AA cells - cost approx. $1/each; widely sold (Costco, Home Depot, etc.) - use quality alkaline batteries (e.g., Energizer) - rechargeables (not recommended) last 40% to 70% less than alkaline batteries - in extremely cold climates (consistently below -20C / -2F), plan on 50% less battery life - battery failure risk increases above 55C / 131F - maximum total voltage: 5V		G4.1 counters* 9 to 10 years G4 counters 3 to 4 years G2/G3 counters 2 to 3 years

! Caution --- Never mix batteries (brands, types, or age)   *Serial numbers ≥ 19xxxx
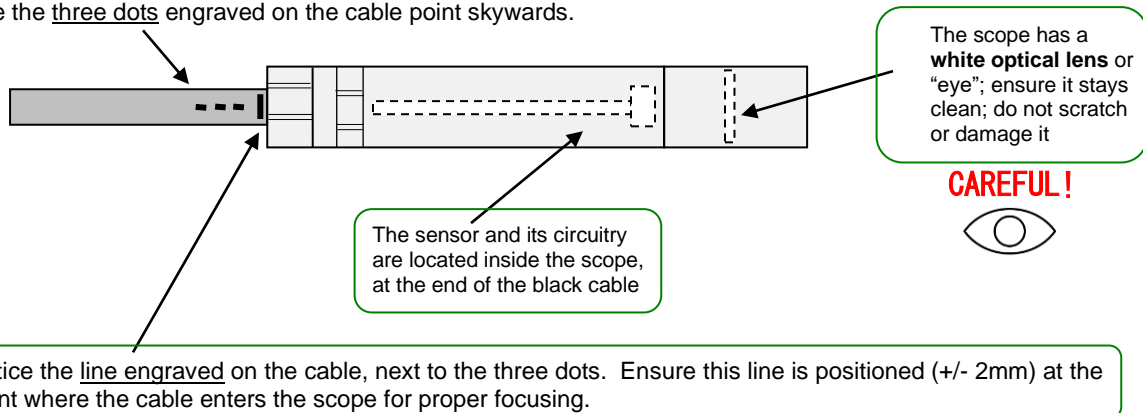
To better secure the batteries, particularly if moving the counter, use duct tape.

- turn battery holder upside down
- tape from side to side as shown
- press tape firmly on sides and on to the batteries as well

NOTES

- Limitations: (a) two or more people clustered or passing side by side are typically undercounted; (b) fast moving bicycles might be missed (pre-G4.1 design)
- Ensure the three dots engraved on the cable point skywards.

The scope has a **white optical lens** or "eye"; ensure it stays clean; do not scratch or damage it

CAREFUL !

The sensor and its circuitry are located inside the scope, at the end of the black cable

Notice the line engraved on the cable, next to the three dots. Ensure this line is positioned (+/- 2mm) at the point where the cable enters the scope for proper focusing.

- Ensure the water-tight fittings are tight on the cable; these prevent water from entering.
- Ensure all the connecting wires are in their proper location and securely clamped down. Test each one of them by gently tugging them. If loose, use provided small screwdriver to firmly connect.
- In direct, hot sun, on hot days (>35C / 95F), the temperature inside a closed box can exceed the counter's and batteries' maximum operating temperature (55C / 131F). If possible use shade; if using a locking box (p. 10), add ventilation holes to it to create crossflow.

G   TESTING

Each TRAFx counter comes factory tested and ready to install. If installed according to instructions, paying careful attention to the specified distances and other details, it is not normally necessary to test it. However, if desired, there are several methods to test a counter.

1 WITH PC

With this method, counts immediately appear on your PC screen. This is useful when first learning about your counter indoors, and also at installation locations, with a laptop. See below.

1. Confirm dock is in PC Mode
2. Connect: PC---cable(s)---dock---counter
3. Open TRAFx Communicator and click GO!
4. Enter "T" for TEST and follow the prompts
    - Position counter at waist height and walk by it (within 3m / 10ft.)
    - Ensure the 3 dots point skywards (see p. 5)
    - As you walk by, counts should appear on the PC's screen


```
17-04-24,13:46,
00001,00000
00002,00000
00003,00000
00004,00000
```

5. To end the TEST, enter ZZZZ
6. To ERASE the test counts from the counter's memory, enter "E"

2 WITHOUT PC

For this method, launch the counter and collect data for a few hours. Note that counting begins at START (normally top of the hour) and that you must wait a full hour <u>after</u> START to download data.

> Example:
> 10:40 - Launched counter > Status LIGHT blinks rapidly until START is reached
> 11:00 - Top of the hour (START) > counting begins > Detection LIGHT blinks upon count
> 12:00 - Okay to download data now.

