

TSAN 045

Dataradio Technical Support

For additional assistance: www.dataradio.com

Within the U.S.A.	1-800-992-7774	International	1-507-833-8819
-------------------	----------------	---------------	----------------

Product: Radio Transmitter

Application: To locate a transmitter that has become 'stuck in transmit'.

Procedure: Although rare, a transceiver can become 'stuck in transmit', meaning that it is constantly outputting RF energy. RTU/PLC failure, ground loops, lightning damage, or comport failures are factors that might cause this problem. This can cause a system wide failure since a RF transmitter on the same frequency interferes with all other RF communication in the system.

In systems with few sites, finding the stuck transmitter may not be too difficult. In systems with many sites, locating the stuck transmitter can become quite a task. In either case, the following methods for locating this transmitter can speed the process of system troubleshooting.

Hint:

If possible, the telemetry system should be taken off line with the polling routine turned off at the SCADA master. This will make following the transmit signal easier for each of the following methods.

Method 1 – Analog Radio Only:

Equipment required: Analog radio (DL3400 or JSLM) of proper frequency range. Portable power source (battery or external power supply), directional antenna tuned to the proper transmitting frequency. Laptop computer with appropriate field programming software (FPS) for the radio being used, adequate length of coaxial feed line cable to either manually hold the antenna or mount the antenna on a temporary pole while the antenna is moved through the area (RG-58 is OK).

Setting/Method: For the DL3400 or the JSLM, program the radio's receiver for the suspect transmit frequency. Select "Diagnostics" (DL3400) or "User Test" (JSLM) from the 'Utilities' heading of the FPS when using a laptop and FPS for this test. The DL3400 FPS will display the RSSI level in DC voltage. The higher the DC voltage, the greater the received signal strength. See Fig. 1.

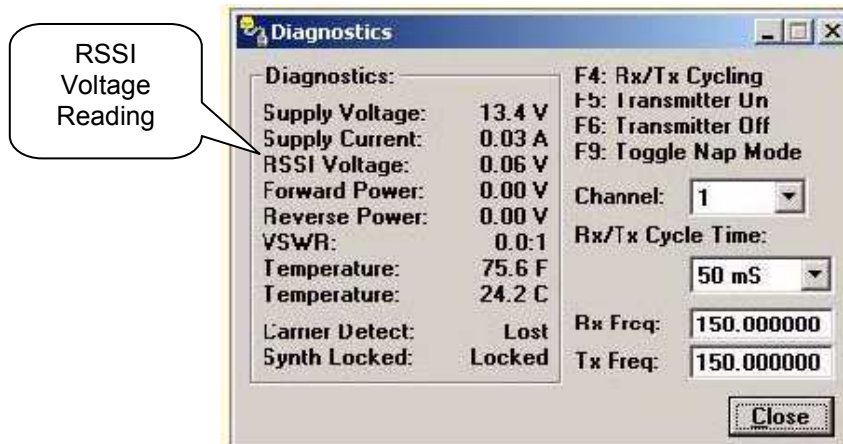


Fig. 1

DL3400 Diagnostics Screen

The JSLM FPS utilizes a bar graph similar to the T-96SR and Integra-TR offline diagnostic screens. See Fig. 2.

