HYDRO:EVOLVED

START-UP GUIDE

VERSION 1.1

SMARTRISE

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1 Introduction: Hydro:Evolved Start-Up Guide

The following information will provide detail and instructions on how to setup the Slowdown distance and steps for troubleshoot the equipment. Prior to setting up the Slowdown distance we must verify following:

1. Number of Floors
2. Floor Openings
3. Learning the Hoistway
4. Contract Speed

Several peripherals affect the acceleration rate, deceleration rate, and speed of the car in the up or down direction which includes, the temperature and viscosity of the oil, and weight.

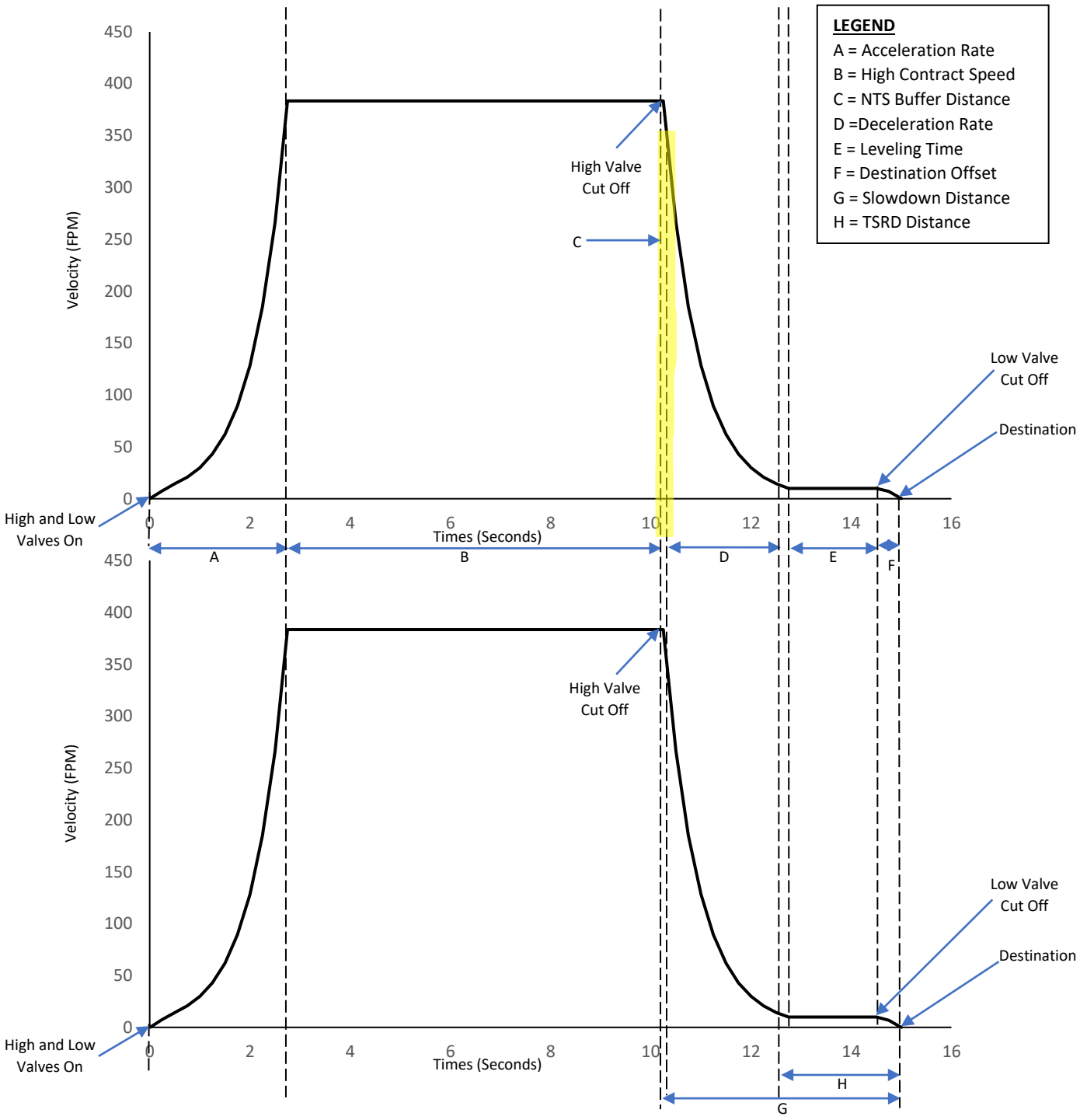
Once all faults and alarms have been resolved during Construction and Inspection Mode, place the DZ magnet 2” above the floor level for the bottom floor and 2” below the floor level for the top floor. This creates an extra precaution for the car not to hit the ring buffer while travelling in up direction and car buffer when traveling in down direction to avoid any unexpected scenarios.

