Unlike traditional operators, ZAP operators do not have limit assemblies.

ZAP operators use a 21st century technology, that uses runtime calibration and current sensing technology to perform the functions of limit assemblies.

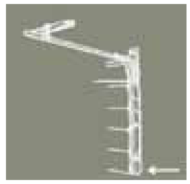

Figure A

The limits of the door operator are physical in nature.

The floor being the down limit. (Figure A)

A physical stop for the upper limit.

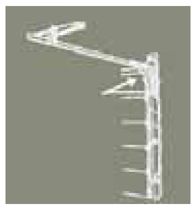

Figure B

On standard lift and low headroom doors the physical stop is the track radius as the door can only rise so high into the radius before the torsion shaft would have to counter rotate to allow the door to go higher. (Figure B)

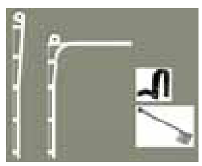

Figure C

On high-lift and vertical lift doors it should be a bumper or pusher spring. (Figure C)

The controller monitors the motor load current. It therefore becomes a sensor that automatically detects the door limits as well as obstructions that can occur without the use of an aftermarket safety edge. Because of its unique abilities it can detect an obstructions on any part of the door, not just the leading door edge.

Speed Change Point Calibration.
Calibration of slow speed change point is needed to determine an approximation of the physical limits. During the initial open calibration cycle, the controller is measuring the run time to the upper limit.

Approximately half way through the first open cycle of operation, note that the operator will slow down. This slow down is called a speed change point. After completing the first up cycle, the run time to the upper limit is stored into memory. The same thing occurs on the close calibration cycle. Approximately half way through the first close cycle of operation, the operator will again slow down. After completing the first close cycle, the close run time is stored into memory as well and is compared to the open run time.

During the second calibration run, the run times are verified against the first set of run times. If they match, they are stored into memory. It takes 2-3 complete cycles to fully calibrate the run time.

Once the operator has fully calibrated the run times, the controller moves the opening speed change point to within seconds of the end of the calibrated open run time. Likewise, the controller moves the closing speed change point to within seconds of the end of it's calibrated run time. This is how the controller knows where the limits are and where to stop.

Motor power and sensitivity potentiometer, obstruction sensing, automatic reversing and safety stop.

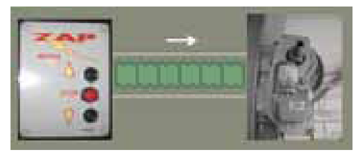

Figure D

Picture if you will, current flowing to the motor. (Figure D)

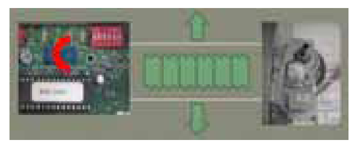

Figure E

If you increase power at the power potentiometer you open up the range of power that can be applied to the motor. (Figure E)

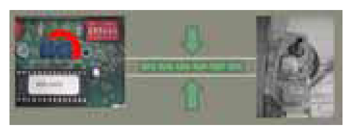

Figure F

If you decrease power at the power potentiometer it closes the range of power that can be applied to the motor. (Figure F)

Inherent safety functions
Stop at limit, safety stop, and automatic reversing

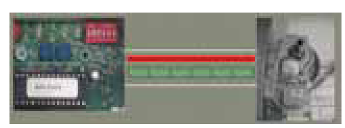

Figure F

The inherent safety and sensitivity function's monitor the system by mirroring the motor current. If the door meets an obstruction in either direction, the current spikes. (Figure F)

Continued on next page.

ZAP Series 3
Simply Logical

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Series 3 Technician's Installation and Service Training Manual
Understanding How ZAP Commercial Operators Work

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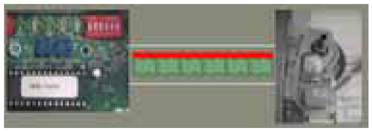

Figure A

If the resistance on the door is significant enough to cause the current demand to spike to the setting of the sensitivity Potentiometer (Figure A), it causes a certain function depending upon the direction of door travel and where the door is in it's cycle of operation.

If the door is near the end of the calibrated run time in either the open or close direction, (after the speed change point), the operator knows it is at the limit of travel and to stop.

If the door is travelling in the open direction prior to the open speed change point and the door meets an obstruction on any part of the door, the operator knows to activate the safety stop feature.

If the door is travelling in closed direction prior to the close speed change point and meets an obstruction on any part of the door, the operator knows to activate the safety stop and reverse function and return the door to the fully open position.

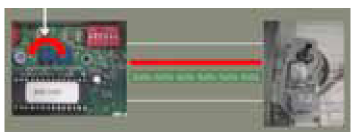

Figure B

The sensitivity is adjustable by incrementally increasing or decreasing the sensitivity potentiometer. (Figure B)

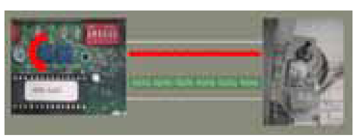

Figure C

If you decrease the sensitivity on the sensitivity potentiometer, it opens up the tolerances of the detection (Figure C).

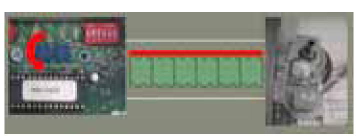

Figure D

Requiring a larger spike in current to reach the sensitivity setting, making the operator less sensitive to detection of obstructions. (Figure D)

Figure E

If you increase the sensitivity on the sensitivity potentiometer it closes up the tolerances of the detection (Figure E).

Figure F

This makes the operator more sensitive to detecting obstructions. Requiring much less of spike in current to reach the sensitivity setting. (Figure F)

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