The White Knight

Tap Locator

- Mount unit directly to meter socket, no special adapter required
- Gather data to identify and locate taps in less than a minute
- Display tap information in step or pulse graphic form, showing distance in feet or meters
- Store up to eight readings for off-site evaluation
- Print out tap information for evidence

Fighting electricity theft? Defend your revenues! White Knight to the Rescue!

This battery-powered unit uses time domain reflectometry and digital signal processing to find overhead and underground taps in single and three phase service.

H.J. Arnett Industries, L.L.C. - Innovative Instruments for Utilities & Industry

visit us at *www.arnettindustries.com*

20460 SW Avery Court Tualitan, OR 97062 Phone (503) 692-4600 Fax (503) 692-4661

The White Knight™

At last - the tap locator you've been waiting for!

The White Knight Tap Detector...

Why worry about illegal taps?

I. Safety:
Most illegal taps are not installed to code, causing serious safety issues. Safety is important; not only for the utility employee, but also for the residents and all people that need access to the meter. In emergency situations, such as fires, when the meter is removed, the emergency personnel assume that the power is off past the meter. In fact, an illegal tap may keep the service "hot". Serious burns or electrocution is possible.

2. Recover Lost Revenue:
Calculate and bill for electricity that was stolen. In most states, the utility can also bill for investigation expenses and in civil court utilities may receive triple the damages.

3. Stop Additional Revenue Losses:
By catching and stopping the theft, the utility may begin billing the customer for all of their electricity being consumed.

How does the White Knight work?

The White Knight detects and locates taps using Time Domain Reflectometry (TDR) and proprietary software algorithms. TDR signals are high frequency (Radar) pulses that are useful in finding impedance changes in electric cables (conductors/wires). TDR pulses reflect back to the TDR source when they encounter a change in cable impedance. Changes in impedance cause a rising or lowering of amplitude on the ***White Knight's*** graphic display .This explains why ***The White Knight*** graph in Step and Pulse modes moves up and down. It is doing so in accordance with cable impedance variations.

By accurately measuring how much time it takes for the reflection caused by the tap (or splice) to return to the TDR source, the distance to the tap can be determined. In a laboratory environment using coaxial cable, where no variations occur in the cable, the graph will be perfectly flat until the end of the cable. In the electrical world, testing service conductors introduce many variables to challenge the accuracy of tap detection and location. These variables include cable sizes, soil differences, ground dampness and even cable installation differences. ***The White Knight*** uses proprietary software algorithms to conquer these challenges.

In general terms, once a tap has been detected by TDR, the software algorithms work to find the distance to it. Taps leave specific signatures that can be reliably located when the appropriate software is employed. An experienced user will be able to discern between illegal taps and cable splices, transformers, and above ground to underground transitions from looking at the graph feedback.

H.J. Arnett Industries, L.L.C. has developed software that sorts through these parameters and consistently reports tap detection and location data with a high degree of reliability .

Your best tool for locating illegal taps.

The White Knight Tap Detector is battle tested for locating the most difficult to find electricity theft-Illegal Taps: when your customer has placed cables before the meter to illegally divert electricity around their meter.

By using easy to read graphs, investigators can determine if an illegal tap is installed and determine the distance from the meter socket to the tap in feet/meters. Each investigation may be saved indefinitely to memory, up to eight investigations, and you may even print paper copies on-site for additional confirmation. All this can be done in just a few minutes. Once back at the investigator's office, the investigation may be accessed and additional analysis can be done.

Graphs using STEP mode:

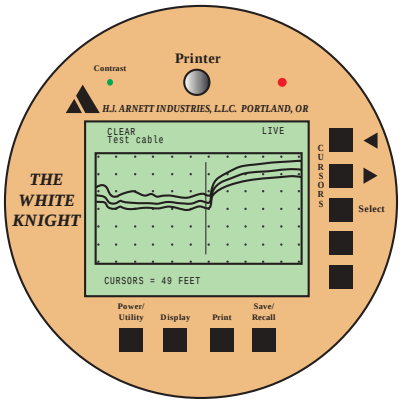

Figure 1:
No tap detected.

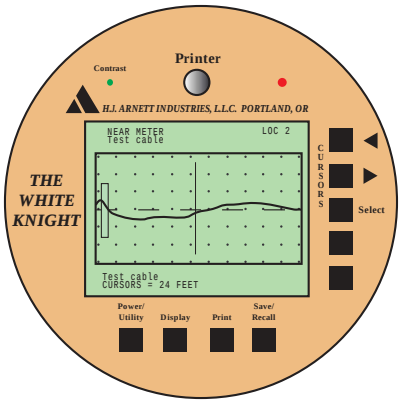

Figure 2
Tap located near the meter.

Fast. Easy. Reliable.

Field-tested in real-world situations by utilities like yours.

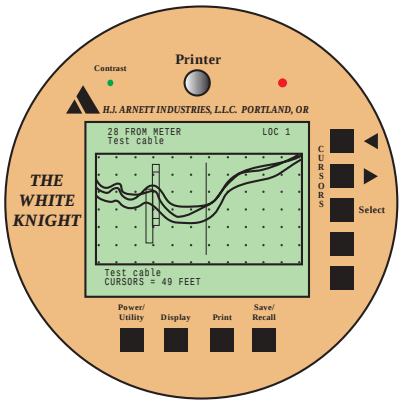

Figure 3
Tap located 28' from the meter.

