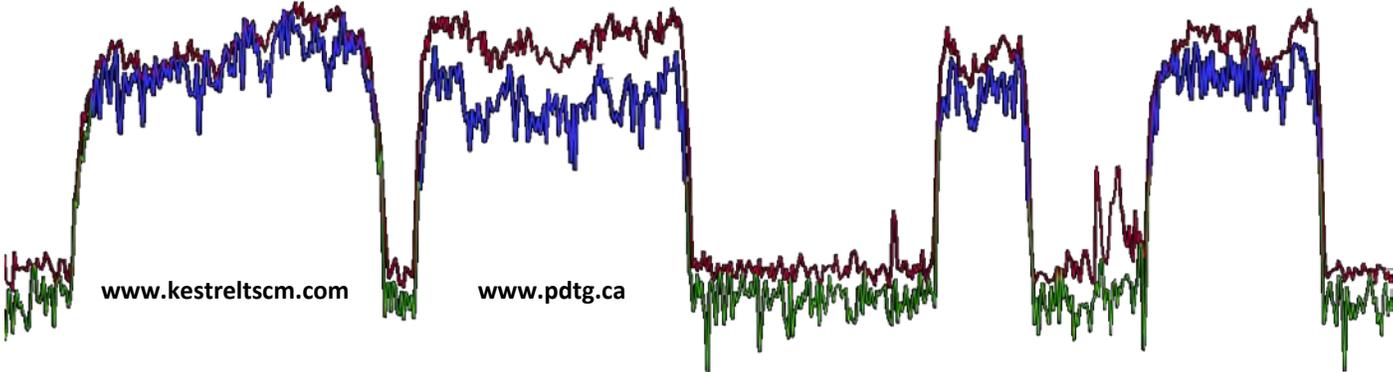


Technical Operator Setup and Operation Manual



**Kestrel<sup>®</sup> Log Periodic (KLP)<sup>™</sup>**  
**Omni-Directional and Directional**  
**High Gain | Wideband Antenna**



## Introduction

Thank you for your recent purchase of the Kestrel Log Periodic (KLP)™ Antenna Kit.

The Kestrel Log-Periodic (KLP)™, is a dual polarized, wideband, high gain, directional antenna, with a unique custom engineered, combination pistol grip and portable tripod mount, for rapid field deployment in a TSCM role.

The Kestrel Log Periodic (KLP)™ offers an exceptional | **Design Frequency Range (DFR)** | of 680 MHz to 6 GHz, which translates into a real-world (Rx only), Near-Field Characterization (NFC) or TSCM operational capability well below 10 MHz, and greater than 10 GHz, making it ideal for both indoor and outdoor, Radio Direction-Finding (RDF) applications, by minimizing the complexities of RF reflections and the effects of multi-path anomalies associated with strong Near-Field (NF) signal events.

A key feature and benefit of the KLP antenna is our innovative, custom engineered and Canadian manufactured, | **Quick Connect Mechanism (QCM)™** |, pistol grip and tripod configuration that supports the antenna as both a tabletop collection antenna, and a comfortable exquisitely engineered, light weight component of a powerful Signal Intelligence Support System (SISS)™ powered by the Kestrel TSCM® Professional Software.

The Kestrel Log Periodic (KLP)™ is a commercially available, Canadian manufactured antenna, with excellent passive isotropic, | **Near-Field Characteristics (NFC)** | that complement TSCM Signal of Interest (SOI) locates.

The KLP comes pre-assembled, and has been tested for optimal quality control assurance, and is delivered with a 2-year limited warranty against manufacturing defects.

