GALAXY IV Controller Conformance Document and Compliance Test Procedure

Galaxy IV VVVF Geared Combivert F5 drive with Rope Gripper Traction Elevator Controller
Galaxy IV VVVF Gearled Combivert F5 drive with Emergency Brake Traction Elevator Controller
Galaxy IV VVVF Gearless Combivert F5 drive with Rope Gripper Traction Elevator Controller
Galaxy IV VVVF Gearless Combivert F5 drive with Emergency Brake Traction Elevator Controller
Galaxy IV VVVF Geared Magnetek AC drives with Rope Gripper Traction Elevator Controller
Galaxy IV VVVF Gearled Magnetek AC drives with Emergency Brake Traction Elevator Controller
Galaxy IV VVVF Gearless Magnetek AC drives with Rope Gripper Traction Elevator Controller
Galaxy IV VVVF Gearless Magnetek AC drives with Emergency Brake Traction Elevator Controller

The following procedure describes the methods used to test the controller for compliance to the CAN/CSA B44-2013 code.

Note: All test jumpers are on the GALX-1102AN main I/O board.

1. Redundancy & Monitoring in critical Circuits 2.26.9.3 & 2.26.9.4

1.1. Magnetically Operated Devices

<u>Motor Contactor:</u>

1-Critical Components: MC
2-Redundant Components: Computer Inputs --- P, 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 detected all three times. The elevator status will show I/O Error when the test is complete.

Hold in the MC contactor. Place a call to another landing. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, release the MC contactor, move the controller inspection switch to the INSP position and then back to NORM.

CAREFULLY jump test point TST2 (this jumps out the MCC output). Place a call to another landing. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, **CAREFULLY** remove the jumper on TST2 move the controller inspection switch to the INSP position and then back to NORM.

CAREFULLY jump test point TST3 (this jumps out the MCA output). Place a call to another landing. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, **CAREFULLY** remove the jumper on TST3, move the controller inspection switch to the INSP position and then back to NORM.

<u>Brake Contactors:</u>

1-Critical Components: BRK, RUN
2-Redundant Components1   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 detected all three times. The elevator status will show I/O Error when the test is complete.

CAREFULLY Hold in the BRK contactor manually or by placing the BRK test switch to the TEST position. Place a call to another landing. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, **CAREFULLY** place the BRK test switch to the NORM position, then move the controller inspection switch to the INSP position and then back to NORM.

While the car is stopped at a landing, **CAREFULLY** jump test point TST1 (this jumps out the drive on output from the drive). Place a call to another landing. If the drive gets a contactor fault during this test, wait for the drive to reset and then reenter the call. Allow three attempts or sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove the jumper from the TST1 test point, then move the controller inspection switch to the INSP position and then back to NORM.

CAREFULLY Hold in the RUN contactor manually or by placing the RUN test switch to the TEST position. Place a call to another landing. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor.   To restore the car to normal operation, CAREFULLY place the RUN test switch to the NORM position, then move the controller inspection switch to the INSP position and then back to NORM.

While the car is stopped at a landing, **CAREFULLY** jump test point TST19 (this jumps out the RUN output). Place a call to another landing. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor.   To restore the car to normal operation, remove the jumper from the TST19 test point, then move the controller inspection switch to the INSP position and then back to NORM.

While the car is stopped at a landing, **CAREFULLY** jump test point TST20 (this jumps out the RUNA output). Place a call to another landing. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove the jumper from the TST20 test point, then move the controller inspection switch to the INSP position and then back to NORM.

Relays:

1-Critical Components: GR1, GR2, DZ, DZ1, SFC, PFC
2-Redundant Components Computer Inputs --- GRT1, GRT2, SFCi, PFCi
                 Computer Outputs --- GR1, GR2, SFC, PFC
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-M2" terminal or open the Governor Switch manually. Observe that the GR1 and the GR2 Relays de-energize and the Rope Gripper or Emergency Brake drops. To restore the car to normal operation , if the "GOV Gripper/EBK" parameter in the "Car Options" menu is set to 1, replace the wire in the "GOV-M2" terminal or reset the Governor Switch. To restore the car to normal operation , if the "GOV Gripper/EBK" parameter in in "Car Options" menu is set to a 0, replace the wire in the "GOV-M2" terminal or reset the Governor Switch, and then perform the following tasks. Place the car on inspection. Access the "Elevator Setup" menu. Access the "Reset Gripper/EBK Fault" menu. Press and hold the Enter button until the display indicates "Rope Gripper is Reset". Place the car back on automatic mode.

Move the controller, inspection switch to the INSP position, CAREFULLY jump test point TST21 (this holds in the GR1 relay). Move the controller inspection switch to the NORM position. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove the TST21 jumper. Move the controller, inspection switch to the INSP position and then back to NORM.

Move the controller, inspection switch to the INSP position, CAREFULLY jump test point TST22 (this holds in the GR2 relay). Move the controller inspection switch to the NORM position. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove the TST22 jumper. Move the controller, inspection switch to the INSP position and then back to NORM.

Move the controller, inspection switch to the INSP position, CAREFULLY jump test point TST23 (this holds in the PFC relay). Move the controller inspection switch to the NORM position. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove the TST23 jumper. Move the controller, inspection switch to the INSP position and then back to NORM.

Move the controller, inspection switch to the INSP position, CAREFULLY jump test point TST24 (this holds in the SFC relay). Move the controller inspection switch to the NORM position. Allow sufficient time for the error condition to be detected all three

times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove the TST24 jumper. Move the controller, inspection switch to the INSP position and then back to NORM.

Jump TST25 which holds in the DZ relay. Place a call to another landing. 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" and does not restart. To restore the car to normal operation, remove the TST25 jumper. Move the controller, inspection switch to the INSP position and then back to NORM.