For proper operation, the controller and valves must be configured so the car has the proper acceleration and slowdown time.

For a better/faster performance, the acceleration time should be less than 1 second.

If the deceleration rate of the car is slow and the car hits the Terminal Stopping Distance (TSRD), reduce the deceleration rate of the valve (transition rate from high valve to leveling valve).

The following is a graphical image of the parameters that are being adjusted:



A. **Acceleration Rate -** Rate at which the car accelerates before reaching maximum speed.

B. **High Contract Speed -** The maximum speed the car will achieve based on the contract speed setting and the high valve setting.

C. **NTS Buffer Distance:** The distance added to the slowdown distance to cut off the high valves.

D. **Deceleration Rate -** Rate at which the car decelerates after it reaches maximum speed.

E. **Leveling Time** - The duration the car moves during level speed before reaching the destination.

F. **Destination Offset -** The distance from the destination position that the car will cut its leveling valve when moving on a non-releveling run/correction run.

G. **Slowdown Distance -** Sets the distance from its destination where the car must cut its high-speed valves when moving at a speed above the speed threshold.

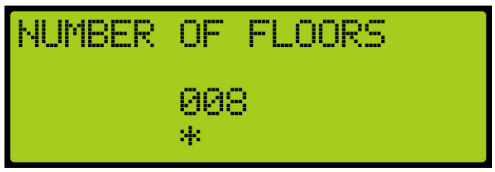
H. **TSRD Distance -** The safe distance from the top and bottom floor level for a car to stop before it hits the buffer. If the car is traveling more than 50 fpm within this distance, a TSRD fault occurs and the car performs an emergency stop.

Place the car in Normal Operation. Prior to learning the hoistway verify the number of floors and openings are correct. Learning the hoistway allows for learning the positioning of all floors.

1.1 Number of Floors

1. Navigate to MAIN MENU | SETUP | FLOORS |NUMBER OF FLOORS.

2. Verify the number of floors are correct.
   NOTE: The number of floors should include any express zones that are serviced by other cars in the group. The opening map will reflect the floors the car serves.



1.2 Floor Openings

1. Navigate to MAIN MENU | SETUP | FLOORS | OPENING (FRONT AND REAR).

2. From the FLOOR OPENING (Front and Rear) menu, verify the front and rear doors for the floors are going to open.

1.3 Learning the Hoistway

1. Bring the car to the top or bottom floor terminal.
2. Check the top right corner of the Main screen to verify the DZ input to the CT board is high by.

3. On the MR board, turn on DIP 5A.
4. The Main screen changes from Normal to Hold UP/DN To Start.

1.4 Contract Speed

The contract speed is the maximum speed the elevator travels and is dependent upon the job configuration.

1. Set the maximum speed of the car to run at contract speed.

2. Set the Contract Speed.

2 Level Maximum Run Distance

Set the maximum run distance where level valve speed run is allowed. Longer runs outside of door zones may start with a higher speed valve. When set to zero, a short distance run will start with the higher valve and have a high likelihood of overshooting the destination.

The following procedure describes how to set the level maximum run distance.