JSLM FPS "User Test" Screen

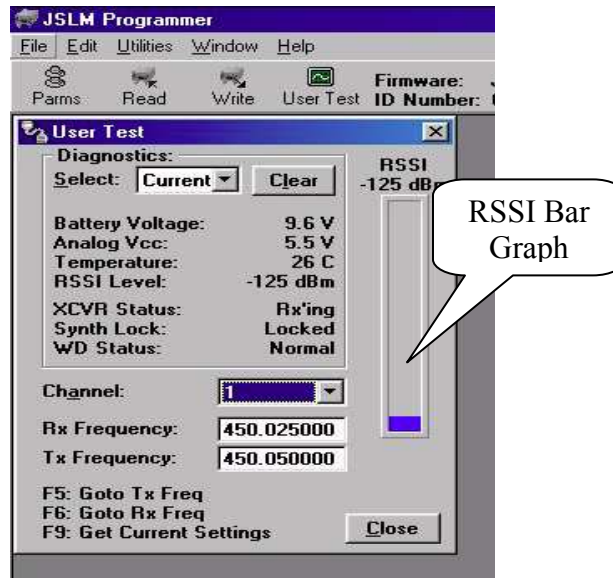


Fig. 2

Using the directional antenna, sweep across the horizon for the strongest constant RSSI level indicated. The stuck transmitter will have a constant signal level and will not vary as the master and remote units will do during their normal polling procedure. Use the RSSI indication to maintain proper direction, varying the antenna direction to ensure the point of strongest signal indication.

Note: In this application, a DC voltmeter may be substituted for the laptop and FPS.

A DC voltmeter can be substituted for the laptop and FPS. The DL3400 provides a RSSI output voltage on Pin 4 of J102 (10 Pin User Interface). The JSLM, *when programmed for RSSI output*, provides a RSSI output voltage on Pin 11 of the DB15 connector. See Fig. 3. The stronger the received RF carrier, the higher the DC voltage will be. Sweep the horizon with the directional antenna for the highest constant DC voltage to ensure direction of the stuck transmitter and not the master and remote units during their normal polling process. Following this RSSI indication will lead you to the area of or to the actual stuck transmitter.