Jump TST26 which holds in the DZ1 relay. Place a call to another landing. 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" and does not restart. To restore the car to normal operation, remove the TST26 jumper. Move the controller, inspection switch to the INSP position and then back to NORM.

Gearless Elevators with Traction Sheave Disc type Emergency Brakes:

1-Critical Components: EBK relay
2-Redundant Components:EBK1 relay, Computer Inputs P
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 4**
Before the car completes a run in either direction, hold in the EBK contactor manually or by placing the BRK test switch, on the emergency brake board, to the TEST position. 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 EBK contactor or place the BRK test switch, on the emergency brake board, to the NORM positon, then move the controller inspection switch to the INSP position and then back to NORM.

Before the car completes a run in either direction, hold in the EBK1 contactor manually or by placing the RUN test switch, on the emergency brake board, to the TEST position. 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 EBK1 contactor or place the RUN test switch, on the emergency brake board, to the NORM positon, then move the controller inspection switch to the INSP position and then back to NORM.

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 test point TST4 (this jumps out the UP output). Place a call above. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor.   To restore the car to normal operation, remove the jumper from the TST4 test point, then move the controller inspection switch to the INSP position and then back to NORM.

While the car is stopped at a landing, CAREFULLY jump test point TST5 (this jumps out the DNR output). Place a call below. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor.   To restore the car to normal operation, remove the jumper from the TST5 test point, then move the controller inspection switch to the INSP position and then back to NORM.

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.

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 and does not restart. Observe that the "SAF-PROC FAULT" led turns on. Observe that the "SAF-PAL FAULT" led turns on. The elevator status screen will show "Inspection Input Flt" and then "Invalid Inspect Input". 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 "CTA" to terminal "INS" (car top inspection). Observe that the car shuts down and does not restart. Observe that the "SAF-PAL FAULT" led turns on. Observe that the "SAF-PROC FAULT" led turns on. The elevator status screen will show "Inspection Input Flt". To restore the car to normal operation, remove the jumper.

While the car is stopped at a landing on Automatic service, **CAREFULLY** jump terminal "HSS" to terminal "ACC" (Access). Observe that the car shuts down and does not restart. Observe that the "SAF-PAL FAULT" led turns on. Observe that the "SAF-PROC FAULT" led turns on. The elevator status screen will show "Inspection Input Flt". To restore the car to normal operation, remove the jumper.

While the car is stopped at a landing on Automatic service, **CAREFULLY** jump terminal "ICA" to terminal "ICI" (in car inspection). Observe that the car shuts down and does not restart. Observe that the "SAF-PAL FAULT" led turns on. Observe that the "SAF-PROC FAULT" led turns on. The elevator status screen will show "Inspection Input Flt". 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**

With the car at the top access floor, **CAREFULLY** jump test point TST6. This jumps out the "DLT" (door lock top Input). Register a call to the top access floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST6 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

With the car at the top access floor, **CAREFULLY** jump test point TST7. This jumps out the "DLT-1" (door lock top Aux Input). Register a call to the top access floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST7 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

With the car at a non-access floor, **CAREFULLY** jump test point TST8. This jumps out the "DLM" (door lock middle Input). Register a call at that floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST8 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

With the car at a non-access floor, **CAREFULLY** jump test point TST9. This jumps out the "DLM-1" (door lock middle Aux Input). Register a call at that floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on

status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST9 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

With the car at the bottom access floor, **CAREFULLY** jump test point TST10. This jumps out the "DLB" (door lock bottom input). Register a call to the bottom access floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST10 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

With the car at the bottom access floor, **CAREFULLY** jump test point TST11. This jumps out the "DLB-1" (door lock bottom Aux Input). Register a call to the bottom access floor call to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST11 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

At a floor, **CAREFULLY** jump test point TST12. This jumps out the "GS" (gate switch Input). Register a call at that floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST12 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

At a floor, **CAREFULLY** jump test point TST13. This jumps out the "GS-1" (gate switch Aux Input). Register a call at that floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST13 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

At a floor on Automatic service, move the DOOR LOCK(S) "BYPASS HOISTWAY" switch to the bypass position. Verify the car will not move to another floor. Observe that the "SAF-PAL FAULT" led turns on. Observe that the "SAF-PROC FAULT" led turns on. Verify the car will not move to another floor. To restore the car to normal operation, move the DOOR LOCK(S) "BYPASS HOISTWAY" switch to the OFF position.

At a floor on Automatic service, move the DOOR LOCK(S) "BYPASS CAR" switch to the bypass position. Observe that the car shuts down and does not restart. Observe that the "SAF-PAL FAULT" led turns on. Observe that the "SAF-PROC FAULT" led turns on. Verify the car will not move to another floor. To restore the car to normal operation, move the DOOR LOCK(S) "BYPASS CAR" switch to the OFF position.

For Rear Floors if Applicable:

With the car at a non-access floor, **CAREFULLY** jump test point TST14. This jumps out the "RLM" (rear door lock middle input). Register a call at that floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST14 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

With the car at a non-access floor, **CAREFULLY** jump test point TST15. This jumps out the "RLM-1" (rear door lock middle Aux Input). Register a call at that floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST15 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

With the car at a floor, **CAREFULLY** jump test point TST16. This jumps out the "RGS" (rear gate switch Input). Register a call at that floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST16 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

With the car at a floor, **CAREFULLY** jump test point TST17. This jumps out the "RGS-1" (rear gate switch Aux Input). Register a call at that floor to open the doors. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST17 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

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**
At a floor, **CAREFULLY** jump test point TST18. This jumps out the "FST" (Fire Fighter Stop Switch Bypass Output). Place a call to another landing. Allow sufficient time for the error condition to be detected all three times. The elevator status will show "I/O Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor. To restore the car to normal operation, remove TST18 jumper, move the controller inspection switch, to the INSP position and then back to NORM.

