

RMLD

Remote Methane Leak Detector

Training & Orientation
Heath Consultants

BENEFITS



- Reduce survey challenges:
- Dogs
- Landscaping
- Uncooperative Customers



BENEFITS

Reduce Survey challenges:
Backyard main/services.



Over or through fences /
no access

Enclosed Regulator
stations

BENEFITS



Perform most surveys without physically walking service lines.

Can scan both sides of the street.

Safer to inspect busy street and intersections.

BENEFITS

COMPRESSOR STATIONS:

Quicker and more efficient inspection of multiple exposed piping in a stations yard.



BENEFITS

More efficient
survey
of pipelines on
bridges
and overpasses



BENEFITS



- Able to remotely check inside buildings or confined spaces for presence of methane.
- Intrinsic Safety - Pending

BENEFITS (cont'd)

- Wider area of search due to sweeping of the beam
 - Significant advantage to detect leaks away from the pipe
 - Scanning technique verses probing technique
- Productivity savings 20% to 40% for most utilities
- Rapid warm-up
- Built in self test and calibration
 - Verifies operation and adjusts laser wavelength for maximum sensitivity

RMLD vs. FI

	Remote Methane Leak Detector	Flame Ionization
Detection Method:	Tunable Diode Laser Absorption Spectroscopy (TDLAS)	Flame Ionization
Measurement Range:	0 to 99,999 PPP-M	0 to 10,000 PPM
Sensitivity:	5 PPP-M at distance from 0 to 50 ft 10 PPP-M or better at distance from 50 to 100 ft	2 to 50 PPM depending on model and type
Detection Distance:	100 ft (30 M) nominal. Actual distance may vary due to background type and conditions	Probe must be within the gas plume
Detection Area:	Conical in shape with a 22" width at 100 ft. (.5 M at 30 M)	2.5 inches
Detection Alarms Modes	Advanced detection signal processing method	simple threshold alarm
Self Test & Calibration	Built in Self Test and Calibration verifies operation and adjusts laser wavelength for maximum sensitivity. Test cell integrated with carrying case.	Requires operator to use complex configuration of gas bottles and regulators
Power Source	Internal battery pack	Hydrogen gas and internal battery

RMLD vs. FI (CONT)

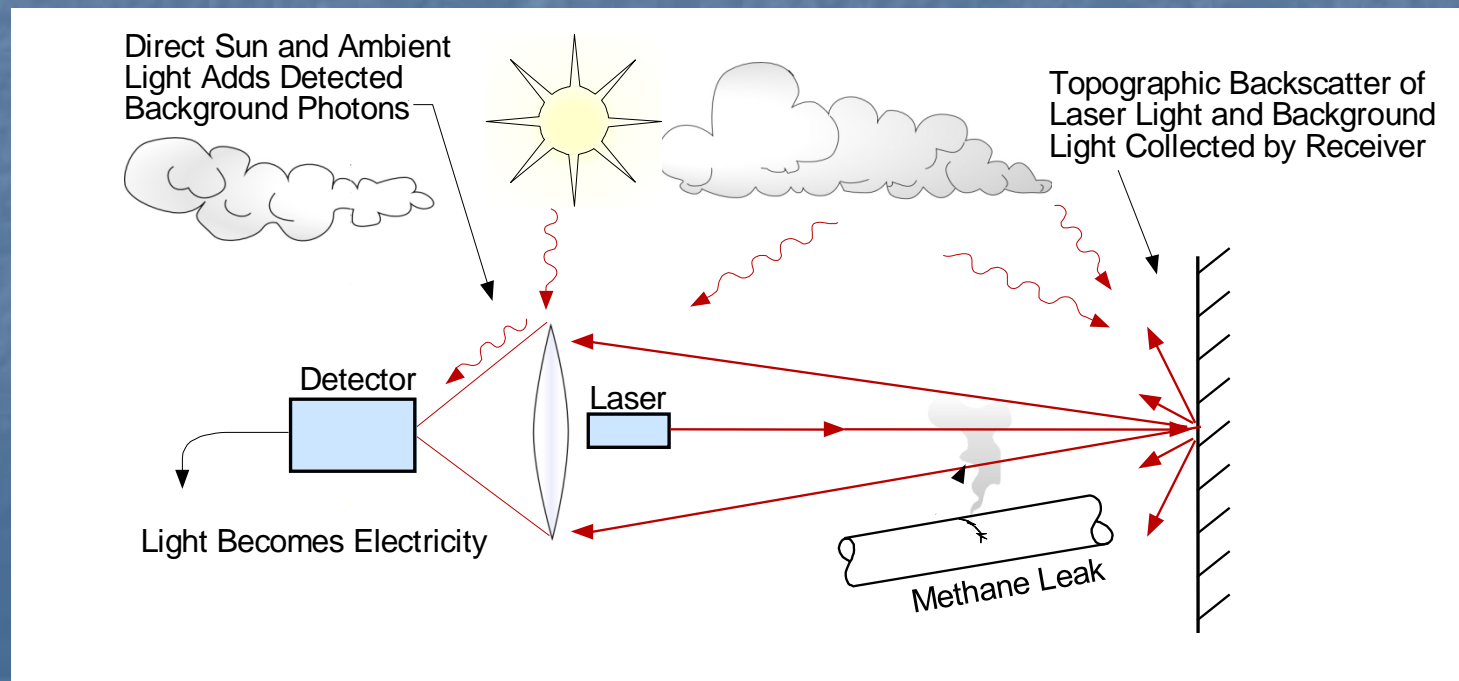
	Remote Methane Leak Detector	Flame Ionization
Safety	IR Detector Laser: Class I Green Spotter Laser: Class IIIa; Do not stare into beam or view directly with optical instruments.	Requires the proper use and storage of highly flammable hydrogen gas
Display:	Large easy to read backlit LCD (.75” Numeric)	Analog meter typical
Operating Temperature	0 to + 120 F (-17 to 50 C)	0 to + 120 F (-17 to 50 C)
Humidity	5 to 95 % RH, non-condensing	5 to 95 % RH, non-condensing
Enclosure:	IP54 (Water splash and Dust resistant)	IP54 (Water splash and Dust resistant)
Operating Time	8 hours at 32 F with out backlight on (Internal battery)	3 hours before recharge of Hydrogen bottle

