Owner's Information Manual

Gen2™ Elevators

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Gen2® Elevators

Otis Elevator Company

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This publication is intended for those individuals or organizations in ownership of Gen2® elevator system and equipment manufactured and sold by Otis Elevator Company. It is expressly designed to be informative and to offer a limited understanding of the operation of these systems. It is not intended to be a guide for servicing or repairing or installing elevator equipment. Professional providers of those services should be contacted to perform any work in a safe and professional manner.

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Owner's Information Manual

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Preface

Thank you for your recent purchase of the Otis Elevator Gen2® system. Your new Gen2 system meets the highest safety and performance standards available in the market today.

Otis has built a reputation based on quality, reliability and an OSHA-proven record of safety that's the best in the business. We continue to pursue a policy of innovation to ensure our customers receive the highest level of service in the industry. We look forward to the opportunity to continue to serve you and your elevator needs for years to come.

The information in this book will provide you and your staff with information about the Otis Elevator Company, the Gen2 system and its maintenance requirements.

Otis personnel have access to the latest information in support of our maintenance practices. We continuously look for ways to improve our processes; not only in support of your equipment, but in the ways we deliver information throughout our company.

To learn more about what genuine Otis maintenance can mean for you and your business, or to locate the Otis representative nearest you, please visit our website at www.otis.com.

How This Book Is Organized

This Owner's Information Manual is divided into five chapters.

The first chapter gives a history of Otis Elevator Company.

Chapter 2 is designed to make elevator owners more aware of their responsibilities, including passenger safety, code requirements, and emergency procedures. It also explains how Otis emphasizes safety in its everyday operations.

Chapter 3 provides information about how your Gen2 elevator operates, a description of its major components, and available features.

Chapter 4 describes the necessary maintenance needed on your new system.

Chapter 5 contains information about Otis' service and maintenance programs.

Chapter 6 provides unique procedures for Gen2 maintenance.

Use of Warnings

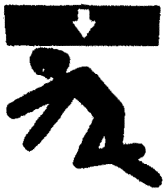
It is essential that you realize your Otis elevator is a complex piece of machinery and should be serviced only by a trained, authorized elevator mechanic. Tampering with the equipment is hazardous to you, to the person performing maintenance, to the passengers, and may be detrimental to the elevator itself.

Some of the topics in this manual deal with the inherent dangers of elevator operation, whether electrical, mechanical, or otherwise. These are identified by warning symbols placed near the application paragraphs. Some of the potential dangers include electrical shock from high voltage, crushing hazards, and flammable or combustible materials. Additionally, other symbols are used to reflect important information. The symbols used in this manual are:

WARNING

RISK OF ELECTRICAL SHOCK

NOTE



CRUSH HAZARD

Please contact your nearest Otis office if you have any question or require assistance with your elevator equipment.

Chapter 1: About Otis Elevator

Otis Elevator Company has a long and interesting history that began in the mid-nineteenth century with its founder, Elisha Graves Otis.

In 1852, while employed by the Yonkers Bedstead Manufacturing Company in Yonkers, New York, Otis built a hoisting machine with a safety mechanism that prevented the platform from falling if the hoisting rope broke. The following year, he opened his own shop in Yonkers, called Union Elevator Works.

It was at the 1854 New York World's Fair—also known as the Exhibition of the Industry of All Nations—that Otis introduced his first safety hoist to the public. His demonstration of riding up and down on the platform and cutting the hoisting rope without plummeting to the ground attracted huge crowds. The event became famous and the safety hoist's debut was a resounding success.

1854: Safety Hoist Elevator at the Crystal Palace, New York World's Fair

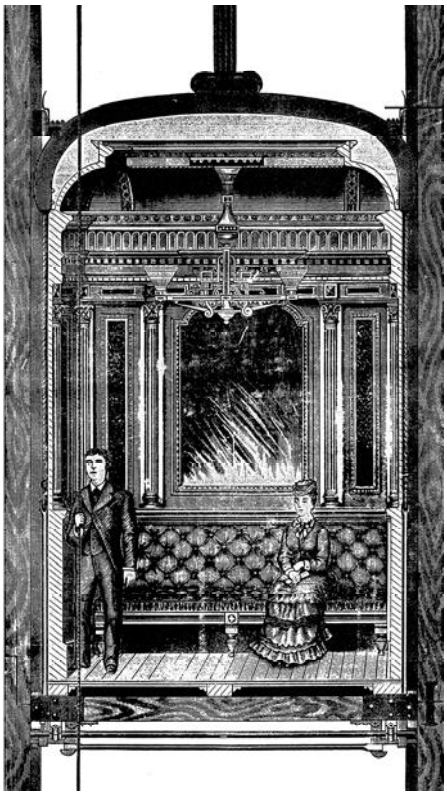
Elevators during the 1850s were used to hoist freight, and Otis and his sons sold their product on the existing market as a hoist. He also realized the safety mechanism made it possible to safely carry passengers, thus potentially opening up a whole new market.

1854: E.G. Otis Calling Card

The next problem to overcome was development of a power source to run passenger elevators. Factories and warehouses with freight elevators were near water, but passenger elevators would be installed in stores, office buildings, and hotels, away from any central power source (this was 22 years before the opening of the first U.S. electric power station).

Otis' solution was to invent a small, oscillating steam engine to power each elevator. So in 1857, he designed, built, and installed the first Otis safety passenger elevator, in the E.V. Haughwout Store in New York City.

1857: The first passenger elevator ever built was installed in the E.V. Haughwout Store in New York City



1873: The elevator operator manipulates the control rope, regulating the direction and speed of the car.

Elisha Otis was a master mechanic and engineer. He obtained many patents in the 1850s, including the safety device he invented in 1852, the oscillating steam engine, a brake, steam plows, and a rotary oven for bakeries.

Unfortunately, at the age of 50, Otis died suddenly during a diphtheria epidemic in 1861. His sons, Charles and Norton, took over the business and utilized the elevator expertise their father taught them. They renamed the company N.P. Otis & Brother, then in the late 1860s changed it to Otis Brothers & Company.

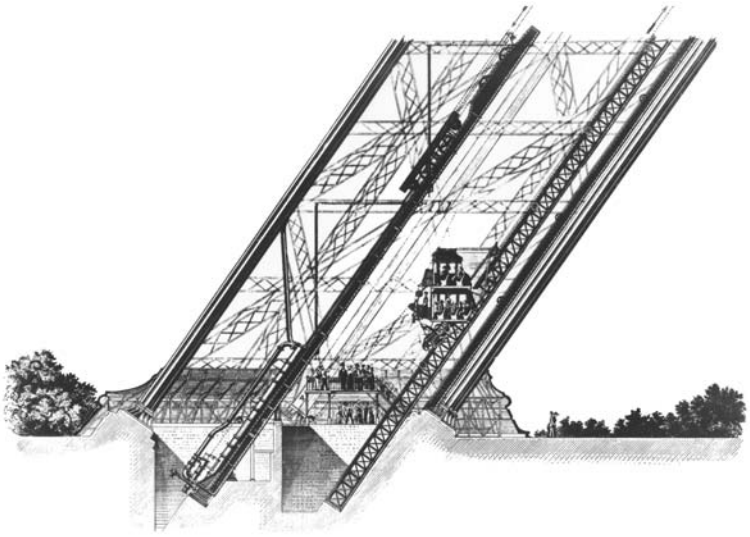
Otis Brothers & Co. patented some 53 new advancements in elevator equipment, including hoisting apparatus, brakes, steam hoist, and pulleys. The brothers continued to use world's fairs and industrial fairs to showcase their elevator technology and create an international market for Otis elevators.

An Otis two-cylinder steam elevator machine and platform were exhibited at the second world's fair to be held in the U.S., the Centennial Exposition of 1876 in Philadelphia. Judges commended Otis for its adaptation of the freight hoist to passenger elevator and for its attention to safety.

Otis elevators were prominently displayed in 1889 at the Universal Exposition in Paris. The French government built the Eiffel Tower specifically for the world's fair and wanted an all-French monument to represent the construction and technological expertise. But no French company could overcome the structural demands of putting elevators inside the tower's curved legs. Otis Elevator successfully installed elevators, giving the company a chance to display its product at the fair's centerpiece attraction.

Post-Civil War era use of structural steel made it possible to construct taller buildings. Otis technology kept up with the construction pace during this "Era of the Skyscraper."

Otis opened offices in England, France, Canada, Germany, and Belgium, and had sales agents representing the company throughout the world. Its most famous elevator installations included the Eiffel Tower, the London Underground, and three elevators for Russian Emperor Nicholas II's private quarters in the Kremlin.

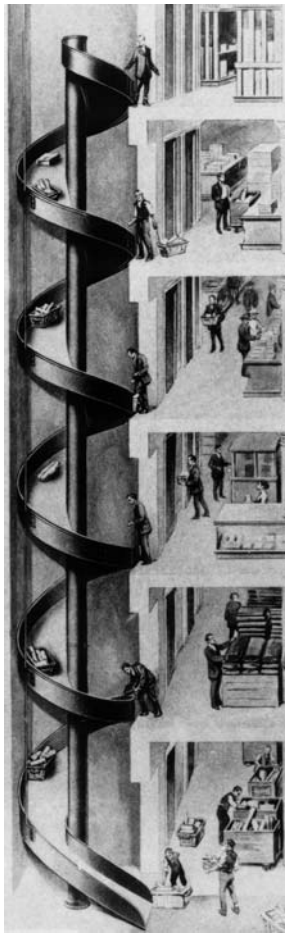


1889: Otis Elevators Inside the Curved Legs of the Eiffel Tower

Modern day Otis came into being during the late 1800s and the early 1900s, a time when "big business" flourished. Otis Brothers & Co. merged in 1898 with several U.S. elevator companies in Boston, Chicago, and Philadelphia to become the Otis Elevator Company. Forty more, small, independent elevator companies were acquired during the period prior to World War I.

The company expanded its product line by acquiring the patents for modern escalator technology from Charles D. Seenberger and Jesse W. Reno. The world's leading elevator manufacturer unveiled its new "escalator" (a term trademarked and owned by Otis for 50 years) at the Paris World's Fair of 1900.

1920: Freight Incline



1900: Gravity Conveyers

In 1903, Otis introduced what would become the "backbone" of the elevator industry, the gearless traction electric elevator. It could be used in buildings of any height and operated at greater speeds than steam elevators.

As skyscrapers got taller and taller, more Otis elevators were installed, particularly in New York City. For example, the 20-story Flatiron building was built in 1902 and had six Otis elevators. In 1912, the Woolworth building rose to 60 floors and was equipped with 26 elevators.

Skyscrapers reached a new pinnacle in 1931 when the world's tallest building—the Empire State Building—opened, serviced by 67 Otis elevators.

More tall buildings meant more elevators and a greater need to keep them in good running condition. Otis recognized this and in 1921 introduced the first preventive maintenance service. Today, maintenance represents 50 percent of Otis' overall business.

From its early days under Elisha Otis until late 1960s, Otis Elevator explored many different product lines outside its core business of elevators and escalators: the rotary oven for bakeries in the 1850s, a haymaker in the 1870s, gravity conveyors around 1900, the Sultan automobile from 1909–1912, and passenger and freight inclines in the 1920–1930s.

Otis converted to military production during World War I, World War II, and the Korean War. It manufactured crank cases for fighter planes, anti-aircraft guns, ammunition hoists, gun recoil mechanisms, depth charge throwers, and airplane elevators for aircraft carriers.

The wars disrupted the normal production, but they also changed Otis' business. Automatic elevators have been sold to homeowners since the 1890s, while most public buildings used elevator operators to run elevators well into the 1940s. But labor shortages during World War II brought the need for automated public elevators to the forefront. So, in 1950 the first group of Otis automatic elevators was installed in Texas.

1921: Preventive Maintenance

1969: Electric Cart

Following the Korean War, Otis continued to diversify its product line, producing military electronics, material handling equipment, and automatic bowling pinsetters. One of its more unique operations was the manufacture of electric buses, vans, and golf carts.

1969: Electric Golf Cart

By the late 1960s and early 1970s, Otis officials chose to concentrate on the core elevator and escalator business and divested the company's other holdings.

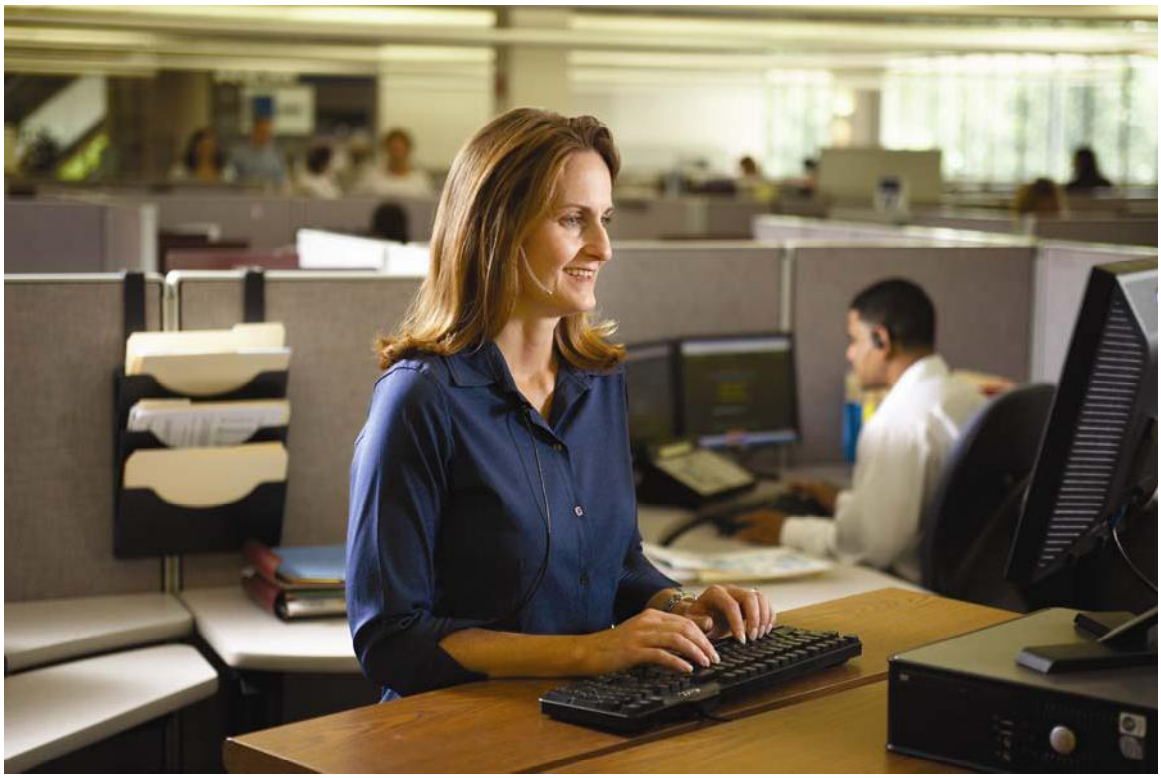
United Technologies purchased the Otis Elevator Company in 1975. Otis became a wholly owned subsidiary in 1976.

One of the most significant developments in elevator technology was the use of computer chips to make elevator control decisions. Prior to this development, elevators relied on large collections of relays and switches. These relay-based systems required a lot more maintenance and occupied significant space.

In the early 1980s, Otis developed the first microprocessor control elevator system, called the Elevonic® 101. It was a watershed event and paved the way for future developments utilizing computer technology.

Advances in microprocessor and data communications technology led to Otis' first Remote Elevator Monitoring (REM®) system, which was introduced in 1985 and installed at an Otis elevator site in the United Kingdom.

REM systems monitor elevators 24 hours a day and provide diagnostic information via a telephone line to our technical center. This information assists our technicians in preventing elevator disruptions.



1985: Remote Elevator Monitoring (REM®) systems monitor elevators 24 hours a day.

Another important technological advance—the Elevonic® 411 software based control system—was released by Otis in 1990. These sophisticated Elevonic systems made "real-time" dispatching rules based on changing traffic conditions in a building. They also managed elevator ride quality, energy consumption, motor performance, and all the in-car information displays.

Elevonic Hall Position Indicator

1990: Elevonic® Hall Button

Some other Otis products include:

- **Gen2™ Elevator System:** The first major breakthrough in elevator lifting technology in nearly 150 years. Gen2, an elevator system for low- and mid-rise buildings, is the first to use flat coated steel belts to lift the elevator cars. The belts are 1 in. (25 mm) wide and 0.1 in. (2.5 mm) thick, quieter, lighter, easily bend around a 4 in. (101 mm) diameter sheave, and last up to two to three times longer than traditional steel ropes. That means the Gen2 system requires a machine one-quarter the size of a traditional machine, eliminating the need for a separate machine room.

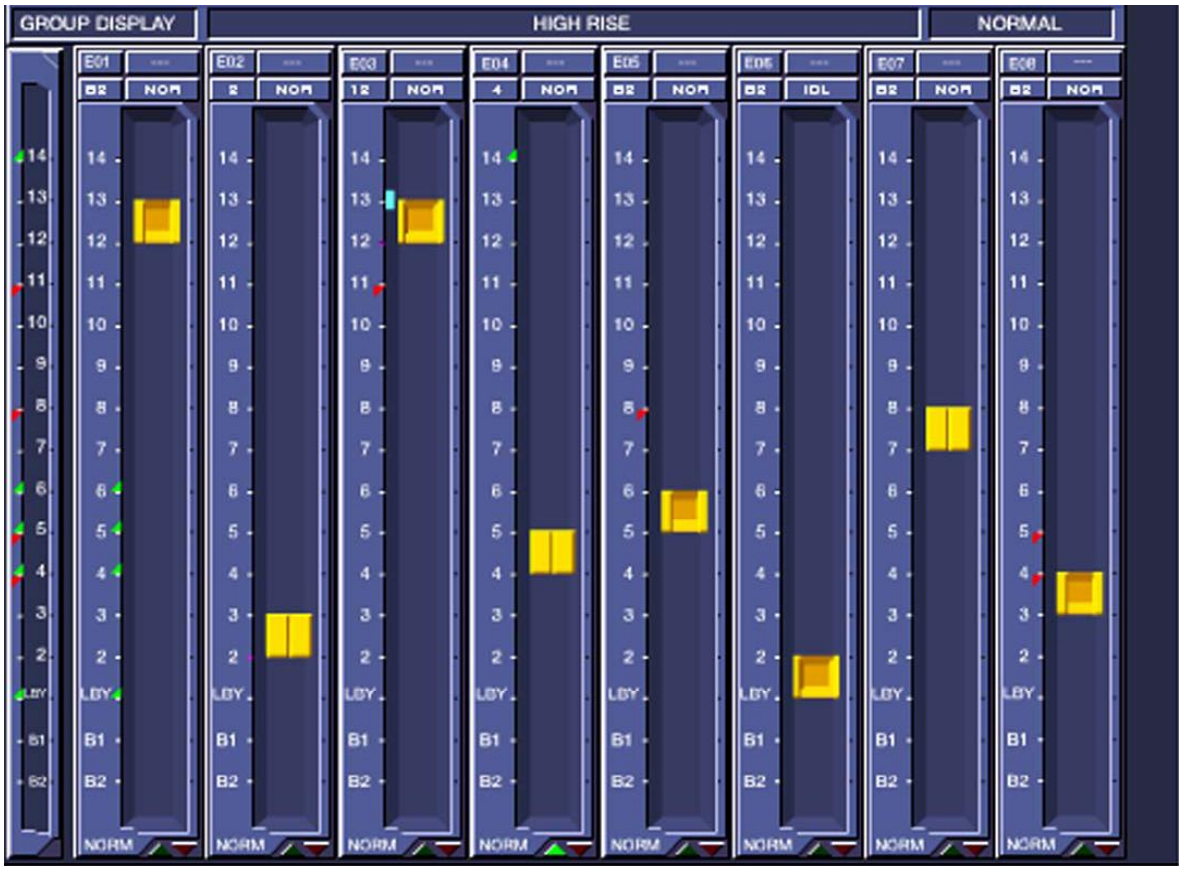
- **TRAV-O-LATOR®:** Moving walkways for expansive facilities such as airport terminals and shopping centers.