1. Navigate to MAIN MENU | SETUP | HYDRO.
2. From the HYDRO SETUP menu, scroll and select Level Maximum Run Distance.

3. From LEVEL MAXIMUM RUN DISTANCE menu, enter the maximum run distance.

4. Scroll right and press Save.

3 NTS Buffer Distance Up and Down

An NTS alarm may be generated in any direction during normal mode of operation. When this occurs, the NTS buffer distance needs to be increased

The following procedure describes how to set the NTS buffer distance up and down.

1. Navigate to MAIN MENU | SETUP | HYDRO.
2. From the HYDRO SETUP menu, scroll and select NTS Buffer Distance Up or NTS Buffer Distance Down.

3. From the NTS BUFFER DISTANCE UP or NTS BUFFER DISTANCE DOWN menu, enter the buffer distance.

4. Scroll right and press Save.

4 Destination and Relevel Offsets

There is some delay at the end of a run between cutting the leveling speed valve and the coming to a stop. By default, the user may see the car overshoot its destinations and relevel back. To address this situation, the car's destination offset has to be adjusted. The offset destinations cause the car to stop its run shy of the ON position in order to compensate for the movement that occurs after the leveling valve is cut.

4.1 Destination Offset

The destination offset determines when to cut the leveling valves, when the car is leveling towards the destination landing. This is the sliding distance after the leveling valves are cut and the car comes to a stop to the destination landing.

If the car has a proper steady state leveling time but still overshoots the learned floor position and stops outside the dead zone and relevels, set the destination offset up or destination offset down depending on which direction the car is moving.

Perform the following procedure to set the up or down offset.

1. Navigate to MAIN MENU | SETUP | HYDRO.
2. From the HYDRO SETUP menu, scroll and Destination Offset Up or Down. The values are set after determing how far the cars have overshot the landing.

3. Does the car stop outside the dead zone?
   a. If the car is moving in up direction and stops outside the dead zone, got to step 4.
   a. If the car is moving in down direction and stops outside the dead zone, go to step 5.
4. Increase the up offset by 0.5in. Go to step 6.

5. Increase the down offset by 0.5in.

6. Scroll right and press Save.

4.2 Relevel Offset

Relevel Offset is the distance from the destination position that the car cuts its leveling valve when moving in the up or down direction on a releveling run.

Perform the following procedure to set the up or down offset.

1. Navigate to MAIN MENU | SETUP | HYDRO.
2. From the HYDRO SETUP menu, scroll and Relevel Offset Up or Down. The values are set after determing how far the cars have overshot the landing.

3. From the RELEVEL OFFSET UP or RELEVEL OFFSET DOWN menu, enter the offset. The values are set after determing how far the cars have overshot the landing.

4. Scroll right and press Save.

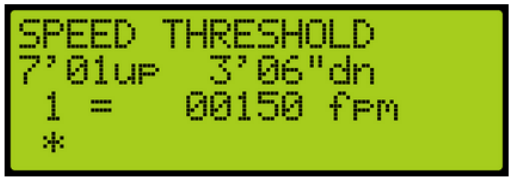
5 Speed Thresholds

The speed threshold is compared to the current speed to determine the slowdown distance used to reach the destination. This distance determines when to slow the car in either the up or down direction.

The following procedure describes how to set the speed threshold.

1. Navigate to MAIN MENU | SETUP | HYDRO.
2. From the HYDRO SETUP menu, scroll and select Speed Thresholds

3. From the SPEED THRESHOLD menu, scroll and select the slowdown distance.



4. Scroll right and press Save.

6 Slowdown Distance

The slowdown distance is the distance in which the car transitions from high speed to leveling speed in the up or down direction.

The following procedure describes how to set the slowdown distance.

