

# endura MRL Inspector's Guide

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# Safety Precautions

**IMPORTANT!**

Read this page before any work is performed on elevator equipment. The procedures contained in this manual are intended for the use of qualified elevator personnel. In the interest of your personal safety and the safety of others, do not attempt any procedure that you are not qualified to perform.

All procedures must be accomplished in accordance with the applicable rules in the latest edition of the National Electrical Code, the latest edition of ASME A17.1, and any governing local codes.

## Terms in This Manual

**! CAUTION**

**CAUTION** statements identify conditions that may result in damage to the equipment or other property if improper procedures are followed.

**! WARNING**

**WARNING** statements identify conditions that may result in personal injury if improper procedures are followed.

## General Safety

**! CAUTION**

Before applying power to the controller, check that all manufacturing wire connections are tight on relays, contactors, fuse blocks, resistors, and terminals on cards and DIN rail terminals. Connections loosened during shipment may cause damage or intermittent operation.

Other specific warnings and cautions are found where applicable and do not appear in this summary. See the *Elevator Employee Safety and Accident Prevention Program Manual* and the *Elevator Industry Field Employees' Safety Handbook* for electrical equipment safety information on installation and service.

## Electrical Safety

All wiring must be in accordance with the National Electrical Code and be consistent with all state and local codes.

### Use the Proper Fuse

To avoid fire hazards, use only a fuse of the correct type, voltage, and current rating. See the job specific drawings sheet (Power Supplies) for fusing information.

Electric shocks can cause personal injury or loss of life. Circuit breakers, switches, and fuses may not disconnect all power to the equipment. Always refer to the wiring diagrams. Whether the AC supply is grounded or not, high voltage will be present at many points.

## Electrical Safety (continued)

### Mainline Disconnect

Unless otherwise directed, always Turn OFF, Lockout, and Tagout the mainline disconnect to remove power from elevator equipment. Before proceeding, confirm that the equipment is de-energized with a volt meter. Refer to the *Elevator Employees' Safety and Accident Prevention Program Manual* for the required procedure.

### When Power Is On

To avoid personal injury, do not touch exposed electrical connections or components while power is ON.

### Test Equipment Safety

Always refer to manufacturers' instruction book for proper test equipment operation and adjustments.

Buzzer-type continuity testers can damage electronic components. Connection of devices such as voltmeters on certain low level analog circuits may degrade electronic system performance. Always use a voltmeter with a minimum impedance of 1M Ohm/Volt. A digital voltmeter is recommended.

## Mechanical Safety

See the *Elevator Employees' Safety and Accident Prevention Program Manual* and the *Elevator Industry Field Employees' Safety Handbook* for mechanical equipment safety information on installation and service.

### Power Unit Fluid System

If working on the power unit fluid system, the static car weight is applying pressure to the jack and valve system and this stored pressure is present at the power unit.

Before working on any component of the power unit, do one of the following:

- Manually lower the car onto the buffers to relieve the stored pressure.
- Close the machine room oil line shutoff valve, and then release the power unit pressure by momentarily opening the manual lowering adjuster valve.

## Arrival of Equipment

### Receiving

Upon arrival of the equipment, inspect it for damage. Promptly report all visible damage to the carrier. All shipping damage claims must be filed with the carrier.

### Storing

During storage in a warehouse or on the elevator job site, precautions should be taken to protect the equipment from dust, dirt, moisture, and temperature extremes.

# Static Protection Guidelines

**IMPORTANT!** Read this page before working with electronic circuit boards.

Elevator control systems use a number of electronic cards to control various functions of the elevator. These cards have components that are extremely sensitive to static electricity and are susceptible to damage by static discharge.

Immediate and long-term operation of an electronic-based system depends upon the proper handling and shipping of its cards. For this reason, manufacturing bases warranty decisions on the guidelines below.

## Handling

- Store all boards in separate, sealed, anti-static bags until time for installation.
- When handling boards, wear an anti-static wrist strap with ground wire. Acceptable straps are available through local electronics parts suppliers. Typical anti-static wrist straps are intended for applications below 240 VAC.
- Do not place boards on any surface without adequate static protection.
- Handle boards only by their edges using proper anti-static techniques. Avoid touching components, traces, and connectors.
- Take extra care when handling individual components, such as integrated chips, metal oxide semiconductors, and field-effect transistors. These components can be destroyed with as little as 30 volts of electrostatic discharge.

