Controller Test Procedure

Galaxy III VVVF Geared HPV-900 with Rope Gripper Traction Elevator Controller
Galaxy III VVVF Gearless HPV-900 with Emergency Brake Traction Elevator Controller
Galaxy III VVVF Gearless HPV-900 with Rope Gripper Traction Elevator Controller
Galaxy III VVVF Gearless Combivert F5 drive with Rope Gripper Traction Elevator Controller
Galaxy III VVVF Gearless Combivert F5 drive with Emergency Brake Traction Elevator Controller
Galaxy III VVVF Geared Combivert F5 drive with Rope Gripper Traction Elevator Controller

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The following procedure describes the methods used to test the controller for compliance to the CAN/CSA B44-2010 code.

1. Redundancy & Monitoring in critical Circuits 2.26.9.3 & 2.26.9.4

1.1 Magnetically Operated Devices

Motor Contactor:

1-Critical Components: MC
2-Redundant Components: Computer Inputs --- P, DEL, MCAi, MCCi
Computer Outputs --- MCC, MCA
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 1**
Note: On the following tests, the car will verify the start condition three times before shutting down. Please allow sufficient time for the error condition to be tested all three times. The elevator status will show I/O Error when the test is complete.

Before the car completes a run in either direction, hold in the MC contactor. Place a call to another landing. Observe that the car shuts down at the landing with an I/O Error and does not restart. To restore the car to normal operation, release the MC contactor, move the controller inspection switch to the INS position and then back to AUTO.

Before the car completes a run in either direction, **CAREFULLY** jump terminal "S10" to terminal "MCC" on the GALX-1038N board revision C or D otherwise it is terminal "MC" on the GALX-1038N revision F or GALX-1064AN revision F board, this will hold in the MC contactor. Place a call to another landing. Observe that the car shuts down at the landing with an I/O Error and does not restart. To restore the car to normal operation, **CAREFULLY** remove the jumper between "S10" and "MCC" on the GALX-1038N board revision C or D otherwise it is terminal "MC" on the GALX-1038N revision F or GALX-1064AN revision F board, move the controller inspection switch to the INS position and then back to AUTO.

While the car is stopped at a landing, **CAREFULLY** jump terminal "S10" to terminal "MCA". Place a call to another landing. Observe that the car shuts down at the landing with an I/O Error and does not restart. To restore the car to normal operation, move the controller inspection switch to the INS position and then back to AUTO.

Brake Contactors:

1-Critical Components: BRK, RUN
2-Redundant Components Computer Inputs --- DON, BRKi, RUNi, RUNAi
Computer Outputs --- BRK, RUN, RUNA
3- Circuit Conforms to 2.26.9.4: Yes
4-**Test 2**

Note: On the following tests, the car will verify the start condition three times before shutting down. Please allow sufficient time for the error condition to be tested all three times. The elevator status will show I/O Error when the test is complete.

CAREFULLY hold in the BRK contactor: Place a call to another landing. Observe that the car does not start. Release the BRK contactor. The controller might shut down at the landing with an I/O error. If an I/O error occurs, to restore the car to normal operation move the controller inspection switch to the INS position and then back to AUTO.

While the car is stopped at a landing, **CAREFULLY** jump terminal "CS" to terminal "DON" or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST1. Place a call to another landing. Observe that the car shuts down at the landing with an I/O Error and does not restart. To restore the car to normal operation, move the controller inspection switch to the INS position and then back to AUTO.

While the car is stopped at a landing, **CAREFULLY** jump terminal "CS" to terminal "BRK" or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST2. Place a call to another landing. Observe that the car shuts down at the landing with an I/O Error and does not restart. To restore the car to normal operation, move the controller inspection switch to the INS position and then back to AUTO.

Before the car completes a run in either direction, **CAREFULLY** hold in the RUN contactor: Place a call to another landing. Observe that the car shuts down at the landing with an I/O Error and does not restart. To restore the car to normal operation, release the RUN contactor, move the controller inspection switch to the INS position and then back to AUTO.

While the car is stopped at a landing, **CAREFULLY** jump terminal "CS" to terminal "RUNA" or if test points are supplied on the GALX-1038N board or GALX-1064AN revision F, jump test point TST3. Place a call to another landing. Observe that the car shuts down at the landing with an I/O Error and does not restart. To restore the car to normal operation, move the controller inspection switch to the INS position and then back to AUTO.

<u>Relays:</u>

1-Critical Components: GR1, GR2, DZ, DZ1
2-Redundant Components Computer Inputs --- GRT1, GRT2
Computer Outputs --- GR1, GR2
3- Circuit Conforms to 2.26.9.4: Yes
4-**Test 3**
While the car is stopped at a landing, **CAREFULLY** remove the wire from the "GOV" terminal on the GALX-1038N or GALX-1064AN revision F board or open the Governor Switch manually. Observe that the GR1 and the GR2 Relays de-energize and the Rope

Gripper or Emergency Brake has set. To restore the car to normal operation, replace the wire in the "GOV" terminal or reset the Governor Switch. Place the car on inspection. On the GALX-1021 or GALX-1101AN or GALX-1005AN LCD board use the up or down buttons to access the "Elevator Setup" menu. Use the Up or Down buttons to access the "Reset Rope Gripper" menu. Press and hold the Enter button until the display indicates "Rope Gripper is Reset". Place the car back on automatic mode.

Before the car completes a run in either direction, hold in the GR1 relay. Observe that the car shuts down at the landing with an I/O Error, "GRT1 input on fault" and does not restart. To restore the car to normal operation, release the GR1 relay. Place the car on inspection. Place the car back on automatic mode.

Before the car completes a run in either direction, hold in the GR2 relay. Observe that the car shuts down at the landing with an I/O Error, "GRT1 input on fault" and does not restart. To restore the car to normal operation, release the GR2 relay. Place the car on inspection. Place the car back on automatic mode.

Before the car leaves the floor for a run in either direction, hold in the DZ relay. The detection of the DZ relay dropping out is done while the car is out of the door zone. Observe that the car shuts down after arriving at the next landing with an I/O Error, "GRT2 input on fault" and does not restart. To restore the car to normal operation, release the DZ relay. Place the car on inspection. Place the car back on automatic mode.

Before the car leaves the floor for a run in either direction, hold in the DZ1 relay. The detection of the DZ1 relay dropping out is done while the car is out of the door zone. Observe that the car shuts down after arriving at the next landing with an I/O Error, "GRT2 input on fault" and does not restart. To restore the car to normal operation, release the DZ1 relay. Place the car on inspection. Place the car back on automatic mode.

<u>Gearless Elevators with Traction Sheave Disc type Emergency Brakes:</u>

1-Critical Components: BKA relay
2-Redundant Components: BKB relay, Computer Inputs P/RTL, DEL
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 4**

a) Before the car completes a run in either direction, hold in the BKA contactor. Place a call to another landing. Observe that the car shuts down at the landing and does not restart. To restore the car to normal operation, release the BKA contactor, move the controller inspection switch to the INS position and then back to AUTO.

Before the car completes a run in either direction, hold in the BKB contactor. Place a call to another landing. Observe that the car shuts down at the landing and does not restart. To restore the car to normal operation, release the BKB contactor, move the controller, inspection switch to the INS position and then back to AUTO.

1.2 Solid State Devices

Up and Down Outputs:

1-Critical Components: Computer Outputs --- UP, DNR
2-Redundant Components: Computer Inputs --- UPi, DNRi
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 5**
While the car is stopped at a landing, **CAREFULLY** jump terminal "EN" to terminal "UP" or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST4. **NOTE:** If utilizing the KEB drive, jump terminal "EN/RND to jumper J8 on the GALX-1064AN revision F board instead. Place a call to another landing. Observe that the car shuts down and does not restart. To restore the car to normal operation, move the controller inspection switch to the inspection position, wait ten seconds, then place the controller inspection switch into the auto position.