1996: TRAV-O-LATOR®

Otis is focused on advanced technology that will improve its operations and products in three key areas: quality, efficiency, and safety. For example:

- Otis dispatching technology improves service dramatically by analyzing and adapting to a building's traffic pattern, then assigning elevators to respond to variations in passenger traffic within the building. This is critical to an integrated building transit system because traffic patterns in the buildings of the future will be more complex than in today's buildings.

- Otis engineers are also designing sophisticated remote elevator monitoring systems. The more closely an elevator is monitored, the easier it can be maintained with fewer costly shutdowns.



Elevator monitoring systems provide comprehensive information about elevator condition, status, and performance.

Today, Otis is recognized as the elevator industry leader, maintaining more than 1.7 million elevators and escalators worldwide. It is an $11.6 billion (U.S. dollars) company with 60,000 employees.

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Chapter 2: Performance and Safety

If anything improper is discovered, corrective action must be taken immediately. Do not attempt to repair the equipment. For safety reasons, only a trained, authorized elevator mechanic should ever service your elevator.

Knowing what to look for is probably the most important aspect of elevator awareness. When you know how to spot issues in performance, you can influence the efficiency of your equipment by taking care of issues before they become problems. The following information suggests ways you can look after your investment and help keep it running at optimum performance. More information about general maintenance procedures can be found in Chapter 4.

You or a member of your building staff should go through the following procedures regularly with each elevator car:

Emergency Lighting/Alarm Bell system provides passenger reassurance in emergencies

1. **Test the operations and safety devices**.

   Test alarm bells, stop switches, intercoms, telephone connections, and emergency lighting systems to make sure they will work in an emergency.

2. **Ride the elevators.**

   Ride the elevator and pay attention to the smoothness of starting and stopping, to any unusual sounds (such as squeaks or scrapes), and to any unusual movements, vibrations, or odors. Close your eyes to increase awareness of irregularities.

3. **Listen during rush hours.**

   Stand in the lobby during peak traffic periods listening to passengers' comments.

You should be aware of several things in order to prevent equipment failure and/or potential hazards. The following seven-point safety and performance checklist can be applied on a regular basis to most elevator systems.

- **How long must passengers wait for an elevator at the lobby?**

Well-timed arrivals and departures, as well as proper acceleration and deceleration, are critical to fast, efficient service.

- **Do the passengers have enough time to enter and exit before the doors close?**

There are a number of variables that determine the door's opening cycle. The minimum time may depend on the number of elevators in the bank and on the distance from a point in the center of the lobby to each elevator. Time may also be measured from notification that a car is arriving by a lantern and audible signal. Times might also be longer for elevators that service elderly or disabled persons.

- **Do the doors reverse direction without touching passengers?**

  Your elevator is equipped with an electronic detector to sense passengers in the door zone. This detector enables a closing door to reverse direction without touching passengers. Reversal should take place as soon as any portion of the passenger enters the door zone when the doors have begun to close.

Electronic detectors enable a closing door to reverse direction without touching passengers.

- **Does the car stop level with the hall floor?**

  Leveling is the process of the elevator platform attaining a stop position that is even with the landing. The car should stop within +/- 0.2 in. (+/-5 mm) of the hall floor, and leveling should be consistent whether the car is full or empty.

- **Does the alarm bell work?**

  The alarm bell should be tested once a week by pressing the alarm button on the car operating panel. This quick and simple procedure ensures that the bell will work when and if it is needed.

Door Open Button

Alarm Bell

Stop Switch

- **Is the intercom or telephone in good working order?**

Intercoms and telephones should be tested regularly. Passengers can be spared inconvenience when minor mechanical difficulties occur by following instructions

received over the intercom or telephone. During an emergency, communication with passengers helps to alleviate or avert panic. At these times, information from passengers can be of great assistance to emergency personnel.

- **Is the interior of the elevator adequately lit?**

  Check that all light switches are on, all lamps are lit, and all light diffusers are clean to permit maximum transmission of light.

Only use the elevator for the purposes for which it was designed. The elevator has been designed to transport passengers and goods within a building, carrying loads up to the maximum weight indicated inside the elevator car, running at the speed for a rated traffic condition. Overloading will result in visual and/or audible signals in the car and further movements will be prevented until the overload condition has disappeared.

It is extremely important that planned maintenance be recorded with a reputable maintenance company. Maintenance is necessary to ensure the safe and correct operation of the equipment. Inspections of the equipment should be carried out in accordance with local regulations. Any irregularities in the operation or performance of the elevator should be reported to the elevator maintenance company immediately. Any alterations or changes to the building that may affect the elevator should also be discussed with the maintenance company.

The control room and access areas for servicing the elevator equipment should remain clean and free of debris at all times. For proper operation, the control room temperature must be between 32° F (0° C) and 104° F (40° C). Areas subject to excessive heat must have proper ventilation.

The elevator's two-way voice communication system must be kept in good working order. This includes the communication line between the car and a rescue service.

State-of-the-art elevator and escalator engineering has developed mechanisms that greatly reduce the risks to life and property in emergency situations. However, building personnel still play a vital role in directing occupants to safety, in monitoring equipment, and in operating controls that initiate emergency routines.

The proper handling of elevators and escalators in an emergency could mean the difference between life and death. You should ensure that all your building personnel are familiar with emergency procedures suitable to your building structure and all of its equipment in the event of accidents, fire, earthquake, or power failure. Contact your local authorities and fire department for appropriate advice, inspections, and drills.

Fireman's Service—SES

Fire service varies based on local code requirements. Contact your local authorities and fire department for appropriate advice, inspections, and drills.

Firemen's Service/Special Emergency Service allows control of elevator operation in the event of fire or other time-sensitive emergencies, particularly where immediate access to specific building areas or floors is necessary. Fireman's Service has two separate operations, or phases.

Firefighter's Service Phase 1

When a smoke or heat sensor is activated on any level (except the main fire return floor), a signal is sent to the elevator control system to return the elevator to the main fire return floor or main designated return landing. The elevator then proceeds immediately to this landing and parks with the door open.

If a smoke or heat sensor is activated at the main fire return floor, the elevator is placed in a "fire recall" status; however, the elevator will proceed to the alternate fire return floor, and park with the door open.

Firefighter's Service Phase 2

This feature is activated by the fire fighters using a keyswitch in the car, which places the elevator under their control. This feature includes the call cancel button and keyswitch in car. When the call cancel button is activated, all registered calls are cancelled and the car stops at the next landing.

Emergency Power Option

In the event of a power failure, your building's emergency power supply operates the elevator during the failure, but only if you have selected the Emergency Power Option for your elevators.

If your elevator system's Emergency Power Option is set to the AUTO mode, each car will automatically travel directly to the lobby (or the previously designated floor) and the doors will open to allow passengers to exit. After the cars arrive at the lobby, they remain parked there until one or more cars are selected to provide service under Emergency Power.

If your elevator system's Emergency Power Option does not have an AUTO mode, or if that mode is not turned on, the cars may be brought to the lobby by manually selecting them, one at a time, using the emergency power strip switch.

Chapter 3: Your Gen2® Elevator

Introduction

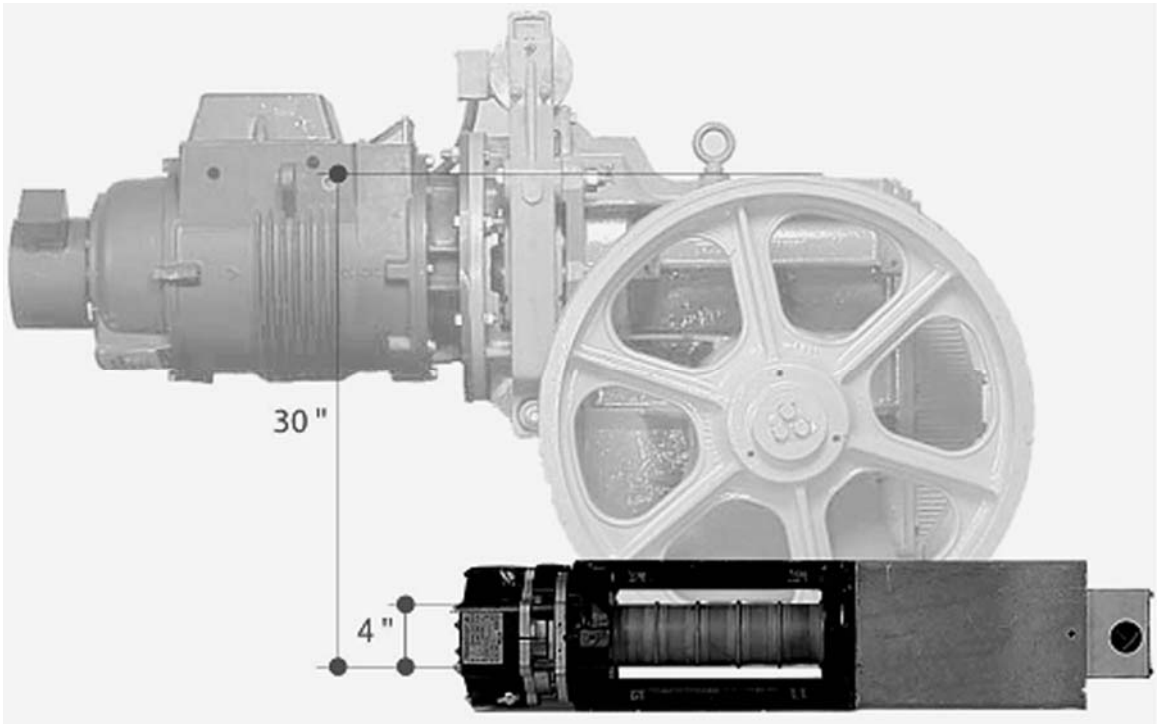
Today's elevators provide a safe, rapid means of passenger transportation. In large part, this is due to advances in elevator technology. The intent of the information presented here is to provide you with a general understanding of how your Gen2 elevator system is designed and how it operates.

At the core of the Gen2 elevator is a revolutionary new technology—flexible steel cords inside a tough polyurethane coating.

Coated Steel Belts

The coated steel belt technology rearranges the steel found in traditional ropes to form a flat belt. Each belt holds the same lifting capacity of the equivalent rope. Each cord of the belt has many strands of wires. Each coated steel belt has multiple steel cords within it. These wires are made of high tensile strength steel and are zinc plated to prevent corrosion. The wires are then coated with polyurethane that prevents the wires from rubbing against each other (referred to as fretting), thus allowing them to last up to two to three times longer than conventional round ropes. Each Gen2 system uses multiple coated steel belts, based on the application.

The coated steel belts are the “enablers” of the Gen2 system. Their flexibility allows us to use a small gearless machine. Elevator codes dictate the size of the sheave based on the diameter of the rope required to lift the load of the elevator system—this is referred to as the d/D ratio (d = diameter of rope, D = diameter of sheave). This ratio by code needs to be 1 to 40, which would require a 40 in. sheave for every inch of rope width.



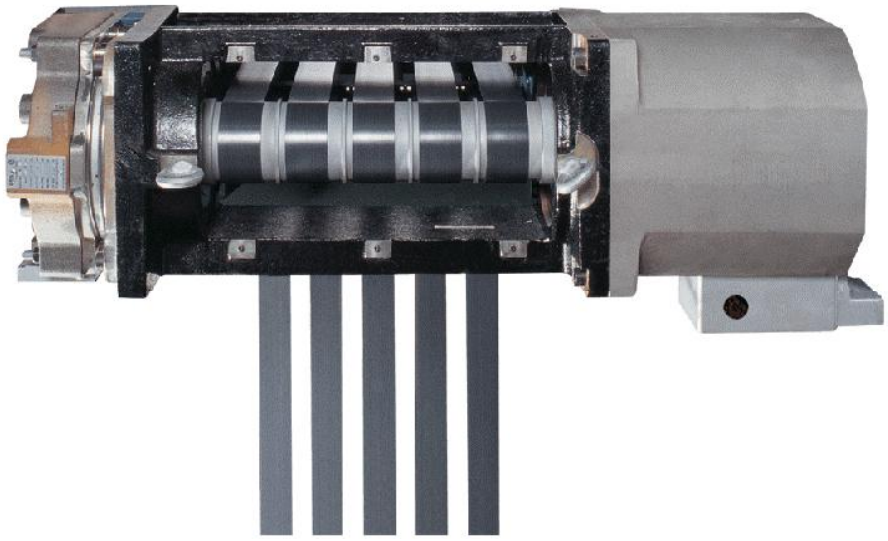
On conventional round-roped elevators, a 0.5 in. round rope is typically used to lift a 3500 lb. elevator cab while with Gen2® elevators, we use a 0.1 in. coated steel belt. As an added benefit, the d/D ratio for Gen2 is 60 to 1, thereby improving the overall durability of the belts. The sheave diameter changes from 20–30 inches (on some conventional traction machines) to a mere 4–6 inch diameter with the Gen2 system.

Permanent Magnet Gearless Hoist Machine

The hoist machine performs the muscle work of lifting and lowering the elevator car. The choice of hoist machine is classified according to the height of a building, the elevator car's load requirements, and the speed at which the load must move (passenger or material). The hoist machines used for the Gen2 elevator systems are referred to as gearless machines.

The Gen2 gearless machine's principal components consist of a high efficiency Permanent Magnet (PM) AC-motor, brake assembly, support frame, and grooved drive sheave. The motor and brake assembly are attached to the support frame and have a common rotating shaft. The pulley or drive sheave for the Gen2 elevator machine is an integral part of this common shaft. The Gen2 gearless machines do not use a gear reduction system; the motor and drive sheave turn at the same speed. The elimination of the gear reduction system simplifies the design and improves reliability and efficiency.

The Gen2 features a regenerative drive that reduces net power consumption. Matched with the efficiency of the permanent magnet motor, the Gen2 system delivers superior performance and ride quality with environmental sensitivity.



Gen2® PM Machine

Gen2 Machine (foreground) Compared to a Traditional Traction Machine (background)

Typical Sequence of Operation

In order to gain further understanding of how a Gen2® elevator system works, let's take you through a typical sequence of operation. A passenger registering an elevator call sets into motion a series of actions. The signal is first picked up by the controller, which acknowledges the request by illuminating an indicator on or near

the call button. Also placed into memory is the location of the call for pickup or delivery. All hall calls are sent to all elevators, if part of a group. (Multiple elevators within a building are referred to as a "group" of elevators.) Each elevator in the group calculates its response time to the call and the elevator with the shortest response time is dispatched to pick up the passenger.

The elevator checks itself against a preflight checklist before permission to run is given. Of particular importance is determining the integrity of the elevator's safety related devices prior to starting the run. In addition, the elevator contains a safety chain to prohibit elevator motion in response to an unsafe condition. The safety chain consists of electronic and electromechanical switches placed at strategic locations in the elevator system. Connected in series, they act as a safety circuit ensuring various elevator apparatus is in the correct operating state for the elevator to make a run. Any one device not in its expected state breaks the chain and the elevator does not operate. An emergency stop is initiated whenever a safety chain device "opens" while the elevator is in motion.

When the controller (the brain of the elevator) receives a request for service, it reviews a sequence of questions and issues instructions according to the responses.

Controller Sequence of Questions

Where do I need to send the elevator?

What is the weight in the car?

Is it safe to move the elevator?

While I'm moving, how do I know where I am in the hoistway?

How do I stop once I've reached the destination?

What do I do after I've stopped?

The Controller now has instructions to move the elevator car in response to the passenger call and has completed its safety check confirming that the elevator is safe to move. It then sends instructions to the elevator motor and car telling it the load in the elevator car and the speed at which to move the elevator car.

The technology driving your system is known as variable-voltage, variable-frequency (VF) control. Traditionally, most elevators were driven by direct-current (DC) hoist machines. This was necessary to achieve the precise control of speed applied to the hoist machine to assure smooth acceleration, cruise, and stopping speeds of the elevator. Doing so required converting the building's alternating current (AC) to DC and, in most cases, required a constantly operating motor-generator and a more complex DC operated hoist machine. Both pieces of equipment require more components, which may be subject to increased maintenance and repair.

Your AC-VF drive is able to use your building's AC power to precisely control the speed and torque of the permanent magnet gearless machine. The AC motor offers robust performance and is economical.

The hoist machine lifts or lowers the elevator car. Through the use of a counterweight, we can reduce the amount of work required to move the elevator. The counterweight is sized to equal the weight of the elevator cab assembly plus approximately 50% of the rated capacity. In this way, the hoisting machine never has to lift more than half the rated load.

The Controller continually compares the stored floor location of the target landing against the position of the elevator. When the car is within its "stopping distance" from the target landing, it begins to decelerate. Position is continuously monitored in order to stop the car level with the target floor. A vane is installed at each landing to provide a redundant means for checking position at floor level. A reader, located on the car, uses the vane to verify the car is level with the floor.

Once the elevator hoist machine stops the brake drops. The main purpose of the brake is to hold the car in place, not to stop the elevator car. Even in the event of a power failure, the brake will drop and hold the elevator.

When the elevator has reached the target floor, the doors automatically open to allow the passenger to leave the elevator. Just as the doors automatically open at the conclusion of a run, they also automatically close when demand for the elevator is present.

Gen2® Safety Features

The Elevator Safety and Governor System

Beneath the elevator car is the elevator safety mechanism. It is tied to a device called a governor. It is an independent system from the coated steel belts and is designed to operate if the elevator car exceeds its rated speed.

The governor performs two actions when the car exceeds 125% of its rated speed. First it attempts to stop the car electrically by activating a switch opening the safety chain circuit. The open circuit interrupts power to the hoist machine and stops the elevator movement. If the elevator car does not stop, the governor's second action is to mechanically stop the elevator by clamping the steel cable, which is fastened to the safety-releasing mechanism on the elevator car. This causes the car safeties to activate and grab the rails on which the car rides. The frictional forces generated between the rails and car safeties bring the elevator car to a controlled stop.

Door Operators and Control Devices

Safe and rapid response to elevator calls is an important measurement of elevator performance. How quickly passengers can enter and exit the car contributes to the

overall performance of the elevator system. The speed at which the doors can safely open and close is a contributing factor to achieving this goal.

