

# V3MVF Based Traction Controller Adjuster's Manual



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# 1. Pre-Adjustment Instructions and Notes

## 1.1 General Notes

It is strongly recommend that you read this manual carefully before proceeding with the installation.

Important information is highlighted by the headings WARNING, CAUTION, or NOTE. These words are defined as follows:

**WARNING** - Warnings are used to indicate instructions which, if not followed correctly, will probably result in personal injury or substantial damage to equipment.

**CAUTION** - Cautions are used to indicate instructions or information which, if not observed, may result in some damage to equipment if care is not taken.

**NOTE** - Notes are used to indicate instructions or information which is especially helpful in understanding and operating the equipment, and which will usually speed up the installation process.

## 1.2 Important Precautions and Notes

The following general rules and safety precautions must be observed for safe and reliable operation of your system.

**WARNING:** If you need to change the EPROM program chip on the CPU, make sure you read the instructions and know exactly how to install the new chip. Plugging the EPROM chip in upside-down may damage the chip. Static electricity can damage the EPROM, so avoid touching the pins on the chip, and ground yourself (by touching the controller cabinet) before touching the chip or the controller. Do not expose the EPROM program chip to bright light, and do not remove the label over the EPROM program chip window.

**WARNING:** The elevator controller must be installed by experienced field installation personnel. The field installation personnel must know and follow all the rules and regulations pertaining to the safe installation and running of elevators. Additional information for specific devices (such as the door operator, etc.) is the responsibility of the manufacturers of those devices.

**WARNING:** This equipment is designed and built to comply with ASME A17.1/CSA B44, ASME A17.5 CSA B44.1 and must be installed by a qualified contractor. It is the responsibility of the contractor to make sure that the final installation complies with all applicable local, state and national codes, and is installed safely.

**WARNING:** The 3 phase AC power supply to this equipment must come from a fused disconnect switch or circuit breaker which is sized in accordance with all applicable national, state and local electrical codes, in order to provide the necessary branch circuit protection for the controller and motor. Incorrect motor branch circuit protection may create a hazardous condition.

**WARNING: Proper grounding is vital for the safe operation of your system. Bring the ground wire to the ground stud that is labeled "GND" or "G". You must choose the proper conductor size. See national electrical code article 250-95, or the related local applicable code.**

## 1.3 Initial Work

For the purposes of this manual it is assumed that;

- The car has been connected to the motor, brake and power supply and is running on temporary run as described in the Virginia Controls temporary run manual.
- The car should be running on inspection operation using either the inspection run buttons in the controller or a temporary run bug.
- The drive has been auto-tuned and the encoder position (when applicable) has been learned by the drive. Note that it is not necessary to do an Auto tune on open loop (no motor encoder) drive systems.

If these procedures have not been completed refer to sheet "P1" in the schematics for instructions.

## 2. Verify Brake Voltages

### 2.1 Adjusting the Brake

**NOTE:** The procedure below should have been done during the initial setup of the controller as described in the Virginia Controls temporary run manual. The information is repeated here for convenience.

Refer to the schematic for the brake circuits (usually sheet 2)

Compare the brake voltage listed on the schematic to the brake data tag. These voltages should be nearly the same. Use the voltage listed on the schematic for setting the brake voltages.

Power may be applied to the brake by manually pushing in contactors "BK1", "BK2" and when equipped "BSA".

If your controller has a second brake (emergency brake) manually push in contactors "BK3", "BK4" and when equipped "BSB" to pick the second brake.

**WARNING:** The car/platform may move when the brake is picked. Do not allow any movement that may cause personal injury or damage to the equipment.

Adjust the brake pick and hold voltages as needed. These values are preset at Va. Controls and should be close to the proper values. Not all brakes have a hold voltage. If there is no hold voltage there will not be any contactors named "BSA" or "BSB" and there will not be a brake economy switch. Refer to the schematic to see what contactors are supplied and what adjustments are available via resistors "B1", "B2", Etc.

1. Use a voltmeter to check for correct brake voltage(s) at terminals B1 and B2 by picking relays "BK1", "BK2" & if equipped "BSA". If the brake has an economy switch install a temporary jumper around this switch to check for the proper brake pick voltage. Adjust brake pick voltage if needed.
2. If applicable, release "BSA" (or remove the temporary jumper installed in the previous step) to check for proper hold voltage. Adjust brake hold voltage if needed.
3. If equipped with a second brake, repeat steps listed above by checking voltage at terminals B3 & B4 via relays "BK3", "BK4" & "BSB".
4. Ensure that the brake(s) is working mechanically and properly adjusted.

## 3. Cartop Selector

The selector system currently in use is typically an IP-8300 style selector with magnets mounted on a steel or poly-coated tape. Check sheet CTX in your schematic and refer to the appropriate instruction below for your particular installation. The selector uses leveling and slowdown magnets mounted on the tape and with 2007 code and later controllers there will be reset magnets at each landing.

### 3.1 Basic Functions for IP-8700 Selectors

The car top selector provides slowdown, floor position, leveling, and terminal landing reset signals to the controller. Magnets are placed on the selector tape in the proper locations to provide signals as required. See sheet "CTX" in the schematics for the exact setup for your installation.

There will be up level, down level and door zone sensors that sense a single common magnet at each landing. There are also slowdown sensors that perform a "step up" and "Step down" operation. Depending on the installation there may be as many as 3 up and 3 down slowdown signals, or there may be as few as 1 up and 1 down slowdown signal. Selector signals are initialized when a magnet is near a sensor. Each sensor is connected to a relay in the car top selector junction box which in turn is connected to the controller.

**NOTE: A 1" wide reset magnet is required at the terminal landings in some installations. This magnet is required for proper reset of floor position at the terminal landings. The controller will not function properly if the reset magnets are not installed! Check your schematic selector sheet to see if this magnet is required.**

### 3.2 Magnet Placement for IP8700 Selectors

Leveling magnets are installed such that the up and down level sensors are above and below the magnet when the car is floor level. When the car is sitting at any floor level the up level (UL) and down level (DL) relays in the selector should be off and the door zone (DZ) relay should be on. A leveling magnet is required at every landing.

