C4 TRACTION

TESTING PROCEDURES

VERSION 1.27

SMARTRISE

Document History

Date	Version	Summary of Changes
January 13, 2025	1.27	Reviewed the Gate Switch Open Outside of Door Zone test.
October 9, 2024	1.26	Reviewed the Door Zone test. Reviewed the Door Zone Stuck HI and Unintended Car Movement test.
September 23, 2024	1.25	Split the Contactor Feedback test into two tests - contactors mounted inside machine room enclosure & contactors mounted inside hoistway enclosure. Reviewed the Gate Switch not in Bypass Mode test. Reviewed the Door Zone Stuck High with Doors Open test. Reviewed the Door Zone Input Stuck High Outside of Actual Door Zone test. Reviewed the Door Zone Stuck High In-Flight test.
September 9, 2024	1.24	Updated the Direction Counter Trip Reset test.
June 17, 2024	1.23	Replaced “S-curve” with “Digital S-curve Technology ™ (U.S. Patent Pending)”.
June 3, 2024	1.22	Reviewed schematic locations.
May 10, 2024	1.21	Updated schematic locations.
April 18, 2024	1.20	Reviewed the expected results under the In-Car Stop Switch in Bypass Mode test & deleted the Troubleshooting Procedure.
March 13, 2024	1.19	Updated the expected results under the Gate switch Open Outside of Door Zone test.
February 14, 2024	1.18	Added the Direction Counter Trip Reset test.
January 5, 2024	1.17	Changed A17.1/B44-19 to A17.1 Added the In-Car Stop Switch not in Bypass Mode test. Added the In-Car Stop Switch in Bypass Mode test.
December 6, 2023	1.16	Added the Door Zone Stuck High with Doors Open Test Added the Door Zone Stuck High In-Flight Test Added the Door Zone Test Added the SFM and SFP Relays Pre-Flight Test.
November 17, 2023	1.15A	Modified A17.1/B44-10 to A17.1/B44-19. Reworded sections 2.3, 2.4.1 and 4.2. Removed section In-Car Stop Switch in Bypass Mode test.
November 10, 2023	1.15	Updated document presentation. Added Door Zone Stuck HI and Unintended Car Movement test. Added Door Zone Input Stuck HI Test.
January 25, 2023	1.14E	ETSL testing revision.
May 18, 2022	1.14D	Restored Brake Board Feedback test. Updated Safety String to Ground test. Updated Loss of Traction test.
October 28, 2021	1.14C	Added Manual Rescue test.

Date	Version	Summary of Changes
October 14, 2021	1.14B	Moved Hoistway Side Switch under FEO. Modified Gate Switch Open Outside of Door Zone test. Modified In-Car Stop Switch in Bypass Mode test.
July 14, 2021	1.14A	Updated reference for Gate Switch Open Outside of Door Zone test. Changed name of Hoistway Landing Slide Power to REF test to Hoistway Landing Side Power to REF test.
March 10, 2021	1.14	Added extra step to Safeties and Governor test to bump up car in Construction Mode. Updated NTSD display expectations.
January 22, 2021	1.13	Deleted Brake Board Feedback test.
January 7, 2021	1.12	Updated the MR display message on the NTSD procedure.
June 29, 2020	1.11	Added manual door instructions. Modified Loss of Traction test to test for exceeding speed threshold.
February 7, 2020	1.10	Modified Gate Switch Open Outside of Door Zone test procedure by stating the car remains in a faulted state until the controller is reset. Modified Loss of Traction test procedure by changing the DIP switch position to ON. Added settings are specific per job to the Loss of Traction troubleshooting procedure.
January 6, 2020	1.9	Corrected Load Weigh instructions for fire testing.
December 16, 2019	1.8	Modified Contactor test procedures. Added Loss of Traction troubleshooting procedure.
November 25, 2019	1.7	Clarified brake slide test – separated primary and secondary brake tests. Modified the test procedures for Unintended Car Movement. Detection Means and Emergency Brake Test by deleting hardware setup, setting and resetting parameters on and off during test, and update test procedure accordingly. Moved emergency terminal stopping device information from NTSD to ETSD. Requires controller Version 1.02.63r0 and above.

Date	Version	Summary of Changes
July 23, 2019	1.6	Deleted modified by and status columns on Document History page. Modified Unintended Movement instructions. Capitalized REF on Modified ETD to REF test and Hoistway. Landing Slide Power to REF test.
March 29, 2019	1.5	Added Unintended Movement instructions for high gear motors. Updated cover page Updated document presentation.
March 5, 2019	1.4	Updated M1000 overspeed instructions
September 25, 2018	1.3	Added instructions to hold brakes for A/D, Brake feedback, and slide.
September 12, 2018	1.2	Added: EBrake slide test. Ability to hold brake open for ascending and descending overspeed test.
August 20, 2018	1.1	Updated Software version to 1.02.50. Removed Drive speed modifications for ETSL test.
August 7, 2018	1.0	Initial Submittal.

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1 C4 Test Procedure Introduction

This manual contains information for the C4 Controller Software Version 1.02.58 and above.

1.1 Safety

The following safety measures are to be followed:

- Tests are to be performed by a qualified elevator mechanic only.
- Be certain that there are no passengers inside the elevator car when performing these tests.
- When performing a test that requires open doors, be sure to have proper personnel guarding the doors.
- When making hardware changes, be certain that all power has been disconnected from the elevator controller.

WARNING

FAILURE TO FOLLOW PROPER PRECAUTIONS CAN RESULT IN SERIOUS INJURY, DEATH, OR DAMAGE TO THE ELEVATOR AND/OR BUILDING.

1.2 Test Procedure Format

Each test procedure in this document is formatted in the style below.

- Applicable Codes – Sections of the ASME A17.1 that the test applies.
- Schematic Location – Location(s) in the job schematics that pertain to the test. These are the drawing that shipped inside the job binder.
- Testing Notes – Notes to be aware of when performing the test.
- Testing Requirements – Requirements that must be satisfied prior to running the test.

The table below lists the Layout of the Testing Procedures.

Table 1: Layout of Testing Procedures

Step	Information / Instruction for Each Step
Setup	Hardware • Necessary hardware changes to perform test. Software • Necessary software changes to perform test. Drive

Step	Information / Instruction for Each Step
	• Necessary drive changes to perform test. Car • Necessary car changes to perform test.
Procedure	Instructions on how to perform the test
Expected Results	The desired result of the test
Revert	Hardware • Hardware changes to get back to normal. Software • Software changes to get back to normal. Drive • Drive changes to get back to normal. Car • Car changes to get back to normal.

The table below lists the Layout of the Troubleshooting procedure.

Table 2: Layout of Troubleshooting Procedure

Step	Information / Instruction for Each Step
Description of Failure:	Troubleshooting procedure

2 Software/Hardware Monitored Electronic Protective

2.1 Interlocks

The sections below describe interlock test procedures.

2.1.1 Interlock not in Bypass Mode

The following information is for interlocks not in bypass mode.

- Applicable Codes – ASME A17.1 sections 2.12.2.3 and 2.26.2.14
- Schematic Location – Interlock Contacts input feeder – MR SRU board – (1.E,1.F); SFM & SFP – MR SRU board – (5.G)
- Testing Notes – This test is to be performed for all three interlocks:
  - Bottom
  - Middle
  - Top
- Testing Requirements – This test can be performed on any mode of operation and at any time.

The table below lists the instructions for each step of the Interlock not in Bypass Mode test.

Table 3: Interlock not in Bypass Mode Test

Step	Information / Instruction for Each Step
Setup	Hardware • If it is possible to open the interlock from outside the landing door, then no hardware change is required. • If the interlock cannot be opened, locate the appropriate interlock wire connected to the Machine Room (MR) board. Be prepared to remove the wire during test.
Procedure	While the car is running, open an interlock or remove the interlock wire from the MR board. This can be done on any mode of operation when the interlock is not being bypassed.
Expected Results	After the Lock Clip Delay (adjustable parameter 16-0876, max 255 ms) has expired, relays SFM and SFP will drop. The safety string will open and the car stops.
Revert	Hardware • Replace any removed wires.

2.1.2 Interlock in Bypass Mode

The following information is for interlocks in bypass mode.

- Applicable Codes – ASME A17.1 sections 2.12.2.3 and 2.26.2.14
- Schematic Location – none
- Testing Notes – None
- Testing Requirements – This test requires turning the Hoistway Door Bypass switch to Bypass and verifying the car does not run on automatic, machine room inspection, or hoistway access.

The table below lists the instructions for each step of the Interlock in Bypass Mode Test.

Table 4: Interlock in Bypass Mode Test

Step	Information / Instruction for Each Step
Setup	Hardware • Place the Hoistway Door Bypass switch in the OFF position. Car • Place the car on automatic, machine room inspection, or hoistway access operation.
Procedure	Place the Hoistway Door Bypass switch in the Bypass position.
Expected Results	The car will immediately come to a stop and will not run until the Hoistway Door Bypass switch is placed back in the OFF position.
Revert	Hardware: • Place the Hoistway Door Bypass switch in the OFF position.

The table below lists the Interlock in Bypass Mode troubleshooting procedure.

Table 5: Interlock in Bypass Mode Troubleshooting Procedure

Step	Information / Instruction for Each Step
Car Failed to Stop	Verify the switch status is changing states. MAIN MENU | Status | Inputs | Inspection | Bypass Hoistway.

2.2 Gate Switch

The sections below describe Gate Switch test procedures.