At each landing there is a set of hoistway doors. The hoistway doors and car doors open in unison because of the door vanes and interlock system. Each entrance landing is furnished with an interlock and switch. The door vane is fastened to the elevator car door. When the elevator stops at a landing and its door starts to open, the vane engages the roller of the hoistway door interlock. This causes the lock to separate from the switch and open the entrance door along with the car door. If the car doors do not completely close within a predetermined time, they will reopen and then begin to close at a reduced speed. The car will extinguish its hall and car direction lanterns, sound the in-car buzzer, and, if part of a group, remove itself from group operation. If the car cannot close its doors after three attempts, it will shut down and park with the doors open. Every two minutes the car will retry closing its doors.

The latest door operators designed by Otis use closed-loop control technology. Environmental conditions, such as debris caught in the door closing path or excessive wind in the hoistway, can prevent a door operator from performing 100 percent efficiently. Closed-loop control compares the door's actual opening/closing speed to the speed stored in computer memory and then adjusts the door speed accordingly.

Car Door Protection Device

The car door protection system features an invisible "safety net" of infrared beams that help ensure the physical well being of passengers.

Using infrared emitters and detectors to create an invisible safety net across the entrance, the system continually scans for interrupted beams. If a beam is interrupted, the car door protection system reopens the door instantly. When an obstruction is present, the doors remain open until the obstruction is removed. If the obstruction enters the doorway as the doors are closing, the doors stop closing and reverse direction.

Remote Elevator Monitoring (REM®)

Information from the elevator's controller is transmitted to a product called Remote Elevator Monitoring (REM®), which is available only with Otis service. REM reacts to three types of information:

Alarms. Defined as a problem that indicates the elevator may be shut down.

Alerts. Defined as a problem that indicates elevator performance degradation, but the elevator continues operating.

Performance Data. Defined as routine elevator information, such as the number of elevator runs and number of door operations.

This microprocessor-based product adds a new dimension to the service and repair of elevator systems. The REM hardware transmits information concerning the status of the elevator to a technical center. If a repair is needed, the technical center places a call to the appropriate Otis representative.

Otis' automated record keeping system provides a personal history of your elevator, which is used for planning maintenance and determining elevator efficiency. This information increases overall elevator performance, decreases downtime, and reduces tenant complaints.

Ideally, service is made on an elevator before any significant problems arise. This is the best possible method to keep your investment running. The history of your elevator's performance is maintained on line and can be viewed by you through our e*Service tool on otis.com. As Otis continues to move forward with technological advancements, we can utilize this historical information to help us with implementing new procedures and improved capabilities. Our goal is to continually reduce the amount of service required.

Emergency Lighting

Your elevator has a supplemental emergency power supply. If main power is lost, power is switched automatically to the emergency supply and lights two lamps inside the elevator. The lamps remain lit for at least four hours.

The alarm button and emergency stop switch located in the car operating panel are wired into the emergency power circuitry. When operated, an alarm bell located on the car top sounds continuously.

Emergency Communication Devices

The choice depends on the equipment and services specified for your particular elevator, including:

- Hands-free telephone (code-compliant).
- Intercom system (provided by other than Otis)

Fixtures

Fixtures are the components passengers use to interact with the elevator. The passenger activates a call for the elevator car at the landing entrance or at the elevator car operating panels. The fixtures perform additional actions that provide feedback to the passenger. For example, a hall lantern illuminates to indicate the car's next direction of travel as the elevator car stops at a floor.

The information that follows describes the types of fixtures used in elevator systems. Some of these fixtures are located at the entrance landings (hall fixtures) others are within the elevator car (car fixtures).

Field Interface Panel

A Field Interface Panel is provided on the door jamb for the Gen2-150. The Field Interface Panel features lockable disconnects for main line power and car lighting circuits for use by Elevator Personnel.

Hall Panel Fixture Assembly

Hall Panels are located at the entrance landings. They contain buttons, keyswitches, and jewels. Activation, through pressing a button or turning a key, registers a call for the elevator to service the landing.

Car Operating Panel

The Car Operating Panel is located in the elevator car. It contains buttons for entering destination requests, door opening and closing, and alarms (activate the alarm bell and/or initiate a phone call). The buttons may illuminate, come in vandal-resistant versions, and have adjacent Braille markings available. The car operating panel also contains keyswitches, jewels, position indicator, and audible signal devices (buzzer, landing passing tone, speech synthesis, etc.).

Lantern Fixture Assembly

Lanterns are located at entrance landings or in the elevator car. They provide passengers with a visual representation of the elevator's next direction of travel. Arrival of the elevator car at a landing sounds a lantern chime: once for up direction and twice for down direction.

Position Indicator

Position Indicators are located at entrance landings and in the car operating panel. They provide passengers with a visual identification of the car's floor position within the hoistway.

Access Fixture Assembly

Access Fixtures are usually mounted in the entrance jamb and are used by service technicians. They contain keyswitch/es for special operation of zoned access, which allows the elevator to be moved (within defined distance and speed limits) with the landing and car doors open.

Buttons

Buttons come either illuminated or non-illuminated, with a raised or flush target, and in either standard or vandal-resistant versions. Pressure applied to a button

registers an elevator call or other operation, such as opening or closing the doors or sounding an alarm.

Keyswitches

Keyswitches operate electrical contacts by turning a key to set positions. They may offer one, two, or three key positions and are of spring and non-spring return types. Activating initiates special actions that are described in the pages that follow.

Jewels

Jewels are located in both hall and car fixture assemblies. These fixtures are illuminated lenses with printed or graphic information. They inform passengers of various elevator activities, operating most often in conjunction with keyswitch activation.

Emergency Stop

An Emergency Stop is a toggle or keyswitch wired within the elevator's safety chain. Activation causes a break in the chain, bringing the elevator to a stop. The emergency stop function is mandatory for all elevators in the U.S.

Braille Character Insert

Braille Character Inserts are raised letter/graphic markings and Braille characters for buttons to be used by the visually impaired.

Utility Outlet

A Utility Outlet is a receptacle offering access to 110 VAC power supply.

Audible Signal Device

An Audible Signal Device is a device that provides an audible tone each time the elevator car passes a landing.

Buzzer

A Buzzer is a device that provides a continuous alert when firemen's service operation is activated or when the doors are nudging closed.

Telephone/Service Cabinet

A telephone cabinet is an optional cabinet mounted below the car operating panel and contains a communication device (telephone or intercom provided by others). A service cabinet can contain special keyswitches as ordered.

Hands-Free Phone

A Hands-Free Phone is a device that helps trapped or disabled passengers call for help. No handset is required, allowing for hands-free operation.

Fixtures can perform special features for security, emergencies, or management operations to a single elevator or group of elevators. These are generally keyswitches operated by designated persons or emergency personnel, such as firemen. Some of these fixtures are standard equipment, while others are optional or variable and dependent on other features your system may employ.

Control Features

The elevator is capable of enhanced functionality well beyond the basic elevator operation of moving your passengers between the building's landings. For example, you may want to override passenger calls and place the elevator under your direct control or have the elevator bypass particular floors. There are numerous control feature options that your elevator is capable of performing. In most cases the action occurs automatically by software instructions or by direct user control, such as activating a key operated switch, or by a combination of the two. The feature may perform an individual action, a combination of actions, and may apply to a single elevator or a group of elevators. The following is a complete feature listing, divided into feature groups, and how they are initiated. The features included with your Gen2 system are listed on documents prepared by your Otis representative at the time of the sale.

Group: Car Operation Features

Full Collective Operation

Full Collective Operation answers calls in the order in which floors are reached, regardless of the sequence in which the calls were registered. Only car calls and up hall calls will be answered when the car is traveling up, and only car calls and down hall calls will be answered when the car is traveling down. When the car reaches the last registered call for the established direction, it reverses and proceeds to answer calls in the opposite direction (if they are present). In the absence of further calls, the car remains at the floor where the last call was answered with doors closed (or park at an alternate landing).

Simplex Operation

Simplex Operation is a single car operating in full collective operation, answering calls in the order in which floors are reached, regardless of the sequence in which the calls were registered. See "Full Collective Operation" for further information.

Anti-Nuisance

If an excessive number of car calls are registered, the elevator will determine whether calls should be canceled. This is a function of passenger load and predetermined weight settings.

Automatic Car Return Operation

Automatic Car Return Operation causes the car to park at a specified landing when there is no further demand. The car parks at the specified Automatic Car Return Landing whenever the car becomes idle. The operation is keyswitch activated, and overrides normal zoned parking. The car can be pre-programmed to park at the automatic car return position with its doors open.

Auxiliary Car Operating Panel

An Auxiliary Car Operating Panel is a second car operating panel, usually located on the opposite side of the main car operating panel on elevators with center opening doors. If an elevator has two openings, the rear opening is designated as the auxiliary car operating panel.

Call Parking Recognition

With Call Parking Recognition, doors only open in response to car and hall demand. Cars parked without a demand are parked without door operation.

Car Buttons—Illuminated

Car Fixtures employ mechanical LED illuminated buttons.

Direction Preference

Direction Preference is given to the hall passenger that registers a car call for the original direction of travel before the doors close. The elevator will not reverse direction for a passenger waiting at another floor.

Direction Reversal

A car without registered car calls arriving at a floor where both up and down hall calls are registered will first respond to the hall call in the direction that the car was traveling. If no car call is registered for further travel in that direction, the car will close its doors and immediately reopen them in response to the hall call in the opposite direction. The hall lantern always shows the direction the car will travel when it leaves a floor.

Emergency Exit Contacts

This feature consists of safety chain contacts for top emergency exits. The feature prevents the car from moving when the car top exit is open.

Fan and Light Sleep Mode

The cab's fan and light automatically turn off if the car is idle for a set period of time to save energy.

Hall Buttons—Illuminated

Hall Fixtures employ mechanical LED illuminated buttons.

Hall Button Protection

If the hall button communication network link fails, all of the cars in the group enter Hall Button Protection operation. Each car answers all pending car calls. When each car has no further demand, each car travels to the lobby and parks with the doors open. As an option, Hall Button Protection can also be configured to automatically activate Wild Car Operation. For more information, please refer to the section on Wild Car Operation.

Landing Passing Tone

A Landing Passing Tone is an audible signal, located in the car operating panel, that sounds when the car passes or stops at a landing.

Load Weighing Bypass

When a car is loaded above a predetermined percent of capacity, further hall calls will be bypassed. (This operation eliminates stopping for additional passengers who would be unable to enter an already filled elevator.) Load Weighing Bypass will not affect the stopping of the car in response to car buttons.

Platform Load Weighing

Platform Load Weighing measures car load so that proper starting torque is applied to the motor.

Group: Door Operation Features

Adjustable Door Time

The time interval that elevator doors remain open after a stop is independently adjustable for car call stops and hall call stops. Normally, more time is allowed for a passenger to enter the car from the corridor than for a passenger to leave the car because the waiting passenger in the corridor is usually further from the entrance of the arriving car than the riding passenger. Additionally, the lobby door time is normally longer than the time at other landings to allow extra passenger traffic at the lobby. Door timing is adjusted to suit the needs of the building, including handicapped code requirements. The door open time after obstruction detection and hall calls answered by a parked car are also adjustable.

Advanced Door Opening

To enhance performance time, the doors begin opening while the car is approaching to the landing.

Cafeteria Position

At a landing with a cafeteria, longer than normal door times may be selected to handle additional traffic.

Cancel Door Dwell Time

When the door close button or car call button is pressed (either/or; not both), any remaining door dwell time is canceled and the doors begin to close immediately. Note that some regions have handicapped codes that do not allow the cancellation of door dwell times.

Parking with Doors Open

Front and rear, the elevator car doors can be programmed to remain open or to remain closed when the car is parked at each landing.

Door Time Monitoring

When the car door protective device is activated after the car has stopped to answer a hall call, the door open time is reduced from the normal setting for a hall call stop. Other aspects of door operation continue normally. This feature can be enabled at all landings, or at all landings except the lobby and cafeteria positions.

Nudging Operation

If the doors are prevented from closing for a fixed time period and there is further demand on the system, the door protective device is rendered inoperable, the in-car buzzer sounds, and the doors close at a reduced speed. Normal operation resumes at the next landing.

Group: Operation Features

The group operates in one of two independent modes. Whenever hall calls are registered, the operating mode is “relative system response dispatching.” When no hall calls are registered, the operating mode is “zoned car parking.” Optimized response to hall calls is achieved through use of RSR Plus® time computed for each hall call registered. The computation of each car’s relative system response time to a call is based on, but not limited to, such relevant factors as distance, service to previously assigned car and hall calls, direction, door and car motion status, and coincidence of car and hall calls. To even waiting times and eliminate particularly long waits while maintaining optimal system performance, the weighting of the factors varies with system traffic. The car with the least relative system response is

assigned the call. Relative system response computations for each hall call are repeated several times a second and the hall call assignment changed if a more suitable car is found. The RSR Plus dispatching software continuously evaluates the efficiency of its dispatching and varies the weighting of the bonuses and penalties to optimize the dispatching efficiency.

Zoned Car Parking

The section of a building served by a group of elevators is divided into a number of fixed zones equal to the number of cars in the group. The assignment of landings to zones is selectable. Each zone comprises a section of the hoistway consisting of one or more consecutive floors. Each zone normally is assigned to one car. This feature is used to park cars with doors closed in the absence of call demand.

Expanded Lobby Zone

Several landings above lobby are made part of the lobby zone. One lobby zone car always parks at the lobby.

Excluded Zone Operation

This feature prevents cars from parking in certain zones, and thus freeing these cars for service elsewhere. The excluded floors (a zone) will not appear as demand to an unassigned car unless a hall call exists in that zone.

Separate Basement Zone

This feature is used where substantial traffic is expected from the basement area (such as would occur in a large basement garage) and there are sufficient elevators in the group to create a single floor lobby zone and a separate basement zone.

Park and Shutdown Operation

Park and Shutdown Operation, activated by either a keyswitch or EMS, parks the car at the lobby. When activated, the car is removed from group operations. If the car has pending car calls, it answers any remaining car calls. Once the car has no further demand, the car travels to the lobby and parks with the doors closed (parking with doors open is available). The car remains out of service until the keyswitch is placed in the OFF position. If a lobby panel is provided, a jewel illuminates when operation is complete.

Delayed Car Protection

Any car not responding to a demand for service within a predetermined time interval is removed from group operation. This allows other cars in the group to pick up calls previously assigned to the delayed car.

Transfer Floor Service

The transfer floor is the common landing at the top floor of the low-rise group of elevators and the first landing above the lobby of the high-rise group of elevators.

Uneven Stops / Travel

Odd travel occurs when one or more cars in a group serve additional or different landings in a building. Mid-building travel occurs when certain cars within the group do not serve landings located in the middle of the building (also referred to as an express zone). When a car is traveling through such a zone, the position indicator displays “EZ”.

Double Riser of Hall Button Operation

Double-Riser Operation allows two hall buttons at a landing to work in parallel and to illuminate simultaneously. When either of the hall buttons at the landing is pressed, the call is registered.

Separate Hall Button Riser

This operation uses two sets of hall buttons, one for normal group operation and the other for providing expeditious service to certain landings during specified periods of the day. Separate riser operation is initiated by a keyswitch. When activated, those cars connected to the separate riser answer hall calls registered on it and ignore the hall calls on the primary riser. Cars operating on the separate riser are not subject to group dispatching features such as Moderate Incoming Traffic.

Split Group Operation

In a building with two major tenants, it is often desirable to divide a group of elevators into two subgroups during certain periods of the day. Each subgroup serves one of the tenants.

Group: Group Dispatching Features

Relative System Response Dispatching

Relative System Response (RSR) is a numeric index that indicates the desirability of having a given car respond to a given hall call based on the car’s parameters (position, direction, load, etc.) and the car’s previously assigned demands for service (car and hall calls). The calculation of RSR involves the summation of applicable time increments associated with various operating states of the elevator. The car with the best (lowest) RSR is assigned to respond to a hall call.

Car to Landing Operation

An optional three-position car-to-landing keyswitch is available in a lobby panel or hall station fixture. The designations on the switch are: "Doors" (the neutral position), "Open" (calls the car to the lobby), and "Close" (which locks the car out of service when the car is placed on independent service).

Cars Parked at Lobby

In a multi-car group, the number of cars parked at the lobby is selectable. The normal condition is one car, but some configurations may require additional cars to handle constant heavy traffic at the lobby.

Moderate Incoming Traffic

When traffic at the lobby floor increases, as indicated by two cars leaving the lobby in the "UP" direction, or as activated by the up peak clock, cars assigned to upper zones are called to the lobby without waiting for a call from the lobby landing. Cars are automatically dispatched from the lobby when they become loaded to or near capacity. They also are dispatched if not loaded to capacity within a predetermined time after the previous car is dispatched. The cars continue to operate in this manner until the lobby traffic is reduced to a predetermined level.

Up Peak Clock Operation

This feature initiates Moderate Incoming Traffic operation after a designated Up Peak Clock period begins and one car leaves the lobby landing loaded to a predetermined percent of capacity (see Load Weighing Dispatch). Up Peak Clock maintains a group of elevators in this mode for the remainder of the designated Up Peak Clock period.

Load Weighing Dispatch

This feature is a variable in Moderate Incoming Traffic. The elevator is dispatched up from the lobby as soon as the weight-sensing device determines that the car is loaded to a predetermined percent of capacity. The load setting for dispatch is adjusted independently of load weighing operations other than Moderate Incoming Traffic.

Basement Service

This feature activates during Moderate Incoming Traffic operation and prevents a car from parking at a basement landing. During Moderate Incoming Traffic operation all cars park at a designated entrance floor and are selected for up-dispatch. The doors open and an "UP" lantern illuminates. Basement hall calls are served by the first down traveling car that answers the basement hall call, provided the "No Lobby Car Bypass" feature is not in effect. Basement service should not be specified if substantial traffic is expected at the basement. Instead use Separate Basement

Zone operation. During periods of the day when the system is not operating in the Moderate Incoming Traffic mode, the basement (which is assumed to be part of the lobby zone) is served as any other floor in the zone.

No-Lobby-Car Bypass

This feature is a variable of Moderate Incoming Traffic operation and speeds the return of cars to the lobby during Up Peak Operation. In the absence of a lobby car, cars travel only to the highest car call and then reverse direction to the lobby. Cars bypass hall calls, stopping only in response to car calls. This operation remains in effect until a car arrives at the lobby.

Rotational Selection

This feature is a variable of Moderate Incoming Traffic operation. It provides for the selection of elevators for dispatch at the lobby in a prearranged sequence if more than one car is at the lobby at once.

Variable Interval Dispatching

This feature is part of Moderate Incoming Traffic operation. The assigned car with higher demand is dispatched at the expiration of a time interval. A car at the lobby and loaded to a preset percentage of its weight capacity is dispatched immediately.

Moderate Outgoing Traffic

Moderate Outgoing Traffic provides additional service during periods of heavy down hall call demand above the lobby. When activated, cars assigned to lobby or basement zones are dispatched to handle hall call demand above the lobby. Moderate Outgoing Traffic commences following the arrival at the lobby of two cars loaded to their preset weight capacity within a selectable time interval. Moderate Outgoing Traffic remains in effect for the same interval after the arrival of the last car loaded to a percentage of its preset capacity weight.