Slowdown magnets are located at a set distance above/below the floor to initiate slowdown and to provide floor position information to the controller. Slowdown is initiated when a sensor rides onto the leading edge of a magnet. The magnets should be placed at the proper distances from the floor as indicated on the "CTX" sheet in the schematic. Depending on the speed of the car there may be multiple sets of up and down slowdown targets.

Two 10 foot long magnets are supplied for jobs that have inspection access. These magnets create a zone that limits car travel while on inspection access operation and should be installed as shown on sheet CTX in the schematic.

## **4. Shaftway Switches**

### **4.1 Determining the Number of Shaftway Switches Required**

Look at sheet “FS” in the schematics to determine the number of shaftway switches required for your installation. These will include the slowdown, normal limit, final limit, and ETSD switches. The number of switches will vary from 6 to 12 depending on the speed of the elevator. Note that all of the shaftway switches are normally closed and will open when actuated by the car cam. Sheet “SS” in the schematics shows the relative position of the switches with respect to one another.

### **4.2 Shaftway Switch Locations**

#### **4.2.1 Normal Limit Switches**

The “Up Normal Limit Switch” (up directional limit) should be located about 1” above the top floor. The car cam should not engage this switch when the car is floor level at the top floor, but should allow for about 1” of over travel.

The “Down Normal Limit Switch” (down directional limit) should be located about 1” below the bottom floor. The car cam should not engage this switch when the car is floor level at the bottom floor but should allow for about 1” of over travel.

#### **4.2.2 Final Limit Switches**

The “Up Final” is the uppermost switch in the hatch. When the car cam opens this switch all power is removed from the control circuits. This switch is located above the Up Normal Limit Switch. Under normal operation the car cam will never actuate this switch.

The “Down Final” is the lower most switch in the hatch. When the car cam opens this switch all power is removed from the control circuits. This switch is located below the Down Normal Limit Switch. Under normal operation the car cam will never actuate this switch.

#### **4.2.3 Slowdown Switches**

The number of slowdown switches will vary depending on car speed. See sheet “FS” in the schematic to see how many switches are required for your installation. The placement of these switches is such that the switch should open about 1” after the corresponding selector target is reached by the cartop selector. For example, if the Up High Speed slowdown selector target is set at 8’ from the top floor, the Up High Speed Slowdown switch should be set at 7’-11” from the top floor. For every slowdown sensor in the cartop selector there will be a corresponding slowdown switch in the shaftway. See sheet “SS” in the schematics for additional information. See sheet “CTX” in the schematics for recommended slowdown distances.

#### **4.2.4 ETSD Switches**

For cars running above 200 FPM, an Emergency terminal slowdown switch is required at both the top and bottom landings. This switch is located at about ½ of the high speed slowdown distance from the landing. It is a closed switch that opens as the car approaches the landing. See sheet “CTX” or “SS” in the schematics for recommended slowdown distances and sheet “ETSD” in the schematics for additional information. See the User manual for detailed instructions concerning the ETSD system.

### **4.3 Sequence of Operation for Shaftway Switches**

In general the car will use the selector slowdown signals to slow down and stop. The shaftway slowdown switches are a backup to the selector sensors at the terminal landings. These switches should operate about 1” after a selector slowdown sensor is activated. The exact distance is not critical to the operation of the elevator and can vary slightly without causing adverse effects to the operation of the controller. See sheet “SS” in the schematics for additional information.

## 5. Drive Adjustment

Before the drive can be properly adjusted, the slowdown switches, selector slowdowns, and selector resets should be set up properly and functioning. Refer to sheet "P1" in the schematic for recommended drive parameters. If a drive ever needs to be replaced follow the instruction on the right hand side of sheet "P1" where it says "START HERE".

**NOTE: The adjustment instructions in this section are based on a KEB drive. If your controller has a different drive, the parameters numbers will be different than those that are listed here. See the drive manual for information on the specific drive that was supplied with your controller.**

### 5.1.1 Initial setup

Initial drive setup should have been done at the time the car was placed into temporary service as described in the temporary run manual. The following information is repeated here for convenience.

- Compare the motor information on the parameter sheet to the actual motor data tag. Va. Controls has predetermined the required values and they are listed on sheets "P1" & "P2" in the schematics. These values have already been programmed into the drive, but should be checked for accuracy. These parameters may have been changed slightly by Va. Controls, but should be very close to the data tag information on the motor.
- Compare all of the drive parameters to those listed on the parameter sheet (sheet P1) in the schematic. They should be the same. See the drive manual for information regarding using the drive programmer to access parameters.
- Check the pulses per revolution (PPR) listed on the encoder data plate. Sometimes the PPR is hidden in the part number. Generally the PPR will be either 1024 or 2048. This must be the same number that is programmed into the "encoder pulses" parameter in the drive or improper operation will occur.

***Before attempting to mover the car, follow the Auto-Tune, Machine Data and Encoder Synchronization instructions on the right hand side of sheet P1 in the schematics and in sections 5.11.2, 5.11.3 & 5.11.4 in the KEB drive manual. For open loop systems (no motor encoder), an Auto-tune is NOT recommended.***

- Use the run bug to attempt a run in the up direction. Check that the controller's up relays ("U1", "U2" etc.) energize, the brake picks and the car runs in the up direction. Repeat for the down direction, ensuring that the controllers down relays ("D1", "D2" etc.) are energized and the car moves in the down direction.
- Make sure that the brake is not dragging. Adjust if needed.
- Make sure that the rope gripper is not clamped down on the ropes.

While running the car, verify that the motor runs smoothly in both directions and at the proper inspection speed. The motor current should now be less than the nameplate value.

- If the car runs smoothly and at the programmed inspection speed (usually 50 FPM), no changes are needed with the encoder phasing.
- If the car responds “sluggishly” and runs at a slow speed, the encoder phasing is generally reversed. This may also be accompanied by excessive motor current. The motor current may be checked with the drive programmer at drive parameter LF.93. (See drive manual for the exact procedure for using the programmer)

*If the car does not run in the proper direction and run smoothly without excessive current draw, review sections 5.11.2, 5.11.3 & 5.11.4 in the drive manual to make the proper adjustments*

- Apply power and test. The car should now run smoothly.