2.2.1 Gate Switch not in Bypass Mode

The following information is for Gate Switch not in bypass mode.

- Applicable Codes – ASME A17.1 sections 2.14.4.2.3 and 2.26.2.15
- Schematic Location – Front and Rear Gate Switch Contact input feeder – CT SRU board – (4.C) – inputs 501 (F), 502 (R); SFM & SFP – MR SRU board – (5.G); 24V (PWR) – MR SRU board – (5.C)
- Testing Notes – This test is to be performed for both the front and rear Gate Switches if applicable.
- Testing Requirements – This test requires both inspection and automatic modes.

The table below lists the instructions for each step of the Gate Switch not in Bypass Mode test.

Table 6: Gate Switch not in Bypass Mode Test

Step	Information / Instruction for Each Step
Setup	Hardware • On inspection mode, locate the appropriate Gate Switch wire coming into the Car Top (CT) board input terminal. • Remove the Gate Switch input from the sensor on the CT board. • Use one spare/unused wire from the traveler cable to connect the Gate Switch input on the CT board. • Go the machine room and use the same spare/unused traveler wire and connect to an available M24 terminal.
Procedure	Put the car on automatic mode. While the car is running, remove the Gate Switch wire connected to the MR board.
Expected Results	Relays SFM and SFP will immediately drop. The safety string will open, and the car will stop.
Revert	Hardware • Re-place the wire on the CT board.

2.2.2 Gate Switch in Bypass Mode

The following information is for Gate Switch in bypass mode.

- Applicable Codes – ASME A17.1 sections 2.14.4.2.3 and 2.26.2.15
- Schematic Location – Front and Rear Gate Switch Contact input feeder – CT SRU board – (4.C) – inputs 501 (F), 502 (R)
- Testing Notes – None

- Testing Requirements – This test requires turning the Car Door Bypass switch to Bypass and verifying that the car does not run on automatic, machine room inspection, or hoistway access.

The table below lists the instructions for each step of the Gate Switch in Bypass Mode test.

Table 7: Gate Switch in Bypass Mode Test

Step	Information / Instruction for Each Step
Setup	Hardware • Place the Car Door Bypass switch in the OFF position. Car • Place the car on automatic, machine room inspection, or hoistway access operation.
Procedure	Place the Car Door Bypass switch in the Bypass position.
Expected Results	The car will immediately come to a stop and will not run until the Car Door Bypass switch is placed back in the OFF position.
Revert	Hardware • Place the Hoistway Door Bypass switch in the OFF position.

2.2.3 Gate Switch Open Outside of Door Zone

The following information is for the Gate Switch open outside of door zone.

- Applicable Codes – ASME A17.1 section 2.14.4.2.3
- Schematic Location – none
- Testing Notes – This test is performed by moving the car outside of the door zone on inspection, opening the doors, and then reverting to normal.
- Testing Requirements – This test requires the car to be on automatic operation.

The table below lists the instructions for each step of the Gate Switch Open Outside of Door Zone test.

Table 8: Gate Switch Open Outside of Door Zone Test

Step	Information / Instruction for Each Step
Setup	None
Procedure	Place the car on Inspection Operation and move away from a door zone. Turn Parameter 01-0151 to ON to allow the door to open outside the door zone on inspection. Manually open the doors. This can be done from the Door Setup menu. Place the car back on Normal Operation.
Expected Results	The car should fault.

Step	Information / Instruction for Each Step
Revert	Turn parameter 01-0151 to OFF.

2.3 In-Car Stop Switch

The sections below describe In-Car Stop switch test procedures not in bypass mode and in bypass mode, respectively.

2.3.1 In-Car Stop Switch not in Bypass Mode

The following information is for In-Car Stop switch not in bypass mode.

- Applicable Codes – ASME A17.1 section 2.26.2.21
- Schematic Location – In-Car Stop Switch Contact input feeder – COP SRU board – (3.C); SFM & SFP – MR SRU board – (5.G)
- Testing Notes – None
- Testing Requirements – This test can be performed on any mode of operation, other than Firefighters' Emergency Operation (FEO) Recall.

The table below lists the instructions for each step of the In-Car Stop Switch not in Bypass Mode test.

Table 9: In-Car Stop Switch not in Bypass Mode Test

Step	Information / Instruction for Each Step
Setup	Car • Be prepared to activate the In-Car Stop switch.
Procedure	While the car is running, activate the In-Car Stop switch.
Expected Results	Relays SFM and SFP will immediately drop, safety string will open, and the car will stop.
Revert	Car • Deactivate the In-Car Stop switch.

2.3.2 In-Car Stop Switch in Bypass Mode

The following information is for In-Car Stop switch in bypass mode.

- Applicable Codes – ASME A17.1 sections 2.26.2.21 and 2.27.31.6(c)
- Schematic Location – In-Car Stop Switch Contact input feeder – COP SRU board – (3.C); SFM & SFP – MR SRU board – (5.G)
- Testing Notes – The In-Car Stop switch is only bypassed during initial FEO recall after the doors have closed and the car has begun to move.

  NOTE: FEO Phase II recall is not included in this test.

- Testing Requirements – This test must be performed during FEO recall after the car has already started to recall.

The table below lists the instructions for each step of the In-Car Stop Switch not in Bypass Mode test.

Table 10: In-Car Stop Switch in Bypass Mode Test

Step	Information / Instruction for Each Step
Setup	Car • Be prepared to activate the In-Car Stop switch. • Put the car away from the FEO main recall landing and be prepared to place the car on FEO recall.
Procedure	Place the car on FEO recall. After the car has started to recall, activate the In-Car Stop switch.
Expected Results	Relays SFM and SFP will not drop, safety string will not open, and the car will continue running.
Revert	Car • Deactivate In-Car Stop switch • Reset FEO

2.4 Door Zone Failure Tests

The sections below describe the Door Zone Sensor Failure test procedures.

2.4.1 Door Zone Stuck High with Doors Open Test

The following information is for the Door Zone Stuck High with Doors Open test.

- Applicable Codes – ASME A17.1 section 2.26.9.3.1
- Schematic Location – Door Zone Sensor input feeder – CT SRU board – (4.C,5.C); 24V (PWR) – MR SRU board – (5.C)
- Testing notes -This test is performed by moving the car outside of the door zone while keeping the door zone input jumped.
- Testing Requirements – This test requires both inspection and automatic modes.

The table below lists the instructions for each step of the Door Zone Stuck High with Doors Open test.

Table 11: Door Zone Stuck High with Doors Open Test

Step	Information / Instruction for Each Step
Setup	Hardware • On inspection mode, remove the DZ input from the sensor on the CT board.

Step	Information / Instruction for Each Step
	• Use one spare/unused wire from the traveler cable to connect the DZ input on the CT board. • Go the machine room and use the same spare/unused traveler wire and connect to an available M24 terminal.
Procedure	Put the car back into Automatic Mode. Place the car inside the Door Zone. Place a car call or a hall call. Open the hall door and/or in-car door while the car is moving outside of the DZ.
Expected Results	The car should fault and should not reattempt to move. The hall/car call is cleared, and the system does not permit the car to move – test by issuing a call.
Revert	Disconnect the +24 from DZ and re-place all wires.

2.4.2 Door Zone Stuck High In-Flight Test

The following information is for the Door Zone Stuck High In-Flight test.

- Applicable Codes – ASME A17.1 section 2.26.9.4
- Schematic Location – Door Zone Sensor input feeder – CT SRU board – (4.C,5.C); 24V (PWR) – MR SRU board – (5.C)
- Testing notes -This test is performed by jumping the door zone input after the car is outside the door zone.
- Testing Requirements – This test requires both inspection and automatic modes.

The table below lists the instructions for each step of the Door Zone Stuck High In-Flight test.

Table 12: Door Zone Stuck High In-Flight Test

Step	Information / Instruction for Each Step
Setup	Hardware • On inspection mode, remove the DZ input from the sensor on the CT board. • Use one spare/unused wire from the traveler cable to connect the DZ input on the CT board. • Go the machine room and use the same spare/unused traveler wire and **prepare to connect to an available M24 terminal.**
Procedure	Put the car back into Automatic Mode. Place a car call or a hall call.

Step	Information / Instruction for Each Step
	Jump DZ to +24 while the car is moving **and** is outside the DZ.
Expected Results	The car should fault and should not reattempt to move. The hall/car call is cleared, and the system does not permit the car to move – test by issuing a call.
Revert	Disconnect the +24 from DZ and re-place all wires.

2.4.3 Door Zone Test

The following information is for the Door Zone test.

- Applicable Codes – ASME A17.1 section 2.26.9.3.1
- Schematic Location – Door Zone Sensor input feeder – CT SRU board – (4.C,5.C); GND (REF) – CT SRU board – (2.D)
- Testing notes -This test is performed by disconnecting the door zone input after the car is placed inside the door zone.
- Testing Requirements – This test requires the car to be on automatic operation.

The table below lists the instructions for each step of the Door Zone test.

Table 13: Door Zone Test

Step	Information / Instruction for Each Step
Setup	Hardware • On inspection mode, remove the DZ input from the sensor on the CT board. • Use one spare/unused wire from the traveler cable to connect the DZ input on the CT board. • Go the machine room and use the same spare/unused traveler wire and **prepare to connect to GND.**
Procedure	Put the car back into Automatic Mode. Place the car inside the Door Zone. Close the car and/or hall doors. Connect the DZ to GND.
Expected Results	The car should fault and should not reattempt to move. The hall/car call is cleared, and the system does not permit the car to move – test by issuing a call.
Revert	Disconnect the DZ from GND and re-place all wires.