## Kit Contents

- 1 | Log-Periodic Antenna (LPA)™ | 1 Meter Quad Shielded RF Cable | Terminated 50 Ohm SMA (M)
- 1 | Kestrel Vision Antenna (KVA)™ | Omni-Directional (5dBi) | Terminated 50 Ohm SMA (M)
- 1 | Quick Connect Mechanism (QCM)™
- 1 | SMA (M) to SMA (M) Quad Shielded RF Extension Cable
- 1 | SMA (F) to SMA (F) RF Adapter
- 1 | Technical Operator Set-up and Operation Manual
- 1 | Soft Storage Pouch

## Set-Up and Operation

On removing the key components from the Soft Storage Pouch, the technical operator can attach the included pistol grip and tripod to the | **QCM Front Plate** |.

The | **QCM Front Plate** | is delivered already installed and ready to accept the combination pistol grip and tripod, included in the kit.

Once the pistol grip and tripod combination is secured to the | **QCM Front Plate** |, the antenna is ready to deploy in a vertical orientation.



To change the antenna polarization to the horizontal position, the antenna is turned 90 degrees (counter-clockwise) from vertical to achieve horizontal polarization.



When the antenna is oriented in the horizontal polarization, the antenna rotates 90 degrees (clockwise) back to the vertical polarization position.

It is essential to consider both vertical and horizontal polarization during the direction-finding (DF) process.

## Antenna Description

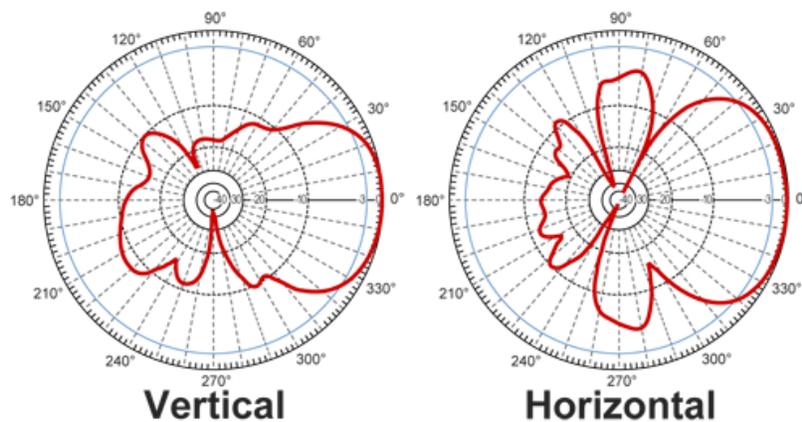
The Kestrel Log Periodic (KLP)™ Antenna is a custom modified, commercially available Log Periodic Antenna (LPA) manufactured with ruggedized plastic and weather resistant sealed seams to provide the technical operator with the ability to deploy the antenna outdoors, or in damp conditions.

A log-periodic antenna by design, is an ideal companion for TSCM applications due to its wide bandwidth reception capabilities, superb directional response, and excellent near-field properties, minimizing the requirement for multiple frequency specific directional antennas.

The Log-Periodic Antenna (LPA) design, consists of a series of dipoles referred to as elements, placed in a logarithmic relationship to frequency, at regular intervals along the antennas axis.

The Kestrel Log-Periodic (KLP)™ Dual Polarized, Passive High Gain, Wideband Directional Antenna was specifically selected for use with the KestrelPrey III™ | Advanced RF Locator as part of a versatile, low cost, technically compatible product that significantly enhances the technical operator's ability to capture and locate Signals of Interest (SOI), within the ambient RF spectrum environment.

The KLP can be deployed in an Omni-Directional, vertically polarized tripod configuration, and quickly and easily transition to a powerful walk-about, highly directional Pistol Grip, Signal of Interest (SOI) locator, minimizing the requirement for a separate broadband RF detector or other resources.



The example LPA plots above, illustrate the differences between the vertical and horizontal antenna polarization patterns and are typical of most Log Periodic Antenna (LPA) designs.

Many technical operators mistaken the log-periodic shape as the reason for the inherent wideband directional properties, however, this is not the case and operators will soon realize that the strongest signal search response for any given frequency, may vary off the actual tip of the antenna.