Down-Peak Clock

This feature initiates the Moderate Outgoing Traffic operation after a designated Down-Peak Clock period begins and one car arrives at the lobby loaded to a percentage of its preset capacity weight. Down-Peak Clock maintains a group of elevators in this mode for the remainder of the designated Down Peak Clock period.

Up Hall Call Bypass

During Down-Peak Clock Operation, any car traveling down with a “nonstop” load causes designated cars to bypass up hall calls. The number of cars operating in this bypass mode is adjustable as a function of building traffic. The operation remains in effect for the duration of Down-Peak-Clock Operation.

Group: Firefighters' Service

Local code requirements must be determined to ensure that Firefighters' Service Operations are correctly configured.

Firefighters' Service Phase I

When a building's smoke sensor or a keyswitch located at the designated return landing is activated, the car performs an emergency return to that designated landing. The return operation is in compliance with applicable codes. A buzzer alerts passengers that the car is returning and a message indicator in the car operating panel shows "Please Exit When Doors Open."

Remote Firefighters' Service Phase I Keyswitch

Adding a second Phase I keyswitch to a remote location can complement the primary Phase I keyswitch.

Alternate Return Landing for Phase I

The car, while responding to a Firefighters' Phase I operation, returns to the "alternate" landing if the smoke detector at the designated return landing is activated.

Heat and Smoke Sensing Device

The elevator controller is designed to receive signals from the devices (furnished by others) that sense heat and smoke or products of combustion. These devices provide normally closed contacts that open when heat and smoke is sensed.

Firefighters' Service Phase II

This feature is activated by the firefighters using a keyswitch mounted in the cab, and places the elevator under their control. The operation is in compliance with applicable codes. In the U.S. this feature includes the call cancel button in the cab. When the car cancel button is pressed, all registered calls are cancelled and a traveling car stops at the next landing. The car responds to car calls, but will only open its doors due to constant pressure on the door open button. The doors will remain open until the door close button is activated. When the Phase II keyswitch is in the hold position, the car parks with its door open, the door closed button is disabled, and car calls cannot be registered.

Group: Security Features

Anti-Crime Protection

Anti-Crime Protection, when activated, forces each car in the group to stop at a predetermined floor and open its doors. This allows a security guard or others at the floor to visually inspect the passengers of the elevator before the car completes its run.

Car Secure Access

This feature allows each car call button to be secured or cleared. If a car call button is secured, it will not register a call unless a landing access code is correctly entered on the car operating buttons within a predetermined time period after the secured car button is pressed. Selection and changing of the landing access codes is done on each car operating panel using the Car Secure Access keyswitch. Activation of Car Secure Access is done using the Group Secure Access keyswitch located in the hall or lobby. Activation illuminates the "Group Secured" lamp located in the hallway. A car call to a secured landing illuminates the "Restricted Landing" lamp in the car's cab car operating panel. It remains illuminated for a set time period, or until a valid landing access code is entered.

Landings that are secured by Car Secure Access are available when the car is operating under Independent Service Override (optional) or Firefighter's Service Phase II.

Car Secure Access is activated by a 3-position keyswitch located in the car operating panel. The three positions are CLEAR, SECURE, and an unlabeled position. The "Restricted Landing" lamp accompanies this switch.

Card Reader in Car

When car card reader security is activated, car calls to restricted landings do not register. When a passenger inserts a valid card into the card reader, they are allowed to register a car call to selected restricted landings. Car Secure Access, Express Priority Service, and Firefighters' Service Phases I and II, override the Card Reader in Car operation. Independent Service operation may selectively override Card Reader in Car operation.

Card Reader in Hall

When the Card Reader in Hall operation security is enabled, a valid card read by the reader is needed to register a hall call. Connections for Card Reader in Hall security are part of the elevator's hall link communication network. This allows a card reader mounted in the lobby, or the implementation of a card reader-type security, to use keyswitches.

Card Reader Lockdown

When this feature is enabled, the car responds only to hall calls from a card reader. When Card Reader in Hall security is activated, the Card Reader Lockdown feature parks the car at a specified landing and takes it out of service, removing it from group operation. If the car is set to park with its doors closed, the car moves to the specified landing, opens its front doors for the maximum hall door time then closes its doors and takes the elevator out of service.

Group Floor Cutoff Service

Group Floor Cutoff Service allows selected landings or calls to be secured for an entire elevator group. A keyswitch activates the feature. Any landings secured are still accessible during Firefighters' Service Phase II operation.

Car Call Cut-Off (Selected Landings)

Car Call Cut-Off operates from a keyswitch. The operation disregards and does not register car calls to pre-selected landings.

Generic Group Security

This feature utilizes keyswitches or clock inputs to cut off car and hall calls on specified cars at specified landings through a software matrix setup.

Special Security

When Special Security operation is activated, all cars in the group return to the lobby after first answering all pending car and hall calls. Once at the lobby, each car is capable of answering a single hall call, after which it returns immediately to the lobby and opens the car doors. When a hall call is entered, the following steps are followed:

- A car is dispatched from the lobby to answer the call. Each car is only assigned a single hall call.
- Once answered, no further hall calls are allowed for that car until it returns to the lobby.
- Once at the hall landing, if no car calls are entered, the car automatically returns to its designated landing and opens its doors.

Car call security, if desired, is handled separately. To secure car calls, some variation of Card Reader in Car security is suggested.

Hall Call Cut-Off—All Landings

Activating the keyswitch disables all hall calls. The car answers all registered car calls parking itself at its last landing with the doors open.

Hall Call Cut-Off—Selected Landings

Hall Call Cut-Off operates from a keyswitch. The operation disregards and does not register hall calls to pre-selected landings. All car calls are handled normally.

Riot Operation

This feature is invoked by a keyswitch that prevents cars from returning to the main lobby during periods of riot control.

Group: Enhanced Service and Operation Features

Attendant Operation

Attendant operation is activated from a keyswitch mounted in the car operating panel. Initiating the operation cancels all registered car calls and places the car in a semi-automatic control of the attendant to decide:

- Car Loading
- Door Closing
- Hall Call Bypass

Automatic door open operation is in effect for all hall and car calls. Manual door closing by the Door Close button is required. Doors automatically reopen if the Door Close button is released before the doors fully close. Door operation and starting of the car are the same as during independent service in that the start signal is not given until the door close button is operated. Constant pressure on the Non-Stop button will cause the car to bypass all hall calls. Nudging is disabled during Attendant Operation. Load weighing bypass and door protection devices are inhibited during Attendant Operation. This feature includes the “FURTHER DEMAND” message indicator and a Non-Stop button.

Independent Service

Activating the Independent Service keyswitch in the car operating panel removes the car from normal group operation. It responds only to calls registered on car buttons and disregards all hall calls. The doors are closed manually pressing the Door Close button. Car and hall lantern operation is suspended. The car independent service switch can be complemented with a hall independent switch, if specified. Independent Service includes a Call Cancel Button. When the button is activated, all registered calls are canceled and a traveling car will stop at the next landing.

Emergency Hospital Service

Turning a hall mounted keyswitch operates the car according to Express Priority Service (Hospital) rules. Once at the hall landing, a second action is required to activate the Emergency Hospital Service keyswitch in the car. When both actions are complete, the car is under the direction of Emergency Hospital Service operation. The operation function removes the car from normal group operation, responds only to registered car buttons, and door closing is a manual operation that requires pressing the Door Close button. The car resumes normal operation only after the car's Emergency Hospital Service keyswitch is turned to its OFF position.

Express Priority Service (Hospital)

A keyswitch initiates Express Priority Service at each landing requiring this service. The car able to respond in the shortest time answers the call after first canceling all registered car calls. When the car reaches the landing, one of the following occurs:

- If no car call is entered within a preset time, the car will close its doors and resume normal operation.
- If a car call is entered and the Door Close button is pressed, the car will serve the call, then resume normal operation.

This operation can be modified so that the car remains in Express Priority Service until no further car calls are present. When no car call is entered within a preset time, the car closes its doors and resumes normal operation. If an Emergency Hospital Service keyswitch is activated, the car will switch to Emergency Hospital Service until the keyswitch is deactivated. At that time, the car resumes normal operation. This feature includes a Priority Service Light in the hall panels and a message indicator on the car operating panel.

Executive Priority Service

A keyswitch is furnished for each hall landing performing Executive Priority Service Operation. When activated, the car within a group, calculated with the fastest response time, answers the call after first completing all existing car calls. When the car reaches the landing initiating the operation, one of the following occurs:

- If no call is entered within a preset time, the car closes its doors and resumes normal operation.
- If a car call is entered the car will serve the registered call then resume normal operation.
- If an Independent Service keyswitch is activated, the car will remain in Independent Service until the keyswitch is deactivated. At that time, the car resumes normal operation.

This feature includes a Priority Service Light in the hall panels and a message indicator on the car operating panel.

Priority Penthouse Access

A separate hall button is furnished for each hall landing performing Priority Penthouse Access operation. When this button is activated, the car, calculated with the fastest response time answers the call after completing existing car calls. Once at the landing, the car performs its normal door open and close operations and then moves automatically to the designated penthouse landing. At the penthouse landing, the car again performs its normal door open and close operations. It then exits Priority Penthouse Access operation and returns to normal operation.

Sabbath Operation

Some religious beliefs do not allow work to be performed on the Sabbath, which includes pressing elevator call buttons. Sabbath operation shall cycle designated elevators to every landing without requiring a hall or car call. When the car reaches a terminal landing, it reverses direction and continues making stops in the opposite direction. Either a timed device or keyswitch normally activates this operation.

Wild Car Operation

Wild Car Operation is an option used when communications carrying registrations for hall calls fails. In that event, all elevators that make up the group complete their car calls until there is no further demand and then each elevator in the group parks at its lobby and takes itself out of service. Activating the Wild Car keyswitch places the elevator group into a programmed operation. Each car in the group moves to assigned floors to pick up passengers and at least two cars in each group are assigned duplicate floors. Car calls are answered normally.

Earthquake Operation (Seismic)

Earthquake emergency operation, actuated by a seismic switch and/or counterweight displacement switch, is required on all traction elevators operating at a rated speed of 0.76 M/s (150 ft./min.) or more in Seismic Risk Zone 2 or greater. Earthquake emergency operation is not required for Risk Zone 2 if the car and counterweight guide rail systems conform to the requirements for Zone 3 or greater. Resetting the elevator system after an earthquake is performed via a button located in the machine room. This feature is used in conjunction with a Major Component Displacement Detector, which produces a signal if the counterweight breaks free of the counterweight rails. Upon receipt of the signal, a car in motion will make a controlled emergency stop, then move at slow speed in a direction away from the counterweight. When the car reaches the next door zone, the car will open its doors and remove itself from service. The car will remain out of service until manually inspected and reset. In the event of a power failure, earthquake operation will remain active, even after power is restored.

Non-Otis Seismic Sensor Activation

This feature is used in conjunction with a seismic detector, which produces a signal if seismic activity occurs. Upon receipt of the signal, a car in motion will stop at its next committed floor, open its doors, and remove itself from service. The car will remain out of service until manually inspected and reset.

Building Sway Operation

This feature is used in conjunction with a building's motion detector. The elevator's speed is reduced to a secondary contract speed when a signal is received from the motion detector.

Emergency Medical Operation

Emergency Medical Operation operates from a hall mounted keyswitch. When activated, a buzzer in the car sounds and visual illumination alerts appear in car and hall landing fixtures. The operation cancels any existing car calls, reassigns all hall calls for the car, and returns the car non-stop to its designated emergency medical landing, where the doors open and the buzzer stops. Once at the landing, the car follows the rules for Emergency Medical Car Operation. If the emergency medical car switch is not activated within 60 seconds after the doors are fully open, the operation is cancelled.

Emergency Medical Car Operation

A landing designated as the emergency medical floor is specially programmed in the control software. A car positioned at this landing with its doors open performs either of two operations based on a 60-second interval:

- If the Emergency Medical Car keyswitch in the car is activated and a car call registered, the doors close and the car moves to the target landing, opens its doors, and holds them open until the next car call is registered. It repeats the operation with the next registered car call.

- Without further keyswitch action, the car disregards any signals for car calls and the door close buttons. After 60 seconds, the car automatically returns to normal operation.

To remove the car from Emergency Medical Car Operation, the car must return to the medical landing and the Emergency Medical Car keyswitch must be deactivated. When the car is on emergency Medical Car Operation, Fire Service Operation cannot be initiated.

Group: Remote Communications, Monitoring, and Control

EMS Panorama® (Elevator Management System)

EMS Panorama is a monitoring and control system used by building management and security personnel to observe and modify elevator operation and performance. Parnorama can provide time-based control of security access. Depending on the building requirements, a machine room display terminal and keyboard, a lobby display terminal, a security station system, and a fire station display terminal and keyboard are also available. The security station supports interactive operations such as security assignment (car and floor access), electroluminescent display message, and the storage of events and alarms. The personal computer allows display of up to eight 8-car groups on the same monitor.

Intercom (Provision)

An optional provision is made in the main car operating panel (auxiliary car operating panel if the main car operating panel includes speech synthesis) for a speaker and/or microphone.

Remote Elevator Monitoring (REM®)

REM is a robust monitoring system that records data on many aspects of your elevator's equipment and operation.

Group: Maintenance Operation Features

Zoned Access at Bottom Landing

Zoned Access operation is activated by a keyswitch typically located in the entrance frame. Under this operation, the car is permitted to move at a reduced speed with the hoistway door at the bottom landing and car door open. The operation is used to permit trained maintenance personnel to access the elevator's pit. Movement of the car away from the bottom landing is limited or "zoned" to prevent excessive movement.

Zoned Access at Upper Landing

Zoned Access operation is activated by a keyswitch typically located in the entrance frame. Under this operation, the car is permitted to move at a reduced speed with the hoistway door at an upper landing (typically the top landing) with the car door open. The operation is used to permit trained maintenance personnel to access the elevator's car top. Movement of the car away from the upper landing is limited or "zoned" to prevent excessive movement.

Top-of-Car Inspection

Top-of-Car Inspection is provided on the roof of the elevator. This feature allows authorized, trained personnel to move the elevator at a controlled, reduced speed.

Group: Standby Power Operations

Standby Power Operation (Automatic with Manual Override)

The number of cars that can operate simultaneously under standby power is designated by contract. Standby Power Operation returns the cars automatically to a designated landing. Preference is given to cars with passengers to reduce passenger waiting time. Any car that does not begin a return within 60 seconds is placed in a "Not Available" mode while the responding cars move. A second attempt is made to recover any car that failed to move. If again unsuccessful, they remain in the "Not Available" mode and only operate manually. Cars returned to their designated landing then go on automatic selection and run on normal operation. The priority of selection is as follows:

- Car(s) on Firefighters' Service Phase II.
- Car(s) designated by contract to be selected.
- First available car beyond the car(s) designated by contract.

If a car selected for normal operation under Standby Power Operation is delayed for 60 seconds, it is placed in a "Not Available" mode and another car is selected for normal operation based on the priorities listed above. Manual override of Standby Power Operation is operated by a strip of switches. A manually selected car may run either as a return operation to a designated landing or in normal operation under Standby Power Operation. If a manually selected car has not first returned to its designated landing, it will do so and then immediately go into normal operation. If a manually selected car is delayed, no other car can be selected in the group unless it is manually selected.

If car selection is changed by Manual Override while a car is running in return or normal operation under Standby Power Operation, the newly selected car is not permitted to run until the car that is running has stopped, opened its doors, and gone into the Standby Power Wait state.

Inter-Group Standby Power Operation

This operation monitors and controls the status of cars in multiple elevator groups in one or more machine rooms during Standby Power Operation. Initially, each group is enabled to return cars to their designated return landing. Once return operations are complete in all groups, a predetermined group or groups are enabled for automatic or manual selection for normal operation under Standby Power Operation protocols. To ensure the number of cars run by the standby power system is not exceeded by manual selections, a software interlocking system is used. If a manually selected car would exceed the total allowable number of running cars, it cannot move until another already moving car stops at its next committed landing, opened its doors, and is placed in the Standby Power Wait state.

Split Feeder Operation

This operation is required when two standby power feeders supply one group of elevators. Each feeder supplies power to some (but not all) cars in the group, causing a split group. A car operates under normal or standby power depending on the condition of its feeder. The two subgroups share the same designated return landing. If only one of the two feeders goes on standby power, the car(s) associated with the feeder begin Standby Power Operations (see “Standby Power Operation Automatic and Manual”). The rest of the group remains on normal operation under normal power. If the second feeder also goes on standby power, all the cars perform standby operations as a single group. To do this, the cars already on Standby Power Operation reset and again perform the return operation to the designated landing. Automatic selection for normal operation under Standby Power Operation occurs after the full group performs the designated return floor operation. Manual Override at this time is also available. Cars returned to normal power first enter Emergency Power Transfer mode, which performs a timed transition between the power supplies recounting the number of cars remaining under Standby Power Operation.

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Chapter 4: Maintaining Your Gen2® Elevator

It is in your best interest as an owner to ensure your elevator system is well maintained. This will minimize the incidence, inconvenience, and cost of unexpected breakdown. This chapter should serve as a guide to understanding the maintenance recommended by the Otis Elevator Company. This chapter is not intended as a guide or instruction manual for performing elevator maintenance. Some of the routines listed may not be relevant to your particular installation, based on the specific features chosen.

Failure to use genuine Otis parts may invalidate any guarantee and may adversely affect the safety of your elevator. Refer to Otis Elevator Company for further information.

For safety reasons, only a trained elevator maintenance technician may perform the operations listed in this chapter. The elevator must be removed from normal service and warning signs displayed. Safety barriers must be used if doors are opened without the car present.

From Inside the Car

1. Inspect car interior for damage and repair sharp and protruding edges.
2. Observe starting and stopping for signs of deterioration or malfunctions.
3. Observe floor leveling to ensure it is within tolerance.
4. Check operation of car and landing doors and ensure all reversal devices function properly.
5. Check operation of all controls within the car, especially alarm devices.
6. Check operation of normal and emergency car lighting.

Controller

The cabinet contains high voltage equipment. Power must be off unless suitable live working methods are employed.

Settings of resistors and other adjustable components should not be altered without a full understanding of their function. If in doubt, contact Otis Elevator Company. Fault finding must not be performed without the correct diagram and a full knowledge of the equipment.

1. Check all electrical connections for tightness.

2. Ensure ventilation fans and grills are clean and functioning.
3. Keep all parts clean.
4. Ensure cabinet doors are locked shut after inspection.

Landing Fixtures

Turn off power before working on any fixtures.

1. Check the operation of all fixtures.
2. Ensure correct operation of the fire service switch and any other special service switches.

Landing Entrances

Do not open doors without a barrier in place if the car is not present. Turn off power or place the car on inspection operation and activate the stop switch before any inspection.

1. Clean landing door tracks.
2. Check doors for free operation.
3. Check that the doors close due to gravity or spring force.
4. Check correct lock engagement and contact wipe.
5. Check for excessive play in bottom door guides (gibs).
6. Check the condition of the air cords or other coupling devices.
7. Check that all bolts are tight.
8. Check the condition of the panels for damage.
9. Check the correct setting of upthrust devices.
10. Check the condition of the tracks and the sills.

