The Theory of USES Operation

USES® reduces power in at least three different ways:

1. **USES®** creates a leading power factor of at least 50% leading which reduces the inductive vars on the system by up to 40 kVar per unit depending on the phase and voltage (600 volts 3 phase 60 hertz). The resultant reduction in the line current means lower conductor and transformer losses. This could mean a 1% to 2% improvement in losses.

2. As a voltage regulator, it stabilizes and regulates the inter-phase voltages to the load from the voltage supply.

3. By far the greatest savings by the **USES®** devise is the ability to develop a negative current from the adjacent phases (such as phase B-C and C-A into phase B). This current is inserted into each phase by means of inducing currents through magnetic coupling of the other phases. Devices as a choke coil, or current transformer or reactor are used and by wrapping the coils in such a way so as to produce a negative current with a relatively large 120 cycle content.

The net result is a reduction in power consumption of to (10) to fifteen (15) percent depending on circuit parameters.

These units also act as a surge and transient suppresser as well as a supplemental source of power for a few cycles, (UPS).

As an example, examine figure 5 of the patent application. Capacitor no. 240 and varistor 242 are meant as an RC network to act as a filter for harmonics and surges. Usually there is also a surge arrester.

Capacitor 224 and 238 are in the circuit to provide a leading power factor. L1 and L2 are magnetically coupled through choke coils 214, 230, 218, 234.

This negative current is achieved in the winding direction of the choke coils and reactors. Let us assume we are looking at phase B. When phase C and phase A are magnetically induced in phase B, they are subjected to a 180 degrees phase shift as they pass through the choke coils. The wave form in phase B would have the basic sine wave form with a leading power factor plus two negative wave forms from phase C (leading) and phase A (lagging). The resultant wave form would be basic sine wave, less a 120 degree cycle clipping, will appear identically in all three phases, thus the overall current will appear as a 60 cycle wave form with a 120 degree cycle current superimposed. Since this current is negative it will be 180 degree out of sync with the main phase current.

This will have the net result of reducing the current from the source and since it is a leading current, will reduce the inductive vars in the circuit.

On the main feeder current the effect can be observed with an oscilloscope, when comparing the before and after **USES®** application, by a reduced cresting factor of the wave form. Thus the treated wave form has a lowered peak and appears more square. This reduced RMS current results in a perceived lower I2R load value to the source. Thus a 5% “in phase” current reduction will result in a 10% power reduction.

There are several key peculiarities to these **USES®** devices. Some are as follows:

a. A static current source-converting magnetic field to electrical energy.

b. Producing a negative current which does not contribute to improving load side consumption of energy but reduces the upstream effect. As an example, let us take a 100 amp load with a **USES®** devise upstream. Whether the USES® device is on or off this load will basically be the same except for minor variances caused by a slight stabilization of phase voltages.

However the current flow back to the source will be reduced by the current from the **USES®** device. This agrees with Kirchoff’s law, that the algebraic sum of all current at a point equals zero.

In other words the current from the **USES®** devise does not flow to the load, but up the line towards the source.

Ohm’s Law if fulfilled by E = IR or E – E back-voltage = IR

There has been one theory put forth that most of the savings are due to motor circulating currents caused by phase imbalances. If this were true, then motor currents would be drastically reduced with the application of the **USES®** units, which normally it is not. However, if the total power savings are much greater than the watts produced by 50% of the **USES®** current (50% leading power factor), then one would find that some of the surplus saving would come from the correctional voltage imbalance.