2.5 Door Zone Input Stuck High Outside of Actual Door Zone

The following information is for a door zone input stuck High.

- Applicable Codes – ASME A17.1 section 2.26.9.3.1
- Schematic Location – Door Zone Sensor input feeder – CT SRU board – (4.C,5.C); 24V (PWR) – MR SRU board – (5.C)
- Testing Notes – This test is performed by moving the car outside of the door zone while keeping the door zone input jumped.
- Testing Requirements – This test requires both inspection and automatic modes.

The table below lists the instructions for each step of the Door Zone input stuck High outside of actual Door Zone.

Table 14: Door Zone Input Stuck High Outside of Actual Door Zone Test

Step	Information / Instruction for Each Step
Setup	Hardware • On inspection mode, remove the DZ input from the sensor on the CT board. • Use one spare/unused wire from the traveler cable to connect the DZ input on the CT board. • Go the machine room and use the same spare/unused traveler wire and to connect to an available M24 terminal.
Procedure	Put the car back into Automatic Mode. Place the car inside the door zone. Place a car call or a hall call.
Expected Results	The car should fault, and the car should not continue moving outside the Door zone (Leveling zone) and should not reattempt to move. The hall/car call is cleared.
Revert	Disconnect the +24 from DZ and re-place all wires.

2.6 SFP and SFM Relays Preflight Test

The following information is for SFP and SFM relays preflight test.

- Applicable Codes – A17.1 section 2.26.9.4
- Schematic Location – SFM & SFP – MR SRU board – (5.G)
- Testing Notes – this test is performed to ensure that both SFP and SFM relays, along with their associated circuitry, are checked during preflight exercises before each run.

- Testing Requirements – This test requires the car to be on automatic operation.

The table below lists the SFP and SFM Relays Preflight test.

Table 15: SFP and SFM Relays Preflight Test

Step	Information / Instruction for Each Step
Setup	None
Procedure	Place car calls to floors X and Y **or** place hall calls at floors X and Y. Disconnect the SFM and/or SFP relays when the car stops at floor X **and** before traveling to floor Y.
Expected Results	The car should fault and should not reattempt to move. The hall/car call is cleared, and the system does not permit the car to move – test by issuing a call.
Revert	Reconnect the SFM and/or SFP relays.

3 Electronic Protective Devices (EPD) in Safety String

3.1 All EPD's in Safety String

The sections below describe EPD's in safety string test procedures.

3.1.1 Any Positively Broken Contact in the Safety String

The following information is for any positively broken contact in the safety string.

- Applicable Codes – ASME A17.1 section 2.26.2
- Schematic Location – Motor Contactors input feeder – MR SRU board – (7.F); Brake Contactors input feeder – MR SRU board – (7.F)
- Testing Notes – These contacts immediately remove power from the driving machine motor and brake. Typical fault stops use a combination of drive and brake power. These stops only use the brake to stop and may require a longer distance to stop from high speed.
- Testing Requirements – This test works on any mode of operation.

The table below lists the instructions for each step for Any Positively Broken Contact in Safety String test.

Table 16: Any Positively Broken Contact in Safety String Test

Step	Information / Instruction for Each Step
Setup	Hardware • Be prepared to activate the EPD.
Procedure	With the car running, activate the EPD.
Expected Results	Motor and brake contactors will immediately open and the car will come to a stop.
Revert	Car • Deactivate the EPD. If the car needs to be moved before the EPD can be deactivated, temporarily place a jumper across the EPD contact to bypass the EPD. • Remove jumper

The table below lists Any Positively Broken Contact in Safety String troubleshooting procedure.

Table 17: Any Positively Broken Contact in Safety String Troubleshooting Procedure

Step	Information / Instruction for Each Step
Contactors Failed to Open	Verify the EPD is wired correctly. Verify that there are no jumpers in the safety string.
Car Slid Too Far Through the Brake	Adjust machine brake to stop the car quicker.

3.1.2 Contactor Feedback - Contactors Mounted Inside Machine Room Enclosure

The following information is for contactor feedback when contactors are mounted inside the machine room enclosure.

- Applicable Codes – ASME A17.1 section 2.26.2
- Schematic Location –M Contactor – Drive sheet – (1.F); B1 Contactor – Brake sheet – (1.H); B2 Contactor – Brake sheet – (5.H)
- Testing Notes – This test is performed for M contactor, B1 contactor, and B2 contactor. These contacts immediately remove power from the driving machine motor and brake.
- Testing Requirements – This test works on any mode of operation.

The table below lists the instructions for each step of the Contactor Feedback test.

Table 18: Contactor Feedback Test - Contactors Mounted Inside Machine Room Enclosure

Step	Information / Instruction for Each Step
Setup	None
Procedure	Press in the contactor being tested (M, B1, or B2).
Expected Results	The controller will fault with contactor feedback.
Revert	None

The table below lists the Contactor Feedback troubleshooting procedure.

Table 19: Contactor Feedback Troubleshooting Procedure - Contactors Mounted Inside Machine Room Enclosure

Step	Information / Instruction for Each Step
Controller Did Not Issue Fault	Verify the Feedback signal is wired correctly. Verify that there are no jumpers in place.

3.1.3 Contactor Feedback - Contactors Mounted Inside Hoistway Enclosure

The following information is for contactor feedback when contactors are mounted inside the hoistway enclosure.

- Applicable Codes – ASME A17.1 section 2.26.2
- Schematic Location –M Contactor – Drive sheet – (1.F); B1 Contactor – Brake sheet – (1.H); B2 Contactor – Brake sheet – (5.H)
- Testing Notes – This test is performed for M contactor, B1 contactor, and B2 contactor. These contacts immediately remove power from the driving machine motor and brake.
- Testing Requirements – This test works on any mode of operation.

The table below lists the instructions for each step of the Contactor Feedback test.

Table 20: Contactor Feedback Test - Contactors Mounted Inside Hoistway Enclosure

Step	Information / Instruction for Each Step
Setup	None
Procedure	-M Contactor Test Jump 120 to terminal MCT
	-B1 Contactor Test Jump M24 to terminal B1CT
	-B2 Contactor Test Jump 120 to terminal B2CT
Expected Results	The controller will fault with contactor feedback.
Revert	None

The table below lists the Contactor Feedback troubleshooting procedure.

Table 21: Contactor Feedback Troubleshooting Procedure - Contactors Mounted Inside Hoistway Enclosure

Step	Information / Instruction for Each Step
Controller Did Not Issue Fault	Verify the Feedback signal is wired correctly. Verify that there are no jumpers in place.

3.1.4 Brake Board Feedback

The following information is for the Brake board feedback.

- Applicable Codes – ASME A17.1 section 2.26.2 and 2.26.8.2
- Schematic Location M24 – MR Power Supply section – (2.B); MM – MR SRU board – (6.F); B1 Contactor – Brake sheet – (1.H); B2 Contactor – Brake sheet – (5.H); Brake Coils – Brake sheet – (1-2.I); Emergency Brake Coils – Brake sheet – (5-6.I)
- Testing Notes – The Brake board outputs voltage to the brake coil via command from the MR board (SR-3030).
- Testing Requirements – This test works on any mode of operation.

The brake control board is the device redundant to the brake contactor B1, provided to implement compliance with ASME A17.1 clause 2.26.8.2 and 2.26.9.3.1. It shall be checked for failure prior to each start during automatize operation (see ASME A17.1 clause 2.26.9.4).

The table below lists the instructions for each step of the Brake Board Feedback test.

Table 22: Brake Board Feedback Test

Step	Information / Instruction for Each Step
Setup	Hardware • Place a jumper from M24 to the MM input on the MR board.

Step	Information / Instruction for Each Step
	• Verify the INSPECTION switch is in the Automatic position.
Procedure	Navigate to the DEBUG menu and select Acceptance Test. Select BRK BRD FEEDBACK. Select Save and press ENTER. Hold the Enable and Up buttons to start the test. When instructed, manually press and hold in either the B1 or B2 contactor. Release the Enable and Up buttons. The brake applies voltage to the coil and confirms feedback. Confirmation of test results appears on the screen.
Expected Results	The software will detect the difference between the command and the feedback. The screen will display complete if the voltage feedback is within 15% of the command.
Revert	None

The table below lists the Brake Board Feedback troubleshooting procedure.

Table 23: Brake Board Feedback Troubleshooting Procedure

Step	Information / Instruction for Each Step
Test Did Not Pass	Verify that the B1 or B2 contactor toggled. Verify that the brake coil is wired properly.

3.1.5 Setup Motor Field Sensing

The following information is for motor field sensing.

- Applicable Codes – ASME A17.1 section 2.26.2.4
- Schematic Location – F1 and F2 (Drive: DSD412) – Drive and Regen section – (2-3.G)
- Testing Notes – This test verifies the functionality of the field sensing circuit.
  - ONLY REQUIRED FOR DC APPLICATIONS
- Testing Requirements – This test works on any mode of operation.

The table below lists the instructions for each step of the Motor Field Sensing test.

Table 24: Motor Field Sensing Test

Step	Information / Instruction for Each Step
Setup	Remove power from the main line to the drive and controller.

