



SUNRISE TELECOM

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Application Series

SunSet xDSL: Detecting Load Coils

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WHAT ARE LOAD COILS?

Over long cable lengths, voice signals are attenuated due to increased capacitance. Phone companies have typically dealt with this issue by placing load coils on these long loops (greater than 18,000 feet). A load coil

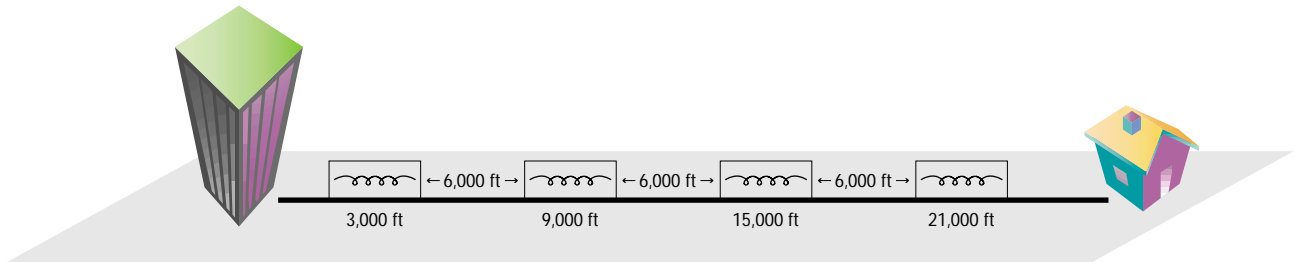


Figure 1 Typical load coil spacing

is an inductor; usually 88 mH, and is placed at regular intervals. The first appears 3,000 feet from the CO or exchange and subsequent load coils are placed every 6,000 feet after that.

Load coils compensate for increased capacitance by creating a tuned circuit for these voice frequencies (300 Hz to 3 kHz). They boost the transmit power level for the frequencies between 300 Hz and 3.1 kHz. However, after 3.1 kHz, the power drops below that of unloaded cable. Refer to Figure 2.

This is ideal for voice transmission, since it is limited to the 300 Hz to 3.1 kHz bandwidth. But, what happens with ADSL or other DSL services that use the higher frequencies? They simply cannot pass through load coils. Therefore, it is critical to remove all load coils before deploying ADSL or other high frequency signals.

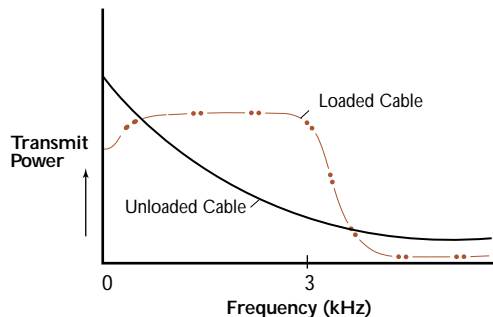


Figure 2 Spectral characteristics of loaded & unloaded cable

HOW DO YOU DETECT LOAD COILS?

Generally, technicians have used a TDR to detect and locate load coils. But as you may well know, TDR is a practiced skill and is not always a simple and quick exercise. The SunSet xDSL's COIL DETECTION feature

quickly detects the presence of load coils with the press of a button. Then, if load coils are present, you may use the TDR to find their exact location for removal.

This application procedure defines two steps for detecting and locating load coils.

- Use the Coil Detection feature to detect the presence of load coils. Check if you have load coils before running a TDR.
- If load coils are present, use the TDR to determine their exact location so they may be removed.

Step 1 Detecting load coils- SunSet xDSL Coil Detection feature

1. Connect the SunSet xDSL to the circuit using the appropriate cable, which will typically be the RJ-45 to alligator clips cable. Make sure to plug into the right side panel labeled LOAD COIL DETECT (light chassis) or TDR/DMM/LINE (full chassis).
2. Press the MENU key.
3. Scroll to LINE. Press ENTER.
4. Scroll to the COIL DETECTION menu item and press ENTER.
5. The Load Coil Detection test automatically begins. The test takes approximately 25 seconds to run. Check the status lines at the top of the screen; it displays the three states- Initializing, Processing, and Completed. Once the test has completed, the results will be displayed.