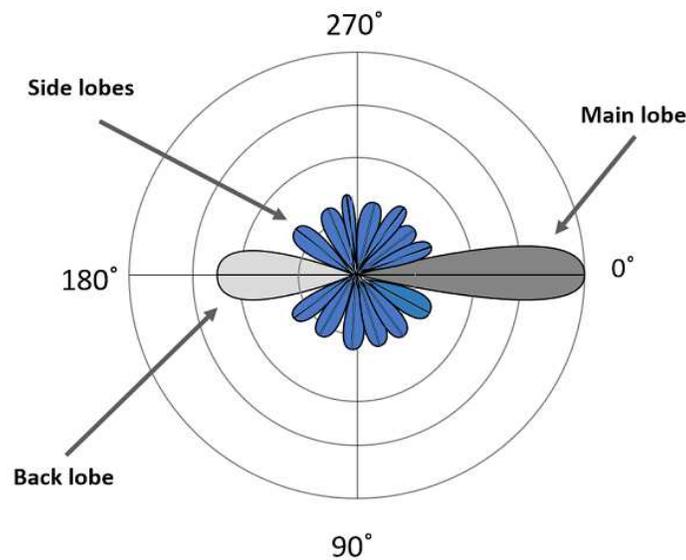
The antenna design structure is made of a series of elements that are shorter in wave-length (higher frequencies) at the tip of the antenna, and longer wave-length elements (lower-frequencies) at the base of the antenna providing the highest to lowest | **Design Frequency Range (DFR)** | into play.

The directional properties may vary off to the side of the tip, depending on the actual Signal of Interest (SOI) frequency, of the emitter, and will be effected by propagation factors, and the emitter Vs antenna polarization, as well as, occupancy and structural considerations.

As illustrated below, there is a significant difference between the | **Main Lobe** | and the | **Back Lobe** |, of a Log Periodic Antenna (LPA) design, with some gain achieved by the | **Side Lobes** |.

The front to back ratio of the Kestrel Log Periodic (KLP)™ is approximately 19 dB providing excellent directional discrimination between signal emission forward Vs signal emissions received from the opposite direction.

This plot is typical of most Log Periodic Antenna (LPA) designs.



The directional Beam Width of the KLP antenna is approximately 85 degrees when oriented in the vertical position and requires that the technical operator make significant directional shifts when determining direction, based on the Relative Signal Strength Indicator (RSSI).

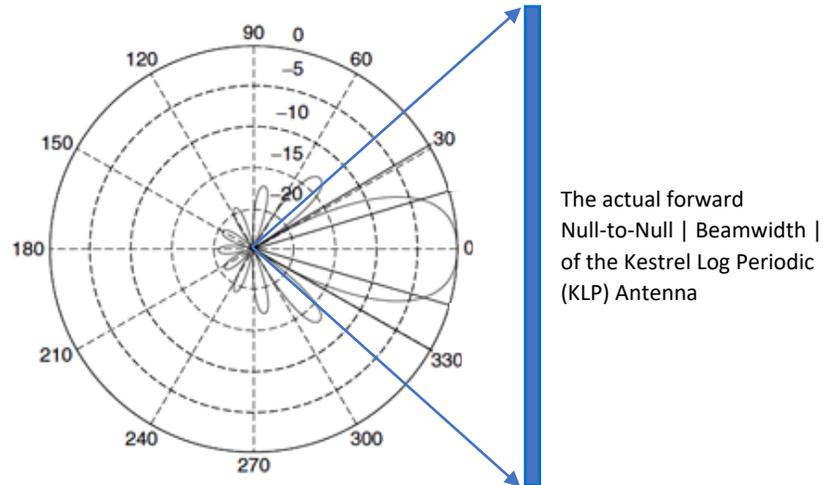
Once the general direction is established, finer directional movement can be applied to precisely locate the emitter within the target area, or determine whether the Signal of Interest (SOI) is actually outside of the defined target area.

The typical Beam Width and half beam width of a Log Periodic Antenna (LPA) are illustrated below from Null-to-Null indicating a Beam Width of approximately 85 degrees.