## 5.1.2 Speed Control

The various speeds may be set through drive parameters LF.41 through LF.47 in the KEB drive. Factory recommended speeds are listed on sheet “P1” on the schematics and are preprogrammed into the drive at the factory. These may be adjusted as desired.

## 5.1.3 Acceleration, Deceleration & “S” Curve Adjustments

The acceleration, deceleration and “S” curve (jerk) adjustments are done via 0.LF.50 through 0.LF.55 and 1.LF.50 through 1.LF.55 in the KEB drive. **Note that the KEB drive manual has incorrect information regarding these adjustments.** Refer to the schematic sheet “P1” to find the proper parameter to adjust for acceleration and deceleration. The proper speed references are listed in () after the parameter number on sheet “P1”. (Example 1.LF.51 ACCELERATION (FS, 1FR, INSP, LV) indicates that 1.LF.51 is the acceleration rate for fast speed, one floor run inspection and leveling.) These parameters may change depending on the job so be sure to check your job specific schematic before making adjustments.

Adjust the acceleration and deceleration curves for a comfortable ride. The jerk rates may be changed as desired to give a smooth start and stop. Larger numbers will give quicker changes while smaller number will allow for more gentle changes.

## 5.1.4 Start Delay

Located on the relay circuit board in the controller is a timer labeled “UDX”. This timer will delay movement of the car to allow for the brake to pick. The drive will hold the car at floor level until this timer expires. The factory setting for this timer is 0.1 seconds. It may be lengthened if necessary to prevent the car from “pulling though the brake” due to a brake that is sluggish to pick. This timer should not need to be set for more than 1 second. A long setting of this timer (About 2 seconds or more) will result in controller faults.

## **5.1.5 Brake Drop Adjustment**

Located on the relay circuit board is a potentiometer labeled “UDTX”. This control allows for adjustment of the brake drop time. Clockwise will hold the brake open for more time, while counterclockwise will allow the brake to set more quickly. Adjust “UDTX” such that the brake sets on a motionless brake drum. Ideally the brake pads should contact the drum just as the drum comes to a complete stop. Too much time on “UDTX” may result in rollback of the car. Too little time on “UDTX” will result in the brake dropping while the car is still in motion. This will result in undesired wear on the brake pads and may be felt as a jerk in the elevator as it stops.

## 6. Ride Adjustment

To obtain the best overall ride quality the following steps are recommended:

1. High speed slowdown distance is set based on recommended distances as listed on sheet "CTX" or "SS" in the schematic. This is done by adjusting the slowdown magnets on the selector.
2. Acceleration and deceleration rates are set via the drive for a smooth ride on fast speed runs.
3. Two floor run speed (2FR) (when applicable) is set via the drive to allow the car to level into the floor with 2 to 4 inches of level distance.
4. One floor run speed (1FR) (when applicable) is set via the drive to allow the car to level into the floor with 2 to 4 inches of level distance.

**NOTE: One floor run and two floor runs speeds will follow the same acceleration and deceleration curves as fast speed runs.**

**NOTES: A one floor run (1FR) is defined as a run between two adjacent landings (2F to 3F.)**

**A two floor run is defined as a run between floors two landings apart. (2F to 4F.)**

**A fast speed or high speed run is defined as a run between floors that are more than 2 landings apart. (2F-5F).**

**Depending on floor heights and car speed not all controllers will have separate 1FR, 2FR and high speed runs.**

**Controllers that are equipped only with relay "FS" have one floor run circuitry.**

**Controllers that are equipped with relays "1FR" and "FS" have two floor run circuitry.**

**Controllers that are equipped with relays "1FR", "2FR", and "FS" have three floor run circuitry.**

## 7. PLC High Speed Counter Setup

For controllers running faster than 200 FPM there will be an Allen Bradley PLC which is being utilized for speed monitoring. The specific instructions to set up this device are in the schematic diagrams. Always check the schematic to ensure you are following the latest setup procedure.

At any time after the car is able to run at full speed, the high speed counter may be programmed in the Allen Bradley PLC. This is a software device that monitors for over speeding of the car. The high speed counter will remember the highest speed obtained during the calibration process, so it is necessary to be sure that full speed is reached during the calibration run. Note that the ETSD/UCM/OS hardware device must also be setup as described elsewhere in this document. To set up the PLC overspeed device the following steps are required.

### 7.1 Initial setup

1. Jump input I-00 on the Allen Bradley PLC to terminal 1 in the controller.
2. Run the car in the up direction and verify output 0 on the Allen Bradley PLC lights.
3. If output 0 on the Allen Bradley PLC does not light, then reverse the A+ & B+ wires at the Allen Bradley High Speed Counter module and repeat step 2.
4. If output 0 does not come on when the car is running up or down, check the wiring between the drive and the Allen Bradley PLC.

### 7.2 HSC Calibration

It may be necessary to jump the shutdown defeat input on the microprocessor before tuning the high speed counter. Check your prints for the location of "SHTDFT" and jump this input to terminal 1 on the main terminal blocks.

1. Power up the controller.
2. Jump input I-00 on the Allen Bradley PLC. (If it is already installed, remove it and put it back on with the PLC powered on.
3. Run the car up at contract speed. Be sure that the car reaches full speed. Speed code outputs O-01, O-02, and O-03 should all be on.
4. Check that output O-00 is on when the car runs up. If not, refer to initial setup section above.
5. When the car stops, remove the jumper on input I-00, while the power is still on.

This completes calibration. If a jumper was installed on the "SHTDFT" input of the microprocessor, be sure to remove it before placing the car into operation. The ETSD monitoring system (if equipped) and the overspeed hardware device (described below) will need to be calibrated before removing the SHTDFT jumper.