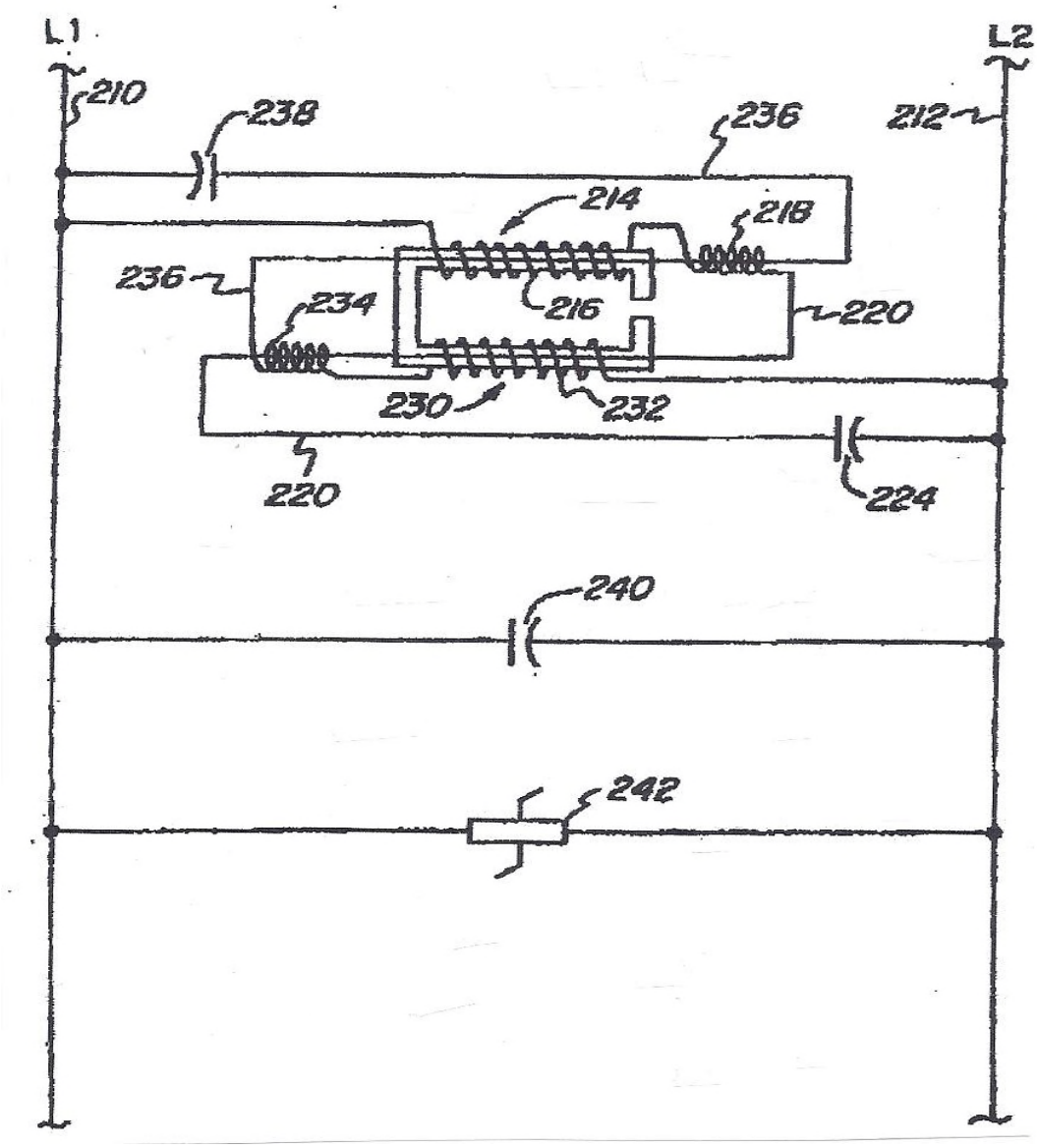
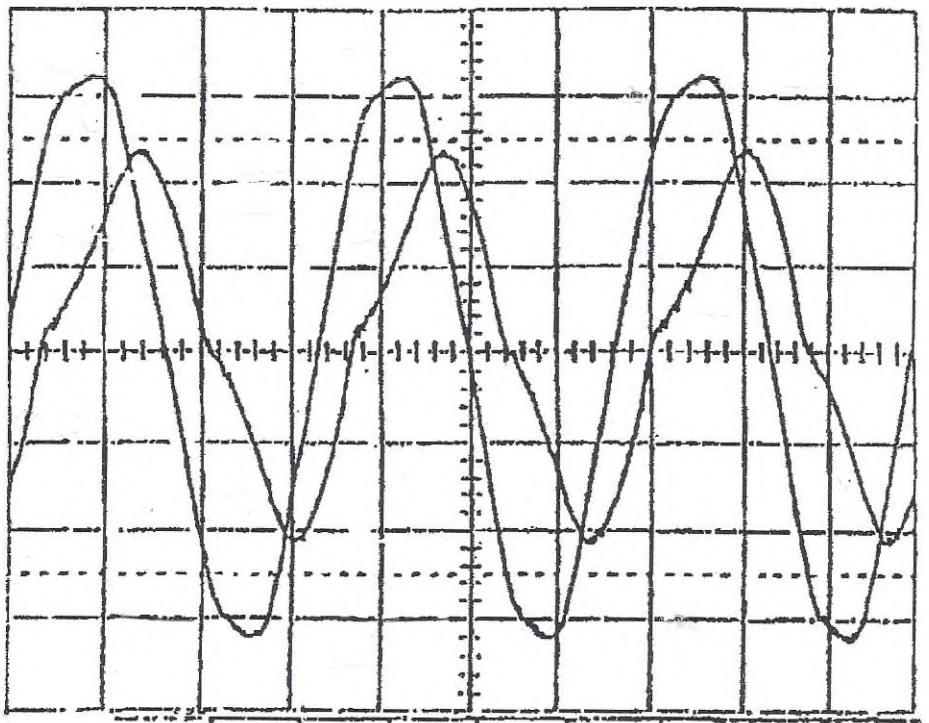