Graphs using PULSE mode:

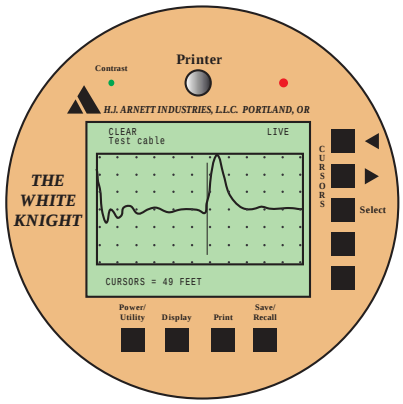

Figure 4
No tap detected.

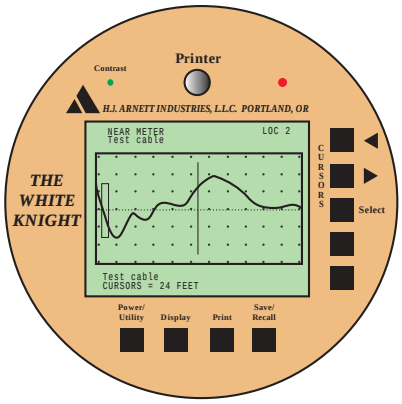

Figure 5
Tap located near the meter.

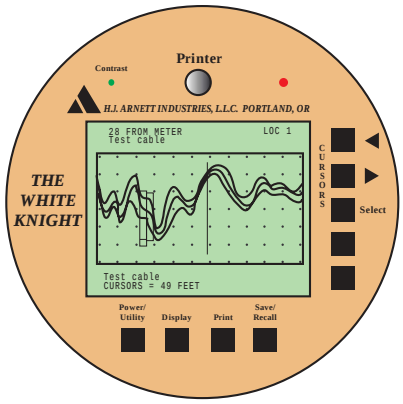

Figure 6
Tap located 28' from the meter

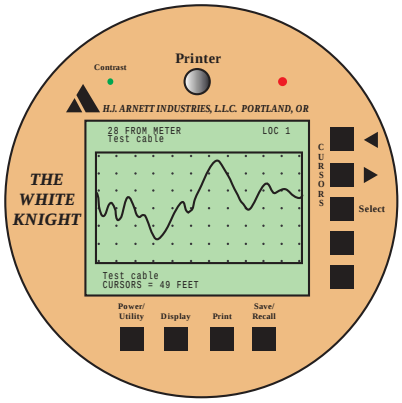

Figure 7
Possible tap at 28' with no boxes due to low impedance.

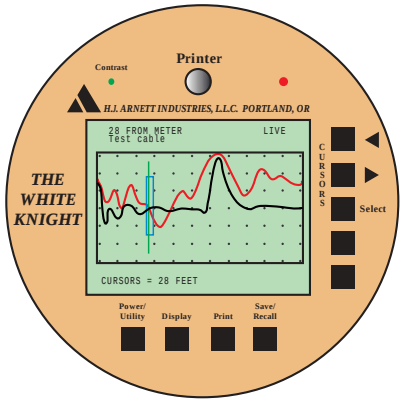

Figure 8
An overlay of two pulse responses. The black line represents TDR with no tap present. The red line represents TDR response of a tap (blue box) at 28' from the meter. If the service were open there would be an abrupt rise in the TDR display, or if it is connected to a transformer we would be able to see a drop in the TDR display, (a transformer shows low impedance).

Opens and shorts in cables are not the only cable changes that cause TDR display fluctuations. Spacing also changes amplitude on the graphs. As spacing between the cable increases, the TDR display amplitude rises, and likewise closer spacing between cables shows lower impedance to TDR signals. Cable spacing differences do not cause the drastic TDR display change that a direct open or short does because the impedance change is only slight.

As always, we here at H.J. Arnett Industries will confirm or help read any graph to insure the highest probability of proper tap location.

The White Knight™

Specifications

Voltage	*Internal battery pack, rechargeable, 8.5V typical when charged*
Usage	*Single-phase residential service* *Three-phase service with optional adapter*
Output	*RS-232 for printer via HJA cable*
Accuracy	*When tap distance is shown, accuracy is typically within 10% of actual distance to tap, for most taps (most taps being within 30ft of meter)*
Dimensions	*8 lbs., 7 1/4" x 8 5/8"* *10 lbs., shipping weight*
Optional	*HP Printer* *Adapter for bottom feed (A-Base) meters and 3Ø services*
Warranty	*One year parts and labor under normal use. Not responsible for misuse.*

About the Company

H.J. Arnett Industries, L.L.C., is an Oregon company which manufactures and distributes products for the electric utilities, tele-communications, and construction industries. For over 30 years, the company has worked closely with its customers to develop practical products geared to solving everyday problems for utilities and industry. The company's line of instruments has grown out of direct discussion with and response to linemen and engineers. We welcome your inquiries and comments.

Stop energy theft - White Knight to the Rescue!

To order, or for more information, contact us today. Phone (503) 692-4600 Fax (503) 692-4661