Computer Hardware:

1-Critical Components: Safety PAL
                                    PIC Processor
                                    Main Processor
2-Redundant Components: Safety PAL
                                    PIC Processor
                                    Main Processor
3-Circuit Conforms to 2.26.9.4: Yes
4-**Test 9**
At a landing on Automatic service, remove jumpers J51 and J52, "SP CAN EN". This will disconnect the "CAN BUS" from the safety processor. The elevator status will show "Saf Proc Com Error" when the test is complete (as seen on status screen). Verify the car will not move to another floor.   To restore the car to normal operation, replace jumpers J51 and J52, "SP CAN EN".

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 10**
Put the car on machine room inspection. Access the "Software Utilities" menu. Access the "Test Watchdog Reset" sub-menu. Follow the instructions on the screen. The Galaxy power up message "GALaxy Initialization" should appear on the LCD screen for a moment. This test stops resetting 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.

1.4. 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 11**
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 landing and opens the doors, that it shuts down and does not restart. The elevator status will show "Door Zone Fault". To restore the car to normal operation, remove the jumper. Move the controller inspection switch, to the INSP position and then back to NORM.

1.5. Single Ground:
1-Redundant Components:L1circuit breaker & Fuse S10
2-Circuit Conforms to 2.26.9.4: Yes
3-**Test 12**

With the "safety string" closed, short terminal "SFC" to terminal "GND". Observe that the S10 fuse (and/or L1/L2 circuit breaker) 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 fuse (and/or L1/L2 circuit breaker) 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 and if used for MONITORING Purposes [see2.26.3]-Identify below

2.1. Driving-Machine Brake (2.26.8.2)

	Identification	Manufacturer	Model
MC or ME	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 ABB Contactor (B7-30) or certified equivalent	
RUN	Run Contactor	ABB Contactor (A16-30-10-84 to A210-30-10-84) or ABB Contactor (B7-30) or certified equivalent	

2.2. Critical Circuits (2.26.9.3)
MC Normally Closed Contact, BRK Normally Closed Contact and RUN Normally Closed Contact used for monitoring purposes. See Section 1.1, Test 1 and 2.

2.3. Redundancy Checking (2.26.9.4)
MC Normally Closed Contact, BRK Normally Closed Contact and RUN Normally Closed Contact used for monitoring purposes. See Section 1.1, Test 1 and 2.

2.4. Static Motor Control (2.26.9.5, 2.26.9.6)

	Identification	Manufacturer	Model
MC or ME	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 &2.26.9.6]-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) Motor Drive (i.e., Combivert F5 drives by KEB America Inc., Quattro /HPV-900/M1000 drives by Magnetek Inc.)

3.2. Contactor / Relay that causes driving machine brake to open [2.26.9.5.4/ 2.26.9.6.4)

1) BRK Contactor by ABB or certified equivalent.

3.3. Additional contactor to open driving machine brake [2.26.9.5.4/2.26.9.6.4)

1) RUN Contactor by ABB or certified equivalent.

4. Conformance and Test Procedures for Electrical Equipment

4.1. Controller Conformance for Independent Speed Feedback and Control

The Main processor uses an encoder mounted to the motor, an inductive proximity sensor on the selector, or an encoder mounted to the governor for feedback. Its feedback will be from a different source than the Safety processor. The Main processor controls the normal speed of the elevator.

The Safety processor (labeled SAF-PROC on the Main I/O board) uses an inductive proximity sensor on the selector, or an encoder mounted on the motor for speed feedback. Its feedback will be from a different source than the Main processor. The Safety processor monitors the speed of the car independent of the Main processor. If the Safety processor detects a velocity fault condition, it will drop the SFC relay causing power to be removed from the driving machine and brake.

The Safety PAL device (hardware device labeled as SAF-PAL on the Main I/O board) uses an inductive proximity sensor on the selector, or an encoder mounted on the motor for speed feedback. Its feedback will be from a different source than the Main processor. It also receives a hardware signal from the Safety Processor that indicates that the car velocity is greater than 150 fpm. The Safety PAL logic independently detects fault conditions and also shuts down the car by removing power from the driving machine and brake.

The NTS processor (labeled NTS-PROC on the Main I/O board) uses an inductive proximity sensor on the selector, or an encoder mounted on the motor for speed feedback. The NTS processor independently verifies the speed of the car when the normal terminal limits are hit. It controls an output to the Drive that is turned off when a normal terminal

limit fault occurs causing the Drive to follow its own speed profile to slowdown and stop the car.

4.2. The car will not revert to normal operation when on Gate or Lock Bypass, Access or Inspection Operation [2.26.9.3(d)].

Conformance:

Three separate means; SAF-PAL (discrete logic), SAF-PROC (software means), and Main Processor (software means) detect the fault and shut down the car.

Test 6 above demonstrates how to test.

4.3. The door interlocks & contacts will return to effectiveness when either a Gate or Lock Bypass switch or Access switches is turned off [2.26.9.3(e)].

Conformance:

Three separate means; SAF-PAL (discrete logic), SAF-PROC (software means), and Main Processor (software means) detect the fault and shut down the car.

Test 7 above demonstrates how to test.

4.4. Bypass circuits (if any) meet 2.26.9.3 & 2.26.9.4 (redundancy checking) per 2.26.1.5.3 for Gate or Lock Bypass

Conformance:

Three separate means; SAF-PAL (discrete logic), SAF-PROC (software means), and Main Processor (software means) detect the fault and shut down the car.

Test 7 above demonstrates how to test.

4.5. Installation of Capacitors or Other Devices to Make Electrical Protective Devices Ineffective [2.26.7]

Conformance:

No field adjustable variable or board jumpers will disable an electrical protective device except as required for testing as per 8.6.1.6.1.

The Configuration File setting (factory set) for Rear Door Operation and Parameter setting for Rear Door on the Safety Processor must match to allow car to run.
The Configuration File setting (factory set) for Reduced Stroke Buffer, Parameter setting for Safety Processor and Jumper setting for Safety PAL must match to allow car to run.