Step	Information / Instruction for Each Step
	Disconnect the field wires from the motor to drive (F1 and F2).
Procedure	Restore power from the main line to the drive and controller.
Expected Results	After bootup, the drive will display Error/Fault Code 905. The controller will display drive fault.
Revert	Remove power from the main line to the drive and controller. Connect the field wires from the motor to drive (F1 and F2).

4 Emergency Brake

4.1 Unintended Car Movement Detection Means and Emergency Brake

The following information is for unintended car movement detection means and emergency brake.

- Applicable Codes – ASME A17.1 section 2.19.2 and 2.19.3.1.2
- Schematic Location –DIP B8 – MR SRU board – (6.E); B1 Contactor – Brake sheet – (1.H); Emergency Brake Circuit – Brake section – (5-8.G-I)
- Testing Notes – The following testing notes are:
  - After performing the test, the Unintended Movement fault remains latched, even after resetting power.
  - When high gear ratio motors are used, the tooth engagement of the motor to the gear box may keep the car from moving when the brakes are manually picked. The car may need some momentum to overcome this internal friction. See Table 20 for more information.
  - Make sure to take all necessary safety precautions while performing this test.
- Testing Requirements – This test requires drifting of the car while holding the doors open.

The table below lists the instructions for each step of the Unintended Car Movement Detection Means and Emergency Brake test.

Table 25: Unintended Car Movement Detection Means and Emergency Brake Test

Step	Information / Instruction for Each Step
Setup	Software • Set the controller to the desired mode of operation. • Set parameter 01-0052 to ON. Car • Put the car at floor level. • Open car and hall doors.
Procedure	Turn DIP B8 to ON. The Emergency brake will automatically open. Manually press in the B1 contactor. This will electrically lift the primary brake and cause the car to drift. The brake will remain lifted as long as the B1 contactor is pressed. **NOTE**: The test will time out after 5 minutes.
Expected Results	Onboard safety relays will drop, dropping the secondary brake. Controller will log an Unintended Movement fault.
Revert	Software • Press and hold the E-Brake Reset button directly above the Onboard Safety relays.

Step	Information / Instruction for Each Step
	• Turn parameter 01-0052 to OFF. Hardware • Turn DIP 8B to the OFF position.

The table below lists the Unintended Car Movement Detection Means and Emergency Brake troubleshooting procedure.

Table 26: Unintended Car Detection Movement Means & Emergency Brake Troubleshooting Procedure

Step	Information / Instruction for Each Step
Emergency Brake Failed to Drop	Verify that there are no jumpers in the emergency brake circuit. Verify that the emergency brake sets when power is removed from the controller.
Car Slid Too Far Through the Emergency Brake	Adjust emergency brake to stop the car quicker. Verify that 8" or shorter door zone magnets are being used.
Car Does Not Move Due to High Gear Ratio	Add more load to the car to overcome the gear friction. Safely turn the sheave manually to help release the gears.

4.2 Door Zone Stuck HI and Unintended Car Movement

The following information is for the Door Zone Stuck HI and Unintended Car Movement.

- Applicable Codes – ASME A17.1 section 2.19.2.2(a)(1)(b)
- Schematic Location – Door Zone Sensor input feeder – CT SRU board – (4.C,5.C); DIP B8 – MR SRU board – (6.E); B1 Contactor – Brake section – (1.H); Emergency Brake Circuit – Brake section – (5-8.G-I); 24V (PWR) – CT SRU board – (2.D-E)
- Testing Notes – This test is performed by moving the car outside of the door zone while removing the Locks and Gate Switch.
- Testing Requirements – This test requires the car to be on automatic operation.

The table below lists the instructions for each step of the Door Zone Stuck HI and Unintended Car Movement.

Table 27: Door Zone Stuck HI and Unintended Car Movement Test

Step	Information / Instruction for Each Step
Setup	Hardware • On inspection mode, remove the DZ input from the sensor on the CT board. • Use one spare/unused wire from the traveler cable to connect the DZ input on the CT board.

Step	Information / Instruction for Each Step
	• Go the machine room and use the same spare/unused traveler wire and connect to an available M24 terminal. Software • Set the controller to automatic mode. • Set parameter 01-0052 to ON. Car • Put the car at floor level and open the car and hall doors.
Procedure	Turn DIP 8B to ON. The Emergency brake will automatically open. Manually press in the B1 contactor. This will electrically lift the primary brake and cause the car to drift. The brake will remain lifted as long as the B1 contactor is pressed. **NOTE**: The test will time out after 5 minutes.
Expected Results	Onboard safety relays will drop, dropping the secondary brake. Controller will log an Unintended Movement fault. MRA (software) will report Unintended Movement fault
Revert	Software • Press and hold the E-Brake Reset button directly above the Onboard Safety relays. • Turn parameter 01-0052 to OFF. Hardware • Turn DIP 8B to the OFF position. • Remove the +24 from DZ and re-place all wires.

Table 28: Door Zone Stuck HI and Unintended Car Movement Procedure

Step	Information / Instruction for Each Step
Emergency Brake Failed to Drop	Verify that there are no jumpers in the emergency brake circuit. Verify that the emergency brake sets when power is removed from the controller.
Car Does Not Move Due to High Gear Ratio	Add more load to the car to overcome the gear friction. Safely turn the sheave manually to help release the gears.

4.3 Ascending Car Overspeed Detection Means and Emergency Brake

The following information is for ascending car overspeed detection means and emergency brake.

- Applicable Codes – ASME A17.1 section 2.19.1 and 2.19.3.1.1

- Schematic Location – Governor Switch Contact input feeder – MR SRU board – (1.G); M24 – MR Power Supply section – (2.B); MM – MR SRU board – (6.F); B1 Contactor – Brake sheet – (1.H); B2 Contactor – Brake sheet – (5.H); Emergency Brake Circuit – Brake section – (5-8.G-I)
- Testing Notes – None
- Testing Requirements – This test requires the Governor Switch to trip at the correct speed and works on any mode of operation, other than Construction.

The table below lists the instructions for each step of the Ascending Car Overspeed Detection Means and Emergency Brake test.

Table 29: Ascending Car Overspeed Detection Means and Emergency Brake Test

Step	Information / Instruction for Each Step
Setup	Software • Navigate to the MAIN MENU | SETUP | SPEEDS | TEST A/D speed. • Set this value at the speed in which the test is conducted - The value is in feet per minute (fpm). Hardware • Place a jumper from M24 to the MM input on the MR board. • Verify the INSPECTION switch is in the Automatic position. Drive • KEB - In basic setup, set the contract speed to the same speed as the test speed. - In Speed profiles, set the high speed to the same speed as the test speed. • HPV900 S2 - In the A1 parameter, increase the contract motor speed to the same percentage the test speed was set over the contract speed. For example, if the contract speed is 500 fpm and the test speed is being set to 600 fpm, that is 1.2 x the contract speed. If the contract motor speed on the drive is 1200 rpm multiply this by 1.2 which is 1440 rpm. This is the value that is set in the A1 menu. • M1000 - In the A1 parameter increase the contract motor speed to the same percentage the test speed is set over the contract speed.

Step	Information / Instruction for Each Step
	For example, if the contract speed is 500 fpm and the test speed is being set to 600 fpm, that is 1.2x the contract speed. If the contract motor speed on the drive is 1200 rpm multiply this by 1.2 which is 1440 rpm. This is the value that is set in the A1 menu. - In the A5 parameter, increase the MAX Frequency to the same percentage the test speed is set over the contract speed. • DSD - In Function 11, increase the contract motor speed to the same percentage the test speed is set over the contract speed. For example, if the contract speed is 500 fpm and the test speed is being set to 600 fpm, that is 1.2x the contract speed. If the contract motor speed on the drive is 1200 rpm, multiply this by 1.2 which is 1440 rpm. This is the value that is set in Function 11. Car • Place the car far enough away from the top terminal landing so that it can accelerate to governor trip speed and stop before hitting the final limit.
Procedure	Navigate to the DEBUG menu and select Acceptance Test. Select the ASC/DESC Overspeed car overspeed. Select Save and press ENTER. The UI displays the following instructions: • Checking if in DZ. • Press the Enable and the Direction in which the test is being performed. - The controller runs the car in the inputted direction with a speed command reflecting the value of the test speed. - When ascending, the user needs to hold in the B1 contactor to keep the main brake open. - When descending, the user needs to hold in both B contactor to keep both brakes open. If either contactor is released, both brakes drop. - Brakes automatically drop if the contactors are held in for more than 20 seconds.

Step	Information / Instruction for Each Step
	NOTE: If either the direction, enable, or contactor are released prior to completion of the test, it will cancel the test immediately. The primary brake remains open as long as the contactor remains depressed and the direction and enable inputs are active.
Expected Results	The Governor switch will open. Onboard safety relays will all drop. The emergency brake will drop.
Revert	Hardware • Reset the Governor switch. • Press and hold the E-Brake Reset button on the MR board. • Remove the jumper on the MM input. • Reset the values in the drive to the correct values.

The table below lists the Ascending Car Overspeed Detection Means and Emergency Brake troubleshooting procedure.

Table 30: Ascending Car Overspeed Detection Means & Emergency Brake Troubleshooting Procedure

Step	Information / Instruction for Each Step
Emergency Brake Failed to Drop	Verify that the safety relays dropped. Verify that there are no jumpers in the emergency brake circuit. Verify that the emergency brake sets when power is removed from the controller.
Car Slid Too Far Through the Emergency Brake	Adjust emergency brake to stop the car quicker. Verify that car is properly balanced.

4.4 Measuring Brake Slide Distance

The following information is for measuring brake slide distance.