## 8. ETSD Monitoring System Setup

The ETSD monitoring system is hardware based device that performs a hardware (non-programmed) check of three critical function of the elevator. The ETSD part of the board checks that the car is decelerating properly as it reaches a terminal landing. The uncontrolled movement part of the board checks that the car is not moving at a time when it should be sitting still (i.e. at a floor with the door open). The overspeed part of the board monitors for overspeed conditions while leveling with the doors open and on inspection. Not all functions of this board are required on all installations depending on car speed. Check your schematic to see if this board is present and which functions are required. The device uses a black & white tape attached to the drive sheave along with a sensor to detect car speed. See the V3MVF user's manual for more information about mounting the sensor and installing the tape.

**NOTE: More detailed instructions for the ETSD & OS system are listed in the V3MVF user's manual.**

**NOTE: The drive should be fully adjusted and the car should be able to run on automatic before calibrating the ETSD SYSTEM circuit board.**

**NOTE: The sensor and tape must be mounted on the machine before attempting to calibrate the ETSD or Overspeed devices.**

Perform the following checks to insure that "PHOTO-1" LED on the ETSD Board lights only when the sensor is pointed at a white segment of the ETSD Tape, and to prevent "PHOTO-0 & PHOTO-1" LED's from oscillating while the sheave is still, and perhaps pointed at a black segment:

- "L/D" (Light/Dark) Switch of Speed Sensor is set to "L" or Light position. (Check carefully!)
- "SENS." Potentiometer of Speed Sensor (2-turn w/clutch) is set on turn - middle.
- Speed Sensor is about 5" ( $\pm 1/4$ ") away from the ETSD Tape.
- Speed Sensor is aligned slightly off (approx.  $10^\circ$ ) perpendicular from tape.

The car speed can be monitored on LED's "S0-S7" by turning on DIP SW-4, "AUX", only. These LED's show car speed as a binary count that should ramp up & down with Accel & Decel and appear stable at constant speed, with dithering (or flashing...) on the lowest one or two bits only.

LED's "S0-S7" represent an 8 Bit count (1, 2, 4, etc...) where each bit accounts for 5FPM (or, one  $1/4$ " of tape travel sampled over 250mS). Example: LED's "S1 + S2 + S3 + S4" = ( 2 + 4 + 8 + 16 ) x 5 = 150FPM.

### **Check sensor operation before calibrating the unit as described below.**

Leave the SW-4, "AUX" in the ON/Up position and run the car at constant speed on a fast speed run. Monitor LED's "S0-S7". The pattern should be stable on the higher numbered LED's and may flash on the lower numbered LED's. **If the pattern is not stable, check sensor alignment and adjust the sensitivity adjustment on the sensor.** A stable pattern is essential for proper calibration of the overspeed ETSD board.

## 8.1.1 Calibrating the Overspeed Device

1. Turn off the controller at the mainline disconnect.
2. Place a jumper on the ETSD monitoring system circuit board terminal "OSC". Connect the other end of this jumper to terminal block 1 (120VAC) on the controller's main terminal strip.
3. Place a jumper on the ETSD monitoring system circuit board terminal "ETSDFT". Connect the other end of this jumper to terminal block 1 (120VAC) on the controller's main terminal strip.
4. Power up the controller by closing the mainline disconnect. If the jumpers to terminals "ETSDFT" & "OCS" were previously installed during the initial startup phase of the project, cycle power to the controller with the jumpers installed before proceeding to the next step.
5. Set inspection speed in the drive to 150FPM. (For cars slower than 200FPM set the speed to 80-90% of full speed)
6. Run the car in either direction on inspection for at least 5 Seconds.
7. With power still applied to the controller and the car stopped, remove the jumper from terminal "OSC"
8. The "OS Tuned" light will turn on indicating that the overspeed device has been calibrated.
9. Cycle the power to the controller to complete the calibration.
10. Set inspection speed in the drive back to 50FPM. If contract speed is 150fpm or lower, limit the Inspection Speed setting on the drive to not more than 50%-60% of contract speed – well below the O-S Calibration speed.
11. Remove the jumper from the "SHTDFT" input.

## 8.1.2 Calibration of the ETSD System

1. Turn off the controller at the mainline disconnect.
2. Place a jumper on the ETSD monitoring system circuit board terminal "ETSC". Connect the other end of this jumper to terminal block 1 (120VAC) on the controller's main terminal strip. If the jumper was previously installed cycle power to the controller with the jumper installed before proceeding to the next step.
3. Power up the controller by closing the mainline disconnect.
4. Set full speed in the drive to be 90% of full speed. (Adjust LF.42 in the KEB drive)
5. Run the elevator in either direction on automatic at 90% of contract speed for at least 5 seconds.

6. After the car has stopped and with power still applied to the controller, remove the jumper from terminal “ETSC”
7. The “ETSD Tuned” light will turn on indicating that the ETSD system has been calibrated.
8. Set full speed in the drive back to contract speed.
9. Remove the jumper from terminal “ETSDFT”

### 8.1.3 Putting the System into Operation

Be sure that the jumpers have been removed from terminals “SHTDFT”, “OSC, and “ETSDFT” before placing the system into service. There should not be any temporary jumpers connected to the circuit board.

**WARNING: The Emergency terminal slowdown/Overspeed/ Uncontrolled movement device will not operate with a jumper on the SHTDFT terminal. This jumper must be removed before placing the car into service.**

**NOTE: Some sections of the board may not be used depending on car speed. If the car speed is 200FPM or below there will be a factory jumper on terminal “ETSDFT”. Factory installed jumpers should not be removed. Check your job schematic to check which factory jumpers are installed.**

### 8.1.4 Faults

If any of the systems on this board have detected a fault condition the corresponding red LED will light. Note that faults will be remembered through a power down condition. To reset an “ETSD” fault push the “ETSD Reset” pushbutton on the board. To reset an “OS” fault push the “OS Reset” pushbutton on the board. To reset a “UCM” fault a jumper must be connected to the “SHTDFT” input on the circuit board. In most cases the controller must be set for automatic (not inspection) operation to be reset.

## 9. Shutdown Defeat Jumper

The Shutdown defeat jumper is connected to terminal 1 and the microprocessor input SHTDFT. This jumper will defeat the operation of many of the controller's safety devices such as run timers and redundancy checks. Some critical faults (such as drive not ready to run) are not defeated with this jumper. This jumper is needed to allow the controller to run on temporary service during the construction and adjustment phases of the installation.