Test Rear Door Parameter Where Applicable

1) Place the car on Machine Room Inspection.
2) On job with rear door, change rear door parameter on safety processor to front door. The Safety PAL and Safety Processor Fault LEDs will light.
3) Verify that the car does not run from the inspection run buttons.
4) Restore Parameter to original value.

Test Reduced Stroke Buffer Parameter and Jumper Where Applicable

1) Place the car on Machine Room Inspection.
2) On job with Reduce Stroke Buffer, remove the Reduced Stroke Buffer jumper from the Main I/O board. The Safety PAL and Safety Processor Fault LEDs will light.
3) Verify that the car does not run from the inspection run buttons.
4) Replace the jumper.
5) Change the Safety Processor Parameter for Reduced Stroke Buffer to Normal Buffer. The Safety PAL and Safety Processor Fault LEDs will light.
6) Verify that the car does not run from the inspection run buttons.
7) Restore the Parameter to back to Reduced Stroke Buffer.

4.6. 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:

Conformance:

The ETSLD is only required when reduced stroke buffers are used. If this is not the case, skip this test.

The SAF-PROC processor reads the sensor 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, brake and the emergency brake.

The SAF-PAL also monitors speed and the emergency terminal stopping switches mounted in the hoist-way and can remove power from the driving-machine motor and brake independent of the SAF-PROC.

Separate speed verification (microprocessor and discrete logic), separate hoist-way switches, and separate speed references 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. For redundancy, two separate magnetic switches are used for the ETSLD function, per 2.25.4.1.9.

Testing ETSLD at the bottom terminal landing:

1) Prior to the test, the "Learn Limit Velocities" and "ETSLD Setup" procedures must be completed. Verify that the "ETSLD TEST" jumper is removed from the 1102 board, and that the "Safety Proc Adj Vars" parameter "ETS Setup Mode = 0". This test will be run twice, once with the "ETS" input jumped out and the second time with the "DTS" input jumped out.

2) Position the car at an intermediate floor where the "ETS" input is on. Install a temporary jumper from the "ETS" terminal to the "S10" terminal on the 1102 board. This will prove that the function operates properly if the "ETS" input fails in the "ON" state.

3) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Emergency Term SD Test". Follow the instructions displayed to run the car in the down direction. Keep in mind that when switching the car from inspection to normal, there will be a 5 second delay. When the test is initiated the car will run to the bottom terminal landing. When the remaining ETSLD switch (DTS or ETS) that is not jumped is actuated, power will be removed from the driving-machine motor, driving-machine brake, and emergency brake.

4) Observe that when the (DTS or ETS) switch is activated the car does an emergency stop (removes power from the brake, emergency 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.

5) Remove the temporary jumper from the "ETS" terminal to the "S10" terminal on the 1102 board. Position the car at an intermediate floor where the "DTS" input is on. Install a temporary jumper from the "DTS" terminal to the "S10" terminal on the 1102 board. Repeat procedure in steps 2 through 4.

6) Remove the temporary jumper from the "DTS" input. Run the car to the bottom landing. Momentarily jump the "ETS" input to S10. A "Terminal Limit Flt" status will be displayed on the status screen and an "ETS Failed On Bot Fl" will be recorded in the fault log. Verify that the car is not allowed to run from the floor. To restore the car to normal operation, move the controller inspection switch, to the INSP position and then back to NORM.

7) With the car at the bottom landing, momentarily jump the "DTS" input to S10. A "Terminal Limit Flt" status will be displayed on the status screen and an "DTS Failed On Fault" will be recorded in the fault log. Verify that the car is not

allowed to run from the floor. To restore the car to normal operation, move the controller inspection switch, to the INSP position and then back to NORM.

8) After tests are complete remove all jumpers.

Testing ETSLD at the top terminal landing:

1) Prior to the test, the "Learn Limit Velocities" and "ETSLD Setup" procedures must be completed. Verify that the "ETSLD TEST" jumper is removed from the 1102 board, and that the "Safety Proc Adj Vars" parameter "ETS Setup Mode = 0". This test will be run twice, once with the "ETS" input jumped out and the second time with the "UTS" input jumped out.

2) Position the car at an intermediate floor where the "ETS" input is on. Install a temporary jumper from the "ETS" terminal to the "S10" terminal on the 1102 board. This will prove that the function operates properly if the "ETS" input fails in the "ON" state.

3) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Emergency Term SD Test". Follow the instructions displayed to run the car in the up direction. Keep in mind that when switching the car from inspection to normal, there will be a 5 second delay. When the test is initiated the car will run to the top terminal landing. When the ETSLD switch is actuated, power will be removed from the driving-machine motor, driving-machine brake, and emergency brake.

4) Observe that when the (UTS or ETS) switch is activated the car does an emergency stop (removes power from the brake, emergency 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.

5) Remove the temporary jumper from the "ETS" terminal to the "S10" terminal on the 1102 board. Position the car at an intermediate floor where the "UTS" input is on. Install a temporary jumper from the "UTS" terminal to the "S10" terminal on the 1102 board. Repeat procedure in steps 2 through 4.

6) Remove the temporary jumper from the "UTS" input. Run the car to the top landing. Momentarily jump the "ETS" input to S10. A "Terminal Limit Flt" status will be displayed on the status screen and an "ETS Failed On Top Fl" will be recorded in the fault log. Verify that the car is not allowed to run from the floor. To restore the car to normal operation, move the controller inspection switch, to the INSP position and then back to NORM.

7) With the car at the top landing, momentarily jump the "UTS" input to S10. A "Terminal Limit Flt" status will be displayed on the status screen and an "UTS Failed On Fault" will be recorded in the fault log. Verify that the car is not allowed to run from the floor. To restore the car to normal operation, move the controller inspection switch, to the INSP position and then back to NORM.