The technical operator needs to make conduct a 360-degree evaluation to determine the starting point for the search.

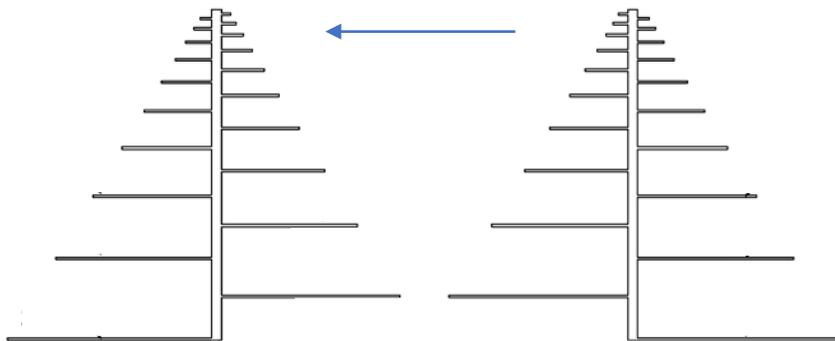
This practice will identify the strongest signal level, based on direction, and the Relative Signal Strength Indicator (RSSI), which will become the starting point in localizing the Signal of Interest (SOI).

Once the initial direction is established, the technical operator must move methodically, to another location and repeat the process to determine the best direction to proceed, narrowing the beam width and monitoring the RSSI.



All elements of a Log-Periodic Antenna (LPA) are considered to be “active” in nature, or electrically connected to the antenna feedline, along with all other elements, with each successive element connected in opposite phase.

If we separate the opposite phases of a typical LPA it would appear as illustrated below.



The | **Design Frequency Range (DFR)** | and | **Near-Field Characteristics (NFC)** | are important concepts for TSCM specific applications, and operators need to have working understanding of the differences in DFR and NFC methodology.

The first concept the technical operator must understand, is the virtually all TSCM applications involve | [Near-Field Characterization \(NFC\)](#) |, Signals of Interest (SOI) searches within a defined target area, or facility, with at least a moderate amount of shielding from the outside ambient RF spectrum environment, allowing the operator to realize significant advantage well outside (above and below) the | [Design Frequency Range \(DFR\)](#) |.

Consider an antenna with a DFR of 380 MHz to 6 GHz, that exhibits excellent NFC from below 10 MHz to above 10 GHz, which is typical of, Near-Field (NF) receive only antenna applications such as TSCM.

DFR related factors are more critical when the antenna is utilized for non-TSCM transmit applications.

The Kestrel Log Periodic (KLP)™ antenna is delivered with a uniquely engineered and proprietary custom manufactured, | [Quick Connect Mechanism \(QCM\)](#)™ | that allows the technical operator to effortlessly align the antenna for both vertical and horizontal polarization.

Polarization is a critical, yet “unknown” factor when deployed in a TSCM specific Radio Direction Finding (RDF) role, as the emitter antenna position and type are unknown to the technical operator, however, with a little effort, the operator can often, through experience determine the likely polarization of the emitter antenna, during the locate.

The | [QCM Back Plate](#) | and | [QCM Front Plate](#) | are pre-installed on the antenna at the time of delivery, allowing the KLP antenna to be quickly setup and deployed in either an Omni-directional or Directional capacity quickly.

The Kestrel Log Periodic (KLP)™ antenna is equipped with a (60 inch | 152.4 cm) quad shielded coaxial cable that is permanently attached to the antenna base and terminated with a strain relief protected, SMA (M) connector.

The | [QCM Back Plate](#) | is designed to provide built in strain relief, and secure the RF antenna cable for optimal positioning during use with the KestrelPrey III | Advanced RF Locator running the Kestrel TSCM® Professional Software, or a suitable third-party portable spectrum analyzer.

Our antenna can be utilized on any spectrum analyser or receiver and is not of a proprietary design, offering significant advantage over products that are proprietary in nature.