**WARNING: The shutdown defeat jumper is intended for initial startup of the elevator and for troubleshooting purposes only. This jumper must be removed before the elevator is placed into service or serious injury or death could result!**

## 10. Placing the Car into Service

After the installation is complete, all setup and calibration procedures are complete, and all temporary jumpers have been removed the car may be placed in service.

**WARNING: Before placing the car into service all setup procedures must be completed and all temporary jumpers must be removed from the controller.**

The installer should check all features of the controller for proper operation. Features such as emergency fire service, emergency power, independent service, etc. should be checked. Items such as safeties and door operators should be checked for safe and code compliant operation. If any safety items are found to be non-operative they should be investigated and repaired before placing the car in service.

# 11. Faults

In the event of a fault the microprocessor will provide fault codes via its onboard display. The fault codes and their descriptions are listed in the schematic on sheets FL1, FL2 and FL3 in the schematic. The microprocessor system stores multiple faults and will retain them during a power loss.

Note that a single event may create several faults simultaneously. For example, if a running car should “tip” a door lock during travel, the most recent fault may be a “Car stopped out of door zone” fault. The next fault down in the fault list will show the fault for the door lock being opened. It is advisable to check several layers down in the fault log to be sure you have the entire picture of the problem. In the example above the car did stop out of door zone, however, that was a result of the original problem, not the problem itself.

In addition to a fault code the data panel will display a set of 1’s and 0’s (10011011). These are the status bits for the particular fault. This provides information such as floor position, direction of travel, etc., at the time of the fault. Each bit of the binary number has a specific meaning. See the schematics and user manual for additional information. Use the fault code along with the binary “status” bits to help determine what happened at the time of the fault.

**NOTE: Use the fault code along with the binary “status” bits to help determine what the car was doing at the time of the fault.**

## **12. Microprocessor Adjustments**

Numerous parameters may be adjusted in the microprocessor. These parameters include items such as door times, homing landing, etc. Refer to the schematic sheets, FA, FA1, FA2, Etc. along with the user manual for a detailed list and description of adjustable features.

## **13. Regeneration Unit (When Provided)**

The regeneration unit is provided to put the motor's regenerated power back into the building power supply during an overhauling condition of the elevator. This unit does not normally require any adjustments.

The first time the regeneration unit is powered up on a power supply other than the one where it was tested, it may display an E.Puch or E.PuC Fault.

To reset the fault use the Regeneration unit keypad to navigate to parameter CP.31 and press enter. This fault should not reoccur unless the unit is connected to a different power source.

# 14. Safety Tests

**WARNING:** Before doing any of the tests outlined below, the elevator must be free of personal and must not be assessable to any passengers. Many of these tests intentionally disable safety devices and should only be performed by qualified trained personnel. After each test is completed a thorough inspection of the elevator should be done prior to placing the car back into service.

**NOTE:** Terminal numbers are listed in the procedures below for your convenience and are the numbers most commonly used. Check your controller schematic to verify terminal designations for your specific controller.

## 14.1 Overspeed Safety Test

It is recommended that an empty car low speed safety test be done to ensure that the safety devices are functioning properly before performing a full load full speed test.

### 14.1.1 Low Speed Test

1. Jump out the car safety switch with a temporary jumper. (2X-2Y)
2. Run the car down on inspection speed (about 50 FPM).
3. While the car is running, manually engage the overspeed governor. The safety device on the car should trip and the motor sheave will continue to turn until the inspection run button is released. Do not allow the drive sheave to turn on the stationary ropes for more than a few seconds or damage will occur!
4. Manually inspect the safety devices to ensure proper operation.
5. Reset the overspeed governor and run the car up to disengage the safeties.
6. Ensure that the safeties are fully disengaged before proceeding.

### 14.1.2 Full Speed Test

1. Turn on the "Hall call cutout" switch located on the relay interface printed circuit board.
2. Run the car away from the lower terminal landing. The car should be high enough in the hoistway to allow the car to accelerate to a high rate of speed before reaching the lower landing.
3. Jump out the car safety switch with a temporary jumper.
4. Jump out the governor safety switch with a temporary jumper. (Terminals 1X-1Y)

5. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the microprocessor.
6. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
7. Record the value of Parameter LF.22 in the KEB drive. Multiply the value from LF.22 by 1.5 and program this new value into LF.22.
8. Place a car call to the lowest landing by touching a jumper from terminal 1 – 1C in the controller.
9. The car will run down at greater than full speed. The governor should trip stopping the car.
10. The drive sheave will continue to turn on the stationary ropes. Turn off power to the controller.

**WARNING: Do not allow the drive sheave to turn on the stationary ropes for more than a few seconds or damage will occur!**

11. Manually inspect the safety devices and car for damage and proper operation.
12. Enter the originally recorded value of LF.22 back into the drive.
13. Reset the overspeed governor and run the car up on inspection to disengage the safeties. Ensure that the safeties are fully disengaged before proceeding.
14. Remove all temporary jumpers.
15. The “Hall Call Cutout” switch may be placed back into the “normal” position.

**WARNING: Do not put the car back into service until it has been carefully checked for damage.**

The above test may now be repeated with a full load on the car if required.

## 14.2 Buffer Tests

### 14.2.1 Car Buffer Test

1. Turn on the “Hall call cutout” switch located on the relay interface printed circuit board.
2. Place the car at the third landing from the bottom.
3. Place a jumper from terminal 1 on the main terminal strip to microprocessor input terminal SHTDFT on the main terminal strip.

4. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
5. Jump out the shaftway slowdown limit switches by jumping terminals 3-19S-19M-19H together. Note that not all controllers will have all of these terminals.
6. Place a jumper on the buffer switch and finals (terminals 1W-1X) if desired.
7. Jump out the down normal limit switch. (Terminals 6-16)
8. Jump out the down ETSD switch (1-32X) if provided.
9. Remove the selector slowdown signals from the controller by disconnecting wires 32H, 32M, 32S. Note that depending on car speed you may not have all of these terminals. Tag the wires so that they may be properly reconnected after the test.
10. Place a car call at the bottom landing by touching a jumper from terminal 1 to terminal 1C.
11. The car will run full speed onto the buffer.
12. After the car strikes the buffer, pull the mainline disconnect or place the car on controller inspection to stop the motor.