8) After tests are complete remove all jumpers.

4.7. ETSD – That ETSD [2.25.4.2] will cause power to be removed from the driving-machine motor and brake if the Normal Slowdown Means and the Normal Terminal Slowdown Device fails to slow the car down at a terminal as intended:

<u>Conformance:</u>

Emergency Terminal Stopping Devices are only required on elevators with static control and rated speeds over 1 m/s (200 ft/min). Elevators that already have Emergency Terminal Speed Limiting Devices are not required to also have Emergency Terminal Stopping Devices.

Magnetic limit switches are arranged at the terminal limits. The Main Processor checks the speed and position of the elevator whenever one of these magnetic switches opens. If a velocity or position fault is detected, it will do an emergency slowdown to the next floor.

The Safety Processor monitors the speed at which the UTS and DTS switches are activated. If the car is above the set speed when the UTS or DTS switches opens, the SAF-PROC processor removes power from the driving machine and brake.

If reduced stroke buffer skip this test because ETSLD test was performed.

Testing ETSD at the bottom terminal landing:

1) Prior to the test, the "Learn Limit Velocities" procedure must be completed. Verify that the limit trip velocities are valid. This can be done by verifying that the "Adjustable Variables" -> "Safety Proc Adj Vars" -> "DTS Velocity is less than contract speed.
2) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Emergency Term SD Test". Follow the instructions displayed to run the car in the down direction. Keep in mind that when switching the car from inspection to normal, there will be a 5 second delay. When the test is initiated the car will run to the bottom terminal landing.
3) When the ETSD switch "DTS" is actuated, verify that power is removed from the driving-machine motor and brake. After the car stops (for the "Fault Time" set in the Field Variables-Car Timers menu) the car will then move to a floor.

Testing ETSD at the top terminal landing:

1) Prior to the test, the "Learn Limit Velocities" procedure must be completed. Verify that the limit trip velocities are valid. This can be done by verifying that the "Adjustable Variables" -> "Safety Proc Adj Vars" -> "UTS Velocity is less than contract speed.
2) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Emergency Term SD Test". Follow the instructions displayed to run the

car in the up direction. Keep in mind that when switching the car from inspection to normal, there will be a 5 second delay. When the test is initiated the car will run to the top terminal landing.

3) When the ETSD switch "UTS" is actuated, verity that power is removed from the driving-machine motor and brake. After the car stops (for the "Fault Time" set in the Field Variables-Car Timers menu) the car will then move to a floor.

4.8. Motor Field Sensing – **That motor field sensing protection functions per 2.26.2.4**

Not applicable on AC motor applications.

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

<u>Conformance:</u>

The Normal Terminal Slowdown signals come from magnetic switches in the hoist way. It functions independently from the Safety processor and Main processor. If the elevator activates the terminal switches above the learned velocity, the NTS processor will turn off the NTSD outputs. The NTSD output feeds an Emergency Slowdown input on the drive. When the input goes out on the drive the drive will do an emergency slowdown specified by its own internal rate. The elevator will slow down to the drives internal leveling speed and stop at the terminal landing.

<u>Test the Top and Bottom Normal Limits:</u>

1) Position the car at the bottom floor.
2) Put the car on inspection, which will render the normal elevator stopping means inoperative.
3) Run the car down on inspection until it stops. Notice the DN led should be off.
4) Put the car on Automatic and position the car at the top floor.
5) Put the car on inspection, which will render the normal elevator stopping means inoperative.
6) Run the car up on inspection until it stops. Notice the UN led should be off.
7) Remove the car from inspection.

<u>Testing NTSD at the bottom terminal landing:</u>

1) Prior to the test, the "Learn Limit Velocities" procedure must be completed. Verify that the limit trip velocities are valid. . This can be done by verifying that the "Adjustable Variables" -> "NTS Proc Adj Vars" -> "DT's" Velocities are less than contract speed.

2) Also verify that the drive is setup with the correct emergency speed profile parameters and will perform a slowdown when the NTSD signal to the drive is removed.
3) Jump UTS, DTS and ETS (if applicable) inputs on the 1102 main I/O board to S10.
4) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Normal Terminal SD Test". Follow the instructions displayed to run the NTSD Test in the down direction. Do not select the NTSD Trip function. Keep in mind that when switching the car from inspection to normal, there will be a 5 second delay. When the test is initiated the car will run to the bottom terminal landing.
5) Observe that when the DT switch furthest from the landing activates, the car will do an emergency slowdown and stop at or near the landing. When the test is complete the LCD display should read "Limit Test Complete Press Mode for Menu".

Testing NTSD at the top terminal landing:

1) Prior to the test, the "Learn Limit Velocities" procedure must be completed. Verify that the limit trip velocities are valid. . This can be done by verifying that the "Adjustable Variables" -> "NTS Proc Adj Vars" -> "UT's" Velocities are less than contract speed.
2) Also verify that the drive is setup with the correct emergency speed profile parameters and will perform a slowdown when the NTSD signal to the drive is removed.
3) Jump UTS, DTS and ETS (if applicable) inputs on the 1102 main I/O board to S10.
4) From the Controller's LCD display, select the "Elevator Setup" menu and then select "Normal Terminal SD Test". Follow the instructions displayed to run the NTSD Test in the up direction. Do not select the NTSD Trip function. Keep in mind that when switching the car from inspection to normal, there will be a 5 second delay. When the test is initiated the car will run to the bottom terminal landing.
5) Observe that when the UT switch furthest from the landing activates, the car will do an emergency slowdown and stop at or near the landing. When the test is complete the LCD display should read "Limit Test Complete Press Mode for Menu".
Remove the jumpers of the UTS, DTS and ETS (if applicable) from S10.

4.10. Ascending Car Overspeed – That the car shall stop in compliance with 2.19.1.2 and not restart until manually reset [2.19.1.2(a)(4)].