Guide Rails

1. Check the condition of all hardware, rail fastenings, and brackets.
2. Remove any debris or dust.

Belts and Terminations

1. Inspect coated steel belts for signs of wear.
2. Check condition of all coated steel belt terminations.
3. Check and adjust lengths to maintain correct counterweight run-by.
4. Ensure that the tension on all belts is equal.

Car Entrance and Operator

Do not ride on the car top unless the cart is on inspection operation. Whenever the car is stopped, immediately activate the emergency stop switch. When working on the car doors, ensure the main power is off.

1. Clean the car door track of any debris.
2. Check the condition of all hardware.
3. Check the condition and adjustment of the door coupling mechanism.
4. Check the door gibs for excessive movement.
5. Check the upthrust rollers for recommended clearance.
6. Check electrical cables for signs of damage.
7. Check the security of all door tracks.
8. Check the clearances between door panels and returns.
9. Ensure correct operation of the door locking mechanism.
10. Check the door closing speed and force.
11. Check the operation of the door open button and all other reversal devices.

Hoistway Switches

Do not make adjustments without a full understanding of any item.

1. Clean the switches and check the arms and rollers for free movement.
2. Check the function of all terminal switches.

3. Check the running clearance of the inductors and vanes.

Car Frame Equipment

Lock off power at the mains before inspection.

1. Clean off lint and dust.
2. Check the condition of all hardware.
3. Investigate any unusual noise, heat, or vibration.
4. Check the operation of the safety gear linkage.
5. Ensure adequate clearance is maintained between the safeties and the rails.
6. Check the safety gear for correct engagement.
7. Check the condition and adjustment of the cab steadier devices.
8. Check the traveling cables and compensation for correct hang and signs of damage.
9. Check the condition of cartop sheave.

Gearless Traction Machine & Brake

Lock off power at the main switch before inspection.

1. Investigate for any unusual noise, heat, vibration, or excessive movement of parts.
2. Check the condition of all bolts and attachments.
3. Check the condition of the machine sheave.
4. Inspect all sheaves for wear and damage.
5. Check the condition of all electrical connections.
6. Ensure all guards are in place.

Counterweight

Ensure the car is on inspection operation with the stop switch activated or lock off power at the main switch.

1. Check the condition of the filler weights.
2. Check the roller guides for correct position and lubrication.
3. Check the condition of the sheave, frame, compensation chain, and guiding devices.

No lubricating of counterweight sheave bearings is required.

1. Check and observe the operation of any safety gear linkage.
2. Ensure the recommended clearance is maintained between safeties and rails.
3. Check the safeties for correct operation and engagement.

Pit Equipment

Do not enter the pit without the power switched off or the pit stop switch activated.

1. Check for free movement of the governor tension frame and check for recommended switch adjustment.
2. Check the condition of the buffer (hydraulic or spring type).
3. Check for the correct hang and loop of the compensating chain(s).

Cleaning

For safety reasons, the elevator must be immobilized for cleaning operations. Do not operate any electrical appliance inside the elevator car using a trailing power cord to an external power source, unless automatic elevator operation has been overridden and the car is safely parked with doors open. Do not leave car unattended while power cords pass through the door opening. The car is a confined space. Do not use cleaning agents that require good ventilation.

The car top must be kept clean of oil, lint, and debris to minimize the risk of fire.

The pit floor and its equipment must be kept clean, dry, and free of debris to minimize the risk of fire.

Car Interior Surfaces

The interior of your elevator car, including the doors and frames, are designed to retain their finish and to last for many years. To ensure that they do, follow these instructions:

Clean the surfaces regularly in accordance with the following advice.

Protect all vulnerable surfaces from damage, especially when an elevator is used for moving furniture or equipment or similar non-passenger activities. Protective pads may be obtained from Otis to protect your elevator.

Otis Elevator Company recommends the following cleaning techniques:

Glass

Clean with a non-abrasive glass cleaner and a soft lint-free cloth.

Stainless Steel

Use a soft lint-free cloth with a reputable stainless steel cleaner. Follow the grain of brushed stainless steel. Do not use any other types of cleaning powders or creams or any grade of steel wool.

Bronze-Tinted Stainless Surfaces

Use a soft lint-free cloth dampened with soap and water and finish with a soft dry cloth. Do not use any cleaning agents designed for un-lacquered brass or abrasive materials.

Laminated Surfaces

Use a soft lint-free cloth dampened with soap and water. Do not use any cleaning powders, creams, or sprays**.**

Painted Surfaces

Use a soft lint-free cloth dampened with soap and water. Do not use any cleaning powders or creams.

Landing Doors and Frames

Landing doors and frames should be cleaned in accordance with the preceding recommendations and protected against damage when necessary.

Car and Landing Door Sills

It is essential to regularly clean all debris from the car and landing door sill grooves. First immobilize the elevator (see note below) with the doors open at a convenient landing.

Then carefully brush out accumulated dirt and extract with a vacuum cleaner.

Use your independent service keyswitch or other supervisory system control lock (i.e., recall to the lobby) to immobilize the elevator. If you are unsure about carrying out the task safely, please call Otis first.

Inspection Requirements

Controllers

Wires. Examine all wiring for breaks, loose lugs, or loose connections.

Resistance Tubes. Inspect for loose connections. Examine tubes for breaks in the enamel. Replace broken resistance tubes with tubes of equal value.

Motors

Connections. Tighten all motor and field connections. Be sure to check all grounds and the bonding of all conduits, and the controller frame, etc.

Gen2® Brake Inspection Details

Check brake connections and wiring. Measure between the brake pad and magnet housing using a metric feeler gauge to ensure that brake clearance is within recommended tolerances. The Gen2 brake requires no lubrication or adjustment.

Governors

Check and clean dust and debris from the governor parts. Ensure that all covers are replaced after inspection. Check the wiring and connections on all solenoids and overspeed switch. No lubrication or adjustments required. Do not lubricate governor rope.

Sheaves

Check all sheaves for wear and debris. Clean if needed. **Do not use any solvents, cleaners, or chemicals on sheave surfaces.** Dust with a dry cloth only if needed.

Sheave bearings are sealed and do not require periodic lubrication.

Car

Flooring. Inspect for worn or loose flooring.

Emergency Exits. Check operation of top exit and switch.

Lighting and Fans. Check for cleanliness, burnt out lamps, and for lubrication. Be sure that globes are fastened.

Fixture Jewels and Lenses. Replace if any are cracked or broken. Glass used in the car should be in accordance with codes.

Car Operating Devices

Pushbuttons. Buttons should not stick and should work properly. Replace worn buttons and switches.

Indicators

Position Indicators. Position Indicators should be tested for proper operation and checked for burnt out lamps.

Car Door

Fastenings. Examine fastenings and check the door opening range. Examine for broken springs and loose connections.

Hangers. Check for worn tracks and rollers, making certain that the door cannot come out of its guides or jam at any point.

Bottom Guides (Gibs). Examine for wear, looseness, or the possibility of the guides coming out of the threshold.

Car

Fastenings. Check and tighten the fastenings if required.

Cab Steadier Plates. Check and tighten cab steadier plates if needed.

Roller Guides. Check the roller guides for wear, proper clearances, and adjustments.

Doors and Door Operators

Wear. Examine thoroughly the doors and door operator for wear, friction, or obstructions that may prevent proper operation.

Adjustment. Clean, align, and adjust the door operator for quiet operation and proper opening and closing speed. Test and observe operation.

Safety Operated Switch

Adjustment. Be sure that safety operated switch will function if the governor trips.

Releasing Carrier

Spring Tension. Ensure that the releasing carrier will operate properly if the governor trips. Check all setscrews, keys, levers, pins, nuts, and lock nuts.

Coated Steel Belts

Condition. Visually inspect Coated Steel Belts for wear, cuts, breaks, or damage. **Do not use any lubricants, cleaners, solvents, or chemicals to clean belts.** If cleaning is needed, use only a dry cloth.

Traveling Cables

Fastenings. Check the supportive device fastenings.

Condition. Examine the outside coverings for wear. Look for any abrasion from concrete or steel supports.

Hoistway Door and Operation

Adjustment. Examine each door carefully. Check for structural defects. Examine the doors to see if they can be opened without releasing the interlock. If the lock is worn or the door has sagged so that interlock does not engage properly, arrange for repairs at once. Clean, lubricate and inspect all pins, bushings, guides, etc. as needed. Be sure that bumpers are in place and in good condition.

Hangers. Examine the hangers for proper operation, wear, upthrust adjustment, and condition of the guides (gibs) in the bottom of the doors. Checks tracks for wear and alignment, and tighten all fastenings if needed.

Interlocks. It is extremely important that all lock failures be repaired immediately. Check contacts and the point at which they close. Try to pull the door open with the car outside the range of the lock. Carefully check clearances and tightness of bolts and screws to avoid future shutdowns.

Conduit

Check the fastenings and ensure the conduit has not pulled out of the fittings and that the duct is securely fastened to the wall.

Counterweight

Roller Guides. Check for wear, proper clearances, and adjustment.

Filler Weight Rods and Nuts. Tighten the rods and nuts, if necessary, and check cotter pins.

Limit Switches and Cams

Rollers. Check the roller guides for wear and replace if they do not engage cams properly.

Wiring. Be sure that all wiring connections are tight.

Test Operation. See that all switches and cams are in correct alignment. Check the operation of final limits.

Rails

Check the brackets, rail fastenings, and fishplates for loose bolts. Tighten and clean when required.

Buffers and Springs

Operation. Run the car at slow speed onto the buffers. Fastenings—Check for loose nuts and bolts and tighten if needed.

Sheaves (Governor)

Bearings. Check for the bearing wear, especially those on the governor tension frames.

Fastenings. Check all fastenings and tighten as needed.

Switches. Check all contacts and switch operation.

Clearances

Pit of Counterweight. Check the pit and striking blocks to be sure the counterweight will land before the car strikes the overhead.

Governor Tension Frames. Check to determine whether or not the rope should be shortened.

Hall Buttons. Check for broken or sticking buttons, and ensure that all screws are in place and the plates are properly fastened. If lights are used, inspect for proper operation.

Emergency Door Opening Keys. Check the operation of keys on doors arranged for their use. Use by people unfamiliar with elevators may result in an accident if the door is opened when the car is not at that floor. Emergency keys should be stored securely in compliance with all elevator codes.

Safety Devices

Check clearance between the safeties and rails. Check all machine screws in the links and rods, and be sure that all pins, nuts, and keys are in place and tight.

Governor Test of Safety. If a recent safety test is not a matter of record, and then a standard safety test at slow speed should be performed. Be sure to check local code requirements. All equipment should be thoroughly inspected before and after conducting the test.

Traveling Cables

Check traveling cables for signs of wear and ensure the attachment points at the car and hoistway are secure.

Environmental Requirements

The Gen2 uses sealed bearings and does not generate waste lubricant.

Escape/Evacuation Procedures

Occasionally passengers may become trapped in an elevator that has stalled due to power failures or other conditions. This section briefly outlines the process for emergency evacuation of passengers from a stalled elevator.

Manual Rescue Operation

Qualified personnel can use the Gen2 Manual Rescue Operation function to move the elevator when main power is lost, by remotely lifting the machine brake from the controller.

Manual Rescue Operation is to be used only after all other means to evacuate trapped passengers have been considered.

Basic Escape/Evacuation Rules

These rules apply in all cases and must be followed with any type of evacuation.

Never attempt an evacuation on your own. *Immediately call an experienced elevator mechanic to the site to perform an evacuation. Passengers need to be removed as quickly as possible but never with the risk of injury to the passengers, building personnel, or mechanics.*

A trained elevator mechanic must perform these basic rules, which include:

- **Lock out and tag the main line before removing passengers from any exit (except under normal operation). This rule applies even if there has been a power failure.**
- Do not open the doors unless someone is at the landing to assist the passengers when they are exiting the elevator.
- Communicate with passengers. Identify yourself and reassure passengers that they are safe and that steps are being taken to evacuate them from the car. Ask questions:
    - How many passengers are in the car?
    - Are any passengers ill, injured, or do any require special assistance?
    - Are the lights on in the elevator car?
    - Are the car doors open or closed?
    - What were the conditions leading up to the entrapment?
    - How long have passengers been trapped?
- Keep passengers informed of the steps being taken throughout the evacuation process:
    - Instruct the passengers to stay away from front door.
    - Instruct the passengers not to touch any buttons unless asked to do so.

- Return the car to normal operation (if possible).
- Ask passengers to:
    - Check that the car Emergency Stop Switch is in the “RUN” position.
    - Try pushing the door open button.
    - Check car doors to make sure they are fully closed.
- A trained mechanic should perform a quick diagnostic check from the machine room to:
    - Check for power.
    - Check for blown fuses.
    - Check for tripped overload.
    - Check for contact(s) not making.
    - Check that the safety circuit (“safety chain”) is closed.
- Restore normal operation (if possible) and ensure that passengers exit safely.

Do not open the doors unless someone is at the landing to assist the passengers when they are exiting the elevator. If the car is more than 30 cm (1 ft.) from floor level, a ladder should be used. In many cases, an additional rescue person is needed—one person in the car and the other at the landing—to assist the passengers. Have the ladder available before opening door; passengers will not wait for the ladder once doors are opened.

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Chapter 5: Otis Maintenance and Service

Elevator maintenance is more than just returning an elevator to service after an elevator shutdown occurs. Since elevator systems are a significant investment, proper maintenance on this equipment is critical to extend the life of the equipment and reduce the possibility of unscheduled disruptions or shutdowns.

Otis utilizes the vast knowledge it has accumulated over the years as the world's leader in the elevator and escalator industry to provide superior maintenance to extend elevator life. That means not only developing better, longer-lasting products, but also the technology to scrutinize their maintenance performance along with the technology to place valuable information into the hands of well-trained mechanics.

Otis Elite™ Service simplifies your day by taking one important responsibility off your mind. Through investments in new technology, Otis Elite service ensures a level of expedience previously unavailable in the industry. We'll respond to service issues in record time—typically in minutes; we'll provide you with status updates in real time; we'll even modify key elevator functions to align with changing patterns the moment you assess the need. You play a central role in optimizing the flow and efficiency of your building. With Otis Elite service, we'll make sure your elevator does also.

Otis Maintenance Management System (OMMS®) is a dynamic program that takes into account your elevators' maintenance needs, use and component life. Otis can tailor inspections and maintenance schedules based on your elevators' use in advance.

OMMS procedures are performed on your equipment at predetermined intervals. Components are replaced before their normal life cycle ends and their performance deteriorates. Although we cannot guarantee that no malfunctions will occur, OMMS procedures greatly minimize shutdowns. In addition, Otis continually re-evaluates and improves these procedures. Engineering testing is constantly underway to update and improve OMMS maintenance techniques and OMMS materials.

OMMS is a system tailored specifically to your environment, equipment and needs. Its standardized work practices and predetermined task scheduling ensure the right maintenance at the right time – today and for the extended life of your equipment. It is based not only on engineered, certified best methods, but on constant analysis of the work performed, to ensure consistent, high quality maintenance. This ultimately protects your elevator investment and ensures satisfied tenants.

The Otis Maintenance Management System is the single most advanced and effective support system available in the elevator industry.

Another Otis technological advance is **Remote Elevator Monitoring (REM®)**. REM uses advanced data communications and microprocessor technology to provide 24-

hour, on-site elevator monitoring. Sensors located in key areas of elevator operation provide diagnostic data in an effort to discover and correct problems before a failure occurs.

Because REM constantly monitors an elevator's performance, it can identify imminent problems that are fixable during a routine maintenance visit. If it finds a major problem, REM automatically sends a message to a customer care center and an Otis service mechanic is dispatched within minutes of the call.

REM continuously monitors your elevators 24 hours a day, 365 days a year. It reduces service interruptions and provides accurate operation information to identify and correct most problems quickly. For fast response, the REM® system makes the service calls for you. A mechanic is dispatched immediately for urgent problems and elevators are often back in service before you or your passengers know there is a problem.

Otis invests in the tools and technology necessary to make technical information easily accessible to Otis personnel. For instance, **OtisWave** is a fully searchable online library of technical documents providing up-to-date information. Otis service personnel now access information faster and easier using the OtisWave library. A maintenance supervisor at a work site needs only a few minutes on his laptop computer to identify a specific part, review a maintenance routine, or find replacement part numbers. The hours previously spent searching through thousands of pages of paper documents in the office are now history.

Otis continuously strives to provide exceptional service to our customers. Evidence of this commitment can be found in facilities such as **OTISLINE®**. OTISLINE is a 24-hour-a-day, centralized communications center that enables you to contact Otis at any time of the day or night. Customer service representatives are available at toll-free phone numbers to provide a prompt and professional response.

e*Service through Otis.com provides direct access 24 hours a day 7 days a week into your building's service history. You can access e*Service using your existing computer and internet browser – just log-in to otis.com and register for e*Service. Knowledge about all service calls and maintenance completed on your elevators or escalators is at your fingertips. E*Service also provides access to your financial statement of account information.

Otis is driven to develop products that improve an elevator's performance, safety, and reliability. Many of these products are incorporated directly into production at the factory for new elevator systems or are added to older equipment to modernize it.

Among the key elements in Otis' overall maintenance program are its customer service centers and testing facilities. For example, the **Otis Service Center (OSC)** in Bloomfield, Connecticut provides maintenance, repair, and modernization services to all Otis maintenance customers throughout the U.S. and Canada. The 220,000-

square-foot facility stocks, manufactures, and sources elevator and escalator parts. Printed circuit board repair and testing are also performed at OSC.

The **Otis Test Tower** and **Quality Assurance Center (QAC)** in Bristol, Connecticut serve as examples of Otis' commitment to minimizing elevator/escalator downtime through continuous improvement. A combination of real-world testing and computer simulation at this facility means faster, quieter, more efficient, and reliable equipment for Otis customers. Engineers not only test products, but also perfect installation and service methods before they are implemented.

Finally, Otis offers many forms of preventative maintenance programs designed to extend the life of elevator and escalator equipment. Monitoring and maintaining equipment properly also allows for the safest, most reliable performance possible. Please contact your Otis sales or customer service representative for more information about these services.

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Chapter 6: Unique or Product-Specific Procedures or Methods for Inspection or Testing / ASME A17.1b-2009/CSA B44b-09 : Requirement 8.6.1.2.1(f)

When it is necessary to access the car top or the pit, individuals should safely access them using a safe, industry-accepted procedure (for example, see NEII/Elevator World's Elevator Industry Field Employees' Safety Handbook*).*

Testing Procedures for GCS Controllers with Software Level BAH, or AAB or Later

Overspeed Test Instruction

PREPARING FOR TEST

This test allows you to run the car at normal speed and, on some systems, at governor tripping speed, to activate the safeties. This is to check that the safeties will apply and stop a fully loaded car in the down direction (or empty car in the up direction) within the distance determined by code.

Take control of the car, making sure there is no one in the elevator.

Test the brake's spring tension to ensure it will hold full load.

Leave the full load on the elevator for the safety test.

If the building has counterweight safeties, they must be tied down before testing the car (this is to prevent the counterweight safeties from setting during the test).

