SUBJECT: Application Recommendations for Using Self-Tune in the DSD-412 DC Elevator Drive

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The DSD-412 closed loop current regulator needs to know the (apparent) inductance of the load, as the input Volts/inductance ratio controls the rate of change of current in the load for a given change in voltage...i.e. - the gain of the transfer function of the motor circuit load. [The SCR power conversion controls only the dc volts directly. The current that flows is an indirect result.]

If there is a large inductance present in the load, the regulator must act with more gain to change the voltage to force the load current to a new value than if there is less inductance present. The DSD-412 calculates what internal amplifier gain is required from the motor load (R & L) and Line Volts (Vac, Hz) data and desired response (Crossover Frequency) which are all entered parameters.

Some useful application notes;

1. If you tell the drive you have more inductance than is really there the drive will compensate for it by raising the gain and possibly become unstable.

2. If you tell the drive that there is less inductance than is really there, the calculated gain will be too low and the drive will be somewhat sluggish. (The crossover frequency will not be at the desired value.)
   Usually this causes no problems except in those cases where the ultimate in current regulator response is necessary.

   Be aware that the choke (and motor armature) will have inductance saturation effects. As the dc current increases, the actual inductance will decrease. This is very designer dependant (from the choke vendor), but the inductance nameplate rating for a dc choke should be correct at rated current. At less than rated current a measured value will be higher than the rated inductance. The DSD-412 measures load inductance at relatively small values of current, so the reported value may be larger than the expected nameplate value. But the real test is at conditions of high current, like during elevator acceleration. If the inductor saturates, the current regulator may become unstable at high currents.

So...

3. The more practical starting point is to enter in the inductance value for the choke (and only the choke). This will yield a known-to-be-stable value at elevator running current, which is the real objective. Self-Tune may be run to verify the inductance value after the ripple filter capacitor value is adjusted to be a minimum of microfarads with an acceptable amount of acoustic motor noise. Then enter in the measured value of L. Then verify that overall operation of the current regulator is as expected.

   If there is a tendency for elevator vibration at high motor current (whereas it previously ran smoothly), the inductance is changing at high current, so the L parameter value is set too high. Compromise between the Self-Tune measured and choke-only values.

4. Even if the inductance parameter value is not changed from the suggested pre-set value, Self-Tune should be run at each site to measure the armature circuit resistance, which will include site wiring. This also affects the tuning of the regulator. The "R" value should be entered to agree with the measurement.