INTRINSICALLY SAFE

- Class
 - Type of Atmosphere; Class I = Gas
- Division
 - Area Classification;
 - 1 => Likely hazard under normal conditions (Continuous hazard)
 - 2 => hazardous under abnormal conditions (Intermittent hazard)
- Gas Group
 - Type of gas in atmosphere (A being the most explosive)
 - A => acetylene
 - B => Hydrogen
 - C => ethylene
 - D => Propane (Methane)
- Temperature Class
 - The maximum temperature under fault conditions
 - T1 = 450 °C, T3 = 200 °C, T6 = 85 °C

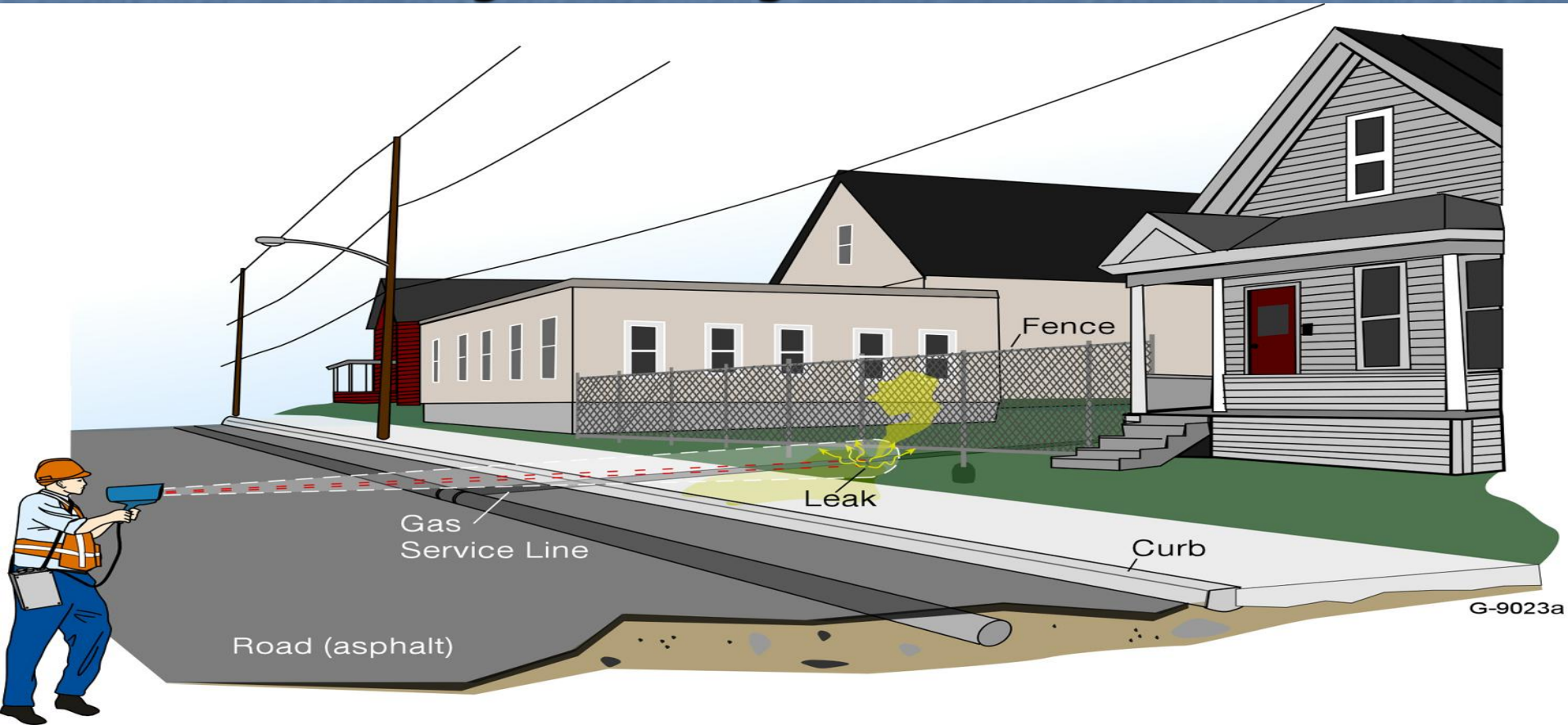
TECHNICAL APPROACH – How it Works

- Laser light beam is remotely projected on to a target (e.g., grass, wall, etc.)
- A fraction of the beam is scattered from the target surface and returned to the source
- Returned light is collected and focused onto a detector
- The presence of methane is encoded within the returned light
- Methane readings are displayed in ppm-m



THREE CONDITIONS NEEDED TO DETECT A LEAK

- Need a sufficient plume to detect a leak
- The IR beam must pass through the plume
- Need a background target to reflect beam



ADVERSE CONDITIONS THAT AFFECT LEAK DETECTION

- Poor background surfaces
- Weather: wind, rain, snow, frost
- Low flowing leaks with non-measurable plumes
- Surface types affect leak spread
- Ground elevation
- Obstructions in line of site
- Scanning over 100 feet

LASER SAFETY

- Infra-red Detector Laser
 - Class I
 - Always on when instrument is on. This laser is invisible.

- Green Spotter Laser
 - Class IIIa
 - Under the control of the operator
 - Same rating as pointer lasers commonly sold in stores and used for business presentations
 - Safe when handled properly

TERMS

- Control Module
- Transceiver
- Spotter Laser
- Tunable Diode Laser
Absorption
Spectroscopy (TDLAS)
- Beam Skip
- Dark Zone
- Footprint
- DMD
- Pure Tone
- Infrared (IR)
- Laser calibration drift
- PPM-M (Parts Per
Million – Meter)

RMLD Overview: Parts and Functions

■ Transceiver

Green Spotter
Laser * (approx
3" above IR laser)
Infrared (IR)
Detector Laser
(invisible beam)