In short, wait at least a few hours before downloading data.

3 WATCH DETECTION LIGHT

This is a variation of Method 2. As mentioned above, counting begins at START (top of the hour). After START, the counter's Detection LIGHT blinks when a count occurs (two blinks means two counts).
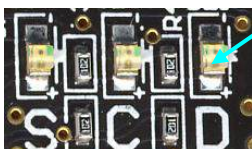
  👁 watch the blinks

H   TROUBLESHOOTING, MAINTENANCE AND SUPPORT

TROUBLESHOOTING

(If your problem is not addressed below, see Chapter 4, TRAFx Manual – Part I, or better yet, visit our Support Hub at *trafx.net/support*)

1 Higher than expected counts

    a. If they occur <u>only during the day</u>, it is likely an installation-related problem. Carefully review installation "don't" on p. 6

    b. If they occur during <u>day and night</u>, it is likely a sensor problem. Email us via our support hub at *trafx.net/support* and attach your data file.

2 Lower than expected counts

    a. Review installation "do and don't" on p. 6, particularly distance and three dots.

    b. Is there something in the IR scope's "eye" (spider nest, dirt, snow, etc.)? If yes, clean with cotton swab.

    c. Are there any punctures (holes) in the lens (vandalism)? If yes, please contact us via our support hub at *trafx.net/support* You'll need a replacement part.

    d. If none of the above apply to you, email us some photos of your installation, via our support hub at *trafx.net/support*

3 No counts (only zeros)

Regarding only zeros (00000) in your data file, day after day:

    a. Is there a loose wire? Check the IR scope's three wires (red, white, yellow). Are they securely connected (see wire guide on p. 2)?

    b. Is there a blockage in the IR scope's "eye" (insect, snow, cigarette butt, etc.)?

    c. Is the IR scope's lens punctured? If yes, please contact us via our support hub at *trafx.net/support* as you will need a replacement part.

MAINTENANCE

Control moisture

Replace the desiccants each time you open the counter's case to download, otherwise damaging condensation (moisture) forms when the air <u>inside</u> the counter's case cools. To dry a damp counter, remove batteries and use heat (car heater, hair dryer, lamp).

Remove finger grease

Remove possible finger grease on the counter's gold fingers with an alcohol pad---the combination of finger grease and moisture can cause problems (e.g., a counter stops counting early).

Keep lid seal clean

Use a toothbrush to remove dirt, grit and other material from the field case seal otherwise the case might leak, potentially damaging or destroying the counter. Make this part of your field protocol.

SUPPORT

All technical support begins at our **Support Hub** at *trafx.net/support* Information about replacement parts and repairs is available at the same location.

Limited warranty

See TRAFx Manual, Part I p. 2 for details. In a nutshell, limited warranty period is normally 1 year and covers manufacturing defects.
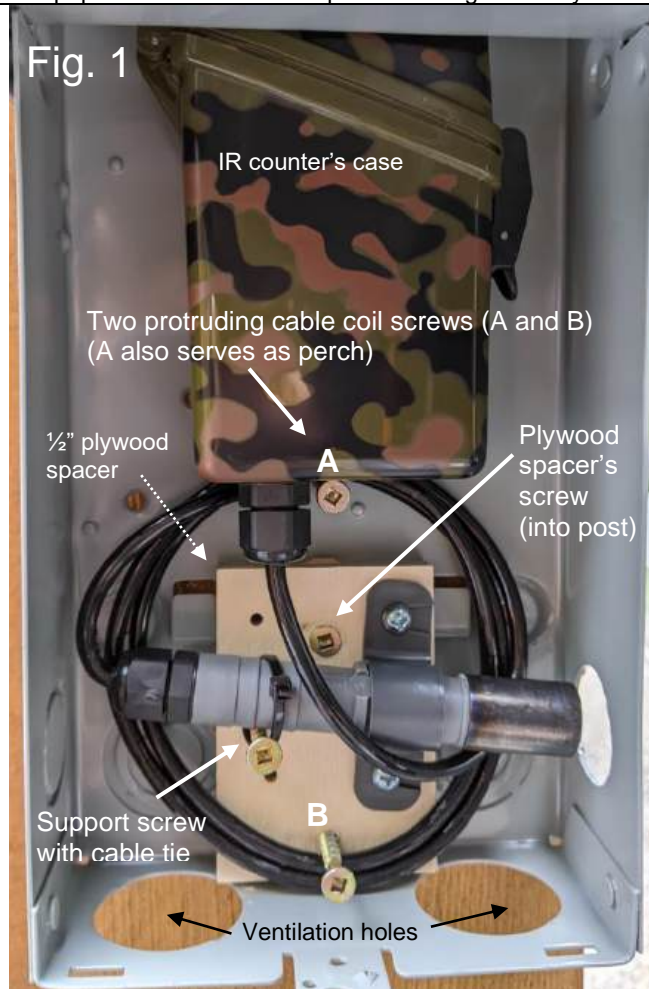
APPENDICES

Appendix 1: How to make a locking box for the IR counter
This popular DIY lockable box provides budget-friendly security and enhanced weather protection.