**WARNING: Do not allow the drive sheave to turn on the stationary ropes for more than a few seconds or damage will occur!**

13. Run the car off of the buffer using the controller inspection switches.
14. Inspect the car and buffer for damage.

**WARNING: Do not put the car back into service until it has been carefully checked for damage.**

15. Remove all temporary jumpers and reconnect the selector wires removed in the steps above.
16. Run the car back near the bottom landing and put the car on automatic.
17. The car will run down to floor level and floor position will reset to "1F"
18. The "Hall Call Cutout" switch may be placed back into the "normal" position.

## 14.2.2 Counterweight Buffer Test

1. Turn on the “Hall call cutout” switch located on the relay interface printed circuit board.
2. Place the car at the third landing from the top.
3. Place a jumper from terminal 1 on the main terminal strip to microprocessor input terminal SHTDFT on the main terminal strip.
4. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
5. Jump out the shaftway slowdown limit switches by jumping terminals 3-18S-18M-18H together. Note that not all controllers will have all of these terminals.
6. Place a jumper on the buffer switch and finals (terminals 1W-1X) if desired.
7. Jump out the up normal limit switch. (Terminals 6-14)
8. Jump out the up ETSD switch (1-31X) if provided.
9. Remove the selector slowdown signals from the controller by disconnecting wires 31H, 31M, 31S. Note that depending on car speed you may not have all of these terminals. Tag the wires so that they may be properly reconnected after the test.
10. Place a car call at the top landing by touching a jumper from terminal 1 to top landing car call terminal (12C, 13C etc.)
11. The counterweight will run full speed onto the buffer.
12. After the counterweight strikes the buffer, pull the mainline disconnect or place the car on controller inspection to stop the motor.

**WARNING: Do not allow the drive sheave to turn on the stationary ropes for more than a few seconds or damage will occur!**

13. Run the car off of the buffer using the controller inspection switches.
14. Inspect the car and buffer for damage.

**WARNING: Do not put the car back into service until it has been carefully checked for damage.**

15. Remove all temporary jumpers and reconnect the selector wires removed in the steps above.
16. Run the car away from the top landing and put the car on automatic.
17. The car will run down to floor level and floor position will reset.
18. The “Hall Call Cutout” switch may be placed back into the “normal” position.

# 15. ETSD Software System Tests

**NOTE:** Cars that run at 200FPM or less are not equipped with an ETSD system.

**WARNING:** Before doing any of the tests outlined below, the elevator must be free of personal and must not be assessable to any passengers. Many of these tests intentionally disable safety devices and should only be performed by qualified trained personnel. After each test is completed a thorough inspection of the elevator should be done prior to placing the car back into service.

## 15.1 ETSD testing for the Microprocessor

The microprocessor will check that the ETSD rail switches have opened when the car arrives at a terminal landing.

1. Run the car to a landing mid-way up the hatch.
2. Place a jumper on the lower terminal landing ETSD switch terminals. (1-32X)
3. Run the car to the bottom landing by placing a car call to 1F.
4. The car will run into the landing, stop and go into shutdown.
5. Remove the jumper from terminals 1-32X and reset shutdown.
6. Repeat this test at the top terminal landing by jumping out the top terminal ETSD switch (1-31X) and running the car to the top. Remove the jumper when finished.

## 15.2 ETSD System Testing

### 15.2.1 Mid Hatch Tests

1. Run the car to a landing in the middle of the shaftway.
2. Place a car call at the bottom landing by touching a jumper from 1-1C.
3. When the car reaches full speed, remove the field wire connected to terminal 32X.
4. The ETSD device will go into fault mode and cause a controller shutdown.
5. Repeat the test in the up direction by placing a car call at the top landing and removing the wire from terminal 31X.

## 15.2.2 Terminal Landing ETSD Tests

The ETSD tests may be done at the terminal landings to check operation of the ETSD device in the way it will actually work with a controller/drive slowdown failure. Note that the test may allow the car or counterweight to strike the buffers.

In order to do this test the car must not be allowed to slow down at the terminal landings. The easiest way to do this is to force various drive interface relays (1FR, 2FR, FS) to remain in their “picked” position as the car runs into the terminal landing. This will vary from controller to controller depending on the speed of the car.

1. Run the car from the bottom to the top landing and observe relays 1FR, 2FR & FS on the relay interface board. Note that you may not have all of these relays, but at the very least will have an “FS” relay. Determine which of these relays are picked when the car is running at high speed.
2. Place a call at the bottom landing by touching a jumper from terminal 1 to terminal 1C.
3. When the car reaches high speed, use the movable tabs on the relays as determined in step “1” above to force the relays into their picked position. If your controller is not equipped with relays that have lockable tabs, locate the microprocessor output(s) that control the speed relays and jump them out to force the relays to remain high while the car is running. Example to hold up relay FS, jump output FS on the microprocessor output card to terminal 35. In this case it would also be necessary to jump out the mechanical limit switches in the hoistway. (Usually terminals 3 to 18H, 19H, & 3 to 18S, 19S when equipped.)

**WARNING: This action will not allow the car to slow down at the terminal landings. The car or counterweight may strike the buffer.**

4. The car will run into the terminal landing at full speed and the ETSD device will fault causing the controller to shutdown and the car to stop.
5. This test may be repeated for the up direction at the top terminal landing.

# 16. ETSD/UCM Board Hardware System Tests

**NOTE: When performing these tests, especially while the elevator has been on Normal operation, first verify that the car is empty and that Hall Calls are cut out.**

These tests are done on the hardware Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board.

## 16.1 UCM System Testing

### 16.1.1 When Equipped for Rope Brake Operation

1. Power down the system and connect a jumper from terminal block 1 on the main terminal strip to input "SHTDFT" on the microprocessor.
2. Remove the controller wire at Input DZ, "Door Zone" on the ETSD Board. Clip this controller wire to a short wire temporarily installed in its place.
3. Power up the system.
4. Run the elevator on Automatic to the top landing.