While the car is stopped at a landing, **CAREFULLY** jump terminal "EN" to terminal "DNR" or if test points are supplied on the GALX-1038N board or GALX-1064AN revision F, jump test point TST5. **NOTE:** If utilizing the KEB drive, jump terminal "EN/RND to jumper J7 on the GALX-1064AN revision F board instead. Place a call to another landing. Observe that the car shuts down and does not restart. To restore the car to normal operation, move the controller inspection switch to the inspection position, wait ten seconds, then place the controller inspection switch into the auto position.

Automatic / Inspection Mode Inputs:

1-Critical Components: Computer Inputs --- AUTO, INS, ACC, MRI, ICI
2-Redundant Components: Computer Inputs --- AUTO, INS, ACC, MRI, ICI
3-Circuit Conforms to 2.26.9.4: Yes

Note: Only one of these inputs can be on at one time, and one of these inputs must be on all the time. If none of these inputs is on a fault occurs. If more than one of these inputs is on at the same time a fault occurs. Three separate means (Safety PIC Processor, Safety PAL, and Main Processor) detect the fault and shut down the car. The "PAL INHIBIT" led and the "PIC INHIBIT" led are located on the GALX-1028N or GALX-1066N board.

4-**Test 6**
While the car is stopped at a landing on Automatic service, **CAREFULLY** remove the wire from terminal "ICA" (in car automatic). Observe that the car shuts down on an inspection fault and does not restart. Observe that the "PAL INHIBIT" led turns on. Observe that the "PIC INHIBIT" led turns on. To restore the car to normal operation, put the wire back into the "ICA" terminal.

While the car is stopped at a landing on Automatic service, **CAREFULLY** jump terminal "SS" to terminal "INS" (car top inspection). Observe that the car shuts down on an inspection fault and does not restart. Observe that the "PAL INHIBIT" led turns on.

Observe that the "PIC INHIBIT" led turns on. To restore the car to normal operation, remove the jumper.

While the car is stopped at a landing on Automatic service, **CAREFULLY** jump terminal "SS" to terminal "ACC" (Access). Observe that the car shuts down on an inspection fault and does not restart. Observe that the "PAL INHIBIT" led turns on. Observe that the "PIC INHIBIT" led turns on. To restore the car to normal operation, remove the jumper.

While the car is stopped at a landing on Automatic service, **CAREFULLY** jump terminal "SS" to terminal "ICI" (in car inspection). Observe that the car shuts down on an inspection fault and does not restart. Observe that the "PAL INHIBIT" led turns on. Observe that the "PIC INHIBIT" led turns on. To restore the car to normal operation, remove the jumper.

Door Lock Circuit and Car Gate Switch Contact Inputs:

1-Critical Components: Computer Inputs --- DLT, DLM, DLB, RLM, GS, RGS, LBP, GBP
2-Redundant Components: Computer Inputs --- DLT-1, DLM-1, DLB-1, GS-1, RLM-1, RGS-1
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 7**

Before the car completes a run to the top floor, **CAREFULLY** jump Pin 12 and Pin 11 on Chip U6 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST6. This jumps out the "DLT" (door lock top Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, DLT DLT-1 Opposite Fault and Top Door Lock Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to the top floor, **CAREFULLY** jump Pin 12 and Pin 11 on Chip U7 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST7. This jumps out the "DLT-1" (door lock top Aux Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, DLT DLT-1 Opposite Fault and Top Door Lock Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to a middle floor, **CAREFULLY** jump Pin 14 and Pin 13 on Chip U6 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST8. This jumps out the "DLM" (door lock middle Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, DLM DLM-1 Opposite Fault and Mid Door Lock Fault. The status will show I/O Error. To restore the car to normal operation,

remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to a middle floor, **CAREFULLY** jump Pin 14 and Pin 13 on Chip U7 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST9. This jumps out the "DLM-1" (door lock middle aux Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, DLM DLM-1 Opposite Fault and Mid Door Lock Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to the bottom floor, **CAREFULLY** jump Pin 16 and Pin 15 on Chip U6 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST10. This jumps out the "DLB" (door lock bottom Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, DLB DLB-1 Opposite Fault and Bot Door Lock Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to the bottom floor, **CAREFULLY** jump Pin 16 and Pin 15 on Chip U7 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST11. This jumps out the "DLB-1" (door lock bottom aux Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, DLB DLB-1 Opposite Fault and Bot Door Lock Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to any floor, **CAREFULLY** jump Pin 16 and Pin 15 on Chip U21 on GALX-1038N board or if test points are supplied on the GALX-1028N or GALX-1066N (Safety Processor) board, jump test point TST12. This jumps out the "GS" (gate switch Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, GS GS-1 Opposite Fault and Gate Switch Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to any floor, **CAREFULLY** jump Pin 14 and Pin 13 on Chip U21 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST13. This jumps out the "GS-1" (gate switch aux Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, GS GS-1 Opposite Fault and Gate Switch Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

While the car is stopped at a landing on Automatic service, move the door lock bypass switch to the bypass position. Observe that the car shuts down on a door lock bypass fault and does not restart. Observe that the "PAL INHIBIT" led turns on. Observe that the "PIC INHIBIT" led turns on. To restore the car to normal operation, move the door lock bypass switch to the open position.
While the car is stopped at a landing on Automatic service, move the car gate bypass switch to the bypass position. Observe that the car shuts down on a car gate bypass fault and does not restart. Observe that the "PAL INHIBIT" led turns on. Observe that the "PIC INHIBIT" led turns on. To restore the car to normal operation, move the car gate bypass switch to the open position.

For Rear Floors if Applicable:
Before the car completes a run to a rear call on a middle floor, **CAREFULLY** jump Pin 10 and Pin 9 on Chip U6 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST14. This jumps out the "RLM" (rear door lock middle Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, RLM RLM-1 Opposite Fault and Rear Mid Lock Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to a rear call on a middle floor, **CAREFULLY** jump Pin 10 and Pin 9 on Chip U7 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST15. This jumps out the "RLM-1" (rear door lock middle aux Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, RLM RLM-1 Opposite Fault and Rear Mid Lock Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to a rear call, **CAREFULLY** jump Pin 16 and Pin 15 on Chip U33 on GALX-1038N board or if test points are supplied on the GALX-1028N or GALX-1066N (Safety Processor) board, jump test point TST16. This jumps out the "RGS" (rear gate switch Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, RGS RGS-1 Opposite Fault and Rear Gate Sw Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

Before the car completes a run to a rear call, **CAREFULLY** jump Pin 14 and Pin 13 on Chip U33 on GALX-1038N board or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST17. This jumps out the "RGS-1" (rear gate switch aux Input). Observe that the car stops, opens the doors, then shuts down and does not restart. Two faults will occur, RGS RGS-1 Opposite Fault and Rear Gate Sw Fault. The status will show I/O Error. To restore the car to normal operation, remove the jumper, place the car on Inspection mode and return the car to automatic mode.

In-Car Stop Switch Bypass:

1-Critical Components: FST
2- Redundant Components: FSTi, FST1
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 8**
While the car is stopped at a landing on Automatic service **CAREFULLY** jump terminal "SFC" to pin 11 on the FST output chip U63 or if test points are supplied on the GALX-1038N or GALX-1064AN revision F board, jump test point TST18. Place a call to another landing. Observe that the car shuts down and does not restart. To restore the car to normal operation, remove the jumper, move the controller inspection switch to the INS position and then back to AUTO.