The screen shows the number of load coils detected at the bottom of the screen. It will also show a graphical representation of the resonances for each load coil

detected. See Figure 3. Each load coil is represented by a dip. In this screen, we see there are three load coils on the circuit.

Since we have discovered load coils, we now need to use the xDSL's TDR to locate the load coils for removal. Remember, all load coils must be removed before deploying DSL; ADSL service cannot link up with even one load coil between the modem and the DSLAM.

Step 2 Finding the location of load coils - SunSet xDSL TDR Feature

1. Again, connect the SunSet xDSL to the circuit using the appropriate cable. This will typically be the RJ-45 to alligator clips cable. If you are still connected to the circuit from the Coil Detection test, you do not have to change the connection.
2. Press the MENU key.
3. Enter TDR
4. First you will need to configure the TDR setup screen. Select the appropriate gauge of the copper pair being tested (typically 24 or 26). If there are mixed gauge values on this circuit, select the highest gauge value. If you do not know the exact gauge, keep the default value of 24.
5. Next, select the Velocity of Propagation (Vp) value. If you do not know the appropriate Vp value, keep the default setting of .67.
6. Select 1 for the Average Interval.
7. When you have finished, press START (F3) or the ENTER key to begin the TDR measurement.
8. Once in the TDR results screen, press SEARCH (F3) to automatically search for the first load coil on the cable pair. The SunSet begins to look for the first fault on the pair. If there is another fault on the pair- possibly a bridge tap-before the first load coil, the TDR may stop on this fault. If this happens, then you must manually find the load coil on the copper pair by using the ZOOM_OT and PAGE_RT function keys in the TDR.
9. When the SunSet finds a fault, it places the cursor by the fault. You should see a FOUND message at the top of the screen. A load coil appears as an upward spike on the TDR screen. See Figure 4. The distance to the load coil is shown at the top of the screen at DISTANCE. In Figure 4, the load coil is 5,117 feet away.

Note that a TDR displays only one load coil at a time. If your Coil Detection test reveals multiple load coils, you will need to run the TDR, remove the first load coil, then run the TDR again to find the next load coil.