1. Navigate to MAIN MENU | SETUP | HYDRO.
2. From the HYDRO SETUP menu, scroll and select Slowdown Distance UP or DOWN.

3. From the SLOWDOWN DISTANCE UP or SLOWDOWN DISTANCE DOWN menu, scroll and select the slowdown distance.

4. Scroll right and press Save.

7 Hydro Speed Setup

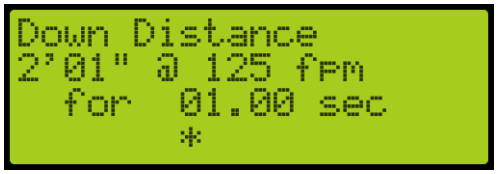
The Hydro Speed Setup takes the slowdown factor of the distance and time relative to the speed to generate the slowdown distances and threshold for each landing. The up and down adjustments depend upon the selected factor in which the greater the factor the greater the distance. For example, if the factor is 1 second, the slowdown distance will be 2’ 1” where as if the factor is 1.78 seconds, the slowdown distance will be 3’ 8”. Depending upon the high speed and type of valve setup, the factor can be determined.

To have a proper slowdown for up or down direction, adjust the up and down time.

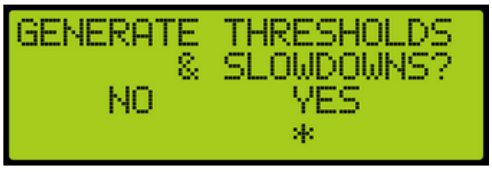
Note: Changes made on Up Adjustment and Down Adjustment will not take affect while Adaptive Slowdown™ system (U.S. Patent Pending) is active, turn off Adaptive Slowdown™ system (U.S. Patent Pending) before proceeding.

1. Navigate to MAIN MENU | SETUP | HYDRO | HYDRO SPEED SETUP | UP and DOWN ADJUSTMENT (need to set both).

2. Adjust the time to set the distance the car will begin slowing down from high speed to leveling speed in the Up Distance and Down Distance



3. Scroll back to GENERATE THRESHOLDS AND DISTANCES and select YES. If YES is not selected, new thresholds and slowdowns are not generated.



4. Selecting yes will generate the values for slowdown distance up, slow down distance down, and threshold.
    a. if overshooting occurs, following instructions on for Car Overshooting and repeat step 1-4.

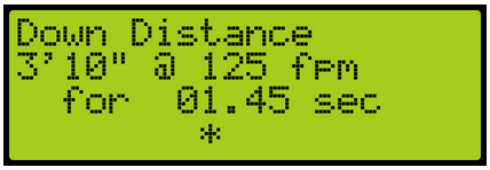
b. If leveling time is too long or short, follow instructions for Adjust Leveling Time and repeat step 1 - 4.

7.1 Car Overshooting

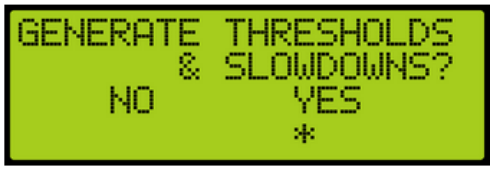
Overshooting is where the car goes beyond floor level. To prevent overshooting, increase the time. This causes the car to slow down sooner which increases the slowdown distance.

The following procedure describes how to resolve car steady state if overshooting occurs:

1. Navigate to Adjustments and adjust the up or down distance by increasing the time. Increasing the time causes the car to slow down sooner which increases the slowdown distance.



2. Scroll back to GENERATE THRESHOLDS AND DISTANCES and select YES. If YES is not selected, new thresholds and slowdowns are not generated.

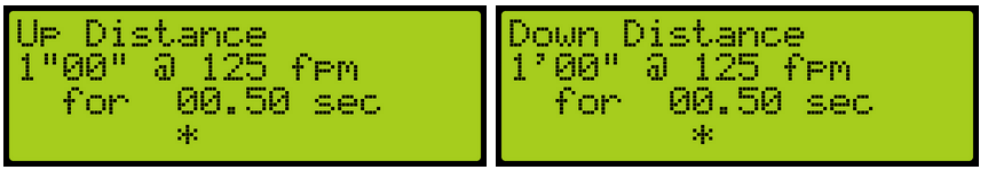


7.2 Adjust Leveling Time

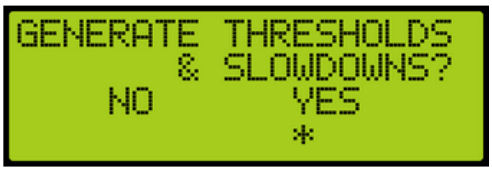
When weight is added to the car, it might take longer than normal (three to five seconds) for the car to level. Decreasing the slowdown distance decreases the time it takes for the car to level. The speed threshold to adjust is dependent upon the speed the car is traveling.