If you are performing a counterweight test then the car safeties must be tied down (this prevents the car safeties from setting during the test).

From the wiring diagram, determine both the car governor's overspeed switch (OS) and the counterweight governor's overspeed switch (CWOS), if present. These switches must be jumped out during the test.

Running Test

Read and become thoroughly familiar with the test instructions before beginning any test.

Plug the tool into the service tool maintenance port on the controller.

Disable OCSS to MCSS communication by going to menu (Module-2-4-7-2) on the tool.

This gives you control of the elevator.

1. Go to menu (Module-2-2-5-1-1-1). The tool will display the screen below.

Read Ovrspd Inst Enter Code ????

2. Enter the code from Step 12, and then push [Blue + Enter] buttons. The tool screen will display:

Car Test = 1 CWT Test = 2

3. Select which test you want to run, by entering 1 for car or 2 for counterweight.
4. The tool will confirm the correct car position for the test selected.
5. If 1 was selected and the car is at the correct landing, the tool will display the screen below.

Ena Safety Test 1 = Yes 2 = End

6. If 1 was selected and the car is not at the correct landing, the following display will come up on the tool.

Car Not at Top Landing <ENTER>

7. Push the [Blue + Enter] buttons on the tool; follow the instruction to move the car to the correct landing. At the end of run the tool will display the screen below.

Ena Safety Test 1 = Yes 2 = End

8. Enter 1 to select the safety test or 2 to abort the test.
9. If 1 is selected, the tool will show both test velocity and uncontrolled motion velocity.

Test V = UCM V =

10. Push the [GO ON] button and the tool will display the screen below.

Read Ovrspd Inst Enter Code ????

11. Enter code from Step 11, then push buttons [Blue + Enter] on the tool. The tool will display the screen below.

Run Test? 1=Yes 2=No

12. Selecting 1 causes the elevator to run towards the bottom landing at the test velocity.

Pushing 1 disables the safety control. The safety function will be disabled for only one run.

You are about to run the car. Performing this test requires operating the elevator in a potentially unsafe and hazardous condition that may result in personal injury or property damage, including death, and damage to your elevator. In addition, not restoring the elevator to service properly at the completion of this test could result in a safety hazard. The code for Step 5 is 2655 and the code for Step 9 is 5429.

13. If your jurisdiction requires the governor to be tested at contract speed, then trip the governor manually.

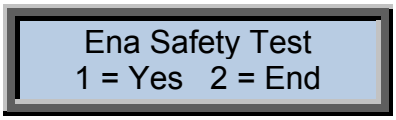
14. If the jurisdiction requires overspeeding of the elevator, the safeties will set when the elevator reaches the governor's tripping speed. The following sequence would occur if 2 were selected in Step 6.

15. If 2 is selected and the car is at the correct landing, the tool will display the screen shown below.

Ena Safety Test 1 = Yes 2 = End

16. If 2 is selected and the car is not at the correct landing, the following will be displayed on the tool.

17. Push [Blue + Enter] on the tool. Follow the tool instruction to move the car to the correct landing. At the end of the run the tool will display the screen below.



18. Select 1 and follow Steps 8 through 11. The car will run toward the top landing at the counterweight test velocity.

19. If the jurisdiction requires the governor to be tested at contract speed, then trip the governor manually.

20. If the jurisdiction requires overspeeding of the elevator, the counterweight safeties will set when the elevator reaches the counterweight's tripping speed.

21. Push Module on the tool to exit the test and restore safety controls.

22. Confirm all tie downs and jumpers have been removed before putting the elevator back onto normal operation.

Not removing all jumpers and restoring the elevator to normal service properly at the completion of this test could result in a safety hazard.

23. Restore OCSS to MCSS communication by going to menu (Module -2-4-7-1).

Buffer Test Instruction

Preparing for Test

This test allows you to run the elevator or the counterweight at **Buffer Striking Speed** onto the buffer. This is to check that the buffer will retard the elevator or the counterweight if they run into the terminal. When the elevator or the counterweight is raised off the buffer, the buffer plunger must return to its normal position within 90 seconds.

Take control of the car, making sure there is no one in the elevator.

Test the brake's spring tension to ensure it will hold a full load.

Leave the full load on the elevator for the car buffer test.

If the building has counterweight safeties, they must be tied down before testing the car buffer. This is to prevent the counterweight safeties from setting during the test.

Before doing the counterweight buffer test, the car safeties must be tied down (this prevents the car safeties from setting during the test.).

The controller is calibrated in millimeters per seconds of car speed. To convert feet per minute to millimeters per second 5.08 x FPM (= mm/sec.) Calculate car speed in mm/s. The buffer striking speed is a speed the buffer is designed to absorb. This speed can be found on the buffer data plate.

Position the car at a landing in the middle of the building, in preparation for the test.

Running Test

Read and become thoroughly familiar with the test instructions before beginning any test.

Remove power from the controller. Log out/tag out the mainline disconnect.

Remove and tape the ends of wires from terminal P21-1 and P21-2.

If the wires are not removed and the jumpers installed for the test, the sensors will be destroyed when power is applied to the controller.

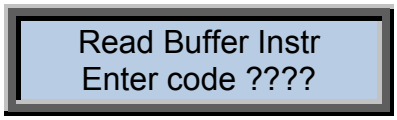
Install jumpers between P21-10 to P21-1 and P21-2.

Plug the tool in the service tool maintenance port on the controller.

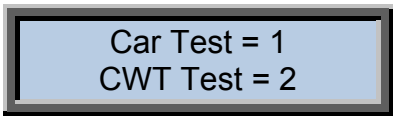
Disable OCSS to MCSS communication, by going to menu (Module-2-4-7-2) on the tool.

This will give you total control over the elevator.

1. Go to menu (Module-2-2-5-1-1-2) and follow the instruction to get to the buffer test.



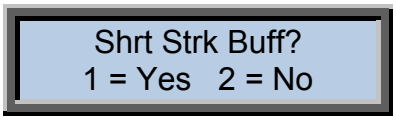
2. Enter code found in Step 15 and push [Blue+Enter], the following display below should be shown on the screen.



3. Select which test you want to run, by entering 1 for car test or 2 for counterweight test.

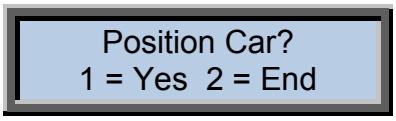
4. The tool will confirm the correct car position for the test selected.

5. If 1 was selected and the car is at the correct landing, the tool will ask if the buffer is full stroke or short stoke by the display shown.

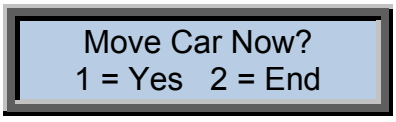


6. If 1 was selected and the car is not at the correct landing, the following display will come up on the tool.

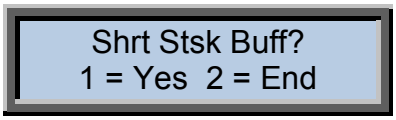
7. Push the [Blue+Enter] buttons on the tool and follow the instruction.



8. If 1 is selected, the display will show:



9. Select 1 and the car will move toward the top floor and then the tool will display.



10. If 1 is selected, the tool will display the buffer striking speed, which should be 85% of contract speed.

Buffer Test Velocity xxxx

11. Push the [GO ON] button on the tool, to display the following screen:

Ena Buffer Test ? 1 = Yes 2 = End

12. Pushing 1 will disable the safety control. The safety function will be disabled for only one run.

13. *You are about to run the car. Performing this test requires operating the elevator in a potentially unsafe and hazardous condition that may result in personal injury or property damage, including death to persons and damage to your elevator. In addition, not restoring the elevator to service properly at the completion of this test could result in a safety hazard. The code for Step 8 is 3877 and the code for Step 17 is 3974.*

14. Press 1 to initiate the test or press 2 to abort the test and restore the safety controls.

15. Key in the code from Step 15 and press Blue + Enter.

Read Buffer Instr Enter Code> ????

16. When the correct code is entered, the tool will display a final decision selection:

Run Test? 1=Yes 2=No

17. Selecting 1 will cause the elevator to run towards the bottom landing at 85% of contract velocity.

18. The following sequence will occur if the 2 is selected for the counterweight buffer test in Step 6.

19. The tool will confirm the correct car position for the test selected.

20. If 2 is selected and the car is at the correct landing, the tool will ask what type of buffer.

Shrt Strk Buff? 1 = Yes 2 = No

21. If 2 is selected and the car is not at the correct landing, the following display will come up on the tool.

Car Not at Bottom Landing <ENTER>

22. Push the [GO ON] button on the tool and follow the instruction, until the display below appears on the tool.

Position Car? 1 = Yes 2 = End

23. Select 1 to position the car.

Move Car Now? 1 = Yes 2 = End

24. The software is designed to prevent the elevator from operating under unsafe conditions, so certain software safety controls must be disabled for each test, they will automatically be restored after each attempt.

25. Follow instructions in Steps 8–14.

26. Selecting 1 will cause the elevator to run towards the top landing at the velocity selected in Step 8.

27. Push Module on the tool to exit the test and restore safety controls.

28. Confirm all the tie downs and jumpers have been removed before putting elevator back onto service.

29. Remove power from the controller. Lock out/Tag out the mainline disconnect.

30. Remove jumpers from the P21-10, P21-1, and P21-2 and then install the wires that were removed earlier.

31. Not removing all jumpers and restoring the elevator to normal service properly at the completion of this test, could result in a safety hazard.

32. Restore OCSS to MCSS communication by going to menu (Module -2-4-7-1).

NTSD Dynamic Test Instruction

Preparing for Test

This test demonstrates the operation of the Normal Terminal Slowdown Device (NTSD) at the top and/or bottom landings. The normal stopping means is inhibited so that the car is forced to slowdown when it encounters the NTSD device. This test must be done before the NTSD static test.

Take control of the car, making sure there is no one in the elevator.

Running Test

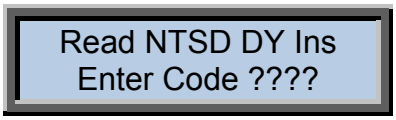
Read and become thoroughly familiar with the test instructions before beginning any test.

Plug the Customer Tool into the service tool maintenance port on the controller.

Disable OCSS to MCSS communication, by going to menu (Module-2-4-7-2) on the tool.

This will give you total control over the elevator.

1. Go to menu (Module-2-2-5-1-1-3) and follow the instruction to get to NTSD dynamic test.
2. Enter code to proceed (see code is in Step 9).



3. The tool will display.

4. Select which test you want to run, by entering 1 or 2.
5. The tool will confirm the correct car position for the test selected.

6. If 1 was selected and the car is at the correct landing, the tool will display "Enable Dynamic Test".

Enable Dyna Test?
1 = Yes 2 = End

7. If 1 was selected and the car is not at the correct landing, the following display will be on the tool.

Car Not at Bottom
Landing <ENTER

8. Push the [Blue+Enter] buttons on the tool, the car will move to the correct landing. When it stop the display below will appear on the tool.

Enable Dynamic Test?
1 = Yes 2 = End

9. Pushing 1 will disable the safety control. The safety function will be disabled for only one run. The next display will request the NTSD dynamic test code.

10. *You are about to run the car. Performing this test requires operating the elevator in a potentially unsafe and hazardous condition that may result in personal injury or property damage, including death to persons and damage to your elevator. In addition, not restoring the elevator to service properly at the completion of this test could result in a safety hazard. The code for Step 5 is 4964 and the code for Step 11 is 5525.*

11. Press 1 to initiate the test or press 2 to abort the test and restore the safety controls.

Read NTSD Dy Inst
Enter Code > ????

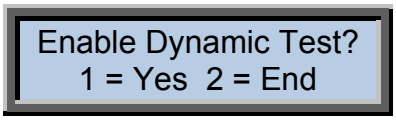
12. Enter the correct code from Step 9 and then push [Blue+ Enter}. The tool will display a final decision selection.

Run Test?
1 = Yes 2 = No

13. Selecting 1 will cause the elevator to run toward the top landing, to perform the test.

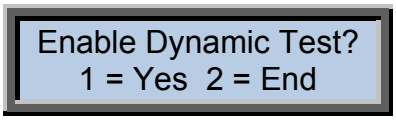
14. The following sequence would occur if 2 were selected in Step 7.

15. If 2 was selected and the car is at the correct landing, the tool will display “Enable Dynamic Test”.



16. If 2 was selected and the car is not at the correct landing, the following display will be on the tool.

17. Push the [Blue+Enter] buttons on the tool. The car will run to the correct landing and when it stop, the display below will appear on the tool.



18. Follow instructions from Steps 9–11 to run the test.

19. Push module on the tool to exit the test and restore safety controls.

20. Get ready to do NTSD static test.

21. To restore normal service, go to menu (Module-2-4-7-1) on the tool.

NTSD Static Test Instruction

Preparing for Test

This test demonstrates the operation of the Normal Terminal Slowdown Device (NTSD) at the top and/or bottom landings. The normal stopping means is inhibited so that the car is forced to slowdown when it encounters the NTSD device. **The NTSD Dynamic Test must be performed before this test**.

Take control of the car, making sure there is no one in the elevator.

Running Test

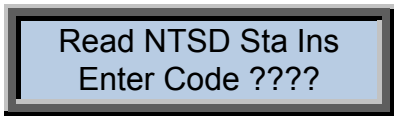
Read and become thoroughly familiar with the test instructions before beginning any test.

Plug the customer tool into the service tool maintenance port on the controller.

Disable OCSS to MCSS communication, by going to menu (Module-2-4-7-2) on the tool.

This will give you total control over the elevator.

1. Go to menu M-2-2-5 -1-1-4. The tool will display the screen below.

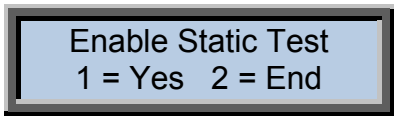


2. Enter code found in Step 9, then push the [Blue+Enter] buttons on the tool.

3. Select which test you want to run, by entering 1 or 2.

4. The tool will confirm the correct car position for the test selected.

5. If 1 was selected and the car is at the correct landing, the tool will display.



6. If 1 was selected and the car is not at the correct landing, the following display will be on the tool.

Car Not at Bot Landing<ENTER>

7. Push buttons [Blue+Enter] on the tool, the car will travel to the correct position. When it stop, the tool will display.

Enable Static Test? 1 = Yes 2 = End

8. Pushing 1 will disable the safety control. The safety function will be disabled for only one run. The next display will request the NTSD Static test code.

9. You are about to run the car. Performing this test requires operating the elevator in a potentially unsafe and hazardous condition that may result in personal injury or property damage, including death to persons and damage to your elevator. In addition, not restoring the elevator to service properly at the completion of this test could result in a safety hazard. The code for Step 5 is 9642 and the code for Step 11 is 7489.

10. Press 1 to initiate the test or press 2 to abort the test and restore the safety controls. If 1 is pressed, the tool screen will display as shown below.

Read NTSD Static Inst Enter Code >????

11. Enter the code from Step 9, and then push [Blue+ Enter}. The tool will display a final decision selection.

Run Test? 1 = Yes 2 = No

12. Selecting 1 will cause the elevator to run toward the top landing, to perform the test.

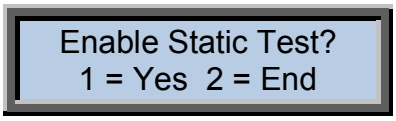
13. The following sequence would occur if 2 was selected in Step 5.

14. If 2 was selected and the car is at the correct landing the tool will display.

Enable Static Test? 1 = Yes 2 = End

15. If 2 was selected and the car is not at the correct landing, the following display will be on the tool.

16. Push the [Blue+Enter] buttons on the tool, the car will move to the correct landing and then display the screen below when it stops.



17. Follow instructions from Steps 8–11 to run the test.

18. Push Module on the tool to exit the test and restore safety control.

19. To put the car back into normal service go to tool menu (Module-2-4-7-1).

ETSD Test Instruction

Preparing for Test

This test verifies the operation of the Emergency Terminal Stopping Devices (ETSD) at the top and /or bottom landing. During test the normal stopping means and the NTSD slowdown response are BOTH inhibited so that the car is forced to stop when it encounters the ETSD switch. This causes an emergency stop, and immediate application of the brake.

Take control of the car, making sure there is no one in the elevator.

Test the brake's spring tension to ensure it will hold a full load.

Leave the full load on the elevator for the ETSD test.

If the building has counterweight safeties, they must be tied down before performing the test. This is to prevent the counterweight safeties from setting during the test.

If the counterweight test is being performed, then the car safeties must be tied down. This is to prevent the car safeties from setting.

Running Test

Read and become thoroughly familiar with the test instructions before beginning any test.

Insert the tool in the service tool maintenance port on the controller.

Disable OCSS to MCSS communication, by going to menu (Module-2-4-7-2) on the tool.

This will give you total control over the elevator.

1. Go to menu M-2-2-5-1-1-6, the screen will show the display below:

Read ETSD Instr Enter Code ????

2. Enter code from Step 10 and then push [Blue+Enter].
3. The tool will display the screen below.

ETSD Test Top = 1 ETSD Test Bot = 2

4. Select which test you want to run by entering 1 or 2.
5. The tool will confirm the correct position for the test selected.
6. If 1 was selected and the car is at the correct landing, the tool will display:

Enable ETSD Test 1 = yes 2 = End

7. If 1 was selected and the car is not at the correct landing. The tool display will look as shown below.

Car Not at Bot Landing <ENTER>

8. Push the [Blue+ Enter] buttons on the tool, the car will move to the correct landing. When the car stops the display below appear on the tool.

Enable ETSD Test 1 = Yes 2 = End

9. Press 1, the tool display will show the screen below.

Read ETSD Inst Enter Code ????

10. Enter code from this step, then push [Blue+Enter].

11. You are about to run the car. Performing this test requires operating the elevator in a potentially unsafe and hazardous condition that may result in personal injury or property damage, including death to persons and damage to your elevator. In addition, not restoring the elevator to service properly at the completion of this test could result in a safety hazard. The code for Step 5 is 3484; the code for Step 10 is 3698.

12. When the correct code is entered, the tool will display a final decision selection.

Run Test? 1 = Yes 2 = No

13. Selecting 1 will cause the elevator to run towards the bottom landing at contract velocity. The tool display will show.

Test in Progress MODULE when done

14. If 2 is selected in Step 7, the following occurs.

15. The tool will confirm the correct position for the test selected.

16. If 2 is selected and the car is at the correct landing, the tool will display "enable ETSD Test".

Enable ETSD Test 1 = yes 2 = End

17. If 2 is selected and the car is not at the correct landing. The tool display will look as shown below.

Car not at Top Landing <ENTER>

18. Push the [Blue+Enter] buttons. The car will move to the correct landing, and when it stops, the tool display the screen below.

Enable ETSD Test 1 = Yes 2 = End

19. Follow instructions in Steps 8–11.

20. Selecting 1 will cause the elevator to run towards the top landing at contract velocity.

21. Push module on the tool to exit the test and restore safety controls.

22. Confirm all the tie downs and jumpers have been removed, before putting the elevator back in service.

23. To restore normal service, go to menu (Module-2-4-7-1).

Traction Test Instruction

Preparing for Test

This test allows you to override software direction limits and land the car (or counterweight) on its respective buffer, while on Inspection, to demonstrate that the hoist ropes will break traction and the drive sheave will spin under the stationary ropes.