Computer Hardware:

1-Critical Components: Safety PAL on GALX-1028N or GALX-1066N Board
PIC Processor on GALX-1028N or GALX-1066N Board
GALX-0028N or GALX-1100AN Main Processor
2-Redundant Components: Safety PAL on GALX-1028N or GALX-1066N Board
PIC Processor on GALX-1028N or GALX-1066N Board,
GALX- 0028N or GALX-1100AN Main Processor
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 9**
While the car is stopped at a landing on Automatic service, remove connector "CAN BUS (CANL/CANH)" from the GALX-1028N or GALX-1066N board. Observe the car shuts down on a Safety Processor Communication fault and does not restart. To restore the car to normal operation, replace connector "CAN BUS (CANL/CANH)".

1-Critical Components: Watchdog Timer
2-Redundant Components: Galaxy Elevator Software
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 10**
Put the car on inspection. Push the Up button on the GALX-1021 or GALX-1101AN or GALX-1005AN LCD board to scroll through the menu until "Software Version" is on the screen. Press the enter button. Press the Up button until "Test Watchdog Reset" is on the screen. Press the enter button twice. Observe the LED on the Microprocessor board will stop blinking. After a few seconds the Galaxy power up message should appear on the LCD screen. This test stops petting the watchdog timer, which causes the timer to reset the microprocessor and turn off all outputs. This simulates what would happen if the software system stopped functioning.

1.3 Software System:

1-Critical Components: Galaxy Elevator Software
2-Redundant Components: Watchdog Timer
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 11**

1.4 Leveling Limits:

1-Critical Components: Selector DZ output
2-Redundant Components: Selector DZA output
Computer Input --- DZ, DZA
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 12**
While the car is stopped at a landing, **CAREFULLY** jump terminal "S10" to terminal "DZ" (door zone). Place a call to another landing. Observe that the when the car stops at the next landing and opens the doors, that it shuts down on a door zone fault and does not restart. To restore the car to normal operation, remove the jumper. Place the car on inspection for 10 seconds, and then put the car back onto normal operation.

1.5 Single Ground:

1-Redundant Components: Fuse L1 & Fuse S10
2-Circuit Conforms to 2.26.9.4: Yes
3-**Test 13**
With the "safety string" closed, short terminal "SS" to terminal "GND". Observe that the S10 (and/or L1) fuse clears, and the car will not restart. Replace cleared fuse.

With the doors closed and locked, short terminal "DLM" to terminal "GND". Observe that the S10 (and/or L1) fuse clears, and the car will not restart. Replace cleared fuse.

2. Contactors/Relays used to meet 2.26.8.2 or 2.26.9.3 to 2.26.9.7 & If used for MONITORING Purposes [see2.26.3]- Identify below

2.1 Driving M/C Brake (2.26.8.2)

	Identification	Manufacturer Model
MC	Motor Contactor	ABB Contactor (A16-30-10-84 to A210-30-10-84) or certified equivalent
BRK	Brake Contactor	ABB Contactor (A16-30-10-84 to A210-30-10-84) or certified equivalent
RUN	Run Contactor	ABB Contactor (A16-30-10-84 to A210-30-10-84) or certified equivalent

2.2 Critical Circuits (2.26.9.3)

No relays used for monitoring purposes.

2.3 Redundency Checking (2.26.9.4)

No relays used for monitoring purposes.

2.4 Static Motor Control(2.26.9.5, 2.26.9.6)

	Identification	Manufacturer Model
MC	Motor Contactor	ABB Contactor (A16-30-10-84 to A210-30-10-84) or certified equivalent

3. Additional Protection for Static Motion Drive Control [2.26.9.5 &2.23.9.6]-Identify below

3.1) Two devices/means provided to remove inhibit power [2.26.9.5.1/2.26.9.6.1)

1) MC Contactor by ABB or certified equivalent.
2) HPV600 or HPV900 VVVAC drive by Magnetek
3) Combivert F5 drives by KEB America Inc.

3.2) Contactor / Relay that causes driving machine brake to open [2.26.9.5.3 / 2.26.9.6.4)

1) BRK Contactor by ABB or certified equivalent.

3.3) Additional contactor to open driving machine brake [2.26.9.5.3/2.26.9.6.4)

1) RUN Contactor by ABB or certified equivalent.

4. Ascending Car Overspeed Detection Means

4.1) Identify the detection method used:

1) Governor over-speed switch, device meets 2.26.4.3
2) Main processor on GALX-0028N or GALX-1100AN Board (Uses encoder mounted to motor for feedback). Detection means meet the requirements of 2.19.2.2(a)(1)(b).

4.2) Unintended Movement Detection Means

Identify the detection method used:

1) PIC processor on GALX-1028N or GALX-1066N Board (Uses holes in Selector tape for feedback for tape application or an encoder mounted on the governor or motor for feedback on tapeless application). Detects unintended car movement away from the landing with open door circuits. Detection means meet the requirements of 2.19.2.2(a)(1)(b).
2) Main processor on GALX-0028N or GALX-1100AN Board (Uses encoder mounted to motor for feedback). Detects unintended car movement away from

the landing with open door circuits. Detection means meet the requirements of 2.19.2.2(a)(1)(b).

5. Conformance / Test Procedures required for Electrical Equipment – Indicate / Demonstrate:

5.1) The car will not revert to normal operation[2.26.9.3(d) When on:

1 - Bypass
2 - Access
3 - Inspection
Note: Three separate means; Safety PAL (discrete logic), Safety PIC Processor (software means), and Main Processor (software means) detect the fault and shut down the car. Test 5 demonstrates how to test.

5.2) The door interlocks & contacts will return to effectiveness [2.26.9.3(e)] when these switches are turned off:

1 - Bypass
2 - Access
Note: Three separate means; Safety PAL (discrete logic), Safety PIC Processor (software means), and Main Processor (software means) detect the fault and shut down the car.

5.3) Bypass circuits (if any) meet 2.26.9.3 & .4 (redundancy checking) per 2.26.1.5.3:

1 - Bypass
Note: Three separate means; Safety PAL (discrete logic), Safety PIC Processor (software means), and Main Processor (software means) detect the fault and shut down the car.

6. ETSLD

That the sensing device of ETSLD [2.25.4.1] is independent of the normal speed control system, per 2.25.4.1.2:
Note: The ETSLD is only required when reduced–stroke buffers are used. If this is not the case, skip this test.

Note 1:
The normal speed control system uses a velocity encoder mounted on the governor shaft or motor encoder or perforated tape, which feeds back the speed information to the main processor on the GALX-0028N or GALX-1100AN board, to ensure proper motion of the car. Mechanical or magnetic limit switches are arranged at the terminal limits. Speed and position of the elevator is checked whenever one of these mechanical or magnetic switches open. If the car is not at the correct position or speed when the switch opens the car does an emergency slowdown. The switch position is also verified, after every run into a terminal landing, and if the switch doesn't open the car does an emergency slowdown.

The speed reference used for the ETSLD comes from a second encoder on the governor shaft, motor encoder or an inductive proximity sensor on the selector. The Safety PIC and PAL processor reads the encoder feedback from the governor encoder, motor encoder or an inductive proximity sensor on the selector and position of the emergency terminal stopping switches mounted in the hoist-way. If a fault is detected power is removed from the driving-machine motor and the brake. Separate devices (PIC and PAL), separate hoist-way switches, and separate speed feedback are used to ensure that the sensing device of ETSLD [2.25.4.1] is independent of the normal speed control system, per 2.25.4.1.2. The following tests will verify each emergency terminal limit switch independently. DTS/UTS are monitored by the PIC on the safety processor board and DTS2/UTS2 is monitored by the PAL on the safety processor board. Each device (PIC and PAL) can independently remove power to the brake and machine.

Testing "DTS/DTS2" Down Emergency Terminal Switches (ETSLD):

1) Bottom emergency terminal test, jump the bottom normal terminal slowdown limit switches DT, DT1, DT2, DT3, etc. depending on how many normal slowdown switches the job has to SS (110VAC). Also jump DTS2 on the safety processor board to SS (110VAC). Refer to the job schematics specific terminal wiring locations.

2) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Car Buffer Test" to perform a bottom emergency terminal limit test.

3) Turn off the automatic door switch. To execute the test, the car must be level at the floor and on automatic operation.

4) The test also cannot be started from a terminal landing. If the car is at a terminal landing, the LCD display will show "To position the car press Enter". Pressing "Enter" will place a car call in the middle of the hoist-way. If the car is already positioned properly for the run, the display will give the option to position the car or the skip to the next step.

5) Once the car is located in the correct starting position, select "Run Buffer Test". When the "Enter" button is pressed, the car's position will be modified internally to the top of the hoist-way for a car buffer test. The car will then run once at high speed to the appropriate limit.

6) While the car is in motion, the LCD display will change to "Press Enter Button to Cancel Buffer Test". Pressing the "Enter" button will cause the car to execute an emergency slowdown.

7) Observe that when the DTS switch is activated the car does an emergency stop (removes power from the brake and machine). After the car stops the car will then move to a floor.

8) Repeat tests 2 through 7 to test DTS2 by removing the jumper for DTS2 on the safety processor board and jump DTS on the GALX-1064AN board to SS (110VAC). In step 7 above, observe that when the DTS2 switch is activated the car does an emergency stop (removed power form the brake and machine). After the car stops the car will then move to a floor.

9) **After the test is complete remove all jumpers**.

Testing "UTS/UTS2" Up Emergency Terminal Switch (ETSLD):

1) Top emergency terminal switch test, jump the top normal terminal slowdown limit switches UT, UT1, UT2, UT3 depending on how many normal slowdown switches the job has to SFC (110VAC). Also jump UTS2 on the safety processor board to SS (110VAC). Refer to the job schematics specific terminal wiring locations.

2) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Counterweight Buffer Test" to perform a top emergency terminal limit test.

3) Turn off the automatic door switch. To execute the test, the car must be level at the floor and on automatic operation.

4) The test also cannot be started from a terminal landing. If the car is at a terminal landing, the LCD display will show "To position the car press Enter". Pressing "Enter" will place a car call in the middle of the hoist-way. If the car is already positioned properly for the run, the display will give the option to position the car or the skip to the next step.

5) Once the car is located in the correct starting position, select "Run Buffer Test". When the "Enter" button is pressed, the car's position will be modified internally to the bottom of the hoist-way for a counterweight buffer test. The car will then run once at high speed to the appropriate limit.

6) While the car is in motion, the LCD display will change to "Press Enter Button to Cancel Buffer Test". Pressing the "Enter" button will cause the car to execute an emergency slowdown.

7) Observe that when the UTS switch is activated the car does an emergency stop (removes power from the brake and machine). After the car stops the car will then move to a floor.

8) Repeat tests 2 through 7 for testing UTS2 by removing the jumper for UTS2 on the safety processor board and jump UTS on the GALX-1064AN board to SS (110VAC). In step 7 above, observe that when the UTS2 switch is activated the car does an emergency stop (removed power form the brake and machine). After the car stops the car will then move to a floor.

9) **After the test is complete remove all jumpers**.

The following test will verify 2.25.4.1.9 where magnetically operated, optical, or solid-state devices are used for positon sensing, a single circuit caused by a combination of grounds or by other conditions, or the failure of any single magnetic operated, optical, or solid-state device shall not permit the car to restart after a normal stop.

1) Place the car in the middle of the hoist-way with the doors disabled.
2) Place a jumper from UTS to SS on the GALX-1064AN board. This will simulate a shorted UTS limit switch.
3) Place a car call to the top floor.
4) After the car comes to a normal stop at the top floor verify that the car does not restart.
5) Repeat steps 1 through 4 above except remove the jumper from UTS to SS and place a jumper from UTS2 to SS on the GALX-1066AN board. This will simulate a shorted UTS2 limit switch.
6) Place a jumper from DTS to SS on the GALX-1065AN board. This will simulate a shorted DTS limit switch.
7) Place a car call to the bottom floor.
8) After the car comes to a normal stop at the bottom floor verify that the car does not restart.
9) Repeat steps 6 through 9 above except remove the jumper from DTS to SS and place a jumper from DTS2 to SS on the GALX-1066AN board. This will simulate a shorted DTS2 limit switch.

After the test is complete remove all jumpers.

7. ETSD

That ETSD [2.25.4.2] will cause power to be removed from driving M/C and brake if NSM and NTSD fail to slow car down at a terminal:
Note: Emergency Terminal Stopping Devices are only required on elevators with static control and rated speeds over 1 m/s (200 ft/min). If the job utilizes ETSLD then skip this test.

Note 1:
The normal speed control system uses a velocity encoder mounted on the governor shaft or motor encoder or perforated tape, which feeds back the speed information to the main processor on the GALX-0028N or GALX-1100AN board, to ensure proper motion of the car. Mechanical or magnetic limit switches are arranged at the terminal limits. Speed and position of the elevator is checked whenever one of these mechanical or magnetic switches open. If the car is not at the correct position or speed when the switch opens the car does an emergency slowdown. The switch position is also verified, after every run into a terminal landing, and if the switch doesn't open the car does an emergency slowdown.

The speed reference used for the ETSLD comes from a second encoder on the governor shaft, motor encoder or an inductive proximity sensor on the selector. The Safety PIC and PAL processor reads the encoder feedback from the governor encoder, motor encoder or an inductive proximity sensor on the selector and position of the emergency terminal stopping switches mounted in the hoist-way. If a fault is detected power is removed from the driving-machine motor and the brake.
Separate microprocessors, separate hoist-way switches, and separate speed references are used to ensure that the sensing device of ETSD is independent of the normal speed control system.

Testing "DTS" Down Emergency Terminal Switch (ETSD):

10) Bottom emergency terminal test, jump the bottom normal terminal slowdown limit switches DT, DT1, DT2, DT3, etc. depending on how many normal slowdown switches the job has to SFC (110VAC). Refer to the job schematics specific terminal wiring locations.

11) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Car Buffer Test" to perform a bottom emergency terminal limit test.

12) Turn off the automatic door switch. To execute the test, the car must be level at the floor and on automatic operation.

13) The test also cannot be started from a terminal landing. If the car is at a terminal landing, the LCD display will show "To position the car press Enter". Pressing "Enter" will place a car call in the middle of the hoist-way. If the car is already positioned properly for the run, the display will give the option to position the car or the skip to the next step.

14) Once the car is located in the correct starting position, select "Run Buffer Test". When the "Enter" button is pressed, the car's position will be modified internally to the top of the hoist-way for a car buffer test. The car will then run once at high speed to the appropriate limit.

15) While the car is in motion, the LCD display will change to "Press Enter Button to Cancel Buffer Test". Pressing the "Enter" button will cause the car to execute an emergency slowdown.

16) Observe that when the DTS switch is activated the car does an emergency stop (removes power from the brake and machine). After the car stops (for the "Fault Time" set in the Field Variables-Car Timers menu) the car will then move to a floor.

17) **After the test is complete remove all jumpers**.

Testing "UTS" Up Emergency Terminal Switch (ETSD):

10) Top emergency terminal switch test, jump the top normal terminal slowdown limit switches UT, UT1, UT2, UT3 depending on how many normal slowdown switches the job has to SFC (110VAC). Refer to the job schematics specific terminal wiring locations.

11) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Counterweight Buffer Test" to perform a top emergency terminal limit test.

12) Turn off the automatic door switch. To execute the test, the car must be level at the floor and on automatic operation.

13) The test also cannot be started from a terminal landing. If the car is at a terminal landing, the LCD display will show "To position the car press Enter". Pressing "Enter" will place a car call in the middle of the hoist-way. If the car is already positioned properly for the run, the display will give the option to position the car or the skip to the next step.