The following procedure describes how to resolve car steady state if leveling is longer:

1. Navigate to Adjustments and adjust the up or down distance by decreasing the time.
2. Decreasing the time causes the car to have a shorter slow down period which decreases the slowdown distance.



3. Scroll back to GENERATE THRESHOLDS AND DISTANCES and select YES. If YES is not selected, new thresholds and slowdowns are not generated.



8 Adaptive Slowdown™ system (U.S. Patent Pending)

The following feature operates on top of the Hydro Evolved Setup Slowdown Distance instructions. When active, the Adaptive Slowdown™ system (U.S. Patent Pending) monitors the operation of each run. After each run, the software adjusts a reference slowdown distance variable based on previous runs so that subsequent runs result in leveling times closer to the target Leveling Time selected. Run-to-run variances in elevator operations will not have a significant effect on the reference slowdown distance.

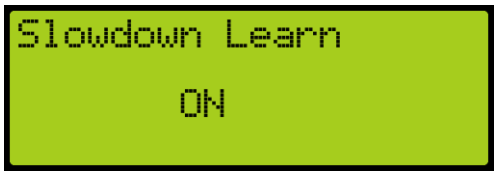
8.1 Procedure

Complete the following steps after successfully setting the adjusted slow down distance:

1. Measure the Leveling Time from when the car reaches the level speed until the car stops. The measured Leveling Time will be used as the base line for the Target Time used on step 2.

2. Navigate to MAIN MENU | SETUP | HYDRO | ADAPTIVE SLOWDOWN™ SYSTEM (U.S. PATENT PENDING) | LEVELING TARGET |, set the Target Time to the measured time on step 1 then select save.

3. Navigate to MAIN MENU | SETUP | HYDRO | ADAPTIVE SLOWDOWN™ SYSTEM (U.S. PATENT PENDING) |ENABLE SLOWDOWN |, set to ON.



4. Allow the car to run from Floor to Floor for 2 full cycles to adjust the slowdown distance. It is recommended to run the car empty during the first 2 cycles to allow the car to measure the slowdown distance accurately.

Note: Turning off Adaptive Slowdown™ system (U.S. Patent Pending) will reset all the slowdown distance learned and will cause the car to operate based on the settings on Hydro Speed Setup.

8.2 Troubleshooting Adaptive Slowdown™ system (U.S. Patent Pending)

The following steps are used to troubleshoot the car based on different occurrences:

- **The car is overshooting the landing** - Overshooting occurs if the leveling time is set too short to allow for the weight fluctuation in slowdown distance, then car will take a significant step back by increasing the slowdown distance. the Adaptive Slowdown™ system (U.S. Patent Pending) will decrease the distance until an overshoot occurs.

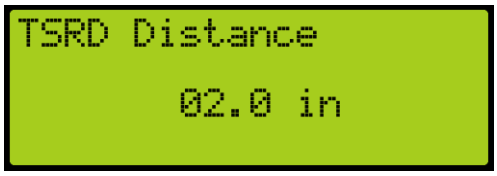
    - Increase the Target Time in increments of .5 seconds and repeat step 4 of the procedure.

- **Car is taking too long arriving to the landing** – The car will decrease the leveling time in increments of .1 seconds based on the initial Hydro Speed Setup until the Target Time on Adaptive Slowdown™ system (U.S. Patent Pending) is met and will continue to fluctuate between the range. Decreasing the range will decrease the fluctuation of the learning distance.