Conformance:

Note 1: Governor over-speed switch, device meets 2.26.4.3
Note 2: Main processor uses monitors the speed of the car and if an overspeed is detected will apply the emergency brake while also removing power from the driving machine and normal brake. Detection means meet the requirements of 2.19.1.2(a)(1)(b).

Test Ascending Car Overspeed from Governor Switch:

1) When the governor switch opens, the controller will drop the power to the rope gripper or emergency brake circuit. If the "GOV Gripper/EBK" parameter is set to a 0 then the Gripper/EBK fault is latched immediately and will require a manual reset. If the parameter is set to 1, the Gripper/EBK fault is latched only if the elevator is moving so that if the switch is opened by hand without elevator motion, it will reset the Gripper/EBK fault automatically once the switch is reclosed.

   On the controller's LCD display, verify the parameter "Adjustable Variables", "Car Options", "GOV Gripper/EBK" is set to a 1. To simulate an over-speed condition, put the car on inspection mode and then operate the governor mechanism by hand. To restore the car to normal operation, reset the governor over-speed switch. If the "GOV Gripper/EBK" parameter is set to a 1 then the rope gripper will reset upon reactivation of the governor over-speed switch otherwise go to "Elevator Setup", "Reset Gripper/EBK Fault" and follow the displayed instructions to reset the Gripper/Emergency brake. Take the car off inspection mode.

2) To perform an Ascending car over-speed test, 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. Refer to governor trip speed and governor overspeed switch speed listed on the governor data tag. Calculate a value half way between the overspeed switch value and the trip speed value. If the contract speed is 150 fpm or less, the calculated value will need to be set greater than the governor trip speed value. This value is the desired speed at which the test should be conducted.
   c. For a KEB Combivert F5 drive:
      i. Set KEB "Tune Parameters" -> "LL16 Overspeed Test Speed" to the desired test speed.
      ii. Set KEB "Tune Parameters: -> "LL15 Overspeed Test" to "start"
   d. For the Magnetek AC drive:
      i. Access the Overspeed Mult parameter (sub menu A1) in the drive and set the % over-speed to the calculated % overspeed, i.e., % overspeed = (desired speed * 100)/contract speed.

ii. If the calculated value of % overspeed is greater than 150%, increase the CONTRACT MTR SPD parameter on the drive to the appropriate rpm to achieve the correct overspeed amount.

iii. 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.

e. Select the "Elevator Setup" menu and then "Overspeed Test" menu and follow instructions on the LCD display to run the test in the up direction. After the test is complete, reset the governor and reset all drive parameters back to the appropriate values.

Test Ascending Car Overspeed Stoping with Emergency Brake Only:

3) Perform an Ascending Car Overspeed test to verify that the elevator will be stop by only the Rope Gripper or Emergency Brake:

a. With the car on automatic, run the car to the bottom floor.

b. Refer to governor trip speed and governor overspeed switch speed listed on the governor data tag. Calculate a value greater than the overspeed switch value but less than the trip speed value. If the contract speed is 150 fpm or less, the calculated value will need to be set greater than the governor trip speed value. This value is the desired speed at which the test should be conducted.

c. Power off the controller. Jump RG5 to RG7 and GOV to S10 with wire jumpers. Power up the controller.

d. From the Controller's LCD display, select the "Elevator Setup" menu and then select "Emergency Brake Test". Follow the instructions displayed to run the Emergency Brake Test in the up direction. Keep in mind that when switching the car from inspection to normal, there will be a 5 second delay.

e. When prompted from the LCD display, select to run the over speed test and also enter the desired over speed velocity.

f. When prompted from the LCD display to set the "Drv Ovspd", follow drive overspeed setup below:

    i. For a KEB Combivert F5 drive:

        1. Set KEB "Tune Parameters" -> "LL16 Overspeed Test Speed" to the desired test speed.

        2. Set KEB "Tune Parameters: -> "LL15 Overspeed Test" to "start"

    ii. For the Magnetek Quattro or HPV-900 drive:

        1. Access the Overspeed Mult parameter (sub menu A1) in the drive and set the % over-speed to the calculated % overspeed, i.e., % overspeed = (desired speed * 100)/contract speed.

        2. If the calculated value of % overspeed is greater than 150%, increase the CONTRACT MTR SPD parameter on

the drive to the appropriate rpm to achieve the correct overspeed amount.

3. 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.

g. Press Enter on the LCD display to start the test.
h. When the test is initiated the car will accelerate to the over speed velocity. Once the required speed is obtained, the drive is turned off and the emergency brake/rope gripper is dropped. The main brake will stay energized for roughly 5 to 6 seconds.
i. After the test is complete the car will delay a few seconds and then attempt to recover to a floor.
j. Place the car on inspection and then remove all jumpers.
k. Return the car to automatic and allow it to recover to a floor.

Test Ascending Car Overspeed Detection from Main Processor:

4) To perform an over-speed test on the Main processor.
   a. With the car on automatic, run the car to the bottom floor.
   b. Select "Adjustable Variables", "Car Motion" and then "Overspeed Trip". Set this parameter to 80%.
   c. Make a run to the top floor.
   d. When the car reaches 80% of contract speed, it will do an emergency stop dropping the Gripper/Emergency brake.
   e. Readjust the "Overspeed Trip" parameter to 115%.
   f. From the controller's LCD display, select "Elevator Setup", "Reset Gripper/EBK Fault" and follow the instructions displayed to reset the Gripper/Emergency brake.

4.11. Unintended Movement – That the car shall stop in compliance with 2.19.2.2 and not restart until manually reset [2.19.2.2(a)(4)].

Conformance:

The Safety processor will, independent of the Main processor, detects unintended car movement away from the landing with an open door circuits. Detection means meet the requirements of 2.19.2.2(a)(1)(b).

The Main processor will, independent of the Safety processor, detect unintended car movement away from the landing with an open door circuits. Detection means meet the requirements of 2.19.2.2(a)(1)(b).