14) Once the car is located in the correct starting position, select "Run Buffer Test". When the "Enter" button is pressed, the car's position will be modified internally to the bottom of the hoist-way for a counterweight buffer test. The car will then run once at high speed to the appropriate limit.

15) While the car is in motion, the LCD display will change to "Press Enter Button to Cancel Buffer Test". Pressing the "Enter" button will cause the car to execute an emergency slowdown.

16) Observe that when the UTS switch is activated the car does an emergency stop (removes power from the brake and machine). After the car stops (for the "Fault Time" set in the Field Variables-Car Timers menu) the car will then move to a floor.

17) **After the test is complete remove all jumpers**.

Verify that the version number and the checksum number on the PAL device on the GALX-1066AN board, safety processor board matches the version number and checksum number on the job's attestation sheet.

8. Motor Field Sensing

That motor field sensing protection functions per 2.26.2.4

Not applicable on AC motor applications.

9. NTSD

That the NTSD [2.25.2] function independently of operation of normal stopping means and ETSD per 2.25.2.1.2

1) Put the car on inspection, which will render the normal elevator stopping means inoperative.
2) Remove wire from the UN terminal.
3) Verify that the car will move down and not up.
4) Replace the wire in the UN terminal.
5) Remove wire from the DN terminal.
6) Verify that the car will move up and not down.
7) Replace the wire in the DN terminal.
8) Remove the car from inspection.

For application where DTS and UTS are not required, DTS is jumped to DT and UTS is jumped to UT. Prior to performing the DT and UT test below, remove jumper wire from UTS and DTS and wire UTS and DTS to SFC terminal on the GALX-1064AN revision F board.

For this test only adjust parameters UT Vel and DT Vel on the Safety Processor Board to contract speed. Also on the GALX-1021 or GALX-1101AN or GALX-1005AN LCD board under Elevator Set-up adjust all the normal terminal slowdown speed clamps to contract speed. This will verify that the GALX-0320AN (NTSD board) will slow down the car to the nearest terminal landing.

Testing Down Terminal Slowdown Switch(es) (NTSD):

1. Bottom terminal slowdown test, DT, DT1, DT2, DT3, etc. depending on how many normal slowdown switches the job has. Jump DTS terminal limit to SFC (110VAC). Refer to the job schematics for specific terminal wiring locations.

2. From the Controller's LCD display, select the "Elevator Setup" menu and then select "Car Buffer Test" to perform a bottom normal terminal slowdown test.

3. Turn off the automatic door switch. To execute the test, the car must be level at the floor and on automatic operation.

4. The test also cannot be started from a terminal landing. If the car is at a terminal landing, the LCD display will show "To position the car press Enter". Pressing "Enter" will place a car call in the middle of the hoist-way. If the car is already positioned properly for the run, the display will give the option to position the car or the skip to the next step.

5. Once the car is located in the correct starting position, select "Run Buffer Test". When the "Enter" button is pressed, the car's position will be modified internally to the top of the hoist-way for a car buffer test. The car will then run once at high speed to the bottom terminal limit switch.

6. While the car is in motion, the LCD display will change to "Press Enter Button to Cancel Buffer Test". Pressing the "Enter" button will cause the car to execute an emergency slowdown.

7. Observe that when the down terminal switch(es) is activated that the car does an emergency slowdown and stops at a floor.

8. After the test is complete remove all jumpers.

Testing Up Terminal Slowdown Switch(es) (NTSD):

1) Top terminal slowdown test, UT, UT1, UT2, UT3, etc. depending on how many normal slowdown switches the job has. Jump UTS terminal limit to SFC (110VAC). Refer to the job schematics for specific terminal wiring locations.

2) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Counterweight Buffer Test" to perform a top terminal slowdown limit test.

3) Turn off the automatic door switch. To execute the test, the car must be level at the floor and on automatic operation.

4) The test also cannot be started from a terminal landing. If the car is at a terminal landing, the LCD display will show "To position the car press Enter". Pressing "Enter" will place a car call in the middle of the hoist-way. If the car is already positioned properly for the run, the display will give the option to position the car or the skip to the next step.

5) Once the car is located in the correct starting position, select "Run Buffer Test". When the "Enter" button is pressed, the car's position will be modified internally to the bottom of the hoist-way for a counterweight buffer test. The car will then run once at high speed to the top terminal limit switch.

6) While the car is in motion, the LCD display will change to "Press Enter Button to Cancel Buffer Test". Pressing the "Enter" button will cause the car to execute an emergency slowdown.

7) Observe that when the up terminal switch(es) is activated the car does an emergency slowdown and stops at a floor.

8) After the test is complete remove all jumpers.

9) **For application where DTS and UTS are not required, place the wire jumper from DTS to DT and UTS to UT on the GALX-1064AN revision F board.**

Adjust the UT Vel and DT Vel parameters on the Safety Processor Board back to their original values as well as the terminal speed clamps on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Elevator Set-up.

9. Ascending Car Overspeed Detection

That the car shall stop in compliance with 2.19.1.2(a)(3) and not restart when a fault of detection means [see D.2] occurs.

1) Verify that under "Adjustable Variables", "Car Options", "Griper Spd Trip" is set to a 1. To simulate an over-speed condition, operate the governor mechanism by hand. To restore the car to normal operation, reset the governor over-speed switch. Put the car on inspection mode. If on the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN under Adjustable Variables, Car Options the GOV Grip Trip is set to a 1 then the rope gripper will reset upon reactivation of the governor over-speed switch otherwise on the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN push the up button to go to "Elevator Setup", push the enter button, push the up button to go to the "Reset Rope Gripper" push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Take the car off inspection mode.

2) To perform an over-speed test (on the governor) the mechanic should follow the required precautions and procedures set forth in the local and national elevator codes.
    a. With the car on automatic, run the car to the bottom floor.
    b. If you are using the Magnetek HPV-600/900 drive:
        i. Access the Overspeed Mult parameter (sub menu A1) in the drive and set the % over-speed to 110%.
        ii. Note: On jobs whose contract speed is 100fpm, access the Overspeed Mult parameter (sub menu A1) in the drive and set the % over-speed to 150%. 200 fpm cars may need to be set to 125%.
        iii. If the car does not over-speed from the previous setting, increase the CONTRACT MTR SPD parameter on the drive to the appropriate rpm to achieve the correct over-speed amount (110% to 150% of contract rpm).
        iv. Set the Overspeed Test flag (sub menu U4) in the drive. This will cause the drive to run over speed for one run. If the CONTRACT MTR SPD parameter was used this step can be skipped.
    c. If you are using the KEB Combivert F5 drive:

i. Note what parameters LF.20 and LF.42 are on the drive.
ii. Change LF.20 and LF.42 to 135% of contract speed. This will prevent from the drive tripping out on an overspeed fault.
iii. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under "Adjustable Variables", "Car Motion", record parameter Motor RPM. Change Motor RPM parameter to 125% of its original value. This will overspeed the drive by 125%. If necessary adjust this parameter accordingly in order to overspeed the car. If using an NTSD board, GALX-0320AN, increase motor RPM as well.

d. On the controller main LCD interface, select "Run Overspeed Test" under the Elevator Setup menu. Follow the directions on the LCD display to make sure the automatic door switch is off and the car is level at the floor on automatic operation. Enabling the over-speed test will prevent the CPU from detecting an over-speed condition for one run.
e. Place a car call to run the car in the up direction to perform the over-speed test.
f. Place the car on inspection.
g. If using the HPV-600/900 drive reset the drive CONTRACT MTR SPD to contract speed rpm if value was modified to achieve over-speed condition.
h. If using the Combivert F5 drive, reset parameter LF.20 and LF.42 to their original values as well as the Motor RPM parameter on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under "Adjustable Variables", "Car Motion". If using the GALX-0320AN, NTSD board, restore the motor RPM to its original value.
i. Reset the governor over speed switch.
j. On GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" Menu.
k. On GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board in the "Reset Rope Gripper" Sub menu push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the rope gripper to drop back out.
l. Inspect the elevator and counter weights.
m. Return the car to automatic operation.

