

***Informational Document from
Harmonics Limited IDHL-4
“Load Reduction”***

**Subject: Load Reduction by Adding Harmonic
Suppression Systems to Transformers in a Software
Development Facility**



Harmonics Limited recently had the opportunity to install Harmonic Suppression Systems on ten 150 kVA k-13 transformers in a computer software development facility. The facility manager was plagued with constant worry about overheated transformers and the constant demand of his engineers to add more computer loads. Faced with the need to safely increase capacity, he examined options including: zig-zag transformers; increasing transformer size (along with rewiring and new switchgear); or the installation of Harmonic Suppression Systems on all his presently-installed transformers.

After examining these options, the manager concluded, based on overall cost (including down time) and energy savings, that the HSS offered the best option for his facility. As part of the sale, Harmonics Limited agreed to measure loading on each transformer. Data were obtained before and after installation of the suppression systems. These data are summarized in Table 1. on the following page.

Several things should be noted:

1. It appears that the load increased on most of the transformers after the HSS was added. In fact, it did, since as soon as the facility manager had the opportunity to add extra computers, he took advantage of this opportunity. The only transformer on which the number of computers powered was not increased after installation of the HSS was transformer D1. Note that on that transformer the load was decreased by over 21%. It can be assumed that the load on the other transformers would have been likewise decreased, had not more computers been added.
2. The rms neutral currents were reduced by an average of 75%. This is despite the fact that more loads were added. Of the “after” neutral measurement, 94% was 60Hz fundamental current due to load unbalance.
3. The 3rd harmonic currents were reduced in the neutral by 98%. Again the “after” measurements included current from the extra computers that were added following installation of the HSS.

The load reduction benefits of installing the HSS have been clearly illustrated by this installation.

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Table 1.

Transformer location, size, kVA	Phase, Average amps rms		Phase Average Load		Neutral, rms amps		Neutral 3rd amps	
	Before	After	Before	After	Before	After	Before	After
A2, 150	225	263	54%	63%	203	28	189	3
A3, 150	137	175	33%	42%	154	55	153	3
B2, 150	168	327	40%	79%	191	52	187	4
B3, 150	186	192	45%	46%	201	50	197	3
C2, 150	183	234	44%	56%	252	81	243	4
C3, 150	277	244	67%	58%	325	77	319	4
C1, 150	240	234	58%	56%	286	55	280	3
D1, 150	175	138	42%	33%	197	45	190	3
D2, 150	121	117	29%	28%	148	51	135	3
D3, 150	153	146	37%	35%	178	43	174	3
Totals					2135	537	2067	33
rms Neutral Current Reduction			75%		3rd Neutral Current Reduction			98%

Harmonic currents and transformer loading, before and after installation of Harmonic Suppression Systems. Transformers powering multiple computer loads at a software development center.

For further information contact:

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