- Applicable Codes – None
- Schematic Location – M24 – MR Power Supply section – (2.B); MM – MR SRU board – (6.F); B1 Contactor – Brake sheet – (1.H); B2 Contactor – Brake sheet – (5.H); Emergency Brake Circuit – Brake section – (5-8.G-I)
- Testing Notes –This test is used to measure the mechanical slide distance of the brake.
- Testing Requirements – None

The table below lists the instructions for each step of the Measuring Brake Distance test.

Table 31: Measuring Brake Slide Distance Test

Step	Information / Instruction for Each Step
Setup	Hardware • Place a jumper from M24 to the MM input on the MR board. • Verify the INSPECTION switch is in the Automatic position.
Procedure	Navigate to the DEBUG menu and select Acceptance Test. Select the BRK SLIDE DIST test to test main brake or EBRK SLIDE DIST to test the secondary brake. Select Save and press ENTER. The UI displays the following instructions: • Press the Enable and the Direction in which the test is being performed. - The car begins moving to the bottom landing if the UP direction is selected or begins moving to the top landing if the down direction is selected. • Press the Enable and Down/UP buttons once the car is at Bottom/Top landing. The user can let go once the car begins moving. - The controller runs the car towards the opposite landing. • Once the car reaches contract speed, the controller issues an ESTOP command. - Hold in either the B1 or B2 contactor to hold the corresponding brakes open. Only one contactor can be held in during the test. **NOTE:** B1 is used for holding main brake open and B2 is used for holding the secondary brake open. - Brakes automatically drop if the contactors are held in for more than 10 seconds. • Once the car has fully stopped, the UI displays the slide distance.
Expected Results	The slide distance is also stored in parameter 16-0865 and 16-0866. To convert this value to inches, divide the value stored in the parameter by 50.8.
Revert	Hardware • Remove the jumper from the MM input.

The table below lists the Measuring Brake Slide Distance troubleshooting procedure.

Table 32: Measuring Brake Slide Distance Troubleshooting Procedure

Step	Information / Instruction for Each Step
Emergency Brake Failed to Drop	Verify that the safety relays dropped. Verify that there are no jumpers in the emergency brake circuit.

Step	Information / Instruction for Each Step
	Verify that the emergency brake sets when power is removed from the controller.
Car Slid Too Far Through the Emergency Brake	Adjust emergency brake to stop the car quicker. Verify that car is properly balanced.

5 Inspection/Access/Speed Limiting

5.1 Inspection/Access Independent Speed Limiting

The following information is for Inspection/Access Independent Speed Limiting.

- Applicable Codes – ASME A17.1 sections 2.12.7.3.3(b) and 2.26.1.4.1(d)(-1)
- Schematic Location – None
- Testing Notes – None
- Testing Requirements –None

The table below lists the instructions for each step of the Inspection/Access Independent Speed Limiting test.

Table 33: Inspection/Access Independent Speed Limiting Test

Step	Information / Instruction for Each Step
Setup	None
Procedure	Set the Inspection Speed parameter greater than 150 fpm. Navigate to MAIN MENU | SETUP | SPEEDS | INSPECTION.
Expected Results	Controller will display an Invalid Speed fault and not allow the car to run.
Revert	Software • Set the parameter Inspection Speed back to original value.

5.2 Hoistway Door Bypass

See Interlocks.

5.3 Car Door Bypass

See Gate Switch.

6 Terminal and Emergency Stopping

6.1 Normal Terminal Stopping Device (NTSD)

The following information is for NTSD.

- Applicable Codes – ASME A17.1 section 2.25.2
- Schematic Location – M24 – MR Power Supply section – (2.B); MM – MR SRU board – (6.F)
- Testing Notes – Emergency terminal stopping devices are bypassed during this test to show NTSD independence.
- Testing Requirements –None

The table below lists the instructions for each step of the Normal Terminal Stopping Device test.

Table 34: Normal Terminal Stopping Device Test

Step	Information / Instruction for Each Step
Setup	Hardware • Install a temporary jumper from M24 to the MM input on the MR board. • Verify the INSPECTION switch is in the Automatic position. Car • Put the car far enough away from the terminal landing being tested to do a full speed run.
Procedure	Navigate to the DEBUG menu and select Acceptance Test. Select the NTS. Select Save and press ENTER. The UI displays the following instructions: • Checking if in DZ. • Press the Enable and the Direction in which the test is being performed. - The controller runs the car in the inputted direction to the terminal at high speed.
Expected Results	Magnetek & L1000A • When NTS is triggered and depending on how aggressive your Digital S-curve Technology ™ (U.S. Patent Pending) is, the MR board displays one of the following alarms: - In the up direction – NTS Up P1-1, NTS Up P1-2, NTS Up P1-3, NTS Up P1-4, NTS Up P1-5, NTS Up P1-6, NTS Up P1-7, NTS Up P1-8

Step	Information / Instruction for Each Step
	- In the down direction – NTS Dn P1-1, NTS Dn P1-2, NTS Dn P1-3, NTS Dn P1-4, NTS Dn P1-5, NTS Dn P1-6, NTS Dn P1-7, NTS Dn P1-8 • The NTS output on the MR board will change state. • The car will come to a stop prior to the final limit and then do a correction run to the floor. KEB • When NTS is triggered and depending on how aggressive your Digital S-curve Technology ™ (U.S. Patent Pending) is, the MR board displays one of the following alarms: - In the up direction – NTS Up P1-1, NTS Up P1-2, NTS Up P1-3, NTS Up P1-4, NTS Up P1-5, NTS Up P1-6, NTS Up P1-7, NTS Up P1-8 - In the down direction – NTS Dn P1-1, NTS Dn P1-2, NTS Dn P1-3, NTS Dn P1-4, NTS Dn P1-5, NTS Dn P1-6, NTS Dn P1-7, NTS Dn P1-8 • The NTS output on the MR board will change state. • The car will come to a stop prior to the final limit and then do a correction run to the floor. DSD • When NTS is triggered and depending on how aggressive your Digital S-curve Technology ™ (U.S. Patent Pending) is, the MR board displays one of the following alarms: - In the up direction – NTS Up P1-1, NTS Up P1-2, NTS Up P1-3, NTS Up P1-4, NTS Up P1-5, NTS Up P1-6, NTS Up P1-7, NTS Up P1-8 - In the down direction – NTS Dn P1-1, NTS Dn P1-2, NTS Dn P1-3, NTS Dn P1-4, NTS Dn P1-5, NTS Dn P1-6, NTS Dn P1-7, NTS Dn P1-8 • The NTS output on the MR board will change state. • The car will come to a stop prior to the final limit and then do a correction run to the floor.
Revert	Hardware • Remove jumper from the MM input.

The table below lists the Normal Terminal Stopping Device troubleshooting procedure.

Table 35: Normal Terminal Stopping Device Troubleshooting Procedure

Step	Information / Instruction for Each Step
Car Did Not Slow Down at the Switch	Magnetek

Step	Information / Instruction for Each Step
	• Verify that the drive NTS inputs are activating. KEB • Verify that the drive NTS inputs are activating. DSD • Verify that the drive NTS inputs are activating. • Arched Travel Disable (#111) Must Be =1 Or ON.
Car Slowed Down, But Hit the Final	Magnetek • Change Parameter A4 | DECEL JERK IN 3. • Change Parameter A4 | DECEL JERK OUT 3. • Increase Parameter A4 | DECEL RATE 3. • Default value is 6 ft/s^2. If increased too much, traction may be lost or the drive will fault on DC OVERVOLT during quick stop. L1000A • Increase Parameter C1-09. • Default value is 6 ft/s^2. If the rate is increased too much, traction may be lost or the drive will fault on DC Overvolt during quick stop. KEB • Increase Parameter LS33 To Quicken the Slowdown. • Default value is 6 ft/s^2. If the rate is increased too much, traction may be lost or the drive will fault on DC Overvolt during quick stop. DSD • Adjust Ramp #3 Accel/Decel Rates used during NTS.

6.2 Emergency Terminal Stopping Device (ETSD)

The following information is for ETSD.

- Applicable Codes – ASME A17.1 section 2.25.4.2
- Schematic Location – NTS Slowdown Signal input feeder – MR SRU board – (7.C); M24 – MR Power Supply section – (2.B); MM – MR SRU board – (6.F)
- Testing Notes – The following testing notes are:
  - This test must be performed once in the up and once in the down direction.
  - NTS switches are bypassed during this test to show independence.
  - Emergency terminal stopping devices are only required for speeds greater than 200 fpm only.
  - TEST IS NOT REQUIRED IF ETSLD IS USED.
- Testing Requirements –None

The table below lists the instructions for each step of the Emergency Terminal Stopping Device test.

Table 36: Emergency Terminal Stopping Device Test

Step	Information / Instruction for Each Step
Setup	Hardware • Install a temporary jumper from M24 to the MM input on the MR board. • Verify the INSPECTION switch is in the Automatic position. Car • Clear any existing faults on the car before performing this test. • Put the car far enough away from the terminal landing being tested to do a full speed run but not at the opposite terminal landing.
Procedure	Navigate to the DEBUG menu and select Acceptance Test. Select the ETS car overspeed. Select Save and press ENTER. The UI displays the following instructions: • Checking if in DZ. • Press and hold the Enable and the Direction the test is being performed. - The controller runs the car in the inputted direction to the terminal at high speed. **NOTE**: If the Enable and Direction are removed prior to the test completing. An emergency stop is performed, and the test will automatically fail.
Expected Results	When the car passes the ETS trip point being tested, the on-board safety relays will immediately drop. Power will be removed from the driving machine motor and brake. The car will come to a stop prior to hitting the buffer.
Revert	Hardware • Remove the jumper from the MM input. Manual Doors • If a lock fault is latched, revert to normal operation to allow the car to automatically level into the floor.