3) To perform an over-speed test and to verify that the elevator will be stopped by the Rope Gripper or Emergency Brake only:
   a. With the car on automatic, run the car to the bottom floor.
   b. Place the car on inspection.

c. Disconnect the tape feedback, governor encoder or motor encoder feedback on the GALX-1066N board.
d. Mechanically or electrically pick the Service Brake so when the over-speed switch is activated the elevator will be stopped by the Rope Gripper or Emergency Brake ONLY. If an Emergency Brake is used, hold in the MC contactor, for the duration of the test, to initially pick the Emergency Brake. To pick the Service Brake electrically hold in the BRK and RUN relay simultaneously if the job does not utilize an electronic brake board. For jobs that utilize the electronic brake board on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Lift Brake on Inspect" sub menu. Then press and hold in the UP and ENTER button on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board while holding in the BRK and RUN Contactor to pick the brake. After the car stops, release the MC contactor if being held. Reset the governor over speed switch.
e. On GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" Menu.
f. On GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board in the "Reset Rope Gripper" Sub menu push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the Rope Gripper or Emergency Brake to drop back out.
g. Inspect the elevator and counter weights.
h. Reconnect the tape feedback, governor encoder or motor encoder feedback on the GALX-1066N board.
i. Return the car to automatic operation.

4) To perform an over-speed test on the Main processor on GALX-0028N or GALX-1100AN Board.
   a. With the car on automatic, run the car to the bottom floor.
   b. If you are using the HPV-600/900 drive on the controller main LCD interface, select encoder RPM. Reduce the encoder RPM slightly more than 25%. The Main processor checks for speeds greater than 10%.
   c. If you are using the Combivert F5 drive on the controller main LCD interface, select Encoder PPR or Encoder RPM. Reduce the Encoder PPR or Encoder RPM slightly more than 25%. The main processor checks for speeds greater than 10%
   d. Place a call to run the car in the up direction.
   e. While the car is in motion follow item 3) d to keep the service brake open.
   f. The car will do an emergency stop using the Rope Gripper or Emergency Brake ONLY.
   g. After the car has stopped return the Encoder RPM or Encoder PPR to the normal value.
   h. Place the car on inspection.

i. On GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" Menu
j. On GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board in the "Reset Rope Gripper" Sub menu, push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the Rope Gripper or Emergency Brake to drop back out.
k. Return the car to automatic operation

10. Unintended Movement detection

That the car shall stop in compliance with 2.19.2.2(a)(3) and not restart when a fault of detection means [see D.3] occurs.

Note: If an Emergency Brake is used instead of a Rope Gripper, hold in the MC Contactor for the duration of each following test to initially energize the Emergency Brake. Release the MC Contactor before resetting the fault condition. This will prove the operation of the GR1, GR2, DZ and DZ1 relays to drop the Emergency Brake. Verify that under "Adjustable Variables", "Car Options", "Griper Spd Trip" is set to a 1.

1) With the doors open at bottom landing remove the field wire from the DZ terminal connection. Verify that the Rope Gripper or Emergency Brake will activate. To restore the car to normal operation, replace the wire back into the DZ terminal. Place the car on Inspection operation. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" sub menu. While in the "Reset Rope Gripper" submenu push and h old the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the emergency brake to drop back out. Then place the car back on automatic operation.
2) With the doors open at a middle landing remove the field wire from the DZ terminal connection. Verify that the Rope Gripper or Emergency Brake will activate. To restore the car to normal operation, replace the wire back into the DZ terminal. Place the car on Inspection operation. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" sub menu. While in the "Reset Rope Gripper" submenu push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the Rope Gripper or Emergency Brake to drop back out. Then place the car back on automatic operation.
3) With the doors open at the top landing remove the field wire from the DZ terminal connection. Verify that the Rope Gripper or Emergency Brake will activate. To restore the car to normal operation, replace the wire back into the DZ

terminal. Place the car on Inspection operation. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" sub menu. While in the "Reset Rope Gripper" submenu push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the Rope Gripper or Emergency Brake to drop back out. Then place the car back on automatic operation.

4) **For Rear Floors if Applicable**: With the rear doors open remove the field wire from the DZ terminal connection. Verify that the Rope Gripper or Emergency Brake will activate. To restore the car to normal operation, replace the wire back into the DZ terminal. Place the car on Inspection operation. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" sub menu. While in the "Reset Rope Gripper" submenu push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the Rope Gripper or Emergency Brake to drop back out. Then place the car back on automatic operation.
5) With an empty car, place the elevator at the bottom landing, level with the floor and the front doors open on inspection**. Make sure that someone is outside the elevator at the bottom floor to ensure that no one enters the elevator during this test**. Mechanically or electrically pick the Service Brake. To pick the brake electrically hold in the BRK and RUN relay simultaneously if the job does not utilize an electronic brake board. For jobs that utilize the electronic brake board on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Lift Brake on Inspect" sub menu. Then press and hold in the UP and ENTER button on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board while holding in the BRK and RUN Contactor to pick the brake. This will cause the elevator to roll up with the doors open. Verify that the Rope Gripper or Emergency Brake will activate and stop the car. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" sub menu. While in the "Reset Rope Gripper" submenu push and hold the enter button for 10 seconds. Releasing the enter button before 10 second will cause the Rope Gripper or Emergency brake to drop back out.
6) With 125% load, place the elevator at the top landing, level with the floor and the front doors open on inspection. **Make sure that someone is outside the elevator at the top floor to ensure that no one enters the elevator during this test**. Mechanically or electrically pick the Service Brake. To pick the brake electrically hold in the BRK and RUN relay simultaneously if the job does not utilize an electronic brake board. For jobs that utilize the electronic brake board on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Lift Brake on Inspect" sub menu. Then press and hold in the UP and ENTER button on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board while holding in the BRK and RUN Contactor to pick the brake. This will cause the elevator to roll down with the doors open. Verify that the Rope

Gripper or Emergency Brake will activate and stop the car. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" sub menu. While in the "Reset Rope Gripper" submenu push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the Rope Gripper or Emergency Brake to drop back out.

7) **For Rear Floors if Applicable**: With an empty car, place the elevator at the bottom landing, level with the floor and the rear doors open on inspection**. Make sure that someone is outside the elevator at the bottom floor to ensure that no one enters the elevator during this test**. Mechanically or electrically pick the Service Brake. To pick the brake electrically hold in the BRK and RUN relay simultaneously if the job does not utilize an electronic brake board. For jobs that utilize the electronic brake board on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Lift Brake on Inspect" sub menu. Then press and hold in the UP and ENTER button on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board while holding in the BRK and RUN Contactor to pick the brake. This will cause the elevator to roll up with the doors open. Verify that the Rope Gripper or Emergency Brake will activate and stop the car. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" sub menu. While in the "Reset Rope Gripper" submenu push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the Rope Gripper or Emergency Brake to drop back out.

8) **For Rear Floors if Applicable**: With 125% load, place the elevator at the top landing, level with the floor and the rear doors open on inspection. **Make sure that someone is outside the elevator at the top floor to ensure that no one enters the elevator during this test**. Mechanically or electrically pick the Service Brake. To pick the brake electrically hold in the BRK and RUN relay simultaneously if the job does not utilize an electronic brake board. For jobs that utilize the electronic brake board on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Lift Brake on Inspect" sub menu. Then press and hold in the UP and ENTER button on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board while holding in the BRK and RUN Contactor to pick the brake. This will cause the elevator to roll down with the doors open. Verify that the Rope Gripper or Emergency Brake will activate and stop the car. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board access the "Reset Rope Gripper" sub menu. While in the "Reset Rope Gripper" submenu push and hold the enter button until the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset". Releasing the enter button before the LCD Board GALX-1021AN or GALX-1101AN or GALX-1005AN displays "Rope Gripper is Reset" will cause the Rope Gripper or Emergency Brake to drop back out.