    - Decrease the Target Time in increments of .5 seconds and repeat step 4 of the procedure.

- **The car is misaligned with the landing** – The car is at the door zone, but slightly above or below the landing.
    - Follow instructions on the for Floor Adjustment to adjust the floor height to align the car with the landing.
- **Car is getting a TSRD fault when you are reaching the landing –** Fault occurs when the range of the TSRD distance to the landing is too high for the Slow Down Distance.
    - Navigating to MAIN MENU | SETUP | HYDRO | TSRD DISTANCE

    - Decrease the TSRD Distance to a lower value and repeat step 4 of the procedure.



8.3 Monitoring Adaptive Slowdown™ system (U.S. Patent Pending)

The actual slowdown average distances can be monitored by navigating to MAIN MENU | DEBUG | VIEW DEBUG DATA |, Indexes 070 (UP) and 071 (DN).

These displays are updates at the end of each run. The Up distance average appear under index 070. The Down distance average appear under index 071.

These distances will increase after TSRD or NTS events.

NOTE: If the distances are not stable, the car may be experiencing NTS alarms at the terminal landings. Check the Leveling Time distances (Section 7). If the average distances on the Debug Data screens drop too far below the Leveling Time distances, the system may trigger NTS alarms. To correct this either decrease the Leveling Time setting (Section 7) or increase the NTS timeout at MAIN MENU | SAFETY | NTS ODL.

9 Floor Adjustment

If the car does not stop at the exact floor level, tripping can occur. The floor adjustment allows for adjusting the stopping point of the elevator. The value reflects the change amount and will return to 0 after the change is saved.

9.1 Car is Too Low

If the car stops before floor level, increase the distance by the amount the car needs to move up.

5. Navigate to MAIN MENU | SETUP | FLOORS | TOO HIGH/ TOO LOW.

6. Adjust the stopping point of the car so the car stops at the exact floor level. For example, if the car stops 1.5”-2” below the floor level, add that distance to the learned position.

9.2 Car is Too High

If the car stops above floor level, decrease the distance by the amount the car needs to move down.

1. Navigate to MAIN MENU | SETUP | FLOORS | TOO HIGH/ TOO LOW.
2. Adjust the stopping point of the car so the car stops at the exact floor level. For example, if the car stops 1.5”-2” above the floor level, add that distance to the learned position.

10 NTS Alarm

An NTS alarm may be generated in any direction during normal mode. When this occurs, the NTS buffer distance needs to be increased.

1. Navigate to MAIN MENU | SET UP | HYDRO | NTS BUFFER DISTANCE UP or NTS BUFFER DISTANCE DOWN depending upon the direction.

2. Increase the NTS buffer distance by 0.5 to 1 inches.

Once the NTS acceptance test has been completed, the NTS alarm can be disabled.

1. Navigate to MAIN MENU | SETUP | HYDRO.| Disable NTS Alarm.

2. From the DISABLE NTS ALARM menu, select ON to disable the alarm.

11 Outside of Dead Zone

The Dead Zone is the distance from which the car stops at either above or below the learned position and inside the door zone that does not trigger releveling. If the car has a proper steady state leveling time but still overshoots the learned floor position and stops outside the dead zone and relevels, set the destination offset up or destination offset down depending on which direction the car is moving.

1. Navigate to MAIN MENU | SETUP | HYDRO | HYDRO SPEED SETUP | DESTINATION OFFSET UP and DESTINATION OFFSET DOWN.

2. Set the Destination Offset as follows:
   If the car is moving in up direction and stops outside the dead zone, increase the destination offset up by 0.5in.

   If the car is moving in down direction and stops outside the dead zone, increase the destination offset down by 0.5in.

This value also determines when to cut the low valves off and the sliding distance after the low valves are cut.

12 Adding Weights to an Empty Car

The initial setup is complete for an empty car. The same settings for the slowdown distance and speed of an empty car are used with a car which has various amounts of load added until the car is fully loaded.