The table below lists the Emergency Terminal Stopping Device troubleshooting procedure.

Table 37: Emergency Terminal Stopping Device Troubleshooting Procedure

Step	Information / Instruction for Each Step
Car Did Not Attain Full Contract Speed During Test	Place the car at a landing farther away from the terminal prior to beginning the test.
Car/Counterweight Did Not Stop Before Hitting the Buffer.	Increase the tension on the service brake. Check that the car is balanced.

6.3 Emergency Terminal Safety Limiting Device (ETSLD)

The following information is for ETSLD.

- Applicable Codes – ASME A17.1 section 2.25.4.1
- Schematic Location – none
- Testing Notes – The following testing notes are:
  - This test can only be performed in the down direction.
  - NTS switches are bypassed during this test to show independence.
  - TEST ONLY REQUIRED FOR REDUCED STROKE BUFFER APPLICATIONS.
  - A modified version of the test may also be used (see “Alternative ETSL test” section)
- Testing Requirements – ETSL setup must be complete prior to running the test. See *C4 User Manual Reduced Stroke Buffer*.
  - ETSL option must be enabled on the controller.
  - Camera offset must be set.
  - Brake slide distance must be set.
  - Buffer speed must be set.
  - Buffer distance must be set.

The table below lists the instructions for each step of the Emergency Terminal Stopping Limiting Device test.

Table 38: Emergency Terminal Stopping Limiting Device Test

Step	Information / Instruction for Each Step
Setup	Drive • HPV900 S2 - In the A1 parameter, decrease the contract car speed to the test speed. - Also decrease the contract motor speed to the same percentage the test speed is set below contract speed.

Step	Information / Instruction for Each Step
	For example, if the contract speed is 1000 fpm and the test speed is set to 800 fpm, that is .8x the contract speed. If the contract motor speed on the drive is 1200 rpm, multiply this by .8 which is 960 rpm. This is the value that is to be set in the A1 menu. • M1000 - In the A1 parameter, decrease the contract car speed to the test speed. - Also decrease the contract motor speed to the same percentage the test speed is set below contract speed. For example, if the contract speed is 1000 fpm test speed is set to 800 fpm, that is .8x the contract speed. If the contract motor speed on the drive is 1200 rpm, multiply this by .8 which is 960 rpm. This is the value that is to be set in the A1 menu. Car • Put the car at the top landing and in the door zone.
Procedure	Navigate to DEBUG | Acceptance Test |ETSL. Select Save and press ENTER. • The UI displays the following instructions: - Checking if in DZ. - Press and hold the Enable and Down buttons. • The controller runs the car in the down to the bottom terminal at high speed. Checking the DETSL fault in logged faults shows the position of the ETSL trip point. **NOTE**: If the Enable and Direction are removed prior to the test completing, an emergency stop is performed and the test automatically fails.
Expected Results	When the car passes the ETSL trip point being tested, the on-board safety relays will immediately drop. Power will be removed from the driving machine motor and brake. The car will come to a stop around the middle of the hoistway.
Revert	Hardware • Remove the jumper from the MM input. Drive • Return the drive parameters back to the original values.

Step	Information / Instruction for Each Step
	Manual Doors • If a lock fault is latched, revert to normal operation to allow the car to automatically level into the floor.

The table below lists the Emergency Terminal Limiting Stopping Device troubleshooting procedure.

Table 39: Emergency Terminal Limiting Stopping Device Troubleshooting Procedure

Step	Information / Instruction for Each Step
Car Did Not Attain Full Contract Speed During Test	Place the car at a landing farther away from the terminal prior to beginning the test.
Car/Counterweight Did Not Stop Before Hitting the Buffer.	Increase the tension on the service brake. Check that the car is balanced.

6.4 Alternative Test for Emergency Terminal Safety Limiting Device (ETSLD)

Step 1: Perform an ETSD test (see section above) at the full rated car speed.

Step 2: Perform a Car Buffer Test (see section below) at the reduced stroke buffer speed.

- Navigate to MAIN MENU | SETUP | SPEEDS | TEST BUFFER SPEED.
- Set the value to the reduced stroke buffer speed in which the test is being conducted.
- The value is in FPM.

6.5 Final Limits

The following information is for final limits.

- Applicable Codes – ASME A17.1 section 2.25.3
- Schematic Location – Final Limits input feeder – MR SRU board – (1.G); H120 input feeder – MR SRU board – (1.H); M Contactor – Drive sheet – (1.F); B1 Contactor – Brake sheet – (1.H); B2 Contactor – Brake sheet – (5.H)
- Testing Notes – The final limits immediately remove power from the driving machine motor and brake. Typical fault stops use a combination of drive and brake power. These stops will only use the brake to stop and may require a longer distance to stop from high speed.
- Testing Requirements – This test can be performed on any mode of operation.

The table below lists the instructions for each step of the Final Limits test.

Table 40: Final Limits Test

Step	Information / Instruction for Each Step
Setup	Software • Navigate to MAIN MENU | SETUP | MISCELLANEOUS. • Set parameter Bypass Term Limits to YES. Car • Put the car at a terminal landing.
Procedure	On inspection, run the car into the final limit.
Expected Results	When the car hits the final limit, contactor M and B will open. Power will be removed from the driving machine motor and brake. The car will come to a stop.
Revert	Software • Navigate to MAIN MENU | SETUP | MISCELLANEOUS. Set parameter Bypass Term Limits to NO Car • Place jumper from BFL (bottom) or TFL (Top) to H120. • Move the car off the final limit. • Remove jumper from BFL (bottom) or TFL (top) to H120. Manual Doors • If a lock fault is latched, revert to normal operation to allow the car to automatically level into the floor.

The table below lists the Final Limits troubleshooting procedure.

Table 41: Final Limits Troubleshooting Procedure

Step	Information / Instruction for Each Step
Car Did Not Stop on the Final Limit	Verify that the final limit switch is wired to the fixed input. Verify that no jumpers are on the safety string inputs.

6.6 Car Buffer Test

The following information is for car buffer test.

- Applicable Codes – ASME A17.1 section 2.25.3
- Schematic Location – Buffer Switch input feeder – MR SRU board – (1.G); Final Limits input feeder – MR SRU board – (1.G); H120 input feeder – MR SRU board – (1.H); M24 – MR Power Supply section – (2.B); MM – MR SRU board – (6.F)
- Testing Notes – None

- Testing Requirements – This test can be performed on any mode of operation.

The table below lists the instructions for each step of the Car Buffer Test.

Table 42: Car Buffer Test

Step	Information / Instruction for Each Step
Setup	Hardware • Place jumper from M24 to the MM input on the MR board. • Verify the INSPECTION switch is in the Automatic position. Software • Navigate to MAIN MENU | SETUP | SPEEDS | TEST BUFFER SPEED. Set the value at the speed in which the test is being conducted. The value is in fpm. Drive • KEB - In Basic Setup, set the contract speed to the same speed as the test speed. - In Speed Profile, set the high speed to the same speed as the test speed. • Magnetek - In the A1 parameter, increase the contract motor speed to the same percentage the test speed is set over the contract speed. For example, if the contract speed is 500 fpm and the test speed is set to 600 fpm, that is 1.2x the contract speed. If the contract motor speed on the drive is 1200 rpm, multiply this by 1.2 which is 1440 rpm. This is the value that is set in the A1 menu. • M1000 - In the A1 parameter, increase the contract motor speed to the same percentage the test speed is set over the contract speed. For example, if the contract speed is 500 fpm and the test speed is set to 600 fpm, that is 1.2x the contract speed. If the contract motor speed on the drive is 1200 rpm, multiply this by 1.2 which is 1440 rpm. This is the value that is set in the A1 menu.

Step	Information / Instruction for Each Step
	- In the A5 parameter, increase the MAX Frequency to the same percentage the test speed is set over the contract speed. • DSD - In Function 11, increase the contract motor speed to the same percentage the test speed is set over the contract speed. For example, if the contract speed is 500 fpm and the test speed is set to 600 fpm, that is 1.2x the contract speed. If the contract motor speed on the drive is 1200 rpm, multiply this by 1.2 which is 1440 rpm. This is the value that is set in Function 11. Car • Put the car far enough away from the terminal landing being tested to do a full speed run
Procedure	Navigate to the DEBUG menu and select Acceptance Test. Select the Car Buffer or Counter Buffer test. Select Save and press ENTER. The UI display the following instructions: • Checking if in DZ. • Press the Enable and the Direction in which the test is being performed. - The controller runs the car in the inputted direction with a speed command reflecting the value of the test speed. **NOTE**: If either the Enable or Direction are released prior to completion of the test, it will cancel the test immediately and perform an emergency stop.
Expected Results	The car will hit the buffer at speed set in parameter the test speed.
Revert	Hardware • Remove jumper from the MM input. Car • To bypass the final limit/buffer switch, place jumper from H120 to BUF & BFL or TFL. • On inspection, take the car off the buffer. • Remove jumper from BUF, BFL, or TFL. Manual Doors • If a lock fault is latched, revert to normal operation to allow the car to automatically level into the floor.