Note: Repeat the above test procedure for all modes of inspection operation applicable. When testing on hoist-way access exclude test 1, 2 and 3 above.

11. Speed in Leveling / truck zone

That the speed is limited to 0.75 m/s (150 fpm) and independent speed control means provided for elevator with static motion control [see2.26.1.6.6.].

Note: The speed reference comes from the Inductive Proximity sensor on the selector for tape application or an encoder mounted on the governor for tapeless application. The normal speed reference comes from the encoder mounted on the motor.

Check Inspection Speed:

1) Place the car on inspection.
2) Change the Inspection speed parameter on the GALX-1028 or GALX-1066 safety processor board to 25 fpm.
3) Run the elevator on inspection and verify the car comes to an immediate stop when the car exceeds 25 fpm. The PAL and PIC LEDs on the GALX-1028 or GALX-1066 safety processor board will come on, if the direction button is pressed for 2 seconds the car restarts.
4) Change the Inspection speed Parameter on the GALX-1028 or GALX-1066 safety processor board back to its original setting.

Check Leveling speed limit:

1) Change the Leveling speed limit parameter on the GALX-1028 or GALX-1066 safety processor board to 0 fpm.
2) On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Adjustable Variables, Car Options set the Preopen Doors option to 1.
3) On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Adjustable Variables, Car Motion set the Preopen Delay to 0.
4) You may have to reduce the leveling speed down to 2fpm.
5) Place a call to a different floor.
6) Verify that the car will come to an immediate stop when the car comes into its destination floor. Observe that the PAL and PIC Inhibit LED's on the GALX-1028 or GALX-1066 safety processor board will come on, and then it will level into the floor.
7) Change the Leveling speed limit parameter on the GALX-1028 or GALX-1066 safety processor board back to its original setting.
8) Change the Preopen Delay parameter and/or leveling speed on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Adjustable Variables, Car Motion back to its original value.

12. Inner Landing Zone Limits

That the inner landing zone is up to 75mm (3 inches) and that the car shall not move with open doors if stopped outside the zone [see 2.26.1.6.7].

1) Run the elevator to the top floor.
    a. Run the elevator down, on inspection, outside the 3 inch door zone.
    b. Open the doors.
    c. Place the elevator on automatic service.
    d. Verify that the car will not move until the doors close.
2) Run the elevator to a middle floor.
    a. Run the elevator, on inspection, outside the 3 inch door zone.
    b. Open the doors.
    c. Place the elevator on automatic service.
    d. Verify that the car will not move until the doors close.
3) Run the elevator to the bottom floor.
    a. Run the elevator up, on inspection, outside the 3 inch door zone.
    b. Open the doors.
    c. Place the elevator on automatic service.
    d. Verify that the car will not move until the doors close.
4) If the elevator has rear doors run the elevator to the rear opening.
    a. Run the elevator on inspection outside the 3 inch door zone.
    b. Open the rear doors.
    c. Place the elevator on automatic service.
    d. Verify that the car will not move until the rear doors close.

13. Both Driving M/C Brake Contactors

Compliance with 2.26.9.5.3 or 2.26.9.6.3.

1) Place a call to another landing. While the car is running, cause the MC contactor to drop out by removing the wire from the A1 side of the MC coil. Verify that when MC drops the brake drops as well. Place the elevator on inspection. Replace the wire in the A1 side of the MC coil and restore the car to automatic operation.
2) Place a call to another landing. While the car is running, cause the RUN contactor to drop out by removing the wire from the A1 side of the RUN coil. Verify that when RUN drops the brake drops as well. Place the elevator on inspection. Replace the wire in the A1 side of the RUN coil and restore the car to automatic operation.
3) Place a call to another landing. While the car is running, cause the BRK contactor to drop out by removing the wire from the A1 side of the BRK coil. Verify that when BRK drops the brake drops but the car will continue to drive through the brake and will eventually cause a drive fault or will stop at the next landing and shutdown with a "Brake Pick Fault". Place the elevator on inspection. Replace the wire in the A1 side of the BRK coil and restore the car to automatic operation.

14. Phase I & II 153.20 Load-Weighing Device

With (100 or 125%) full load in car verify that the load weighing device does not interfere with Phase 1 [2.27.3.1.6] or Phase II [2.27.3.31(i)].

Where applicable, with the car on normal, automatic operation away from the designated level, simulate a full load (method varies according to device used); then activate Phase I and make sure that the car responds in accordance with Phase I requirements.
Where applicable with the car on Phase II operation, simulate a full load (method varies according to device used), and make sure that the car responds in accordance with Phase II requirements.

15. Phase II & Ground

That a ground or short circuit in electrical parts located at landing side of H/W enclosure and associated wiring will not disable Phase II operation after it is activated [2.27.3.4]

1) Determine if controller is supplying high voltage (120vac) or low voltage (24vac) to the smoke detector contacts and Phase 1 switches. If the controller is supplying high voltage, while the car is on Phase II, short to ground the HC terminal in the landing fixture. The HC fuse will clear. Verify that Phase II operation remains unaffected. If the controller is supplying low voltage, while the car is on Phase II, short to ground the FSP24 terminal in the landing fixture. The FSP24 fuse will clear. Verify that Phase II operation remains unaffected.
2) Replace HC fuse, if controller is supplying high voltage. Replace the FSP24 if controller is supplying low voltage.

16. Phase I & II 153.20 Power Off

That the elevator will find its position after power interruption and restoration, as to not be removed from Phase I or II [2.27.3.4]

1) Power off the controller while the car is on Phase I at any floor away from the designated landing. Restore power to the controller. The car will remain on Phase I and proceed to the designated level.
2) Power off the controller while the car is on Phase I at the designated landing. Restore power to the controller. The car will remain on Phase I at the designated landing.
3) Power off the controller at any floor while the car is on Phase II. Restore power to the controller. The car will remain on Phase II at that landing until the firefighter enters a call.
4) Power off the controller while the car is moving between floors and on Phase II. Restore power to the controller. The car will move to an available floor and stop. It will remain on Phase II at that landing until the firefighter enters a call.

17. 2.20.8.1 Protection Against Traction Loss

An encoder on the governor or a tape installed in the hoist-way will provide the velocity-measuring device for the suspension members and an encoder on the motor is used for the velocity measuring device for the drive sheave. The safety processor board and the main CPU will monitor each velocity device independently. If the difference between the velocity on the safety processor board and the main CPU is exceeded by a field adjustable amount, the system will engage the rope gripper or emergency brake, preventing the elevator to move and a manual reset of the elevator controller needs to be performed.

To test the functionality of this operation, set the velocity check parameter to a lower value than normal, run the car and verify that the gripper has tripped. This test can be accomplished using the following steps.

a) Under "Adjustable Variables", "Car Options", set "Slip Vel Diff" parameter to 1. With the car on automatic at the top or bottom landing place a car call.
b) Observe that the GR1 and the GR2 relays de-energize and the Rope Gripper or Emergency Brake has set. To restore the car to normal operation, place the car on inspection. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board use the up or down buttons to access the "Elevator Setup" menu. Use the Up or Down buttons to access the "Reset Rope Gripper/Emergency Brake" menu. Press and hold the Enter button until the display indicates "Rope Gripper or Emergency Brake is Reset".
c) Under "Adjustable Variables", "Car Options", set "Slip Vel Diff" parameter back to its original value.