Take control of the car making sure there is no one in the elevator.

Test the brake's spring tension to ensure it will hold full load.

Leave the full load on the elevator for the traction test.

Running Test

Read and become thoroughly familiar with the test instructions before beginning any test.

Insert the tool into service tool maintenance port on the controller.

Disable OCSS to MCSS communication, by going to menu (Module-2-4-7-2) on the tool.

This will give you total control over the elevator.

1. Go to menu M-2-2-5-1-1-5 for Traction test. The tool will display:

2. Enter the code from Step 5 and then push [Blue+Enter].

3. The tool will instruct you to put the car on machine room inspection.

Put Car on CRI

4. Put the controller on inspection, then push [GO ON] button on the tool, the screen below will appear.

Enable Traction Test 1 = Yes 2 = No

5. Press 1 and the tool will display the screen below.

Read trac Tst Inst Enter Code ????

5. Enter the code from this Step and then push [Blue+Enter].

You are about to run the car. Performing this test requires operating the elevator in a potentially unsafe and hazardous condition that may result in personal injury or property damage, including death to persons and damage to your elevator. In addition, not restoring the elevator to service properly at the completion of this test could result in a safety hazard. The code for Step 2 is 4596; the code for Step 5 is 2792.

6. When the correct code is entered, the tool will display a final decision selection.

Run Test? 1 = Yes 2 = No

7. If 1 is selected, the tool will display.

Run Car on CRI

8. Run the elevator up to fully compress the counterweight buffer.

9. Attempt to run the elevator up again; the ropes must slip traction.

10. Push Module on the tool to exit the test and restore safety control.

11. Confirm all jumpers have been removed before putting the elevator back in normal service.

12. To restore normal service go to tool menu (Module -2-4-7-1), and then take the car off machine room inspection.

Cab-Mounted Governor (CMG) Trip Test

Preparing for Test

This test allows you to run the car at the governor electrical overspeed, check that when the car reaches the trip speed, immediately performs a timed deceleration, then shuts down.

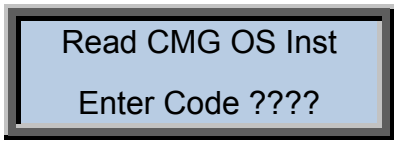
1. Take control of the car, making sure there is no one on the elevator.
2. Test the brake's spring tension to ensure it will hold full load.

Running Test

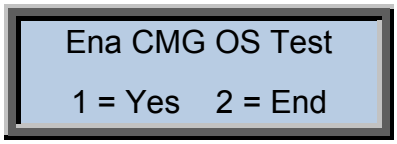
1. Please review the flow chart in Figure 1 for a complete sequence map.
2. Plug the tool into the Service Tool Maintenance port on the controller
3. Disable OCSS to MCSS communication by going to menu (Module -2-4-7-2 on the tool

This will give you total control over the elevator.

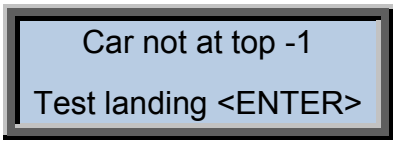
4. Go to menu Module-2-2-5-1-1-B and the tool will display:



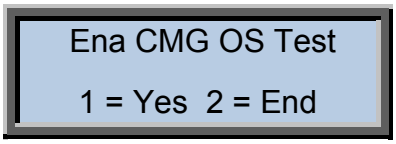
5. Enter code **1737** and then push [Blue+Enter] buttons. The tool screen will display the following screen if the car is at the correct landing:



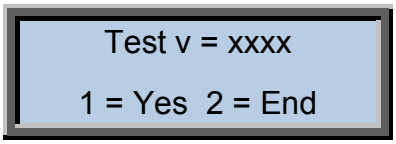
6. If the car was not at the correct landing when the code was entered in Step 5, the tool will display the following.



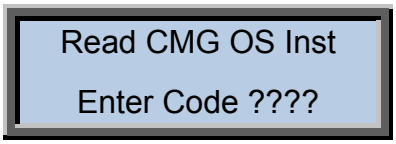
7. Push the [Blue+Enter] buttons on the tool and follow the instructions to move the car to the correct landing. At the end of the run the tool will display the screen below:



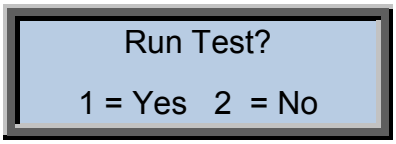
8. Select 1 on the tool, and it will display the speed the car will run to enable the test.



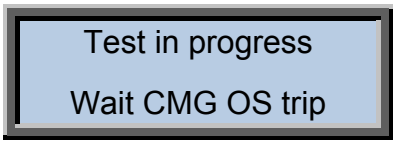
9. Select 1 on the tool and it will display:



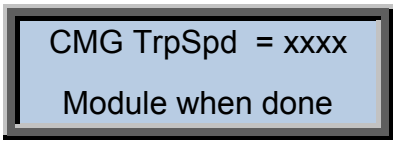
10. Enter the code **3465** and the push [Blue+Enter]. The screen below the warning will be displayed.



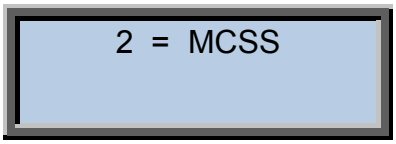
11. Select 1 and the elevator will run at the test speed, while the tool displays:



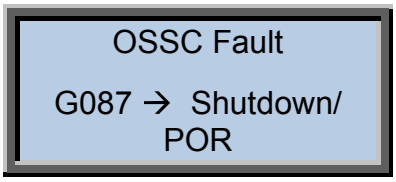
12. When the elevator trips the overspeed, the tool will display the speed at which it trips.



13. Push the Module button on the tool, the display will show:



14. Go to menu M-2-2-2 and the tool display should confirm that the car is shut down with an overspeed fault.



15. Push the “Manual Reset” button on the input/output board.

16. Push Module, then Enter M-2-2-3-1. This should reset the controller.

17. Push Module on the tool, then enter M-2-4-7-1. This will put the car back in service.

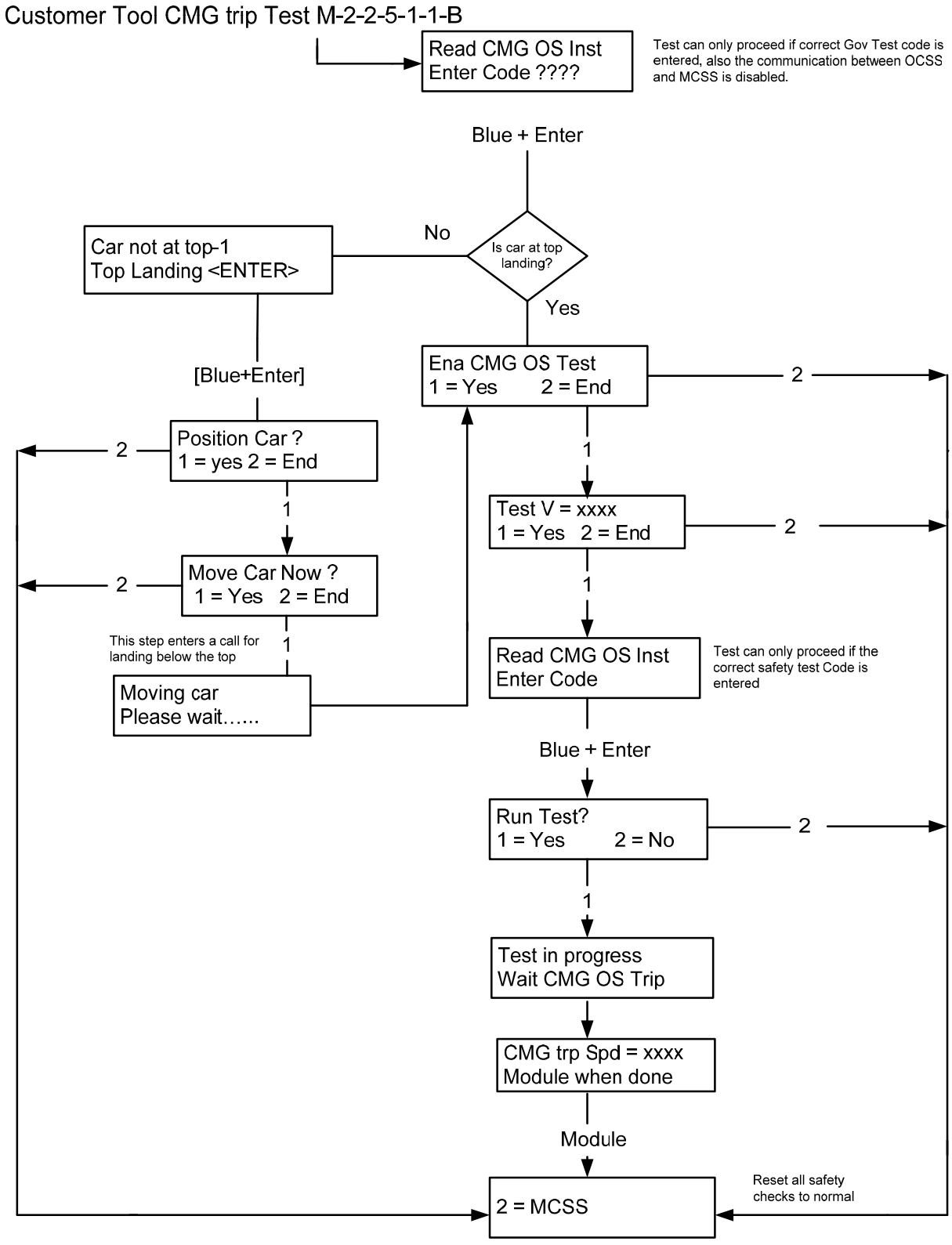


Figure 1: Unintended Car Movement Protection (refer to ASME A17.1-2000 & CSA B44, Section 2.19.2)

Unintended Car Movement Protection instructions

If the car leaves the door zone with an open door, the emergency brake must be able to stop the car within 48 inches of the door zone. This test verifies that operation.

This test will only work with A__31256___ baseline and later.

Preparing for Test

1. Run the car to the bottom landing with no load in the car.
2. Verify the doors are closed and there is no one in the car.
3. Disable the OCSS-to-MCSS communication by going to the customer tool menu M-2-4-7-2.
4. Verify the doors are closed and there is no one in the car.
5. Remove power from the controller.
6. From the wiring diagram, find the connections for the hoistway door locks (FDS) and gate switch (FGS). Remove the field wires from the controller terminals.
7. Locate and remove PX jumper from the J1 plug in the controller and connect it to the J4 plug (see Figures 2 and 3).

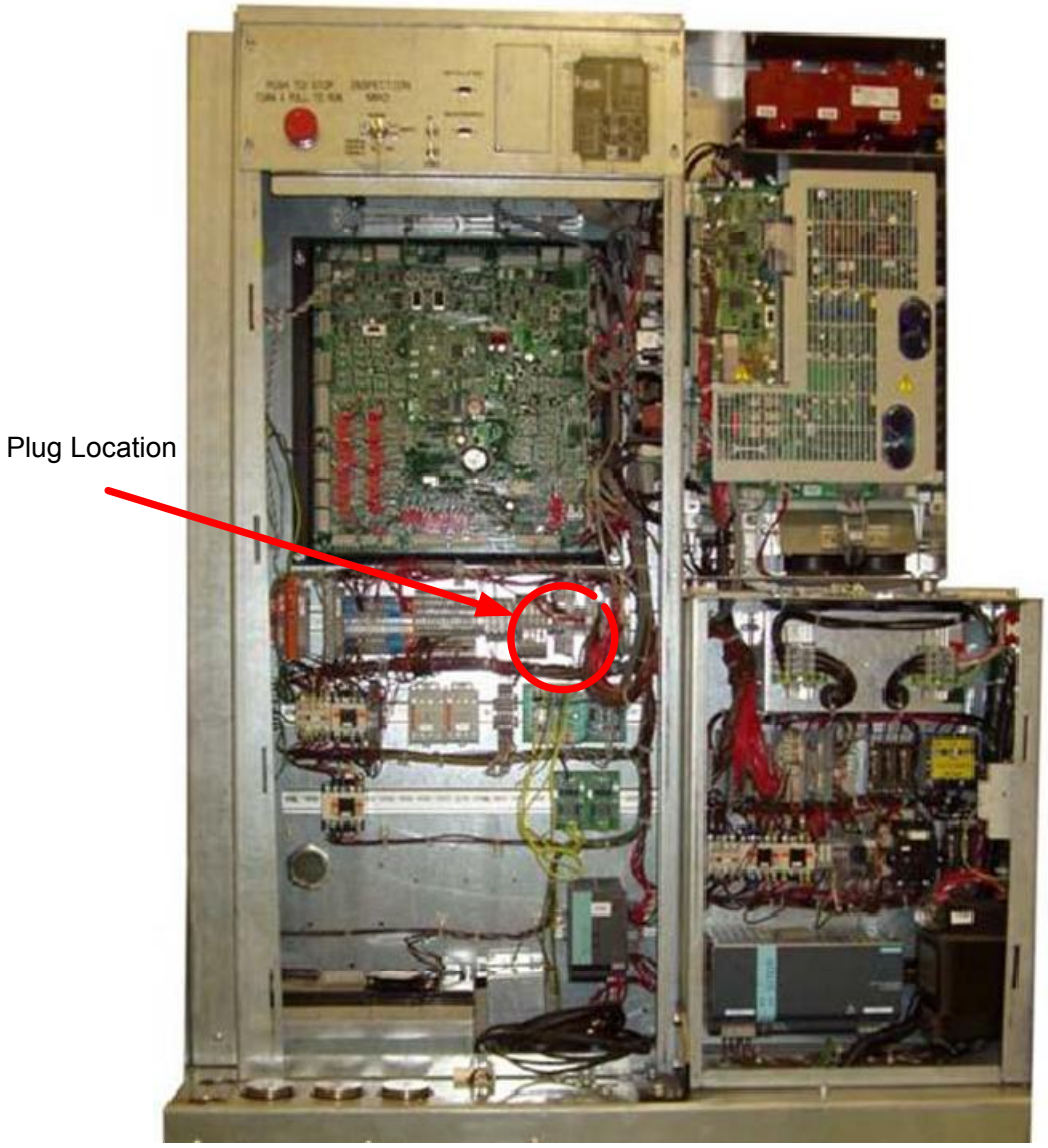


Figure 2: Plug Assembly Location

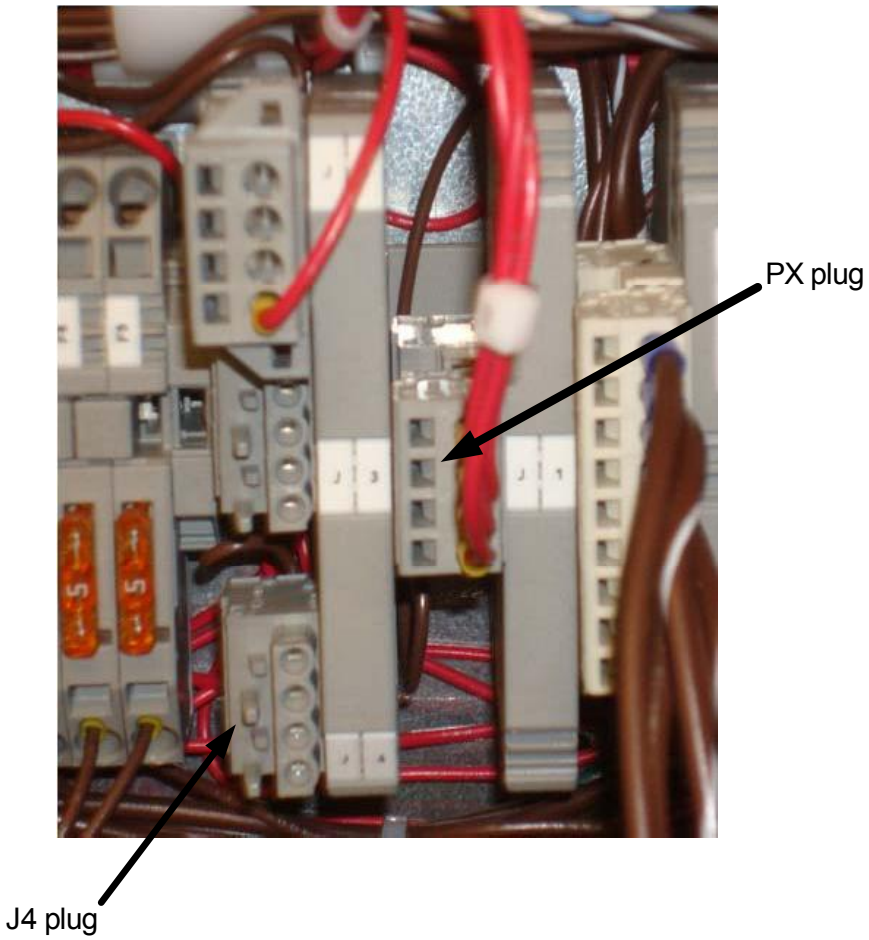


Figure3: Plug Location

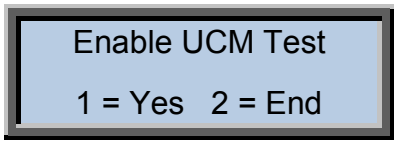
8. Restore power to the controller and confirm that the UCM relay is out.
9. Place the Inspection switch (CIS) to the BAT ON position.
10. Go to menu Module-2-2-5-1-1-C—this should energize the UCM relay.

To get C on the tool enter [Blue+6].

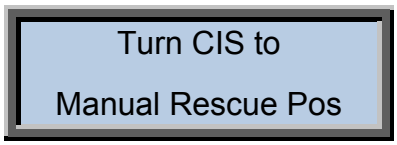
Rd UCM Tst Inst

Enter Code ????