Spotter Trigger
Switch

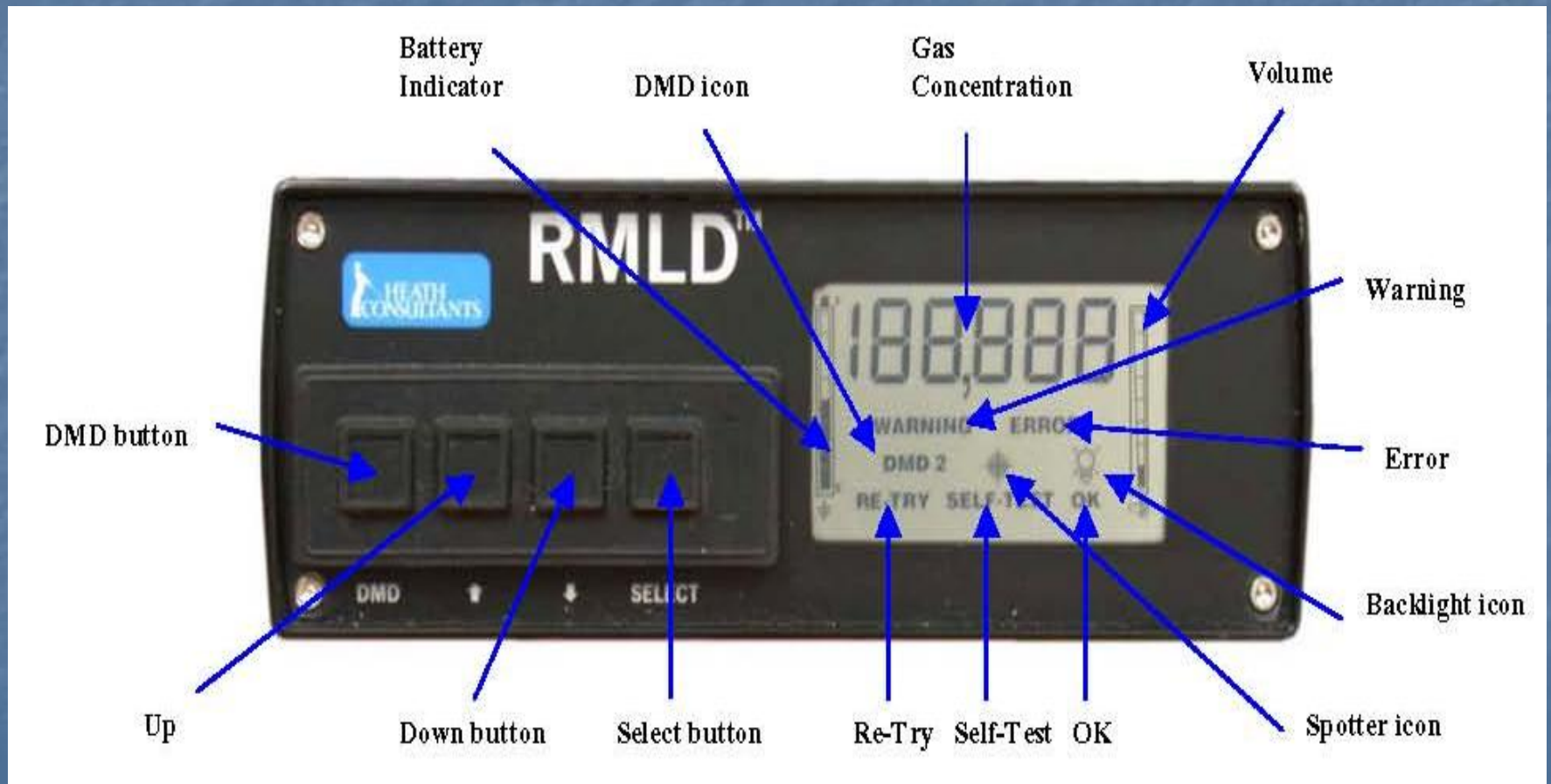


Sighting
Marking

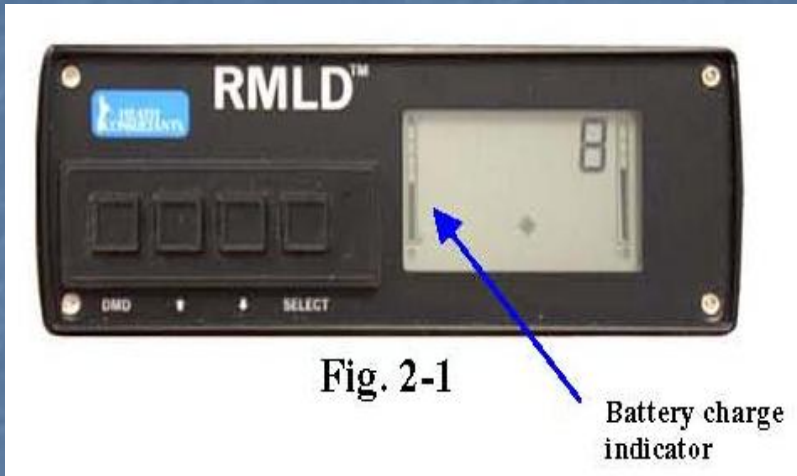
Fiber Optic
inside Cord
(Don't roll to less
than 4" coil – kink
can break it)

*Caution: Don't stare into beam or view directly with optical instruments.

CONTROL MODULE - FRONT



INTERNAL BATTERY



- Rechargeable Li-ion battery
- Life – 2 to 3 years
- Charge last 8 hrs. @ 32 deg. F
- Cold weather and constant use of spotter can drain battery faster

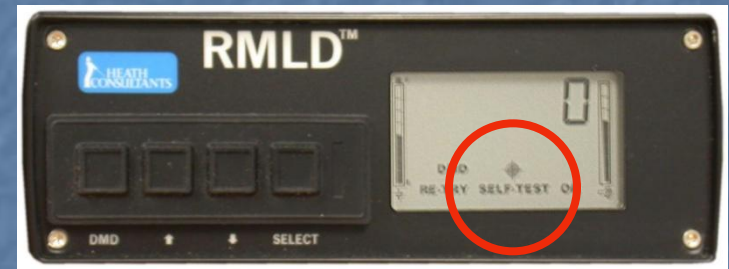


INTERNAL BATTERY (cont'd)

- Front of controller – blinking red light and solid green indicated normal charging
- Allow instrument to charge until both lights have turned off
- The blinking red light will turn off as the battery becomes charged

SELF - TEST

1. Turn on the instrument and allow it to warm up for 2 to 3 minutes.
2. Place the Transceiver in its position in the carrying case, making sure it is all the way in place and flat.
3. Press the Select button until the Self-Test icon is shown on the display.
4. Press the Up button to initiate the Self-Test. The number 255 will then be displayed.
5. When the OK icon is displayed, the instrument passed the Self-Test.



CALIBRATION

6. Press the up button. This will initiate the calibration of the laser. This takes about 45 seconds to complete and you will notice that the gas concentration readings will go up and down.
7. When the OK icon is once again displayed, then the instrument passed the laser calibration.
8. Press the up button to acknowledge.
9. Press the select button to scroll back to the run display.

If the retry icon is displayed then the instrument failed the calibration. Press the up button to return to the beginning of the Self-Test.