## Shipping

- Complete the included board discrepancy sheet.
- Any board returned to manufacturing must be packaged in a closed, sealed anti-static bag designed for the board, and packaged in a sturdy protective shipping carton.
- Clear bubble wrap and Styrofoam are unacceptable packing materials.



Refer to the *Replacement Parts Catalog* to order extra static bags and shipping cartons for each board.

**Failure to adhere to the above guidelines will void the card warranty!**

# Access and Egress Procedures

The access and egress procedures that are used entering the hoistway determine whether or not power is needed to perform the required task(s). If not, Turn OFF, Lockout, and Tagout the mainline disconnect.

## Car Top Safety

**! WARNING** DO NOT stand on the car top emergency access cover.

### Safety Precautions When Accessing/Egressing Car Tops

- Before opening the hoistway door, ensure that the correct hoistway has been selected and that the car is at the proper floor (to avoid a fall hazard).
- Access car tops from the top terminal landing whenever possible.
- Never access a hoistway, unless a reliable method of controlling the car has been determined.
- Locate the emergency stop switch.
- Before accessing the car top, place the stop switch in the STOP position, and confirm the proper operation.
- Locate a safe refuge area.
- Always maintain control of the hoistways doors during access/egress.
- Fall protection is to be used when a fall hazard exists. The only exception to this is when routine maintenance is being performed on top of complete, operational elevator cars. Do Not use fall protection where there is a greater risk of entanglement.
- When opening hoistway doors from the car top, do so slowly, so that no one steps in from the landing thinking a car has arrived.
- Observe overhead clearances.
- Use extra care when working on car tops that are curved, domed, or located in unenclosed hoistways.

**! WARNING** DO NOT turn the following switches to Automatic Operation until the hoistway door interlock is open—and remains open—and the hoistway is empty.

- When egressing the hoistway/car top, ensure that the stop switch is in the STOP position, and that the inspection switch is on Inspection Operation.

### Safety Precautions When Working on Car Tops

- Before beginning work, check the car top for oil or grease, and clean as required.
- Locate position and counterweights of the car being accessed, as well as any other cars/counterweights in the vicinity. Take appropriate measures to avoid hazards.
- Verify proper operation of the top-of-car inspection operating buttons. Where outlets are provided, use a grounded, portable light with a suitable, non-conductive; or use a grounded lamp guard and reflector.

**! CAUTION** DO NOT attach electrical cords on the car or counterweight ropes.

## Access and Egress Procedures (continued)

### Pit Safety

Before entering a pit, ensure that every employee is aware of the hazards. Some common hazards are:

- Recognized refuge space
- Inadequate lighting
- Improper access
- Tripping hazards
- Improper use of pit ladders
- Moisture/water/fluid
- Moving equipment

### Safety Precautions Before Entering a Pit

Take appropriate steps to minimize the following hazards and any others that are identified, such as:

- Locate the position of the car being accessed, as well as any other cars in the vicinity.
- Before accessing the pit, the car **MUST** be located high enough to allow the placement of the pit prop pipe stands to be inserted into the buffers.
- Once the pit is initially accessed, the pit props must be installed and the oil line shutoff valve closed to prevent car movement.
- Obtain control of the car.
- Identify a refuge space.
- If movement of the elevator is not needed to complete the work being performed, Turn OFF, Lockout, and Tagout procedures are required.
- If notified by the building owner or representative that the pit and/or hoistway has been classified as a Permit Required Confined Space (this notification could be verbal or the pit/hoistway may be labeled), contact the appropriate person for authorization. In either case, do not enter the pit/hoistway until authorization is received.

### Safety Precautions When Working In Pits

- Before entering a pit, test and verify the door lock circuit and stop switch circuit.
- Ensure that all portable lights and tools are connected through a ground fault (GFCI).
- Take care to protect all lighting from damage.
- **DO NOT** work in a pit with standing water.
- Before climbing, always examine shoes for fluid/grease.
- Use both hands when working with ladders and also when accessing and egressing a pit.
- Be aware of moving equipment (e.g., pump, motors, belts, and sheaves), and ensure that clothing and hands cannot get caught in them.
- Avoid smoking or the use of open flames in the pit.