**NOTE: Be sure to take the necessary steps to prevent anyone from boarding the elevator during the test.**

5. As the elevator opens its doors at the top landing, remove the controller wire clipped to the temporary wire at Input DZ on the ETSD Board.
6. The UCM System will cause the "UCM TRIP" LED to light and the Rope Brake to set.
7. Power down the system.
8. Restore the controller wiring at Input DZ.
9. Power up and briefly touch a wire from terminal block 1 on the main terminal strip (120VAC Hot) to Input SHTDFT on the ETSD Board to reset the UCM System and the Rope Brake.
10. Remove the jumper connected to microprocessor input "SHTDFT"

### 16.1.2 When Equipped for Emergency Brake Operation

1. Run the elevator on Automatic to top landing.

**NOTE: Be sure to take the necessary steps to prevent anyone from boarding the elevator during the test.**

2. Power down the system with the doors closed and connect a jumper from terminal block 1 on the main terminal strip to input "SHTDFT" on the microprocessor. See the controller drawings for the location of this input or terminal.
3. Remove the field wires at controller terminals 21 & 22, (Up & down Leveling Switches) and temporarily place a short wire in terminal 22.
4. Power up the system.

5. Briefly touch a wire from terminal block 1 on the main terminal strip to controller terminal 27 (Door Open Button Input), to open the elevator doors.
6. With the doors open, clip the wire from controller terminal block 1 to the short wire just installed at controller terminal 22 (Down Level Switch.)
7. The elevator will level down slowly until it rides out of the Door Zone.
8. The UCM System will cause the "UCM TRIP" LED to light and the Emergency Brake to set.
9. Power down the system.
10. Restore the field wires at terminals 21 & 22.
11. Power up the system.
12. Touch a wire from terminal block 1 on the main terminal strip of the controller to Input SHTDFT of the ETSD Board to reset the UCM System and Rope Brake.
13. The elevator will close its door and re-level back to the floor.
14. Remove the jumper connected to microprocessor input "SHTDFT"

## 16.2 O-S System Testing

1. With the car at mid-hatch, place the elevator on Inspection Operation from the controller.
2. Power down the system.
3. Install a jumper from terminal block 1 on the main terminal strip to "SHTDFT" on the microprocessor. See the controller drawings for the location of this input or terminal.
4. Power up the system.
5. Set the drive for a full speed of 175FPM and run the car on automatic. (Leave full speed set to the full speed of the car when full speed is less than 150FPM.)
6. The O-S System will fault causing the "O-S TRIP" LED to light and stop the car.
7. Power down the system.
8. Remove the jumper connected to microprocessor input "SHTDFT" and power up the system.
9. Restore the drive to its original Inspection Speed.
10. Use the "O-S RESET" Push Button on the ETSD Board to reset the O-S System.
11. Restore the elevator to Normal Operation.

## 16.3 ETSD System Testing

1. With the car at mid-hatch on Normal Operation and at floor level, power down the system.
2. Install a jumper from terminal block 1 on the main terminal strip to "SHTDFT" on the microprocessor. See the controller drawings for the location of this input or terminal.
3. Remove the field wire from controller terminal 31X (Up ETS Switch), and clip this field wire to a short piece of wire temporarily installed in its place.
4. Power up the system.
5. Set a Car Call in the Up Direction that causes the car to run multiple floors at contract speed.
6. Monitor car speed by observing Relay Output LED's: "EX1 & EX2".
7. When these LED's go out, remove the field wire clipped to terminal 31X.
8. The ETSD System will fault causing the "ETSD TRIP" LED to light and stop the car.
9. Power down the system.
10. Remove the jumper connected to microprocessor input "SHTDFT".
11. Restore the field wire at controller terminal 31X.
12. Power up the system.
13. Use the "ETSD RESET" Push Button on the ETSD Board to reset ETSD System.
14. The elevator will level to a landing on Normal Operation.
15. If desired repeat the above steps in Down Direction using terminal 32X, the Down ETS Switch.

# 17. Normal Terminal Stopping Device (NTSD) Tests

**NOTE: The normal terminal stopping devices are the mechanic rail mounted switches connected to terminals 18, 18S, 18M, 18H and 19, 19S, 19M, 19H.**

## 17.1 Normal Terminal Stopping Device Test

### 17.1.1 Lower Landing Test

1. Turn on the “Hall call cutout” switch located on the relay interface printed circuit board.
2. Place the car at the third landing from the bottom.
3. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
4. Remove the selector slowdown signals from the controller by disconnecting wires 32H, 32M, 32S. Note that depending on car speed you may not have all of these terminals. Tag the wires so that they may be properly reconnected after the test.
5. Place a car call at the bottom landing by touching a jumper from terminal 1 to terminal 1C.
6. The car will run to the terminal landing and slow down and stop. It may overshoot the floor slightly and re-level.
7. Replace the wires on terminals 32H, 32M, 32S.

### 17.1.2 Upper Landing Test

1. Turn on the “Hall call cutout” switch located on the relay interface printed circuit board.
2. Place the car at the third landing from the top.
3. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
4. Remove the selector slowdown signals from the controller by disconnecting wires 31H, 31M, 31S. Note that depending on car speed you may not have all of these terminals. Tag the wires so that they may be properly reconnected after the test.
5. Place a car call at the top landing by touching a jumper from terminal 1 to the top floor car call terminal.
6. The car will run to the top terminal landing and slow down and stop. It may overshoot the floor slightly and re-level.
7. Replace the wires on terminals 31H, 31M, 31S.

## 18. Loss of Traction Test

The loss of traction feature prevents the sheave from running continuously without any motion from the car. For this test we will land the counterweight on its buffer and then tell the motor to run in the up direction at full speed. The sheave will turn and a loss of traction will occur. After about 5 seconds, the loss of traction timer will trip and shut down the car.

**WARNING: Do not allow the drive sheave to turn on the stationary ropes for long periods of time or at high speed. Rope damage will occur!**

To prevent prolonged turning of the sheave on the ropes during this test, the run fault timer must be reduced to 5 seconds. Check your schematic for the run timer number in the microprocessor that needs to be adjusted. Put the timer back to its default value after the test is complete.