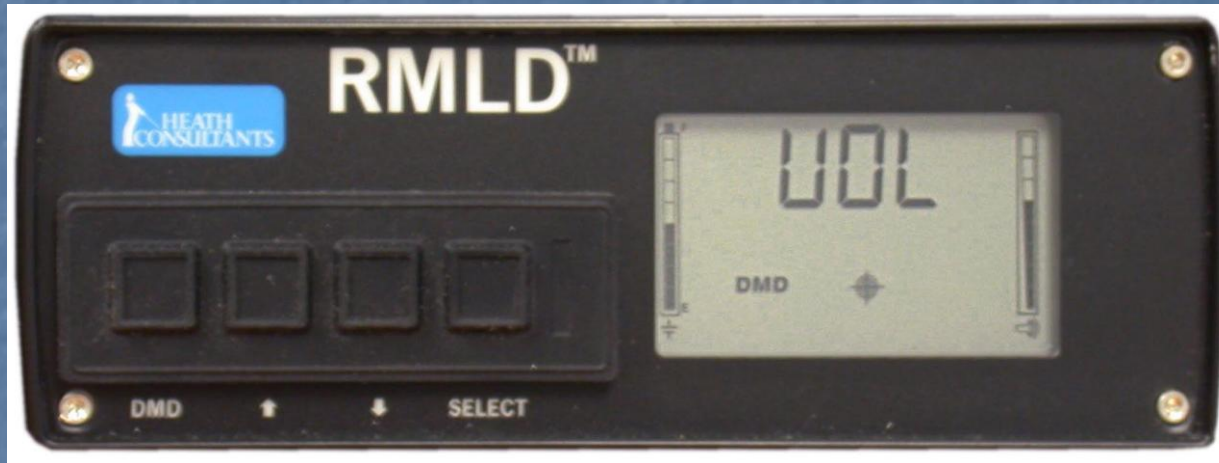
TROUBLESHOOTING SELF - TEST

If Self-Test fails, remember:

- Make sure the battery is charged!
- Make sure the transceiver is all the way down in the case and flat!
- Gas concentration must read between 500-2000 ppm-m.
- Typically will read about 1000 ± 100 ppm-m.

Should the instrument fail after several attempts, do NOT survey. Contact Heath for further assistance.

VOLUME LEVEL



VOL

- Press up button to increase the volume level.
- Press down button to decrease the volume level.

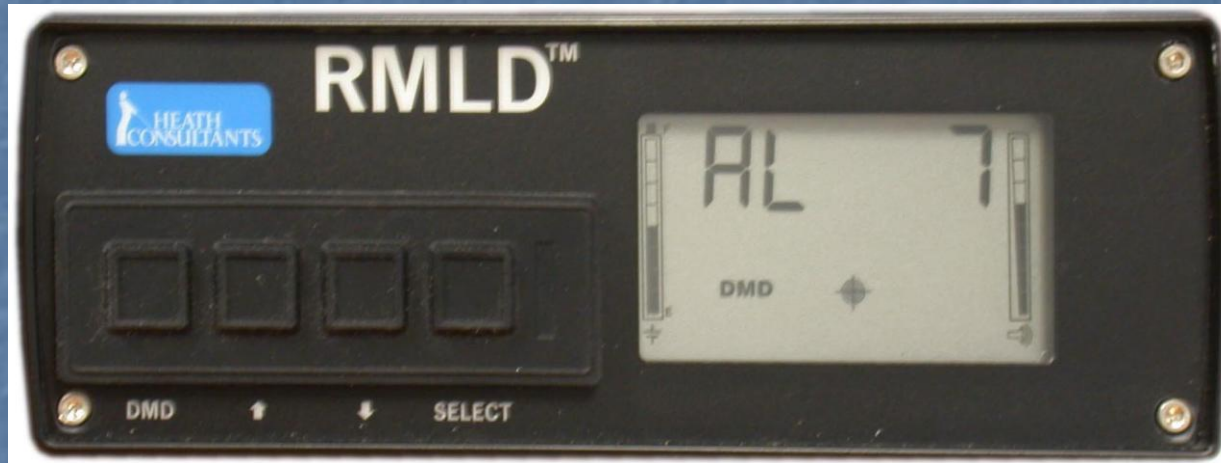
SPOTTER ENABLING AND DISABLING



SPO

- Press up button to enable or disable the spotter laser.

ALARM DETECTION THRESHOLD



AL

- Press Up button to increase the Alarm detection threshold.
- Press Down button to decrease the Alarm detection threshold. **Higher threshold = Less sensitivity**

DISPLAY BACKLIGHT



BACLI

- Press Up button to turn on or to turn off the display backlight.

DMD MODE



- To turn on the DMD mode, press the DMD button.
- The DMD icon is displayed, as shown.

Note: You must be on the “run screen” to activate or de-activate DMD mode.