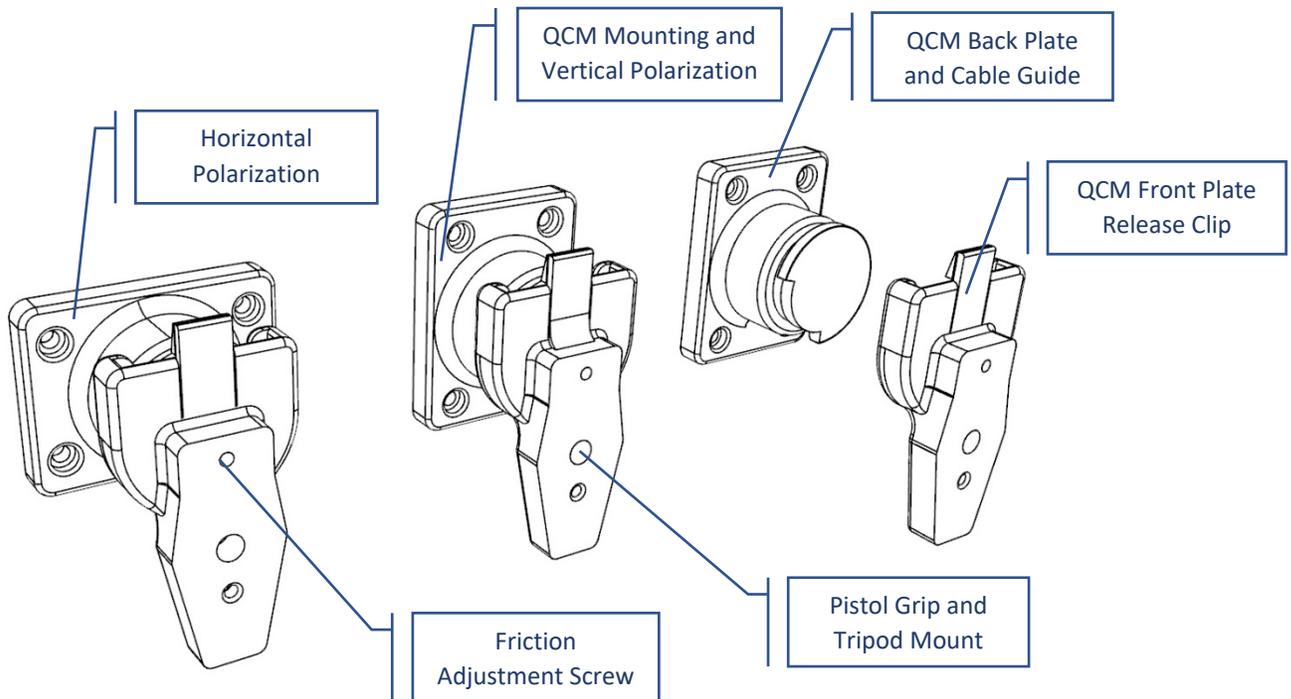
The | [QCM Front Plate](#) | is designed to provide physical mounting support for the included pistol grip and tripod combination, and adds significant versatility for TSCM specific collection assignments, and easily transitions to provide precision Signal of Interest (SOI) emitter locates, utilizing standard RSSI based Radio Direction Finding (RDF) techniques.

Holding the antenna in the left hand (arrows up), and the QCM front plate assembly in the right hand, holding the pistol grip, load the | [QCM Front Plate](#) | assembly to mate with the | [QCM Back Plate](#) | ensuring the antenna cable moves freely within the | [QCM Back Plate](#) | assembly.

There is no real requirement to separate the | [QCM Front Plate](#) | assembly, from the | [QCM Back Plate](#) | assembly, and only the pistol grip and tripod combination need be removed for storage.

To release the | [QCM Front Plate](#) | assembly from the antenna, first ensure that the antenna is in the vertical polarization position, and gently apply back pressure to the | [QCM Front Plate](#) | release clip and apply downward pressure to separate the components.