Test Unintended Motion:

1) With 125% load, place the elevator at the second landing, level with the floor and the front doors open on inspection. **Make sure that someone is outside the elevator at the floor to ensure that no one enters the elevator during this test**. Mechanically or electrically pick the Service Brake. To pick the brake electrically:
    a. Put the BRK test switch in the test position.
    b. Put the RUN test switch in the test position.
    c. From the LCD display, select "Elevator Setup", "Lift Brake On Inspect" and follow the instructions displayed to override the "Car Not Safe" status and lift the brake on inspection.
    d. Push and hold the ENTER and UP button. This will cause the elevator to roll down with the doors open.
    e. Verify that the Rope Gripper or Emergency Brake activates and stops the car.

  To put the car back in service:
    a. Put the BRK test switch in the NORM position.
    b. Put the RUN test switch in the NORM position.
    c. From the LCD display, select "Elevator Setup", "Reset Gripper/EBK Fault" and follow the instructions displayed to reset the Gripper/Emergency brake.
    d. Place the car back on automatic operation.

Note: Repeat the above test procedure (4.11) for all modes of inspection operation applicable.

4.12. Speed Control on Inspection: For elevator with static motion control, the inspection speed is limited to 0.75 m/s (150 fpm), independent of the normal speed control means [2.26.1.4.1(d)(1)].

Conformance:

The Safety processor and Safety PAL, independent of the Main processor, verifies the speed of the car on inspection and removes power from the driving machine and brake if a fault condition is detected.

Check Inspection Speed Limit

1) Place the car on inspection.
2) From the LCD display interface, change the "Car Motion", "Inspect Speed" parameter to 50fpm.
3) Change the "Safety Proc Adj Vars","Insp Velocity" parameter to 25 fpm.
4) Run the elevator on inspection and verify the car comes to an immediate stop when the car exceeds 25 fpm. Observe that the SAF-PAL FAULT and SAF-PROC FAULT LEDs will come on for 2 seconds.
5) Change the "Insp Velocity" Parameter back to its original setting.

6) Return the car to automatic operation.

4.13. Speed Control on Access: For Elevators with static control, the Access speed is limited to 0.75 m/s (150 fpm), independent of the normal speed control means [2.12.7.3.3]

<u>Conformance:</u>

The Safety processor and Safety PAL, independent of the Main processor, verifies the speed of the car on Access and removes power from the driving machine and brake if a fault condition is detected.

<u>Test Access Speed Limit</u>

1) Place the car on inspection.
2) From the LCD display interface, change the "Car Motion", "Access Speed" parameter to 50fpm.
3) Change the "Safety Proc Adj Vars","Insp Velocity" parameter to 25 fpm.
4) Run the elevator on Access and verify the car comes to an immediate stop when the car exceeds 25 fpm. Observe that the SAF-PAL FAULT and SAF-PROC FAULT LEDs will come on for 2 seconds.
5) Change the "Access Speed" and "Insp Velocity" Parameters back to the original setting.
6) Return the car to automatic operation.

4.14. Speed in Leveling / Truck Zone – For elevator with static motion control, the speed in the leveling/truck zone is limited to 0.75 m/s (150 fpm), independent of the normal speed control means [2.26.1.6.6.].

<u>Conformance:</u>

The Safety processor and Safety PAL, independent of the Main processor, verifies the speed of the car while in the leveling/truck zone and removes power from the driving machine and brake if a fault condition is detected.

<u>Test Leveling Speed Limit</u>

1) With the car in automatic operation.
2) From the LCD display interface, change the "Car Option", "Preopen Doors" parameter to 1 (enable preopening).
3) Change the "Safety Proc Adj Vars","Leveling Vel" parameter to 0 fpm.
4) Place a call to a onward floor.

5) Verify that the car comes to an immediate stop when the car leveling into its destination floor begins opening the door. Observe that the SAF-PAL FAULT and SAF-PROC FAULT LEDs will turn on. After the SAF-PAL FAULT and SAF-PROC FAULT LEDs go off, the car will then level into the floor.
6) Change the "Preopen Doors" and "Leveling Velocity" parameter back to the original setting.

4.15. 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 [2.26.1.6.7].

Conformance:

The Safety processor and Safety PAL, independent of the Main processor, verifies the inner landing zone and door status and removes power from the driving machine and brake if a fault condition is detected.

The Main processor is programmed to not attempt to run the car when outside of the inner landing zone until the doors are fully closed.

Test Inner Landing Zone Limits:

1) 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.
2) 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.
3) 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.

4.16. Both Driving Machine and Brake Contactors – Compliance with [2.26.9.5.2] or [2.26.9.6.2]

Conformance:

See section 3 above.

Test Driving Machine and Brake Contactors:

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 MC terminal on the GALX-1105AN board. Verify that when MC drops the brake drops as well. Place the elevator on inspection. Replace the wire in the MC terminal 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 RUNA terminal on the GALX-1105AN board. Verify that when RUN drops the brake drops as well. Place the elevator on inspection. Replace the wire in the RUN terminal and restore the car to automatic operation.

4.17. Phase I & II 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(m)] or Phase II [2.27.3.3.1(l)].

Conformance:

Main CPU programmed to operate as per 2.27.3.

Test Fire Operation with Full Load

1) 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.
2) 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.

4.18. Phase II & Ground - That a ground or short circuit in electrical parts located at landing side of the hoistway enclosure and associated wiring will not disable Phase II operation after it is activated [2.27.3.3.6]

Conformance:

1 – HCP (Hall Call Power) Fuse
2 – FEP (Fire Emergency Power) Fuse

Test for Short to Ground on Landing Side of Hoistway

1) Place the car on Phase II operation. Short to ground the HCP terminal in the landing fixture. The HCP fuse will clear. Verify that Phase II operation remains unaffected. Short to ground the FEP terminal in the landing fixture. The FEP fuse will clear. Verify that Phase II operation remains unaffected.
2) Replace HCP and FEP fuses.