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# Introduction

This inspector's guide has been developed as an aid for adjusters, inspectors, or any persons with authority having jurisdiction in the inspection and acceptance testing of the endura MRL System. It is not intended to replace any other documentation that may be used, and it is not totally inclusive of all items required for inspection tests.

The following procedures are based on the latest edition of ASME's *Guide for Inspection of Elevators, Escalators, and Moving Walks, A17.2*. For procedures not in this guide, please refer to the appropriate ASME documentation. Read this entire document, and if any information is unclear, contact the local TK Elevator Office.

## Inspection Tests



- Both the shutoff valve and the auxiliary power unit (APU) require power from either the controller or the auxiliary power cord.
- To operate the APU, the STOP button on the service panel must be depressed.
- The following items are located behind the controller landing service panel:
  - IOD Card
  - CPUA
  - UIT

### Pressure Transducer, UIT Pressure Display Test

1. Use proper access procedures to access the pit. See Access and Egress Procedures on page 6.
2. Connect a pressure gauge to the valve's quick connect (located inside the tank). See Figure 1.

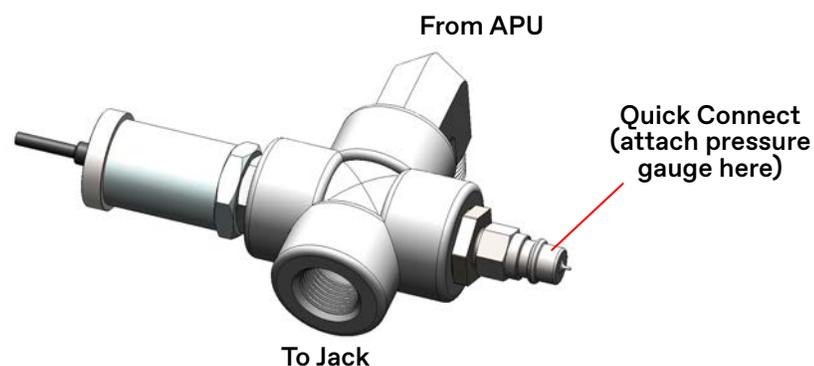


Figure 1 - Pressure Transducer

3. Compare the pressure gauge reading from the pit to the pressure reading on the UIT. The readings should be the same.
4. Reassemble the tank, and return the car to Normal Operation.

## Pressure Transducer Test

1. Place the car at the first floor landing.
2. Position the stop switch (located on the service panel) to the STOP position.
3. Turn the manual lowering keyswitch to DOWN position, and hold for a few seconds.
4. Allow the car to sit on the buffers, and observe the pressure on the UIT. After the pressure drops, the system status goes to Low Pressure and shuts down and the UIT displays a 1074 Fault.
5. Position the stop switch to the RUN position, and return car to Normal Operation.

## Valve High Pressure Relief Test (Stop Ring Test)

This test allows the car to be run onto the jack system's stop ring to force the valve into high pressure relief. The UIT displays system pressure, and confirms relief pressure.

1. With the car on Automatic Operation, position it level at the top floor.
2. After the doors close, move the switch on the IOD Card from NORMAL to INSP.
3. Install a temporary jumper on the IOD Card at CON47, pins 2–3. This action bypasses the NP Microprocessor's safety string control output.
4. Run the car UP until it stops on the directional limit magnet.
5. From the UIT, issue a PRT Command.  
UIT > Block Select Adjustments > Adjust Car > Startup Menu > Enter > PRT.
6. Press **ESC** until **BLOCK SELECT ADJUSTMENTS** displays > **LOG OFF UIT** displays.
7. Press **ENTER** to return to the pressure reading screen (default window).



**For the next step, immediately stop the power unit if the oil pressure exceeds 600 PSI.**

8. Run the car UP until the car contacts the stop ring and the valve goes into high pressure relief. Note the pressure reading on the UIT.
9. After the test is finished, complete the following:
  - a. Run the car DOWN to the top floor level on Inspection Operation or off of the directional limit magnet.
  - b. Remove the temporary jumper installed in Step 3.
  - c. Return the car to Automatic Operation.