The following images illustrate the technical operation of the | **Quick Connect Mechanism (QCM)**™ |.



The locking | **QCM Front Plate** | supports the pistol grip and tripod combination (included), and permits the use of any standard tripod configuration (not included) to be utilized for unique deployment or temporary mounting applications.

Our Technical Research and Standards Group (TRSG)™ designed and engineered the | **Quick Connect Mechanism (QCM)** | as a simple, easy to assemble, operate, and deploy resource for a wide range of oftentimes challenging scenarios.

## **Operation | Tripod Mount | Omni-Directional**

The Kestrel Log Periodic (KLP)™ antenna provides excellent | **Near-Field Characteristics (NFC)** | for the TSCM role, when deployed with the antenna orientation upward, mounted on the included, combination pistol grip and tripod.

The actual antenna orientation within the target area must take into consideration to advantage the antenna pattern.

Positioning the antenna to provide the best possible receive only detection pattern is off of the broad sides of the Kestrel Log Periodic (KLP)™ antenna.

The antenna radiation pattern is more of less from edge to edge with a Null along both of the edges of the antenna and an Omni-directional pattern.



The polarization can be adjusted up to 90-degrees depending on the target area orientation with reference to the antenna Null regions, off each narrow edge of the antenna.

This is easily accomplished utilizing the included tripod, by unfolding the combination pistol grip and tripod support legs and standing the KLP on a desktop surface or on the floor within the defined target area.

If the cable is not long enough to reach the receiver or spectrum analyzer, the technical operator can connect the RF extension cable, using the SMA (F) to SMA (F) RF adapter, also included as part of the Kestrel Log Periodic (KLP) <sup>TM</sup> antenna kit.

The tripod head angle, can also be adjusted, providing a measure of directional capability, or to alter the Null region, as a function of the combination pistol grip and tripod.

The Kestrel Log Periodic (KLP) <sup>TM</sup> antenna should be oriented pointing straight up, vertically on the tripod as a normal practice.

To alter or return the orientation of the antenna for this purpose, there is a locking ratchet capability located on the combination pistol grip and tripod, as well as a release button located on the side of the tripod.

The technical operator will find the antenna extremely easy to deploy in any required configuration during deployment.

Understanding the characteristics of the antenna can be easily accomplished during field deployment in real-world scenarios, with a little practice on target area signals and those from outside the facility.

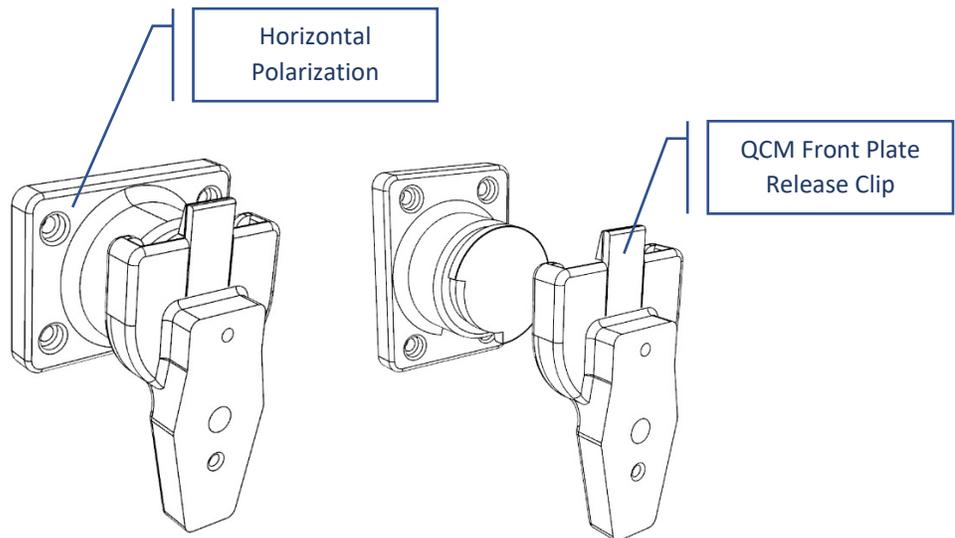
## Operation | Pistol Grip | Directional | Horizontal Polarization

Horizontal Polarization is achieved by rotating the antenna 90-degrees (counter clockwise) from the Vertical to the Horizontal polarization position.