4.19. Phase I & II Interruption of Power – The failure and subsequent restoration of electrical power (normal, emergency, or standby) shall not cause any elevator to be removed from Phase I Emergency Operation or Phase II Emergency In-Car Operation [2.27.3.4]

Conformance:

Main CPU programmed to operate as per 2.27.3.

Test Phase I & II Interruption of Power

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. Once at a landing, it will continue to operate on Phase II.
4) Power off the controller while the car is moving between floors and on Phase II with the In-Car key switch in the "OFF" position. Restore power to the controller. The car will move to an available floor and stop. Once at a landing, it will continue to operate on Phase II.
5) Power off the controller while the car is moving between floors and on Phase II with the In-Car key switch in the "ON" position. Turn the key switch to the "HOLD" position. Restore power to the controller. Place a car call and verify that the car does not move. Turn the key switch to the "ON" position. The car will not move to recover to an available floor until a car call is placed. Place a car call and allow the car to recover to a landing. The car will continue to operate on Phase II.

4.20. Protection Against Traction Loss [2.20.8.1]

Conformance:

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 and the Main CPU will monitor each velocity device independently. If the difference between the velocity on the Safety Processor and the Main CPU is exceeded by a field adjustable amount, the system will engage the rope gripper or emergency brake, preventing the elevator from moving and a manual reset of the elevator controller needs to be performed.

Test Protection Against Traction Loss:

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

1) Under "Adjustable Variables", "Safety Processor Adjustable Variables" change the "Encoder RPM" to a value 50f/min lower than the existing value.
2) Under "Adjustable Variables", "Car Options", set "Slip Vel Diff" parameter to 10f/min. With the car on automatic at the top or bottom landing, place a car call.
3) When the velocity difference between the Main CPU and the Safety Processor is greater than the "Slip Vel Diff" parameter value, a fault will be detected. Observe that the GR1 and the GR2 relays de-energize and the Rope Gripper or Emergency Brake sets.
4) To restore the car to normal operation, place the car on inspection. From the LCD display, select "Elevator Setup", "Reset Gripper/EBK Fault" and follow the instructions displayed to reset the Gripper/Emergency brake.
5) Under "Adjustable Variables", "Car Options", set "Slip Vel Diff" parameter back to its original value.
6) Under "Adjustable Variables", "Safety Processor board Adjustable Variables" set the "Encoder RPM" parameter back to its original value.

4.21. Emergency Power – Where an emergency or standby power system is provided, demonstrate conformance to 2.27.2 by simulation.

Conformance:

Main CPU programmed to operate as per 2.27.2.

Test Emergency Power

1) Where applicable, simulate emergency power by jumping terminal HCP to terminal EMP. Make sure that the elevator(s) complies with 2.27.2.
2) To restore to normal operation remove jumper from EMP terminal.

4.22. Power Loss Brake Lift - 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. [2.7.6.4] (Means Necessary for Tests)

<u>Conformance:</u>

<u>Contactors:</u>
MBP – Manual Brake Power
MBC – Manual Brake Contactor
BRK – Brake Contactor (Tested in Sections 1.1, 2.1, 3.2 and 3.3)
RUN – Run Contactor (Tested in Sections 1.1, 2.1, 3.2 and 3.3)

MBC and MC are mechanically interlocked, mutually exclusive.

Test MBP Contactor:

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

Test MBC Contactor:

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

Testing the communication from the controller to the UPS:

1) Disconnect the UPS communication cable.
2) Place a car call and verify that the car is out of service and does not leave the floor. Elevator Status will indicate "PWL UPS Comm Fault".

3) Connect the UPS communication cable and the elevator will resume back in service.
4) **Testing the UPS battery capacity:**

1) Under Diagnostics, UPS Comm Status note what the battery capacity is.
2) 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.
3) Verify that the elevator does not accept car calls and does not start. Elevator Status will indicate "PWR UPS Fault".
4) 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.
2) Push and hold the Manual Brake Pick Enable button on the controller until the MBP relay picks.
3) Put the Normal Brake BRK test switch in the test position.
4) Put the Normal Brake RUN test switch in the test position.
5) Under the Setup menu on the LCD Interface, select the Power Loss Lift Bake option. Press and hold the UP and Enter buttons to pick the main and emergency brakes.
6) The leveling zone status, UL, DZ and DL LEDs indicate when you are at or near a floor. Car speed and direction are shown on the LCD display.
7) When the car reaches the desired position, release the UP and Enter buttons.
8) Place the Normal Brake BRK and RUN test switches back to the Normal position.

End of Document

Revision history: version 1.1

    Included note on page 23 to test 4.11, unintended motion on all modes of inspection operation.

Revision history: version 1.2

    Revised language in test procedure 4.20, code requirement 2.20.8.1 on page 28 <u>from:</u>

        a) Under "Adjustable Variables", "Car Options", set "Slip Vel Diff" parameter between 10 and 20.
    <u>to:</u>

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

Revision history: version 1.3

    Test Driving Machine and Brake Contactors – section # 3 on page 26 has been removed.

Revision history: version 1.4

Section 4.9. NTSD – Revised testing NTSD at the bottom and top terminal landings on page 19.
  3. Jump UTS, DTS and ETS (if applicable) inputs on 1102 main board to S10.

Section 4.20 – Revised protection against traction loss [2.20.8.1] on page 28.
1. Under "Adjustable Variables", "Safety Processor Adjustable Variables" change the "Encoder RPM" to a value 50f/min lower than the existing value.
2. Under "Adjustable Variables", "Car Options", set "Slip Vel Diff" parameter to 10f/min. With the car on automatic at the top or bottom landing, place a car call.
6. Under "Adjustable Variables", "Safety Processor board Adjustable Variables" set the "Encoder RPM" parameter back to its original value.