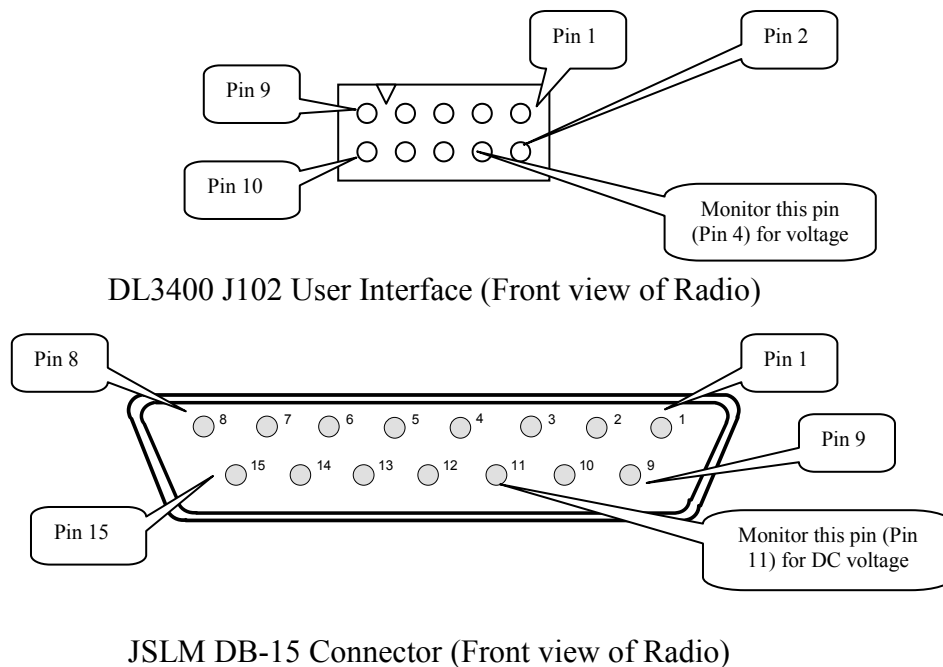


Fig. 3

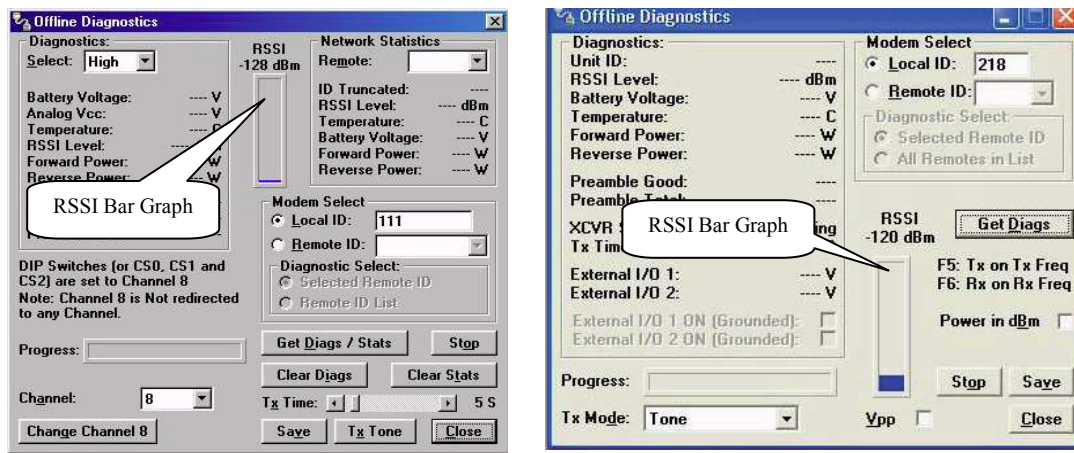
Method 2 – Radio/Modem:

Equipment required: Radio/Modem, same type as used in the Telemetry system (Integra-TR or T-96SR), laptop computer with applicable FPS, directional antenna tuned to the proper frequency, portable power source (battery) and adequate length of coaxial feed line cable (RG-58 is OK).

Setting/Method: Program the radio/modem's receiver for proper transmit frequency. Connect power source, coax and antenna to radio/modem. Using the (FPS) offline diagnostic screen found under the Utilities heading, perform a "Read" function of the 'monitor' radio/modem. The offline diagnostic screen

displays a RSSI bar graph indicator. This bar graph acts as a real time RSSI monitor. Scan the horizon with the directional antenna for the highest 'constant' received signal indication. This signal will be the stuck transmitter's carrier and not the master or remote transmitting signals that vary with the polling routine. See Fig. 4.

Follow the signal path as indicated by the RSSI bar graph, varying the antenna position, thus assuring proper direction is being followed. This will lead you to the area of the transmitter that is "stuck" in transmit mode.



T-96SR Offline Diagnostic Screen

Integra-TR Offline Diagnostic Screen

Fig. 4

Method 3 – Spectrum Analyzer:

Equipment required: Spectrum Analyzer with internal battery or external power supply, directional antenna tuned for proper frequency range and adequate length of coaxial feed line cable (RG-58 cable is OK).

Setting: Set Spectrum Analyzer to receive on the transmit frequency. Connect antenna to analyzer with coax.

Method: Using the directional antenna, scan the horizon for the highest receive level indication on the analyzer screen. If the transmitter is stuck 'on', this signal should be a constant level and not vary as the master and remotes do during the normal polling routine. Follow this signal indication, varying the antenna direction

and maintaining peak signal. This will point in the direction of the stuck transmitter. Proceed in this direction until transmitter is located.

Hints:

1. Not only can the method described above help find a 'stuck' transmitter, but can also be used to find interfering signals that may not be from the system itself. The method utilizing a spectrum analyzer is a convenient one, since a spectrum analyzer is capable of scanning through a wide range of frequencies. Radios or Radio/Modems must be set to one specific frequency at a time.

2. Radio scanners, such as the Radio Shack® Pro-70 or Pro-80 series, can sometimes be used for these purposes in place of the signal analyzer or radio. The application of a directional antenna provides added assurance that the correct direction is being followed. If the scanner has a receiver squelch adjustment, adjust the squelch sensitivity to a level higher than the ambient noise and signal in the immediate area. Care should be taken not to set the squelch level so high as to squelch out the signal from the stuck transmitter. Ideally, pointing the antenna in the proper direction would unsquelch the receiver. Pointing away from the transmitter squelches the receiver and returning to the proper direction opens the squelch again. This makes tracking the proper signal easier. If a squelch control is not available, follow the signal providing the best quieting. The higher the signal strength the quieter a receiver will become. If the "stuck" transmitter is transmitting data, the data will sound constant (not the chirping sound of a polling system). The closer you get to the "stuck" transmitter, the clearer the data will sound.