## APU Relief Test

1. Verify that the Valve High Pressure Relief Test (Stop Ring Test) on page 10 has been performed.
2. Verify that the Pressure Transducer, UIT Pressure Display Test on page 9 has been performed.
3. Place the car at the first landing.
4. Move the switch on the IOD Card from NORMAL to INSP.
5. From the service panel, insert the AUX PWR CORD 1 into the PLUG 1 receptacle.
6. Turn the shutoff valve keyswitch (located on service panel) to the Close position. The Close LED will illuminate when activated (11–13 seconds).
7. Position the stop switch (located on the service panel) to the RUN position.

**WARNING**

**In the next step, if High Pressure Relief is set to 600 PSI or above, damage to the equipment is possible.**

8. Observe the system pressure displayed on the UIT, and turn the AUX Operation Keyswitch to the UP position.
9. Turn the shutoff valve keyswitch to the Open position. The Open LED will illuminate when activated (11–13 seconds).
10. Unplug the AUX PWR CORD 1 from the PLUG 1 receptacle.
11. Position the stop switch to the RUN position.
12. Move the switch on the IOD Card from INSP to NORMAL.

## Electronic Shutoff Valve Test

**WARNING**

**If High Pressure Relief is set to 600 PSI or above, damage to the equipment is possible.**

1. Place the car at the first floor landing.
2. Move the switch on the IOD Card from NORMAL to INSP.
3. Turn the shutoff valve keyswitch (located on service panel) to the Close position. The Close LED will illuminate when activated (11–13 seconds).
4. Monitor the pressure displayed on the controller UIT as the car is run UP from Inspection Operation. Should the pressure rise to 600 PSI or above, IMMEDIATELY stop the UP run and run the car DOWN to relieve the pressure.

## Electronic Shutoff Valve Test (continued)

5. Run the car UP on Inspection Operation and observe that the car does not move up, and the pressure builds until the bypass pressure is reached (less than 600 PSI).
6. Turn the shutoff valve keyswitch to the Open position. The Open LED will illuminate when activated (11–13 seconds).
7. Return the car to Normal Operation.

## Lowering Valve Test

1. Place the car at the first floor landing.
2. Move the switch on the IOD Card from NORMAL to INSP.
3. Position the stop switch (located on the service panel) to the STOP position.
4. Turn the manual lowering keyswitch to the DOWN position, and hold a few seconds.
5. Manually open the doors, and observe the following:
  - a. The position count on the UIT is counting down.
  - b. The car has moved and is now below the floor level.
6. Position the stop switch to the RUN position, and return car to Normal Operation.

## Top Terminal Slowdown Test (NTSD)

1. Issue a VER Command to verify the installed software. See Figure 2.



- The test will not function correctly without this software.
- If an update is needed, obtain the software from the Lobby.

```

Job: E-DYN01b-Dynamic Simulator
Generic V4R2D _ Feb  2 2016 17:22:43
  Release Build
OS V3R6bFeb  2 2016 17:31:02
CPUA FPGA V2R4
IOD FPGA Version:9
Boot V0R5
Safety Processor V3R13
NP Processor V2R5
Selector A Processor V27
Top HNB Processor V23
Bottom HNB Processor V23
CWIA / DPIA Processor V20
G5C1>

```

- CPUA Generic: V4r2D (or newer)
- Safety Processor: V3r13 (or newer)
- Selector: V27 (or newer)

Figure 2 - VER Command Screen and Required Software

## NTSD System Test

1. Place the car level at a floor other than the top terminal landing.
2. Issue a RFL Command.
3. Move the switch on the IOD Card from NORMAL to INSP.
4. Record the P17 value.
5. Set P17 to one-half of its current value.
6. Move the switch on the IOD Card from INSP to NORMAL.
7. Run the car into the top terminal landing.
8. Verify that NTSD activates (Faults 981, 2801) and that the car does not shutdown on Terminal Speed Reduction (TSR).
9. Set P17 back to the recorded value.

## Top Terminal Speed Reducing (TSR) Device Test

1. Place the car level at a floor other than the top terminal landing.
2. Run the car into the top terminal floor.
3. Issue a TSR Command.
4. Verify that the checkpoint velocities are within the ranges listed below. The car will shutdown at the indicated speeds.