TWO DETECTION MODES

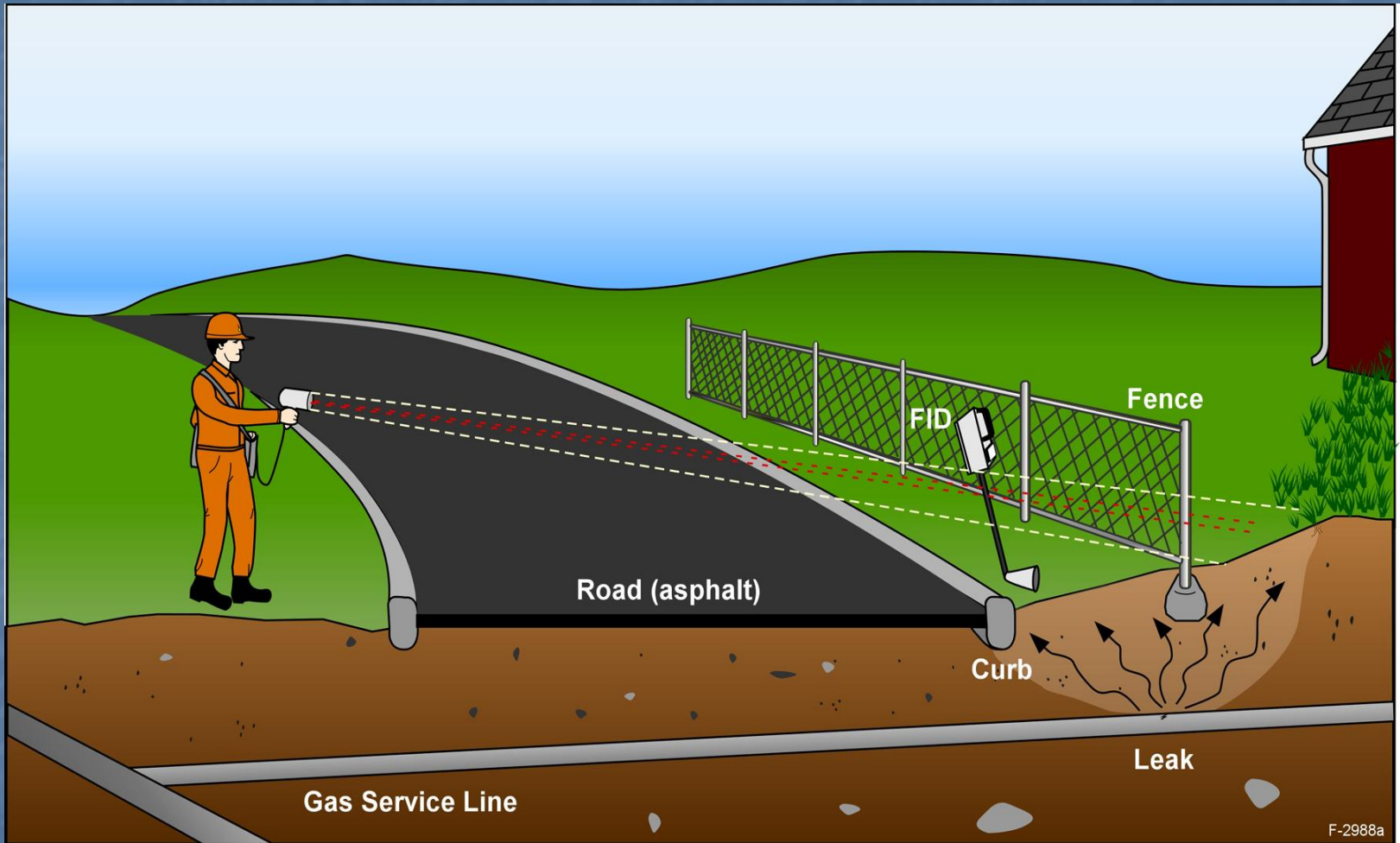
DMD (Digital Methane Detection) Mode

- Used in most survey situations.
- Silent until methane is detected.
- Higher the tone, the higher the methane concentration.

Pure Tones Mode

- Continuous tone relative to methane concentration levels.
- Most effective up close to help verify low level detections.

RMLD CONCEPT



Do not need to be in gas plume!

SEVERAL FACTORS

- Instrument is selective to methane only
 - Is a search tool and not a measurement tool
- Maximum distance is 100 feet with a beam width of 22 inches
- Technology makes it possible to detect leaks along the sight line without always having to walk the full length of the pipe

SURVEYING TIP

The most important aspect when surveying with the RMLD is proper control and aiming of the infrared beam.

SURVEY TECHNIQUES – KEEP BEAM IN FRONT OF YOU: 15 – 20 FEET



WALKING THE MAIN

- Sweep in methodical, even motions to minimize “false” reads.
- Use spotter beam and/or sighting marks for aiming.
- Scan service taps and valves as you approach.
- As with FI, target probable vent locations, vegetation damage, etc.