Front

Back

Fig. 1

IR counter's case

Two protruding cable coil screws (A and B)
(A also serves as perch)

½" plywood spacer

A

Plywood spacer's screw (into post)

Support screw with cable tie

B

Ventilation holes

Materials list (per box)
1. Electrical disconnect box (~$25); steel
   US: homedepot.com or lowes.com; enter
   - Part #: DPF222RP
   Canada: homedepot.ca or homehardware.ca; enter
   - Part #: 3GAC222NF
   Alternative box: Siemens WNC2060 (google it)
2. Small padlock
3. Seven #8, 2" flat head wood screws
4. Two #8, 1/2" pan or round head screws (for IR scope)
5. One cable tie (~5")
6. 1/2" thick plywood for spacer; see Step 1
7. Tools: screwdriver, hammer

─────────────

Step 1 - Order custom ½" plywood spacers
Buy from sendcutsend.com; for three above listed boxes; precision machined for ideal fit and IR scope alignment; ~$5/each; free 1 to 3 days shipping (US); Canada (~$20).

1. Go to trafx.net/downloads and download design file:
   IR lockbox spacer.dxf

2. Go to sendcutsend.com to order your spacers
   - Upload above .dxf design file
   - Select inches for units (important!)
   - Select "Wood and MDF" > "Baltic Birch Plywood"
     - 0.472" (12.0 MM)
   - Skip other options > Pay > Done!
─────────────
Or, cut and drill your own from ½" plywood or OSB (½" actual thickness required)
   - *cut to 2⅛" x 3" (5.4cm x 7.6cm) using the "Plywood template" PDF from trafx.net/downloads*

Step 2 - Prepare box
1. The box is sold with unnecessary components inside; remove all these with a screwdriver---you just need the box.
2. With a hammer and screwdriver, knock out a side metal window (it's easy). Also, knock out the two bottom ones for ventilation (reduces overheating risk in hot sun).
3. Optional: With two-part epoxy, glue wire mesh to the inside of the box to cover the window (see Appendix 3).

Step 3 - Install lockable box (see Fig. 1)
1. Bring these instructions and above materials with you
2. Carefully review "Installation do and don't" on p. 6
3. Screw box to wooden post (or rail or tree)
   - use box's upper holes (three 2" screws)
4. Screw ½" plywood spacer to box **AND** post
   - position spacer as shown (Fig. 1); notch down
   - one 2" screw in upper middle hole (Fig. 1); flush with the plywood and into the post behind
5. Partially screw in two 2" cable coiling screws so they protrude; upper (A) serves as perch for IR case (Fig. 1)
6. Screw IR scope to spacer using spacer's pilot holes
   - Position cable's three dots skywards!! (see p. 5)
7. Add one 2" support screw and cable tie (Fig. 1)
8. Launch counter (see p. 5 and 6)
9. Done; congratulations!

Screw to post or tree
--screw from inside
Tip: to reduce risk of tampering, add a sticker. Example:

Trail counter (not a camera)
Its data helps support trails.
Please do not disturb.
Thank you!
Questions? Call 123-4567

Fasten to metal post
--use a 4" x 1/2" hose clamp; unscrew clamp and feed one end through the "slits" on back. Re-screw and tighten.
--or, drill holes in post with a metal drilling bit and screw box to post.
--metal U-channel or square tube posts are also an option (use bolts)

If the above photos are not clear, see the digital copy of this manual at *trafx.net/support*

Appendix 2: How to embed the IR counter inside a post

Here is one way to modify a 6" x 6" post so that the TRAFx Infrared Trail Counter can be fully embedded inside it, using common tools (electric drill, hammer and chisel). Various TRAFx customers have done this in various ways. This robust solution is useful in urban areas. It is best to use a plastic post because wood can expand 15% when wet (and damage the IR scope), and also it can become water saturated, increasing the risk of moisture/water damage.

|	
L: 10cm (3.75in) W: 17cm (6.75in)	
1. Mark chamber area and drill multiple holes to 4.5cm (1.75in) depth; tape drill bit to mark depth	2. Knock out with hammer
3. Finish with chisel	4. Drill hole through post for IR scope; waist height; angle downwards; hole diameter 7/8" for IR scope
Note long screws in 4 corners to wrap cable around	
5. View of back Cover on back	6. View of front

Screw on a metal or plywood cover. Tamper proof screws can be used if desired.
It is also possible to make a "portable post" that can be moved from site to site.