L1
L2
210
238
236
212
214
218
236
234
216
220
230
232
220
224
240
242

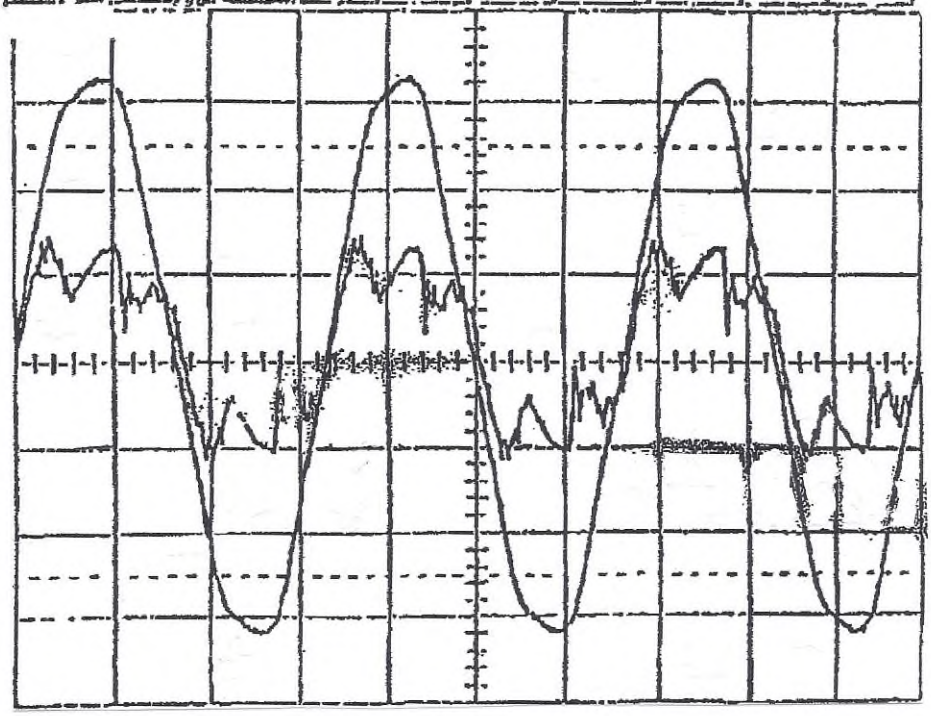
FIG. 5

D-SCOPE ANALYSIS

USES – OFF



USES – ON



USES CLIPS WASTE FROM UPPER & LOWER PEAK PORTION OF THE CURRENT

CURRENT AND VOLTAGE TO THE LOAD REMAINS CONSTANT. NO CHANGE

USES CORRECTS THE CURRENT FROM POINT OF INSTALLATION BACK TO THE TRANSFORMER