c. Select "Recording" with the arrow keys and then press "View" (F1)
   i. If multiple sessions are saved, you can then choose the session you want to view...in this case it will be the one you just saved.
d. The session screen will recall the configuration data and number of samples collected.
e. Press "Trend" (F3) to show a graphical plot of the data points and a vertical cursor.
   i. Move the cursor to points of interest with the arrow keys
   ii. Note the voltage of that data point and the timestamp
   iii. Continue examining as required
f. Return to the "Summary" (F3) screen or "Close" (F4) the session and return to the main VAC function menu

4. Attach a second DMM of equal or greater accuracy and precision to the incoming Mains as a moment-by-moment comparison tool for the next step.
5. Repeat the recording process, now measuring at the EO.
6. Document the incoming Mains voltage, monitored by the second DMM, at several points during the second recording session.
7. Observe the difference in Mains voltage between the incoming Mains connection and the EO.

When the second recording session is complete, import the saved data into FlukeView Forms (v3.3 or later) when the application prompts you, or from the FVF menu if needed. Once the data is imported, reexamine both sessions and look for inconsistencies that might suggest instability or a significant voltage drop between the incoming Mains and the EO. In this case, a visible fluctuation from the baseline of more than a couple of volts indicates a potential problem.

If needed, the data in FVF can be exported to applications like Microsoft Office "Excel" or OpenOffice "Calc" for additional graphical or numeric analysis. Another approach would be to perform both incoming Mains and EO recording sessions at the same time-- two Fluke 289 meters are required to accomplish that.

Meter configuration

The Fluke 289 is very easy to configure for the tests identified in this document. The recording feature is very powerful and saving the results is a snap. The following screens help demonstrate the convenience.

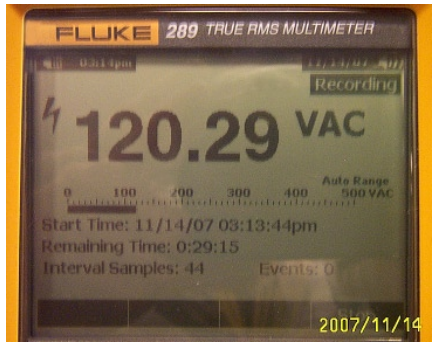
The results

After approximately two weeks of heavy use of the device under test, during which the EO was switched repeatedly with heavy current loads plugged in, we documented no obvious degradation of Mains voltage on the EO. We concluded that none of the switching relays were damaged.

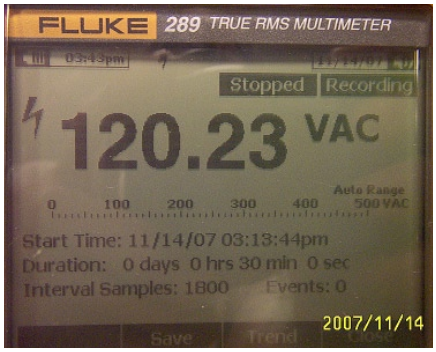
Our test loads for robustness testing included a high current induction motor and a bank of incandescent lamps connected in parallel. We used an induction motor to test the design's resistance to damage from reverse-EMF and lamp fixture in the same way to test the design's resistance to damage from loads with high inrush current.

The following screen shots from FlukeView Forms shows a Mains voltage baseline and voltage drops during switching. The absence of large reverse-EMF spikes from switching loads with a lot of inductance and the absence of enormous drops from switching loads with very low start-state resistance provide confidence that the design is adequately protected from damage by those potentially destructive dynamic loads.

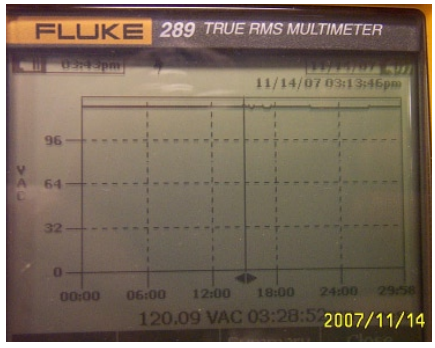
Fluke 289 recording setup.



Fluke 289 recording voltage data.



Fluke 289 recording complete.



Fluke 289 recording session summary.