### Distance from Floor

Checkpoint 1	4 <sup>1</sup> / <sub>2</sub> " Below	Shutdown Velocity (FPM) > 140
Checkpoint 2	1 <sup>1</sup> / <sub>2</sub> " Below	Shutdown Velocity (FPM) > 90
Checkpoint 3	1 <sup>1</sup> / <sub>2</sub> " Above	Shutdown Velocity (FPM) > 50

5. Run the car to some floor below the top terminal landing.
6. Move the switch on the IOD Card from NORMAL to INSP.
7. Issue a RFL Command.
8. Issue a TSRT Command. The test will cancel if the car does not run to the top terminal within one minute.
9. Move the switch on the IOD Card from INSP to NORMAL.
10. Run the car into the top landing. The car will shutdown at the first checkpoint and log TSR Faults.
11. Within 5 seconds of the TSR Fault logging, move the switch on the IOD Card from NORMAL to INSP.

### TSR Device Test (continued)

12. Open the hoistway door at the top landing, and measure the distance from the car sill to the hoistway sill. The distance should be between  $4\frac{1}{2}$ " and 3".
13. Press **RSTSP** on the IOD Card.
14. Verify proper operation, and return the car to service.

## Bottom Terminal Slowdown Test (NTSD), Terminal Speed Reducing Device

1. Place the car level at a floor other than the bottom terminal landing.
2. Issue a RFL Command.
3. Move the switch on the IOD Card from NORMAL to INSP.
4. Record the P18 value.
5. Set P18 to one-half of its current value.
6. Move the switch on the IOD Card from INSP to NORMAL.
7. Run the car into the bottom terminal landing.
  - The car should stop within the leveling zone, producing system faults.
  - The car should operate on Automatic Operation. If the car stops outside of the Relevel Zone, the NTSD slowdown magnets are not properly placed.
8. Set P17 back to the recorded value.
9. Verify proper operation, and return the car to service

## Low Fluid (Oil) Protection Test

1. Place the car at the first floor.
2. Record the O17 current value, and temporarily set this value to 20.
3. Record the P17 current value, and temporarily set this value to 6,000 (increase as needed).
4. Set the top landing call. The car will ascend until the low timer expires (after 20 seconds of run time, O17), and the car will go into low oil operation.
5. After the low oil operation is complete, place the car on Inspection Operation.
6. Clear the faults, and return P17 and O17 to their original values.
7. Verify proper operation, and return the car to service.

## Overspeed Valve with Bucher Test

1. Verify that the springs are installed on the buffer(s).
2. Load the car to 100% capacity.
3. Position the car at the top landing.
4. On the Miniterminal, press and hold ←, and the DOWN LED (#3) on the Delta Controller will start to flash.
5. Register a bottom landing car call, and the car will free fall until the overspeed valve halts travel.
6. On the Miniterminal, release ←.



Releasing ← with a registered call will permit travel to resume when the overspeed valve resets as the pressure equalizes.

7. Verify the following: For the maximum velocity achieved during the test, the Miniterminal displayed 110% – 140% of contract speed.
  - a. If the overspeed valve does not reset on its own, run the car Up on Inspection Operation to reset it.
  - b. Should adjustment be necessary, perform the following procedure: Overspeed Valve Adjustment with Bucher Valve in the *enduraMRL Product Manual* (located on the Lobby).
8. Verify proper operation, and return the car to service.

## Run Stall Timer Protection Test (UP Direction)

The controller uses a motor/pump-driven timer to protect against a stalled car condition.

1. Place the car on Automatic Operation at the bottom floor.
2. Remove CON15 from the IOD Card (located on the controller landing service panel) to inhibit the up run capability.
3. Place a car call for the top terminal landing, and the following sequence begins:
  - The motor remains energized, but the control valve does not.
  - After a sufficient time (set by timer adjustment Z44), the motor shuts off, the controller registers a 1150 Fault, and Run Monitor displays as the control status.
4. Replace CON15 on the IOD Card, and cycle the inspection switch in the controller to re-set the run monitor fault condition.

## Car Emergency Signal Test

This test verifies that the emergency power source (battery) has an output rating that operates all emergency lights, alarms, and two-way communication equipment.