6.7 Car Safeties and Governor

The following information is for car safeties and governor.

- Applicable Codes – ASME A17.1 section 2.18
- Schematic Location – M24 – MR Power Supply section – (2.B); MM – MR SRU board – (6.F); M120 input feeder – MR SRU board – (1.H); GOV input feeder – MR SRU board – (1.G)
- Testing Notes – None
- Testing Requirements – This test requires the car to reach the governor trip speed in the down direction.

The table below lists the instructions for each step of the Car Safeties and Governor test.

Table 43: Car Safeties and Governor Test

Step	Information / Instruction for Each Step
Setup	Software • Navigate to the MAIN MENU | SETUP | SPEEDS | TEST A/D SPEED. Set this value at the speed in which the test is being conducted. The value is in fpm. Hardware • Place jumper from M24 to the MM input on the MR board. • Place a jumper from M120 to the GOV input on the MR board. • Verify the INSPECTION switch is in the Automatic position. Drive • KEB - In Basic Setup, set the contract speed to the same speed as the test speed. - In Speed Profiles, set the high speed to the same speed as the test speed. • Magnetek - In the A1 parameter, increase the contract motor speed to the same percentage the test speed is set over the contract speed. For example, if the contract speed is 500 fpm and the test speed is set to 600 fpm, that is 1.2x the contract speed. If the contract motor speed on the drive is 1200 rpm, multiply this by 1.2 which is 1440 rpm. This is the value that is set in the A1 menu.

Step	Information / Instruction for Each Step
	• M1000 - In the A1 parameter, increase the contract motor speed to the same percentage the test speed is set over the contract speed. For example, if the contract speed is 500 fpm and the test speed is set to 600 fpm, that is 1.2x the contract speed. If the contract motor speed on the drive is 1200 rpm, multiply this by 1.2 which is 1440 rpm. This is the value that is set in the A1 menu. - In the A5 parameter, increase the MAX Frequency to the same percentage the test speed is set over contract speed. Car • Put the car far enough away from the terminal landing being tested to do a full speed run.
Procedure	Navigate to the DEBUG menu and select Acceptance Test. Select the ASC/DESC Overspeed test. Select Save and press ENTER. The UI displays the following instructions: • Checking if in DZ. • Press the Enable and the Direction in which the test is being performed. -The controller runs the car in the inputted direction with a speed command reflecting the value of the test speed. **NOTE**: If either the Enable or Direction are released prior to completion of the test, it will cancel the test immediately and perform an emergency stop.
Expected Results	The car will overspeed to the governor tripping speed. The Governor will trip, and the car safeties will be activated.
Revert	Hardware • Remove the jumper from the MM input. • Remove the jumper from the GOV input. Drive • Revert the drive to run the car at normal speed. Manual Doors • If a lock fault is latched, revert to normal operation to allow the car to automatically level into the floor. Mode:

Step	Information / Instruction for Each Step
	• Move the car up in Construction mode to release the safeties then return to normal mode of operation.

The table below lists the Car Safeties and Governor troubleshooting procedure.

Table 44: Car Safeties and Governor Troubleshooting Procedure

Step	Information / Instruction for Each Step
Car Did Not Trip the Governor	Verify that the car reaches the governor trip speed. If it does not, increase the overspeed value in the drive.

7 Redundancy

7.1 Safety Inputs

The following information is for safety inputs.

- Applicable Codes – ASME A17.1 section 2.26.9.3.2
- Schematic Location – RDC Jumper – CT SRU board – (6.F), COP SRU boar – (6.F)
- Testing Notes – The following testing notes are:
  - Software/Hardware electronic protective devices are monitored by redundant board inputs.
  - The redundant inputs are constantly compared with one another to verify proper operation of the input circuitry. If the inputs are not in the same state, a Redundancy fault is latched, and the car goes out of service.
  - Table 37 lists the electronic protective devices that are redundantly monitored by the Software/Hardware system.
- Testing Requirements – None

The table below lists the Electronic Protective Devices Monitored by the Software/Hardware System.

Table 45: Electronic Protective Devices Monitored by the Software/Hardware System

Electronic Protective Device	Input Location
Machine Room Board	
Bottom Interlock	LFB/LRB
Middle Interlock(s)	LFM/LRM
Top Interlock	LFT/LRT
Machine Room Inspection Enable	Internal
Hoistway Access Top Up	ATU
Hoistway Access Top Down	ATD
Hoistway Access Bottom Up	ABU
Hoistway Access Bottom Down	ABD
Car Door Bypass	SWCAR
Hoistway Door Bypass	SWHO
Car Top Board	
Cartop Inspection Enable	507
Front Gateswitch	501
Rear Gateswitch	502
Car Operating Panel Board	
In-Car Stop Switch	SF2
Hoistway Access Enable	SFM

The table below lists the instructions for each step of the Safety Input test.

Table 46: Safety Input Test

Step	Information / Instruction for Each Step
Setup	Hardware • Locate RDC jumper
Procedure	Remove RDC jumper
Expected Results	The controller will latch a Redundancy fault and go out of service.
Revert	Hardware • Restore RDC jumper

The table below lists the Safety Input troubleshooting procedure.

Table 47: Safety Input Troubleshooting Procedure

Step	Information / Instruction for Each Step
Car Did Not Detect Redundancy Fault	Contact Smartrise

7.2 Removal of Power

The sections below describe removal of power test procedures.

7.2.1 Machine Brake Power

The following information is for machine brake power.

- Applicable Codes – ASME A17.1 section 2.26.8.2
- Schematic Location – B1 Contactor – Brake sheet – (1.H); B2 Contactor – Brake sheet – (5.H)
- Testing Notes – The following testing notes are:

The following contacts can remove power to the machine brake:

  - ➢ Motor Contactor
  - ➢ Auxiliary Contact, B
  - ➢ Contactor and Drive relay.

  - This test is performed by holding the B Contactor in at the end of the run. When the car stops, the Brake Contactor is simulated in a stuck position.

- Testing Requirements – This test can be performed on any mode of operation.

The table below lists the instructions for each step of Machine Brake Power test.

Table 48: Machine Brake Power Test

Step	Information / Instruction for Each Step
Setup	None

Step	Information / Instruction for Each Step
Procedure	While the car is running, hold the B Contactor in the closed position with an insulated tool.
Expected Results	At the end of the run, the machine brake will drop. A “B Contactor” fault will appear.
Revert	Car • Release the B contactor.

7.2.2 Motor Power

The following information is for motor power.

- Applicable Codes – ASME A17.1 section 2.26.9.5.1
- Schematic Location – M Contactor – Drive sheet – (1.F)
- Testing Notes – The following testing notes are:
  - The following can remove power to the motor:
    - ➢ M Contactor
    - ➢ Drive Enable Relay
  - This test is performed by holding the M Contactor in at the end of the run. When the car stops, the Motor Contactor is simulated in a stuck position.
- Testing Requirements – This test can be performed on any mode of operation.

The table below lists the instructions for each step of Motor Power test.

Table 49: Motor Power Test

Step	Information / Instruction for Each Step
Setup	None
Procedure	While the car is running, hold the M Contactor in the closed position with an insulated tool.
Expected Results	At the end of the run, the drive relay will open. Power will be removed from the motor. A “M Contactor” fault will appear.
Revert	Car • Release the M contactor.

8 Ground Faults

8.1 EPD Input to REF

The following information is for EPD input to REF (M24 to REF).

- Applicable Codes –A17.1 section 2.26.9.3
- Schematic Location – M24 – MR Power Supply section – (2.B); REF – MR Power Supply section – (2.C)
- Testing Notes – This test requires intentionally shorting M24 to REF.
- Testing Requirements – This test can be performed any time the controller has power.

The table below lists the instructions for each step of the EPD input to REF test.

Table 50: EPD Input to REF Test

Step	Information / Instruction for Each Step
Setup	None
Procedure	Using a jumper wire, connect M24 to REF.
Expected Results	Power is removed from the M24 Bus. M24 to REF DC voltage will read 0VDC.
Revert	Remove jumper from M24 and REF. Reset M24 breaker.

8.2 Safety String to Ground

The following information is for safety string to ground.

- Applicable Codes –A17.1 section 2.26.9.3
- Schematic Location –120V – MR SRU board – (7.G)
- Testing Notes – This test requires intentionally shorting a 120 VAC Bus to REF.
- Testing Requirements – This test can be performed any time the controller has power.

The table below lists the instructions for each step of the Safety String to Ground test.

Table 51: Safety String to Ground Test

Step	Information / Instruction for Each Step
Setup	Verify that all safety string contacts are closed.
Procedure	Using a jumper wire, connect 120 to ground.
Expected Results	Either: • The onboard fuse will open while the short is present. • The breaker will open.

Step	Information / Instruction for Each Step
Revert	Remove jumper from 120 and ground. Reset circuit breaker or power cycle the MR Board.

9 Emergency Operation

9.1 Firefighters' Emergency Operation (FEO)

The following sections describe FEO test procedures.

9.1.1 FEO – Interruption of Power

The following information is for FEO – Interruption of power.

- Applicable Codes –A17.1 section 2.27.3.4
- Schematic Location – none
- Testing Notes – This test requires placing the car on FEO and cycling power.
- Testing Requirements – This test must be performed on any FEO mode.

The table below lists the instructions for each step of the FEO – Interruption of Power test.