18. Emergency Power

Were an emergency or standby power system is provided, demonstrate conformance to 2.27.2 by simulation.

Were Applicable, simulate emergency power by jumping terminal HC to terminal EMP. Make sure that the elevator(s) complies with 2.27.2. To restore to normal operation remove jumper from EMP terminal.

19. Power loss brake lift utilizing a UPS for emergency/main brake pick only.

This is in reference to 2.7.6.4 (Means Necessary for Tests) – where direct observation of the elevator drive sheave or ropes is not possible from the location of the means necessary for tests that require movement of the car or release of the driving-machine brake or emergency brake.

Contactors:
MBP – Manual Brake Power
MB2 – Picks Main Brake
MB1 – Picks Emergency Brake
MBC – Manual Brake Contactor

MBC and MC are mechanically interlocked, mutually exclusive.
Before the car completes a run in either direction, hold in the MBP contactor. Place a call to another landing. Observe that the car shuts down at the landing and does not restart. To restore the car to normal operation, release the MBP contactor, move the controller inspection switch to the INS position and then back to AUTO.

Before the car completes a run in either direction, hold in the MB1 contactor. Place a call to another landing. Observe that the car shuts down at the landing and does not restart. To restore the car to normal operation, release the MB1 contactor, move the controller inspection switch to the INS position and then back to AUTO.

Before the car completes a run in either direction, hold in the MB2 contactor. Place a call to another landing. Observe that the car shuts down at the landing and does not restart. To restore the car to normal operation, release the MB2 contactor, move the controller inspection switch to the INS position and then back to AUTO.

Before the car leaves the floor for a run in either direction, hold in the MBC contactor. Place a call to another landing. Observe that the car shuts down at the landing and does not restart. To restore the car to normal operation, release the MBC contactor, move the controller inspection switch to the INS position and then back to AUTO.

Testing the communication from the controller to the UPS. Disconnect the UPS communication cable; Place a car call and verify that the car is out of service and does not leave the floor. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Elevator Status it will indicate "PWL UPS Comm Fault". Connect the UPS communication cable and the elevator will resume back in service.

Testing the UPS battery capacity. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Diagnostics, UPS Comm Status note what the battery capacity is. Then under Adjustable Variables, System Options, set the Low Bat Cap Lev parameter to a value above the battery capacity observed under Diagnostics, UPS Comm Status. Verify that the elevator does not accept car calls and does not start. Also on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Elevator Status it indicates "PWR UPS Fault". Change the parameter for Low Bat Cap Lev back to its original value.

Procedure to electrically picking the main and emergency brake.

1) Make sure the controller is on machine room inspection. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD under Setup select the Power Loss Lift Bake option.
2) Push and hold in the BRK PICK EN button on the controller until the MBP relay picks.
3) Press and hold the UP and Enter button on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board in addition to pushing and holding the EM POWER BRAKE PICK ENABLE button and the main and emergency brake should pick.
4) The leveling zone status, UL, DZ and DL will be displayed on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board indicating when you are at or near a floor and speed and direction will be indicated on the GALX-1066/1028 safety processor board.

20) Power loss brake lift utilizing a UPS for automatic emergency power recover or emergency power generator for emergency/main brake pick only.

This is in reference to 2.7.6.4 (Means Necessary for Tests) – where direct observation of the elevator drive sheave or ropes is not possible from the location of the means

necessary for tests that require movement of the car or release of the driving-machine brake or emergency brake.
Contactors:
MBC – Manual Brake Contactor

MBC and MC are mechanically interlocked, mutually exclusive.

Before the car leaves the floor for a run in either direction, hold in the MBC contactor. Place a call to another landing. Observe that the car shuts down at the landing and does not restart. To restore the car to normal operation, release the MBC contactor, move the controller inspection switch to the INS position and then back to AUTO.

Testing the communication from the controller to the UPS. Disconnect the UPS communication cable; Place a car call and verify that the car is out of service and does not leave the floor. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Elevator Status it will indicate "PWL UPS Comm Fault". Connect the UPS communication cable and the elevator will resume back in service.

Testing the UPS battery capacity. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Diagnostics, UPS Comm Status note what the battery capacity is. Then under Adjustable Variables, System Options, set the Low Bat Cap Lev parameter to a value above the battery capacity observed under Diagnostics, UPS Comm Status. Verify that the elevator does not accept car calls and does not start. Also on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board under Elevator Status it indicates "PWR UPS Fault". Change the parameter for Low Bat Cap Lev back to its original value.

Procedure to electrically picking the main and emergency brake.
1) Make sure the controller is on machine room inspection. On the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD under Setup select the Power Loss Lift Bake option.
2) Press and hold the UP and Enter button on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board and the main and emergency brake should pick.
3) The leveling zone status, UL, DZ and DL will be displayed on the GALX-1021AN or GALX-1101AN or GALX-1005AN LCD board indicating when you are at or near a floor and speed and direction will be indicated on the GALX-1066/1028 safety processor board.

21) Verification of version and checksum on PAL device of safety processor board.

Verify that the version number and the checksum number on the PAL device on the GALX-1066AN board, safety processor board are V1.00 and 0031E88E respectively.

End of Document.

Revision history: version 1.08

Added 2.20.8.1 requirement on page 24.

Reason: New 2010 code requirement.

Renumbered test procedures.

Revision history: version 1.08a

Revised language in test procedure number 16, code requirement 2.27.3.4 on page 24.

Reason: Provide language to test for low voltage option.

Revision history: version 1.08b

Revised language in test procedure 18, code requirement 2.20.8.1 on page 25 from

a) Under "Adjustable Variables", "Car Options", set "Slip Vel Diff" parameter between 1 and 10.

to:

a) Under "Adjustable Variables", "Car Options", set "Slip Vel Diff" parameter to 1.

Also added item number 3 and 7 under test procedure 12 – Speed in Leveling/ truck zone; Check Leveling Speed Limit on page 22.

Revision history: version 1.08c

Revised language in test procedure 11, Unintended Movement detection, page 22.

From:

Note: Repeat the above test procedure for all modes of inspection operation applicable. When testing on hoist-way access exclude test 1 and 3 above.

To:

Note: Repeat the above test procedure for all modes of inspection operation applicable. When testing on hoist-way access exclude test 1, 2 and 3 above.

Reason: This test will be done under test 5 and 6 under test procedure 11.

Revision history: version 1.08d

Included the revision number for the "GALX-1064AN revision F" within the test procedure.

Revision history: version 1.08e

Update test procedure to include GALX-0320AN board (NTSD Board) on pages 15 through 17.

Revision history: version 1.08f

Included verification of version number and checksum on PAL device on the GALX-1066AN Safety Processor Board on page 14.

Revision history: version 1.08g

Revised language in test procedure for the down and up terminal slowdown switches on pages 15 and 16.

Revision history version 1.08h

Revised test procedure 9.4 e) which references 3c. test 9.4 e) should reference 3d. on page 19 of the over-speed test for the KEB drive. Included reference for speed feedback for the safety processor board to include motor encoder.

Revision history version 1.08i

Revised test procedure to include testing of ETSLD function.
Included reference for GALX-1101AN, GALX-1005AN and GALX-1100AN boards.

Revision history version 1.08j

Updated test procedure to reference Motor RPM parameter instead of Encoder RPM when performing overspeed test9.2.c.iii, and added Encoder RPM parameter in overspeed test 9.2.4.c
Included verbiage for NTSD board.

Revision history version 1.08k

Added test procedure test 20 to include testing 2.7.6.4 utilizing a UPS for automatic emergency power recover or emergency power generator for emergency/main brake pick only

Revision history version 1.08L

On page 30, test 19, 2) changed MBP button to BRK PICK EN and also on page 30, test 19, 3) added requirement to also push and hold EM POWER BRAKE PICK ENABLE button in order to lift the main and emergency brake.