



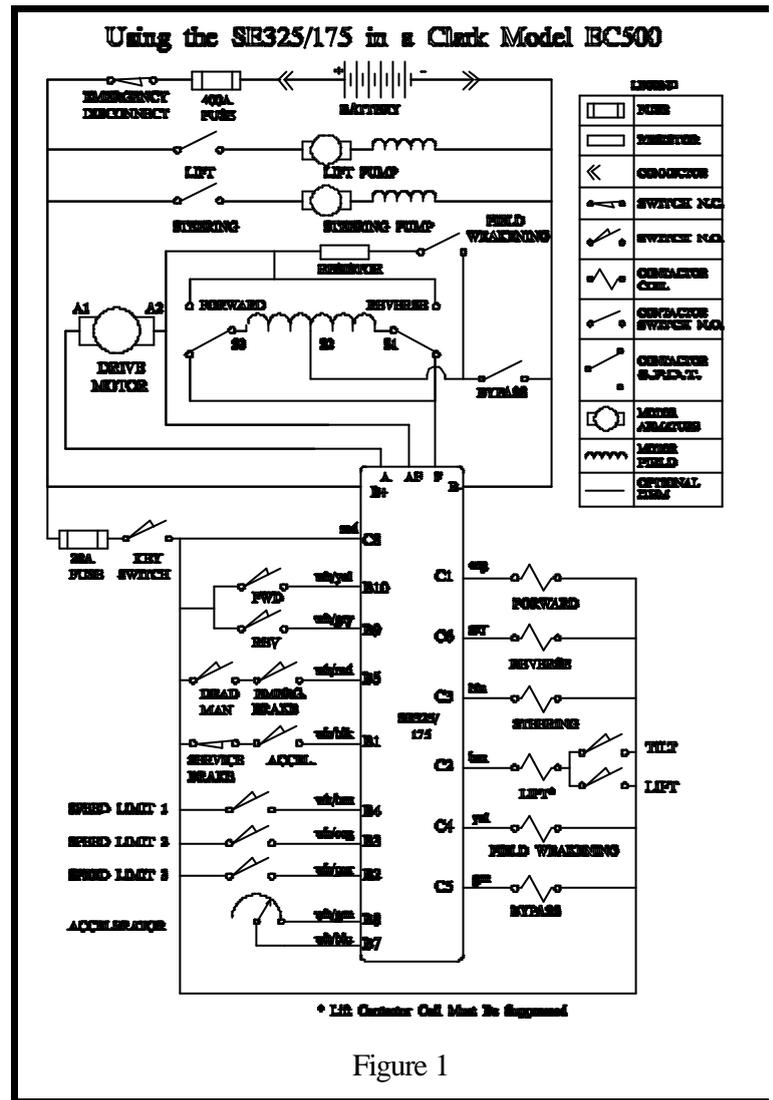
Installation Tips

An SRE Bulletin on Making Your Installations Easier!

Application Note #11: Using the SE325/175 in a Clark Model EC500 (Split Field)

Theory of Operation

Some Clark Model EC500's uses a split field wound motor with a unique two stage field-weakening/bypass configuration. The first contactor places a resistor in



parallel with all or part of the field. The second shorts out 1/2 the field and bypass's the controller. Depending on which contactors are in you get different levels of field weakening.



Contactors In	Result
Field Weakening	Resistor in parallel with 1/2 of the field. Near "classic" field weakening, usually the whole field would be in parallel with the resistor.
Bypass	Controller is bypassed. 1/2 of field is shorted. "Classic" field weaken & bypass except that this combination is usually accomplished with two contactors.
Bypass & Field Weakening	Controller is bypassed. 1/2 of field is shorted. Remaining 1/2 of the field has a resistor in parallel.

This configuration has the advantage of providing several levels of field weakening and it places the load under field weakening to a different half of the field depending on the direction of travel¹. It has the disadvantage of bypassing the controller (see the Cautions section).

Installation

The electrical installation is done the same way as for a normal installation, except for the power wiring. The power wiring is done as in the diagram in figure 1. The field weakening resistor will be connected from the normally open side of the direction contactors to the center tap of the field when the field weakening contactor is closed. The bypass contactor will short the center tap of the field to B-.

Note: It is **VERY IMPORTANT** that the normally open side of the direction contactors be connected to the A2/AF side of the motor circuit and the normally closed side of the direction contactors be connected to the F terminal of the controller.

The setting of the field weakening pull-in and drop-out levels will require careful experimentation in order to set the various field weakening activation points. Depending on load, driving conditions, and pull-in and drop-out levels the field weakening contactor may pull in before or after the bypass contactor. It may even be possible to adjust it so that the field weaken contactor will pull in, then drop out when the bypass pulls in, and then pull in a second time giving a three stage field weakening².

Cautions

Any configuration that uses a bypass or 1A contactor runs the risk of the contactor welding and permanently bypassing the controller. This is normally offset somewhat by the fact that the direction contactors can open the circuit independently. This is still true in this configuration but there is greater opportunity for mis-wiring in a way that circumvents these protections. It is **VERY IMPORTANT** that the power wiring be done **EXACTLY** as is shown in figure 1. Better yet see the Alternatives section for other ways of wiring this truck.

Alternatives

There are two alternatives for wiring this truck up (and any similar split field configuration) that provide the following advantages 1) they don't require a bypass contactor and 2) they avoid the complex wiring of the above solution. They have the disadvantage of providing less field weakening than the maximum field weakening configuration above (with both field weakening and bypass contactors closed). We recommend that you try at least one of these before using the more complex solution. You may find that the additional field weakening provided by the maximum field weakening case is not necessary.

¹ This should be made more apparent by studying the implementation diagram in figure 1.

² Don't expect to be able to do this. It is just too dependent on specific loads and timings.



Alternative 1: Field Weakening Resistor

In this configuration the field center tap (S2) on the motor is ignored and the motor is treated as a normal 4T motor. The field weakening resistor is wired so that it will be in parallel with the entire field when the field weakening contactor is closed. This is a "classic" field weakening configuration. It provides greater field weakening than the "Field Weakening contactor only closed" configuration above but less than when both contactors are closed.

This is probably the recommended configuration. It loads both sides of the field identically and has a simple wiring scheme.

Alternative 2: Shorted Field

In this configuration the motor is treated as a normal 4T motor for all the power wiring except for the field weakening contactor. The field weakening contactor is wired to short S2 to S1 or S2 to S3 when it closes. This reduces the field by removing 1/2 of it from the circuit. This provides equivalent field weakening to just having the bypass contactor closed (in the table above).

The disadvantage of this compared to alternative 1 is that the field halves are not treated equally.

Revision History:

96-01-20 RTA -- Original Version.