SERVICE LINES

- **Use the advantage of the beam by sweeping wider.**
- **Work the beam up the line in a horizontal “S” pattern.**
- **Scan the meter.**
- **Rescan down the line using the “S” pattern.**
- **Approach, as needed:**
 - **Verify detections.**
 - **Scan “dark zones”.**
 - **Out-of-range.**

METER CONSIDERATIONS

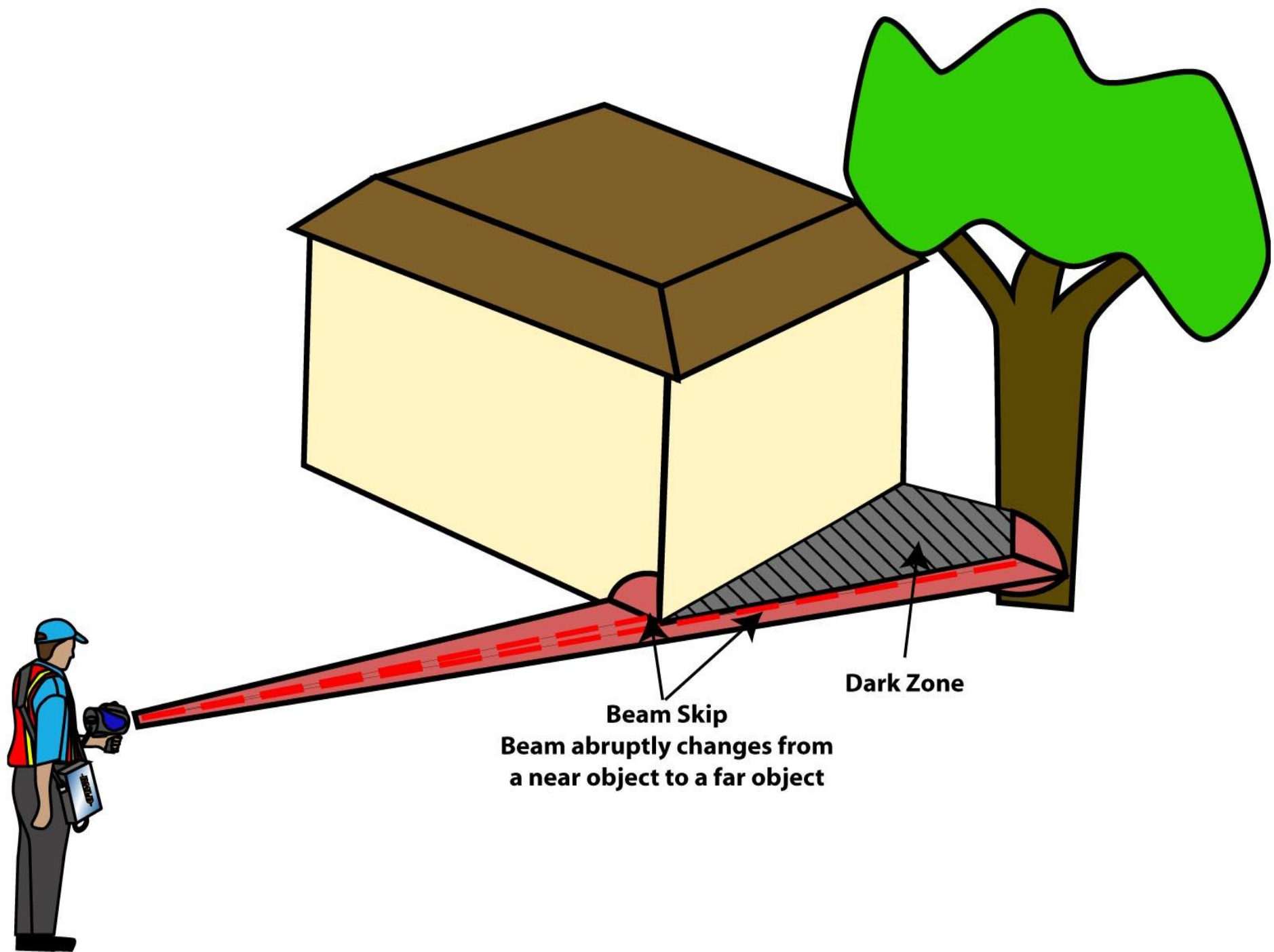
- Maintain a distance of at least 10' so the beam is not too small.
- Thoroughly scan the ground around the meter.
- Use the best angle to provide good background behind the meter.
- If a meter is out in the open or an angle is not available to provide sufficient background, scan across the meter in an "S" pattern, maintaining a constant distance, as you sweep across.

SCANNING WHERE THE SERVICE LOCATION IS NOT KNOWN

- Use a sweeping pattern to thoroughly scan area.
- Target typical vent areas.
- Target suspected or known valve areas.
- Scan foundation.
- Move in closer, as needed:
 - Elevation changes.
 - “Dark zones”.