To prevent possible damage to the ropes, the car speed should be reduced by lowering the full speed setting on the drive.

1. Put the hall call cutout switch in the “cutout” position.
2. On automatic operation, run the car to the top landing via a car call.
3. Locate the controller terminals for the selector floor reset target inputs (1FP, 2FP, 4FP, 8FP, 16FP, etc.) Disconnect one or more of the floor reset signals until the position indicator shows a landing that is lower than the top landing. (Example: top landing = 8F, Position indicator shows 5F.)
4. Put the car on controller inspection operation.
5. Jump out the top final limit switches (1X-1W) and the up normal limit (6-14).
6. Jump out the slowdown switches (3-18H, 3-18S).
7. Jump out the ETSD switch at the top landing (1-31X) when supplied.
8. Jump the door zone input on the microprocessor. (See your schematic for the exact input required.)
9. Run the car until the counterweight lands on its buffer. See that the drive sheave can turn with the counterweight landed.
10. Place the car on automatic operation.
11. Place a car call to the top landing by jumping terminal 1 to the appropriate car call terminal (8C, 12C etc.)
12. The car will run at full speed for less than 30 seconds and shut down.
13. Put the car on inspection operation and note that the fault does not reset.
14. Reset the fault by jumping terminal 1 to the SHTDFT input on the microprocessor or by using the FAULT RESET key switch.
15. On inspection operation, run the car in the down direction away from the final and normal limits.

16. Remove the jumpers on the normal and final limits and reconnect the selector floor reset signals that were previously disconnected. (1FP, 2FP, 4FP, 8FP, 16FP, etc.)
17. Test the car for proper operation before placing back into service.
18. Put the hall call cutout switch back in its normal position. If the speed was reduced or the run timer adjusted, put these items back to their default values.

# 19. Microprocessor Rope Brake & Emergency Brake Tests

On controllers equipped with a rope brake (rope gripper) the controller will set the rope brake any time the car experiences uncontrolled movement. Once a rope brake fault has been detected it must be manually reset via the “SHTDFT” input. To reset the rope brake momentarily touch a jumper from terminal block 1 to microprocessor input terminal “SHTDFT”.

For cars that have emergency brakes rather than rope brakes, see the appropriate sections below.

## 19.1 Test of Rope Brake with Doors Open.

### 19.1.1 Stationary Test with Car at a Landing

1. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
2. With the car on automatic operation and the doors open. Remove the door zone signal from the controller by removing the field wire from terminal 20X. The rope brake will set.
3. Reset the rope brake fault by momentarily touching a jumper from terminal block 1 to microprocessor input terminal “SHTDFT”.
4. Remove the jumper from the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)

### 19.1.2 Drift Test with Car at a Landing

1. Place the car at a landing with the car on automatic operation and hold the doors open.
2. Remove field wires 21 & 22 (up & down Level switches) from the controller
3. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
4. Manually open the brake and allow the car to drift away from the floor.
5. The rope brake will set.
6. Reconnect wires 21 & 22 and reset the rope brake by momentarily touching a jumper from terminal block 1 to microprocessor input terminal “SHTDFT”.
7. Remove the SHTDFT jumper from the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board.

## **19.2 Test of Emergency Brake with Doors Open.**

### **19.2.1 Stationary Test with Car at a Landing**

1. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
2. Check sheet “FA1” in the schematic for the microprocessor “EM BRAKE HOLD TIME” register number.
3. Increase EM BRAKE HOLD TIME to 5 minutes to allow for testing.
4. Run the car on automatic operation and observe that the Emergency brake does not set after the car stops.
5. With the car on automatic operation and the doors open. Remove the door zone signal from the controller by removing the field wire from terminal 20X. The emergency brake will set.
6. Reset the emergency brake fault by momentarily touching a jumper from terminal block 1 to microprocessor input terminal “SHTDFT”.
7. Remove the jumper from the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
8. Reset the microprocessor “EM BRAKE HOLD TIME” register to its original value (usually 5 seconds).

### **19.2.2 Drift Test with Car at a Landing**

1. Check sheet “FA1” in the schematic for the microprocessor “EM BRAKE HOLD TIME” register number.
2. Increase EM BRAKE HOLD TIME to 5 minutes to allow for testing.
3. Place a jumper from terminal 1 on the main terminal strip to terminal SHTDFT on the Emergency terminal slowdown/Overspeed/ Uncontrolled movement device circuit board. (If equipped)
4. Run the car to a landing with the car on automatic operation and hold the doors open.
5. Observe that the Emergency brake does not set after the car stops.
6. Remove field wires 21 & 22 (up & down Level switches) from the controller
7. Manually open the brake and allow the car to drift away from the floor.
8. The emergency brake will set.
9. Reconnect wires 21 & 22 and reset the rope brake by momentarily touching a jumper from terminal block 1 to microprocessor input terminal “SHTDFT”.

10. Remove the SHTDFT jumper from the Emergency terminal slowdown/Overspeed/Uncontrolled movement device circuit board.
11. Reset the microprocessor "EM BRAKE HOLD TIME" register to its original value (usually 5 seconds).

## 20. Ascending Overspeed Test

The purpose of this test is to see that the governor will trip during an up run and set the rope brake.

**WARNING: Do not allow the car to run into the overhead. Damage may occur.**

1. Place the car at the bottom landing.
2. Set the drive to overspeed in the same manner as you would to set the safeties when running in the down direction. (For KEB drives, set LF.22 to 1.5 times its normal setting.)
3. Place a call at the next to the top landing. (For 2 stop elevators the call will be to the top landing.)
4. When the car starts to run, manually hold up contactors BK1 & BK2. (For dual brake systems, also hold up contactors BK3 & BK4.) This will prevent the machine's brake from stopping the car.
5. The car will accelerate until the governor trips. When the governor trips, the rope brake will set to stop the car.
6. Manually reset the rope brake by touching a jumper from terminal 1 to input SHTDFT on the microprocessor or by turning the FALUT RESET switch to the reset position.