The simplicity of the KLP design, makes changing the polarization from vertical to horizontal and back to vertical an easy task, during on-the-fly walk-about emitter locates.

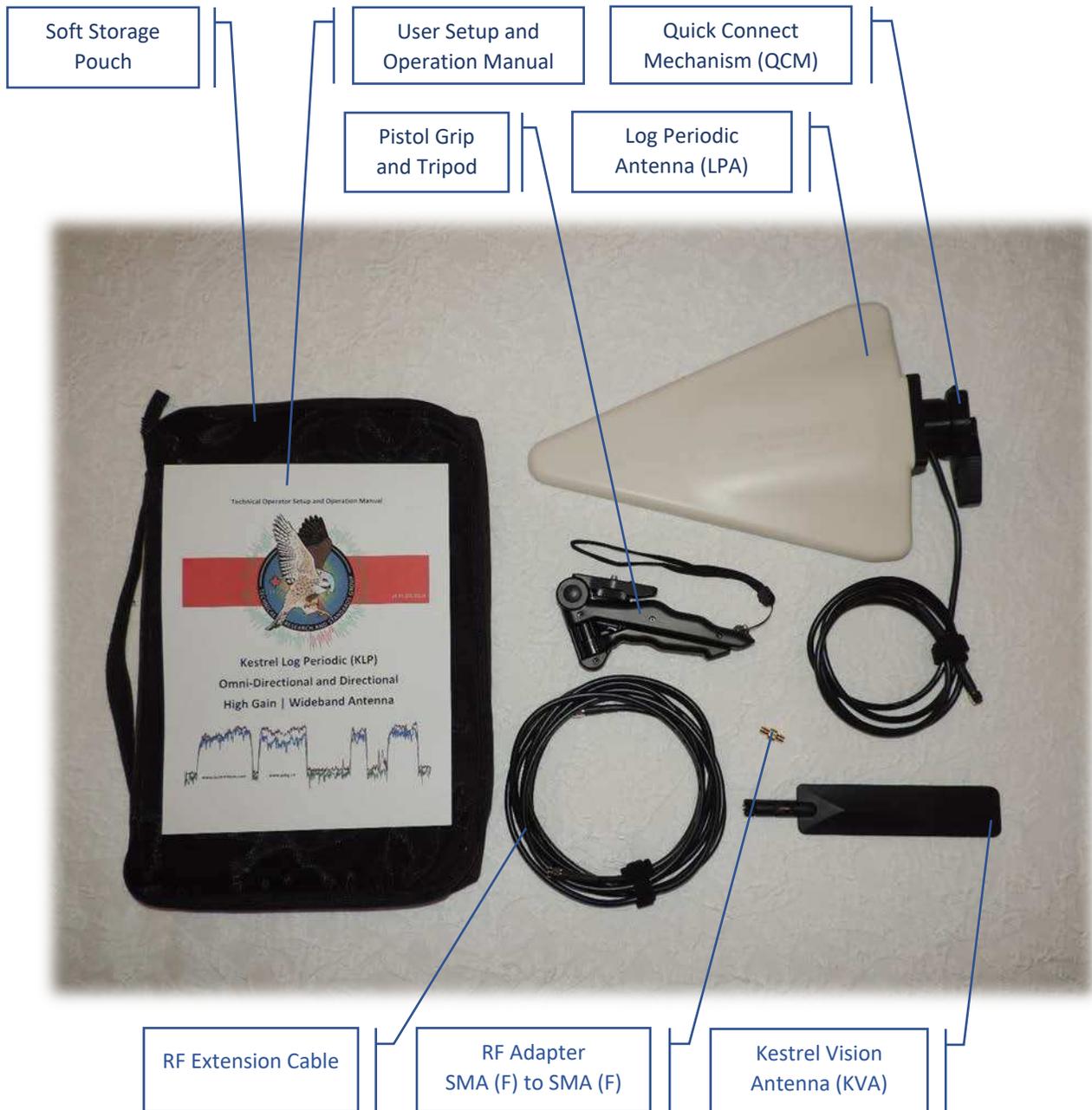
From the Horizontal position the antenna can be rotated 90-degrees (clockwise) back to the Vertical position, if required.



