

APPLICATION NOTE - 004

Testing FSK communications with the SLM2200 and PSM2200

FSK (frequency shift keying) is a well-established technique for encoding binary data by transmitting one frequency for 'zero' and a different frequency for 'one'. It is commonly used in industrial monitoring and control systems where transmitters and receivers may be separated by long distances.

In order to have confidence in the communications, it is important to verify the signal levels at the receivers to detect any degradation in performance, such as would be caused by increased cable resistance or poor connectors.

The SLM2200 is a dual frequency, dual channel selective level meter with frequency sweep capability from 10mHz to 2.4MHz. The PSM2200 includes the SLM function as one of a wide range of measurement functions. Both units use two simultaneous DFT analysers to monitor two independent frequency components in real time. They have an automatic search algorithm that can sweep a specified frequency range looking for signal peaks, then tune in to the precise frequencies of the two signal components, then display their magnitudes in real time.

This means that to test the signal level at the receiver, it is not necessary to know the precise frequency of the transmitter, nor to switch the transmitter to all 'ones' or all 'zeros'. In fact, it is not necessary to be near the transmitter at all. Simply connect the SLM2200, or PSM2200, to the received signal lines (inputs are isolated and fully autoranging up to $\pm 500V$ peak cat II), enter a frequency range that includes the two transmitted frequencies and let the instrument find the two largest components. Then let the instrument tune in and monitor their levels.

Received signal level test procedure

1. Press SETUP and select scan = sweep.
2. Enter the start and end frequency for the range to sweep that will include the two FSK tones.
3. Set the number of sweep steps to around 100.
4. Press NEXT and set the selectivity to coarse (or medium if below 1kHz).
5. Press NEXT again to exit the menu.
6. Press START and observe the graph on the display. When the sweep has ended, two lines will be drawn to show the selected peaks.
7. Once two tones have been identified, press NEXT to start the tuning procedure.
8. When tuning has finished, the display reverts back to real time operation showing the selected frequencies with their magnitudes.

The SLM2200 and PSM2200 also operate simultaneously on two input channels. When scan = single, data from both channels is displayed at one frequency; when scan = dual, data from both frequencies is displayed for either channel. The channel displayed is alternated by the DISP key. Transmission losses can therefore be measured by injecting a test frequency from the SLM2200 / PSM2200 generator and measuring the level at two points using the two channels.