SURVEYING - "X" PATTERN

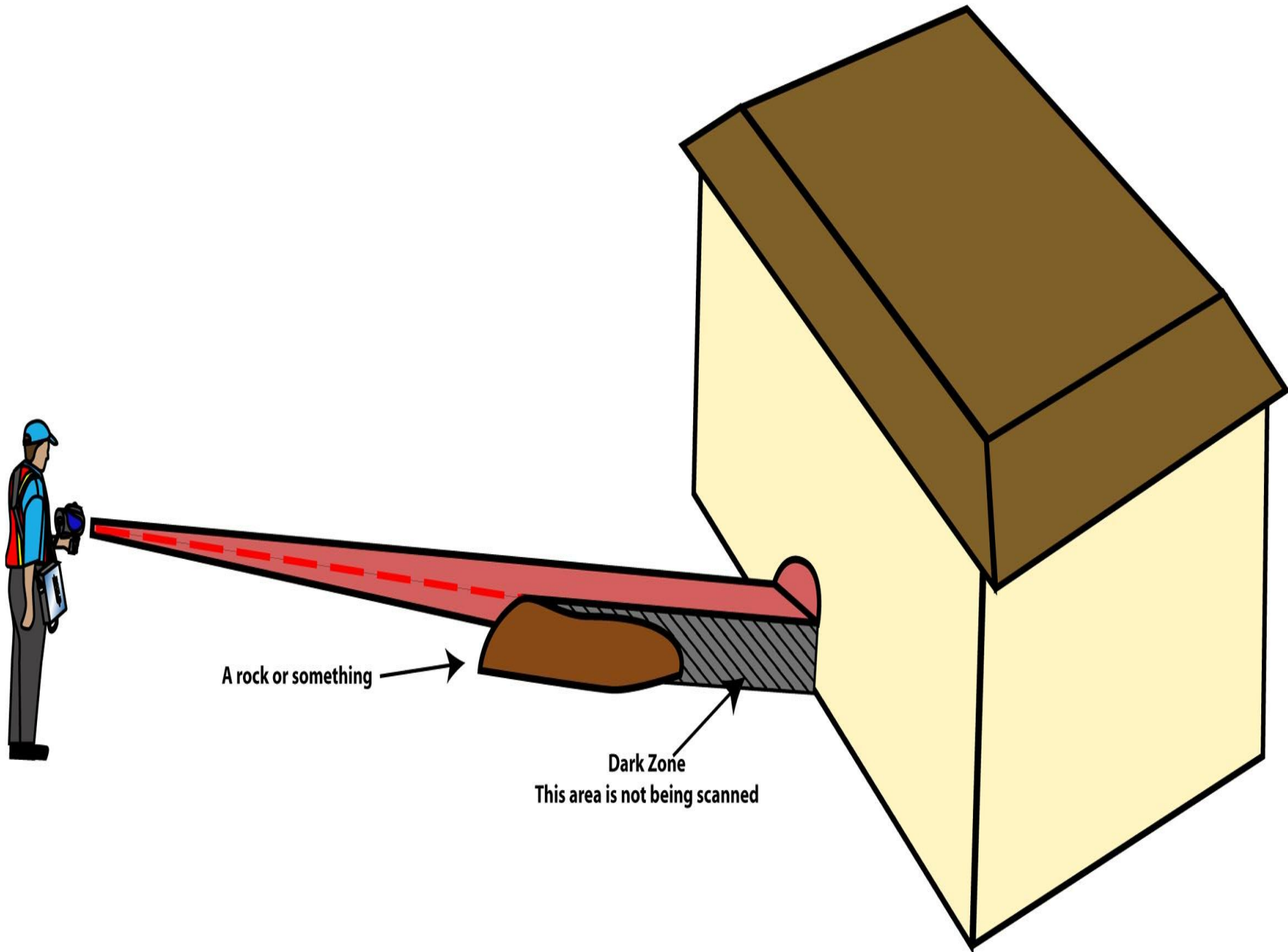




Beam Skip

**Beam abruptly changes from
a near object to a far object**

Dark Zone



LOCALIZING THE LEAK

- Try to keep the wind at your back.
- Stand about 10' away from the meter / underground leak.
- Use the pure tones to pick out the strongest return.
- Start aiming low, on the ground.
- Work the beam up and around the piping:
 - **Note that the spotter laser is about 3" above the IR laser beam.**

As usual, when in doubt, soap the meter and barhole the area.

LONG RANGE SCANNING

- The RMLD can detect leaks up to 100 feet away.
- The actual distance may vary due to:
 - Target surface.
 - Environmental conditions.

Tip: When surveying distances greater than 50', it is important to slow down the scanning rate and take care in aiming the laser.

FALSE DETECTIONS

- Sudden changes in light return.
- Elevations.
- Abrupt or jerky motions.
- Strong reflections off certain surfaces, (e.g., black garbage bags, dew, glass, polished surfaces, stones, license plates, reflectors, etc.).

SURVEYING TIP

If you experience a false detection, pause at this distance, aim off to the side then re-sweep across the area to determine if gas is present.

CONDITIONS WHICH MIGHT HINDER SURVEYING

- Weather.
- A system likely to have many low flowing leaks.
- Surface & soil conditions.

Slow down the survey as needed.

SAFETY

- Do not stare into beam or view directly with optical instruments.
- Do not attempt to repair instrument.
- Do not turn on or attempt to use the RMLD indoors if there is an indication, potential or suspicion that an explosive level of gas is present.

STOP