To verify the slowdown distance and speed of a car with a load, add a 500 pound load to the car. Place a car call for one floor and a multi floor run in both directions. Observe if the car overshoots and relevels or has a long leveling time. If the valves are not regulated, the deceleration rate or the steady state of leveling are affected. The deceleration rate will increase or the leveling speed will decrease as the weight of the car increases.

- If the car overshoots, increase the slowdown distance.
- If the leveling time is too long, decrease the slowdown distance. If the valves are not regulated and leveling time is longer, do not change the slowdown distance.

For fine tuning the slow down distance, observe what is the maximum speed of the car before it starts slowing down.

Note: Adjustments made on Slowdown Distance Up and Slowdown Distance Down will not take affect while Adaptive Slowdown™ system (U.S. Patent Pending) is active, refer to the Adaptive Slowdown™ system (U.S. Patent Pending) Procedure.

1. Navigate to SET UP | HYDRO | SLOWDOWN DISTANCE UP and SLOWDOWN DISTANCE DOWN.

2. View the current Slowdown Distance.

3. Due to multiple speed thresholds and slowdown distances, select the slowdown distance for the speed the car is running at. **DO NOT** generate the threshold and distance after fine tuning the slowdown distance. This will override the fine-tuning values and generate new slowdowns depending on the factor in the up/down adjustments.

If adjusting the car for a different threshold with weights added and the car is overshooting or the leveling time is greater than the empty car, increase or decrease the slowdown distance.

There are seven speed thresholds and slowdown distances. Select the correct speed threshold to adjust so the speed of the car matches high speed.

12.1 Car Overshooting

The slowdown distance is dependent upon the speed of the car. As more weight is added to the car, the speed and the slow down time of the car may decrease. If the car overshoots, the slow down distance needs to increase to give the car more time to slow down. If the valves are regulated, the speed of the car may not change.

Note: Adjustments made on Slowdown Distance Up and Slowdown Distance Down will not take affect while Adaptive Slowdown™ system (U.S. Patent Pending) is active, refer to the Adaptive Slowdown™ system (U.S. Patent Pending) Procedure.

1. Navigate to SET UP | HYDRO | SLOWDOWN DISTANCE UP.
2. Select the slowdown distance for the speed the car is running at. Scroll to find the correct slowdown distance to adjust.

3. The high speed of the car must be less than the speed threshold. For example, after adding weights the high speed of the car is 100 fpm, select the speed threshold with speed of 105 fpm.
4. Increase the slowdown distance up from 2' 09" to 3' 02". Place a car calls in up direction and see if the car still overshoots the floor. Repeat these steps , if the car still overshoots the floor.

12.2 Adjust Leveling Time

When weight is added to the car, it might take longer than normal for the car to level. Decreasing the slowdown distance decreases the time it takes for the car to level. The speed threshold too adjust is dependent upon the speed the car is traveling.

Note: Adjustments made on Slowdown Distance Up and Slowdown Distance Down will not take affect while Adaptive Slowdown™ system (U.S. Patent Pending) is active, refer to Adaptive Slowdown™ system (U.S. Patent Pending) Procedure.

1. Navigate to SET UP | HYDRO | SLOWDOWN DISTANCE DOWN.
2. Select the slowdown distance for the speed the car is running at. Scroll to find the correct slowdown distance to adjust.

3. The high speed of the car must be less than the speed threshold. For example, after adding weights the high speed of the car is 100 fpm, select the speed threshold with speed of 105 fpm.
4. Decrease the slowdown distance up from 3' 06" to 2' 09". Place a car calls in down direction and see if the car still has longer steady state of leveling to the floor. Repeat these steps , if the car still has longer steady state of leveling to the floor.

Continue adding a load to the car and verifying the slowdowns until the car is fully loaded.

13 Store Floor Level

The store floor level stores the position of the floor level.

1. Navigate to MAIN MENU | SETUP | FLOORS | STORE FLOOR LEVEL.

2. View the floor level.