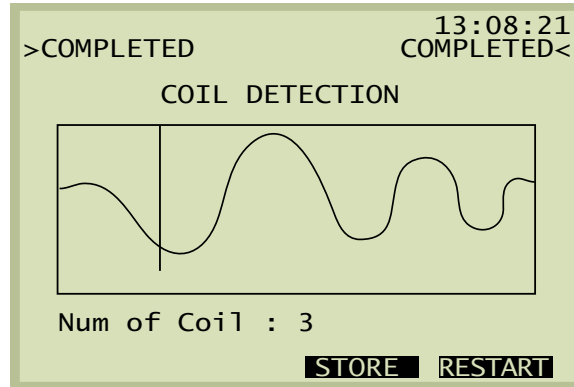


Figure 3 Coil Detection screen, indicating three load coils

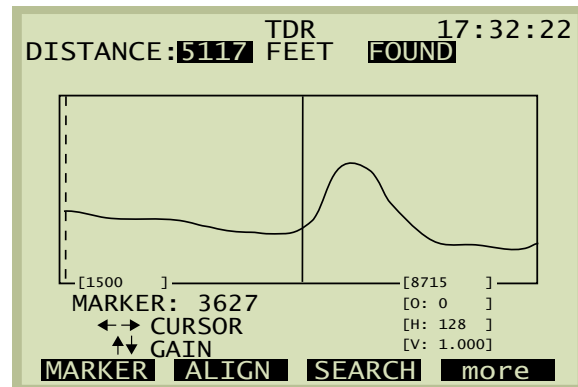
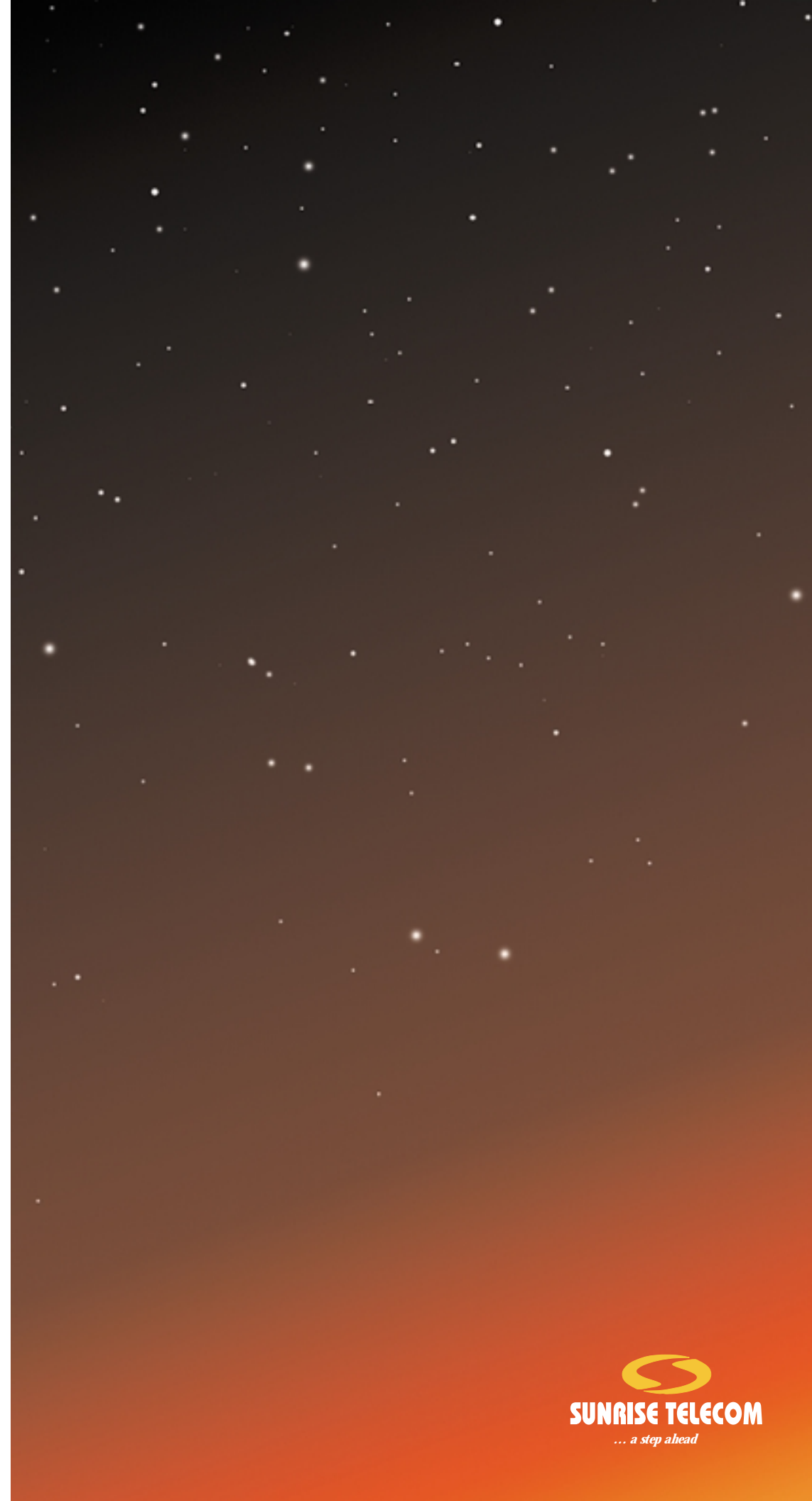


Figure 4 TDR screen with location of first load coil



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