Table 52: FEO – Interruption of Power Test

Step	Information / Instruction for Each Step
Setup	None
Procedure	Recall the car using Phase I and run the car using Phase II operation to verify. Reset main line power.
Expected Results	The car will remain on FEO in the correct phase and with the correct position.
Revert	Reset FEO using lobby key switch.

9.1.2 FEO Phase I and Load Weighing Device

The following information is for FEO phase I and load weighing device.

- Applicable Codes –A17.1 section 2.27.3.1.6(m)
- Schematic Location – Full Load input feeder – CT SRU board or MR SRU board– one of the inputs; C24 (PWR) – CT SRU board – (2.D)
- Testing Notes – The controller allows the car to recall on FEO Phase I in the down direction even with the overload input active.
- Testing Requirements – This test must be performed on any FEO Phase 1 recall.

The table below lists the instructions for each step of the FEO Phase I and Load Weighing Device test.

Table 53: FEO Phase I and Load Weighing Device Test

Step	Information / Instruction for Each Step
Setup	Car

Step	Information / Instruction for Each Step
	• Place the car away from the main recall landing. Hardware • Jumper the car board input Full Load to C24.
Procedure	Place the car on FEO Phase I.
Expected Results	Verify that car recalls as expected.
Revert	Remove jumper between C24 and Full Load. Reset FEO service using lobby key switch.

9.1.3 FEO Phase II and Load Weighing Device

The following information is for FEO phase II and load weighing device.

- Applicable Codes –A17.1 section 2.27.3.3.1(l)
- Schematic Location – Full Load input feeder – CT SRU board or MR SRU boar– one of the inputs; C24 (PWR) – CT SRU board – (2.D)
- Testing Notes – The controller allows the car to move on FEO Phase II in the down direction even with the overload input active.
- Testing Requirements – This test must be performed on any FEO Phase II.

The table below lists the instructions for each step of the FEO Phase II and Load Weighing Device test.

Table 54: FEO Phase II and Load Weighing Device Test

Step	Information / Instruction for Each Step
Setup	Car • Place the car on FEO II. Hardware • Jumper the car board input Full Load to C24.
Procedure	Enter car call below current floor.
Expected Results	Verify that the car answers car calls.
Revert	Remove the jumper between C24 and Full Load. Reset FEO using lobby key switch.

9.1.4 Hoistway Landing Slide Power to REF

The following information is for Hoisting Landing Slide Power to Ref (H24 to REF).

- Applicable Codes –A17.1 section 2.27.3.3.6
- Schematic Location – H24 – MR Power Supply section – (4.B); REF – MR Power Supply section – (2.C)
- Testing Notes – This test requires intentionally shorting H24 to REF.
- Testing Requirements – This test can be performed on any FEO Phase II.

The table below lists the instructions for each step of the EPD input to REF test.

Table 55: EPD Input to REF Test

Step	Information / Instruction for Each Step
Setup	None
Procedure	Using a jumper wire connect H24 to REF.
Expected Results	Power is removed from the H24 Bus. H24 to REF DC voltage will read 0VDC. Car continues to operate on FEO Phase II Operation.
Revert	Remove jumper from H24 and REF. Reset H24 breaker.

9.2 Emergency Power

The following sections describe emergency power to one or all elevator test procedures.

9.2.1 One Elevator Provided with Emergency Power at a Time

The following information is for one elevator provided with emergency power at a time.

- Applicable Codes –A17.1 section 2.27.2
- Schematic Location – Select Car X – Riser Board (RB2)
- Testing Notes – This test is for buildings with a generator that supplies power to only one car at a time.
- Testing Requirements – This test can be performed on any mode of operation.

The table below lists the instructions for each step of One Elevator Provided with Emergency Power at a Time test.

Table 56: One Elevator Provided with Emergency Power at a Time Test

Step	Information / Instruction for Each Step
Setup	Hardware • Place emergency power selector switch in the Automatic position.
Procedure	Start and run emergency generator.
Expected Results	Cars will proceed by availability, one at a time, to the designated level. The car with the lowest index number will be placed into service. Adjusting the selector switch will take the currently selected car out of service at an available floor and the selected car will be placed into service.
Revert	Return to normal building power.

9.2.2 All Elevators Provided with Emergency Power at the Same Time

The following information is for all elevators provided with emergency power at the same time.

- Applicable Codes –A17.1 section 2.27.2
- Schematic Location – none
- Testing Notes – This test is for buildings with a generator that simultaneously supplies power to all cars.
- Testing Requirements – This test must be performed on any mode of operation.

The table below lists the instructions for each step of All Elevators Provided with Emergency Power at the Same Time test.

Table 57: All Elevators Provided with Emergency Power at the Same Time Test

Step	Information / Instruction for Each Step
Setup	None
Procedure	Start and run emergency generator.
Expected Results	All cars will run normally and a lamp indicating emergency power operation is on in the hall station.
Revert	Return to normal building power.

10 Suspension Means and Their Connections

10.1 Loss of Traction

The following information is for loss of traction.

- Applicable Codes –A17.1 section 2.20.8.1
- Schematic Location – DIP A3 – MR SRU board – (6.D)
- Testing Notes – None
- Testing Requirements – None

The table below lists the Loss of Traction test.

Table 58: Loss of Traction Test

Step	Information / Instruction for Each Step
Setup	Hardware: • Verify the car is in the normal mode at the bottom floor.
Procedure	Turn ON DIP A3 to disable car doors. Set parameter 01-0154 = ON (This disables the drive feedback). • While the parameter is set, the speed from the position encoder is replaced by a speed of zero. • If the car travels faster than Traction Loss Threshold, a Traction Loss will be triggered regardless of the setting of Traction Loss Offset Percentage. Navigate to MAIN MENU | Setup | Safety | Traction Loss. Adjust the Threshold, Timeout, and Offset parameters to meet job needs. • **Threshold**: Sets the minimum car speed required for a traction loss fault. -If the car is traveling slower than this speed, Traction Loss is not checked. • **Timeout**: Sets the time traction loss must be detected before a fault is set. -If Traction Loss is detected for a period greater than this time, the fault will occur. • **Offset**: Sets the % difference between the encoder speed and the car speed required to trigger a Traction Loss fault. Max offset % value = 60.

Step	Information / Instruction for Each Step
	-If the % difference of the speed from the encoder and the contract speed of the car is greater than or equal to the Offset % value, a Traction Loss fault will occur. Enter a car call to a landing that causes the car speed to exceed the Traction Loss Threshold speed. -Increase the distance if a Traction Loss fault does not occur. Verify the car faults prior to reaching the destination. Verify fault remains active and car does not run.
Expected Results	The controller will latch a Traction Loss fault.
Revert	Set binary parameter 01-0154 = OFF. Reset fault by pressing and holding Traction Loss button on MRSU Board. **NOTE:** TLOSS reset button will be disabled if the Traction Loss Reset input is programmed on the controller. Input must be low to reset the Traction Loss fault. Enable car doors (if desired) by turning off DIP A3.

The table below lists the Loss of Traction troubleshooting procedure.

Table 59: Loss of Traction Troubleshooting Procedure

Step	Information / Instruction for Each Step
Car Did Not Trip Traction Loss	Check traction loss trip threshold and offset in the Traction Loss Safety menu. MAIN MENU | Setup | Safety |Traction Loss. Settings must be modified per job prior to running the test. Enter a higher floor car call.

11 Manual Rescue

The following information is for Manual Rescue.

- Applicable Codes –A17.1 section 2.27.2
- Schematic Location – B1 Contactor – Brake sheet – (1.H); M24 – MR Power Supply section – (2.B); ML2 – Drive and Regen section – (8.E)
- Testing Notes – None
- Testing Requirements – None

The table below lists the Manual Rescue test.

Table 60: Manual Rescue Test

Step	Information / Instruction for Each Step
Setup	Hardware • Place a jumper between M24 to ML2
Procedure	Position the car between two openings. Turn off power to the controller. On the MR board, set the NORMAL/INSPECTION switch to NORMAL. From the Emergency Rescue Device, turn on the Battery Disconnect switch. Put car on Construction Mode and close hall doors. Confirm the Enable Construction Box is OFF to bypass software. Press and hold the Brake Release, MR ENABLE, and UP button. Manually open the front or rear doors.
Expected Results	The Hold Voltage is equal to the Relevel Voltage. The B1 contactor picks, the brakes lift and the car drifts to the nearest opening and goes out of service with its doors opened.
Revert	Remove Jumper

12 Direction Counter Trip Reset

The following information is for Direction Counter Trip Reset.

- Applicable Codes – None
- Schematic Location – None
- Testing Notes – None
- Testing Requirements – None

The table below lists the Direction Counter Trip Reset test.

Table 61: Direction Counter Trip Reset Test

Step	Information / Instruction for Each Step
Setup	None
Procedure	<u>View the present value on the Direction Change Counter:</u> Navigate to MAIN MENU. Go to DEBUG. Go to VIEW DEBUG DATA. Select option 030, which corresponds to the "Dir. Change Counter". <u>Perform the test:</u> Navigate to MAIN MENU. Go to SETUP. Go to MISCELLANEOUS. Go to DIR. COUNTER LIMIT. Enter the Access Code (provided by Technical Support). Set the number of direction changes limit to 10 increments more than the present value. Move the car in various directions (10 times while monitoring the counter). **NOTE:** the value on the Direction Change Counter increments with every change in direction.
Expected Results	The car should go out of service after the 10th direction change. **NOTE:** When the direction counter exceeds the limit, the counter cannot be reset again.
Final Step	Set a new threshold for the number of direction changes.