The | **Quick Connect Mechanism (QCM)**™ | is a 90-degree rotatable friction assembly, manufactured with a strong durable material that is light weight, reduces fatigue during deployment, and the compact nature of the Kestrel Log Periodic (KLP)™ antenna kit, is ideal for travel.

## Operation | Pistol Grip | Directional | Vertical Polarization

By default, upon assembly, the KLP antenna will be oriented in a vertical polarization position, and provides a light weight, stable, and well balanced directional, wide band receive antenna with excellent isotropic gain characteristics.



The combination pistol grip and tripod allow the technical operator to utilize the antenna in an Omni-Directional, stationary signal search and collection capacity, and immediately transition to a walk-about Direction Finding role, when the antenna is connected to the KestrelPrey III™ | Advanced RF Locator, or another portable tablet or laptop computer.

## Specifications

### Kestrel Log Periodic (KLP)™

*Design Frequency Range (DFR):* **680 MHz to 6 GHz**

*Near-Field Characterization (NFC):* **Below 10 MHz to Above 12 GHz**

*Standard Operational Bands:* **HF | VHF | VHF – FM | UHF | SHF | ISM | DECT 6.0 | DCS | DAB | LTE | AWS | GSM | PCS | GPRS | 2G | 3G | 4G | WLAN | FWA | BPL | W-CDMA | HSDPS | CDMA One | CDMA 2000 | 1XEV-DO | EDGE | ZIGBEE | BLUETOOTH | DSSS | FHSS | OFDM**

*Front / Back Attenuation:* **19 dB**

*Beamwidth:* **85 Degrees**

*Gain:* **11.14 dBi**

*Impedance:* **50 Ohms**

*Connector Type:* **SMA (M)**

*Fixed Antenna Cable Length:* **Quad Shield Low Loss | 152.4 cm (5 feet)**

*Extension Cable:* **Quad Shield Low Loss | 304.8 cm (10 feet)**

*Dimensions:* **295 x 210 x 55 mm (1.6 x 8.3 x 2.2 inches)**

### Kestrel Vision Antenna (KVA)™

*Design Frequency Range (DFR):* **698 MHz to 2700 MHz**

*Near-Field Characterization (NFC):* **Below 30 MHz to 6 GHz**

*Type:* **Omni-Directional**

*Standard Operational Bands:* **| VHF | VHF – FM | UHF | SHF | ISM | DECT 6.0 | DCS | DAB | LTE | AWS | GSM | PCS | GPRS | 2G | 3G | 4G | WLAN | FWA | BPL | W-CDMA | HSDPS | CDMA One | CDMA 2000 | 1XEV-DO | EDGE | ZIGBEE | BLUETOOTH | DSSS | FHSS | OFDM**

*Impedance:* **50 Ohms**

*Gain:* **5 dBi**

*Connector Type:* **Swivel 90 Degree | SMA (M)**

## Limited Warranty

*The Kestrel Log Periodic (KLP) antenna is delivered with a 2-Year limited warranty against manufacturing defects. Catastrophic damage caused by misuse, is not covered under the limited warranty. Please contact Professional Development TSCM Group Inc., or an authorized distribution partner for warranty and repair information.*