★ **Reminder: position three dots skywards! See p. 5**

Appendix 3: How to protect IR scope's "eye" from punctures with wire mesh
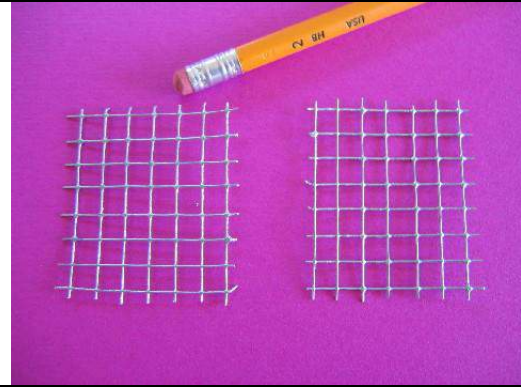
¼ inch hardware cloth mesh
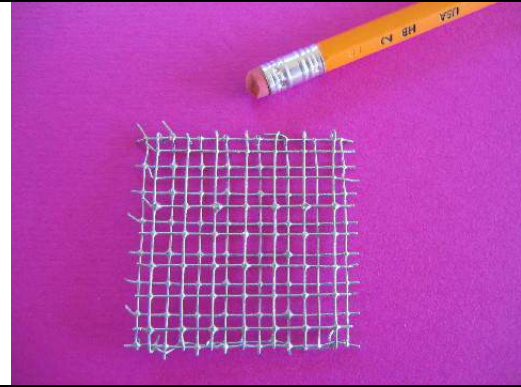
Overlap two pieces for 1/8 inch density

The IR scope has a special high-tech, plastic optical lens that concentrates infrared energy, allowing the counter to detect and count people (see p. 7). The counter can't "see" and count properly with a punctured lens.

If necessary, cover the IR scope's opening with wire mesh to reduce the risk of damage (by curious people or birds pecking it).

Use a specific type of wire mesh called **¼" hardware cloth** (yes, it has an odd name). It is galvanized and therefore does not rust. It is sold at most hardware and garden stores.

With wire cutters, cut a sufficiently large piece of **¼" hardware cloth**. If desired, overlap two pieces, creating 1/8th inch density, as shown at left.

<u>Warning</u>: Do not use mesh or screen denser than 1/8" otherwise the counter will not be able to "see" and operate properly!
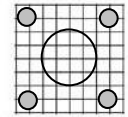
How to apply mesh
   a. Locking box (p. 10): use two-part epoxy
   b. Post (p. 11): nail mesh to post so as to protect hole
   c. Not using a box or post? Bend and wrap the mesh around the IR scope, like the wrapped plastic shown in Appendix 4 below.

Appendix 4: How to protect the IR scope's "eye" from insects and drifting snow with clear plastic


If insect nests or drifting snow block the lens, the counter can't count. If you observe this, protect the IR scope's opening with clear sandwich bag plastic.

---only use plastic from clear plastic sandwich bags; it is thin and IR transmissive.
---cut an 8cm (3in.) diameter circle of plastic and stretch it <u>tightly</u> over the opening; secure with an elastic band
---make it <u>drum tight</u>; ensure there are <u>no wrinkles.</u>

Appendix 5: How to make a storm hood
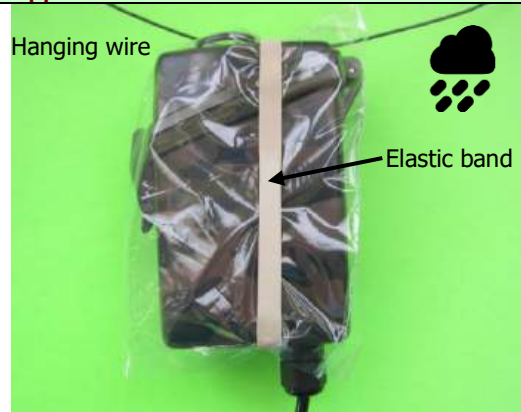
Hanging wire

Elastic band

In very heavy, persistent, driving rain, the case may leak, especially if there is dirt, grit or other material on the seal. Create a simple, plastic "rain hood" from a clear plastic sandwich bag to reduce this risk.

1. Use an upside down sandwich bag or small freezer bag
2. Place over field case like a hood
3. At eyelet at the top of the field case, poke a small hole through bag with the hanging wire
4. Use an elastic, as shown at left, to make bag snug on case