1. In the car, verify the functions of the emergency lights, the alarms, and the two-way communication equipment.
2. Place the car at the controller landing for easy access to the mainline disconnect located behind the controller landing disconnect panel.
3. Remove the car from service.
4. Place the car doors in the open position, and, if necessary, block the doors to prevent them from being closed by the hoistway door closing device.
5. Turn OFF, Lockout, and Tagout the mainline disconnect.
6. Turn OFF the 120VAC car light/fan/emergency lighting circuit (located behind the controller landing disconnect panel).
7. Return to the car and verify that the emergency lights, alarms, and two-way communication equipment functions on the emergency power source (battery).
8. Turn ON the mainline disconnect.
9. Turn ON the 120VAC car light/fan/emergency lighting circuit.
10. Verify proper operation, and return the car to service.

## Low Pressure Switch Test

endura MRL Controllers include a pressure transducer installed in the system piping that is monitored by the system CPU. Upon a loss of pressure, the CPU will inhibit normal down running.

1. Verify that the Valve High Pressure Relief Test (Stop Ring Test) on page 10 has been performed.
2. Place the car on Automatic Operation at any floor other than bottom terminal.



**Close the shutoff valve to the jacks.**

3. From the service panel, insert the control power plug into the receptacle between the two plugs.
4. Turn the shutoff valve keyswitch (located on the service panel) to the Close position and activate the shutoff valve. The Close LED will illuminate when activated (11–13 seconds).
5. Place a car call to the bottom floor. The car should not run, and a fault code is logged. Re-level is permitted. If the car fails to re-level UP, use Adjustment Z44 (Run Stall Timer) to shutdown the car.

## Low Pressure Switch Test (continued)

6. Move the switch on the IOD Card from NORMAL to INSP to place the car on Controller Inspection Operation.
7. Run the car UP (to recharge the jack line) until the valve goes into high pressure relief, and pressurizes the jack line.
8. Turn the shutoff valve keyswitch to the Open position and de-activate the shutoff valve. The Open LED will illuminate when activated (11–13 seconds).
9. Return the car to Automatic Operation.

## Oil Temperature – Over Temperature Sensor Test

The controller includes a temperature sensor to determine if the oil exceeds acceptable operating temperatures. The Oil Temperature - Over Limit (OLTO) input opens when reaching the predetermined set point (approximately 170° F).

1. With the car on Automatic Operation at the bottom landing, place an UP call to the top floor.
2. After the car begins to run UP, disconnect CON23-3 on the IOD Card to inactive the OLTO input (metered logic).
3. Verify that the system registers the following faults:
  - 1741 Fault (speed monitoring relay fault).
  - 1042 Fault (viscosity shutdown due to over-temperature).
4. Replace CON23-3 on the IOD Card to clear the OLTO forced state.
5. Verify the following to ensure that the motor is de-energized.
  - The elevator lowers to the lowest landing.
  - The doors open, then close once, at the lowest landing.
6. Verify that the elevator will not respond to an UP car call or a hall call.
7. After the door closes, verify that **DOOR OPEN** will reopen the door.
8. Clear the faults, and cycle the controller inspection switch to return the car to Automatic Operation.
9. Verify proper operation, and return the car to service.

## Flooded Pit Test

1. From the UIT, scroll to Block Select Adjustments > Adjust Car/Group > Homing and Shutdown > **ENTER**.
2. Press **↑** or **↓** to set the following parameters. Press **ENTER** to select the parameter, and **↑** or **↓** to change the value.
  - a. H17 = 2 (the flooded pit return floor).
  - b. H18 = Which door opens at the return floor.
  - c. H21 = 100 (the time the door is open at the return floor).
3. Press **ESC** until **BLOCK SELECT ADJUSTMENTS** displays.
4. Press **→** until **BLOCK SELECT STARTUP WIZARD** displays.
5. Press **↓** until **STARTUP WIZARD** displays.
6. Press **↓** until **SAVE TO FLASH** displays, and press **ENTER**.
7. Place the car on Automatic Operation at the first floor.
8. Apply G24 to CON36, pin 5 on the IOD Card, and Flooded Pit Operation activates.
9. Run the car to the second floor or designated flooded pit return floor, and cycle the doors. After the car arrives at the return landing, the shunt breaker trips and removes all power to the controller.

## Rath Phone Monitoring Test

This test demonstrates code compliance for detection of alarms and elevator telephone line loss.

1. Set up the Rath SmartPhone unit. See the instructions located on the car station.
2. Verify that the phone is programmed with a 10-minute value (default) for the Phone Line Detection Timer.

Press the following on the phone keypad:

- Enter
- 3
- 4
- Enter
- 0010
- Stop - press for 3 seconds.

## Rath Phone Monitoring Test (continued)

### AHJ Inspection Procedure

1. Disconnect the active building phone line from the phone unit in the car station. The system checks for an active phone line every 10 minutes (factory default).



If an active phone line is not detected, the system will make a second check in 60 seconds and a third check 60 seconds after that. If an active phone line is not detected after the third check, the buzzer and indicator in the hall station will activate. The additional second and third line checks are to prevent activation of the alarms from false and momentary phone line interruptions.

2. Once the alarms have activated, reconnect the active phone line to the phone unit in the car station.



Once a non-active phone line has been detected by the system, the system will check every 60 seconds for an active phone line. If an active phone line is detected, the hall station buzzer and indicator will automatically deactivate.

### Hall Station Devices

- To temporarily silence the buzzer, turn the Phone Reset Buzzer Keyswitch to **Reset**. The buzzer will sound again in 18 hours if an active phone line is not restored (per A17.1 (2.27.1.1.6)).
- The indicator remains active until an active phone line is restored.

## Battery Tests

### Battery Lowering

1. Use the UIT or IMS to verify the following adjustments:
  - a. E10=1 (emergency power type, Type 1 = battery lowering).
  - b. E11=The appropriate return floor when on emergency power.
  - c. E12=Which door opens when on emergency power, 0=front; 1=rear.
2. Remove the CON17 plug from the IOD Card.
3. Install a temporary jumper on the IOD Card at CON17, EPD1-EPD2.
4. Turn OFF, Lockout, and Tagout the mainline disconnect (located behind the circuit breaker door in the second floor door jamb).
5. Verify that the car lowers to the designated landing and that the doors cycle.



**DOOR OPEN** remains functional until the battery unit shuts down.

6. Remove temporary jumper on the IOD Card, and return the original plug to CON17.
7. Turn ON the mainline disconnect.
8. Verify proper operation, and return the car to service.

## Battery Tests (continued)

### Battery Monitoring

1. Set the shutdown threshold to 97%.
  - a. Verify O68=1.
  - b. Set O73=97.
2. Issue a UCA Command to determine if the battery capacity is below 97%. If not, use the DOB/DCB input to operate the doors until the battery capacity is below 97%.
3. Verify the following:
  - The car is on Run Monitor.
  - Car Fault 1978 (low battery charge) is logged.



The car remains on Run Monitor until the battery capacity reaches 98%.

4. From the IMS Remote FAST, enter a UCA Command to determine the battery capacity. Verify that when battery reaches 98%, the car returns to service.
5. Set the shutdown threshold to 30%.
  - a. Verify O68=1.
  - b. Set O73=30.
6. Enter a WRT Command.

## REPPS Test

1. Place car to the lowest landing.
2. Go to the controller, and place the car on controller inspection.
3. Run the car upward from the lowest landing to a point where the bottom of car can be observed.
4. Open the hoistway door, and visually inspect the mechanical parts for damage.
5. Visually inspect that the cables are in the pulleys correctly.
6. Pull down the handle, and lock into the yoke.
7. While observing the red arms on the REPPS support, ensure the parts move freely.
8. Close the hoistway door.
9. At the controller, remove the car from controller inspection. Ensure that the car remains on inspection mode.
10. Restore the REPPS to the stowed position by releasing the red handle from the yoke.
11. Close the hoistway door. Call car to the lowest landing.
12. Use the hoistway access and raise the car to deploy the REPPS system. Lower the car, ensuring the car fully rests on the stands.
13. Return the car to service.

### Periodic Inspection and Annual Tests

The endura MRL Controller may be examined and tested periodically in the same manner as any other controller. The procedures included here may be used, if required, for periodic examinations and tests.



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