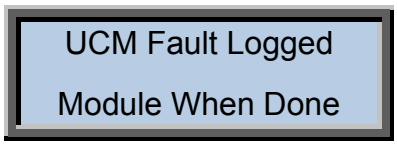
11.. Enter code **1927** and the tool will display:



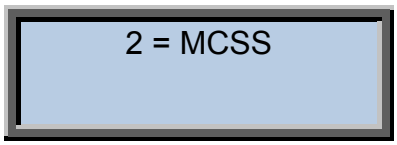
12. Select 1 and then rotate the inspection switch clockwise to the "Manual Rescue Position" and hold. The tool will display:



13. The car should start to move and the emergency brake should stop the car within 48 inches of movement. The tool will display:



14. Push Module on the tool to disable the test.



15. Remove power from the controller and reconnect the door lock and gate switch field wire.

16. Move PX plug back to the J1 plug.

17. Turn the Inspection switch counterclockwise to the Inspection position.

18. Restore power to the controller and run it on Inspection.

19. Push the Manual Reset button on the input output board and on the tool go Module -2-2-3-1.

20. Turn the CIS switch to the Normal position.

21. Go to menu M-2-1-2 and go to the GTN command, run the elevator to a landing.

22. On the tool restore communication between OCSS and MCSS by going to Module-2-4-7-1.

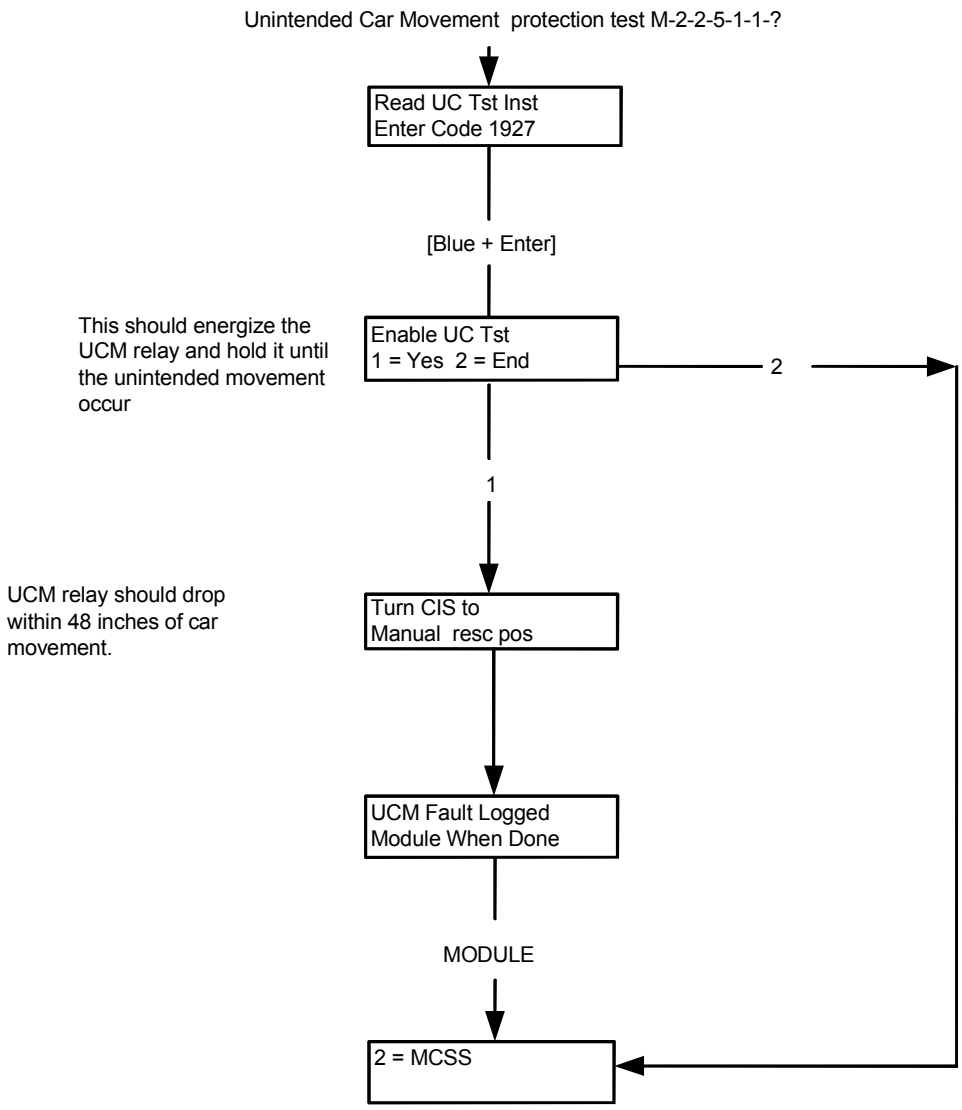


Figure 4: Unintended Car Movement

Maintenance:

Coated-Steel Belt Inspection : Visual Inspection

When it is necessary to access the car top or the pit, individuals should safely access them using a safe, industry-accepted procedure (for example, see NEII/Elevator World's Elevator Industry Field Employees' Safety Handbook*).*

Even though coated-steel belts are designed to last two to three times longer than traditional elevator wire ropes, an annual visual inspection is recommended.

This procedure defines the technique for the visual inspection of coated-steel belts. There are two main criteria for coated-steel belt replacement: evidence of wire strand breakage or evidence of polyurethane degradation that may expose belt cords to wear.

1. Turn Cartop Inspection Switch (CIS) to INSPECT. Using Control Room Inspection (CRI), position car top near floor level at the top landing.

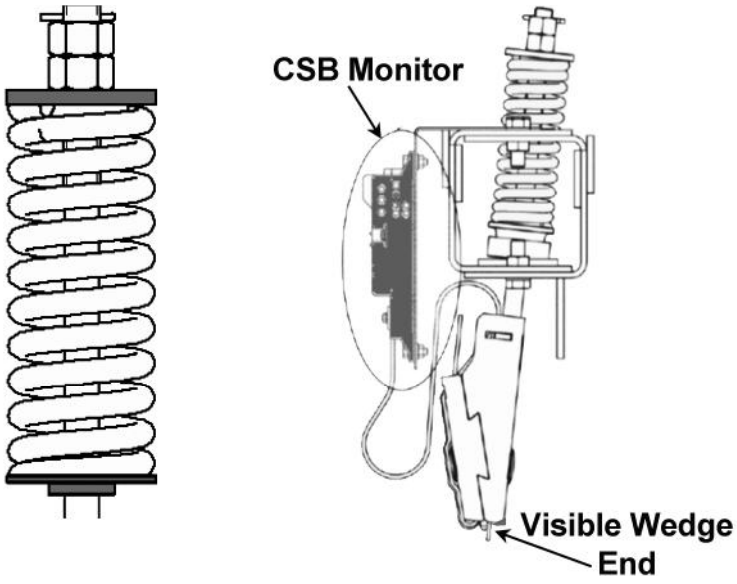
2. Access the top of the elevator. Using top-of-car inspection, run the elevator from the top of hoistway to the bottom of the hoistway.

When it is necessary to access the car top or the pit, individuals should safely access them using a safe, industry-accepted procedure (for example, see NEII/Elevator World's Elevator Industry Field Employees' Safety Handbook*).*

3. Stop as needed to inspect the coated-steel belts using the following images for comparison and recommended action.

4. Inspect coated-steel belt installation, terminations, springs, nuts, cotter pins, wedges and rod condition.

   - Springs, no cracks
   - Wedges, tip visible just below termination basket
   - Nuts, two installed on each rod
   - Cotter pin present and tip bent to secure in place
   - All belts in the set should be installed facing the same direction to the drive sheave (if belt has chevron grooves on bottom) and all belts in the set should be installed running the same direction as the direction arrows printed on the belts



5. Egress the car top.

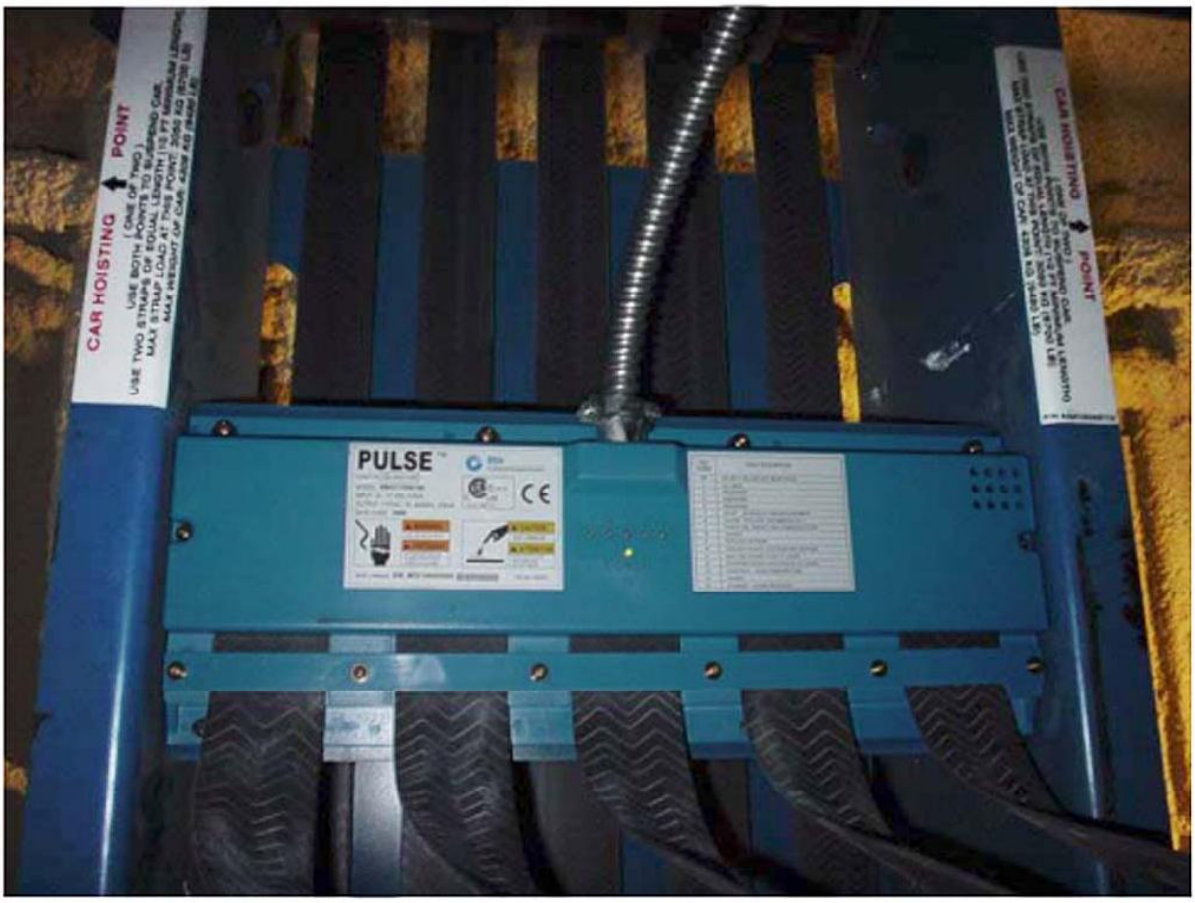
When it is necessary to access the car top or the pit, individuals should safely access them using a safe, industry-accepted procedure (for example, see NEII/Elevator World's Elevator Industry Field Employees' Safety Handbook*).*

6. Return the Cartop Inspection Switch (CIS) to the NORMAL position.

7 Close the hoistway doors

Coated-Steel Belt (CSB) Inspection Using the Pulse™ Continuous Monitoring System

Pulse™ is the Otis commercial solution to CSB inspection. It monitors the condition of the steel cords inside the CSB continuously and signals the car controller with the CSB status. The CSB status is communicated as an alert or an alarm as detected. When in ALARM the elevator will go out of service immediately after allowing passengers to exit. If the system has REM® installed, alerts, alarms, and Pulse system health is reported to local personnel. If the system does not have REM, alerts, alarms, and Pulse system health are reported on the device. The Pulse unit is either located in the overhead of the hoistway mounted to the underside of the machine structure on MRL or located in the machine room mounted to the top-side of the machine bedplate when used in a machine room configuration.



Below is the label applied to the Pulse unit, explaining the faults.

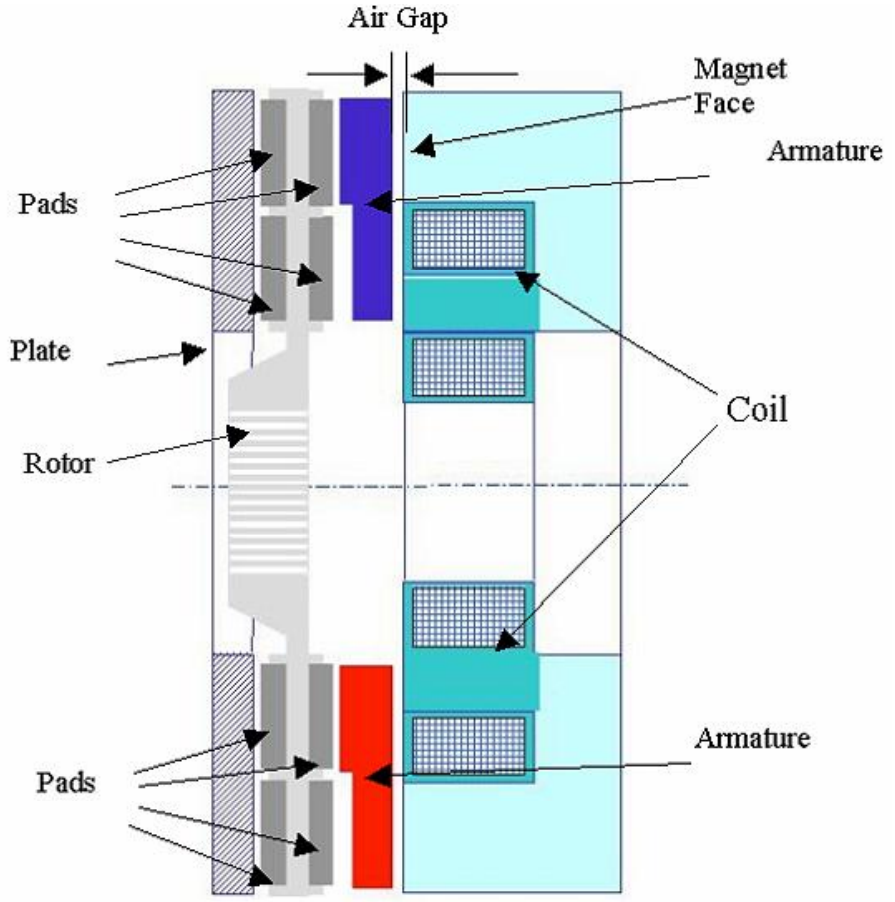
LED FLASH	FAULT DESCRIPTION
OFF	NO BELT OR CSB NOT MONITORED
1	ALL WELL
2	RESERVED
3	RESERVED
4	RESERVED
5	ALERT - SCHEDULE CSB REPLACEMENT
6	ALARM - REPLACE CSB IMMEDIATELY
7	CHECK RSL WIRING AND COMMUNICATION
8	UNUSED
9	REPLACE EEPROM
10	REPLACE BOARD, USE EXISTING EEPROM
11	BAD CSB CONNECTION AT LEARN
12	STARTING RESISTANCE ERROR AT LEARN
13	HOISTWAY - OVER-TEMPERATURE
14	UNUSED
15	STANDBY - LEARN REQUIRED

Machine and Emergency Brake Wear Inspection

1. Access the brake.
2. With the brake de-energized, measure between the brake armature and magnet housing using a feeler gauge. Measure each of the brake/armature segments.

A new brake will have an air gap of 0.21 mm to 0.5 mm.

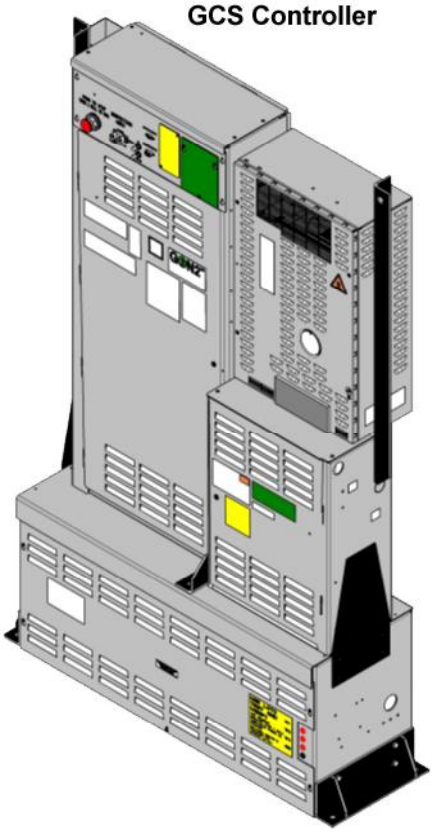
3. An air gap of > 0.60 mm or 0.024 inches requires brake replacement.



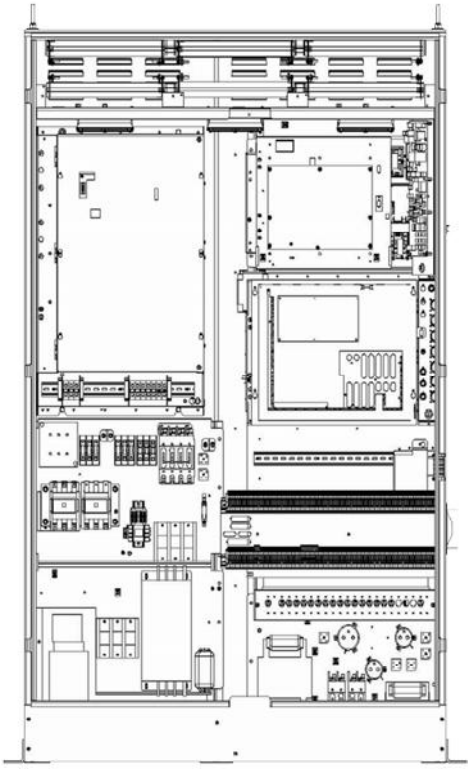
Gen2 Brake Details

Other Operations

GCS Controller



NGGC Controller



MRO (Manual Rescue Operation)

Only properly trained, authorized and qualified personnel should perform Manual Rescue Operation.

1. Remove power to the elevator, lock out, tag out, test, and verify.
2. Verify that all hoistway and car doors are closed completely.
3. Set CB2 circuit breaker to the OFF position (for NGGC controller only).
4. Ensure the CB1 circuit breaker is in the ON position.
5.

   A. With the NGGC controller; insert the Manual Rescue (Group One Security: UTE) key in the INSP/Manual Rescue Enable Keyswitch on controller under the service panel board.

   B. With the GCS Controller the MRO keyswitch can be found top center of the outside of the controller.

The MRO key should not be left in the MRO keyswitch or stored in the controller.

6. Turn and hold the MRO keyswitch to the ENABLED position and then depress and hold the BRB1 button located on the service panel board. The elevator should move in short pulses in the direction of system overbalance.

7. Direction and movement of elevator will be displayed on the service panel board LEDs. Car position will be on the service panel board display when car motion stops. The DZ light on the service panel board will illuminate when the car is in the door zone ±3 in. (±76 mm).

8. The elevator should automatically stop at the next door zone if constant pressure is maintained on BRB1 and the MRO keyswitch.

9. Release the BRB1 button and release the MRO keyswitch.

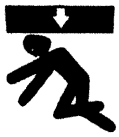
10. (Only during testing) Test and verify that the elevator can move to the next landing, if not already at a terminal landing by turning the MRO keyswitch to the ENABLED position again and then depress the BRB1 button. The elevator should move in short pulses in the direction of imbalance to the next door zone and stop.

11. When testing is complete, remove the MRO key from the MRO keyswitch.

12. On the NGGC controller, return CB2 to the normal position.

13. Return the car to service following proper procedures.

Car Top Access Using Zoned Access*



When it is necessary to access the car top or the pit, individuals should safely access them using a safe, industry-accepted procedure (for example, see NEII/Elevator World's Elevator Industry Field Employees' Safety Handbook*).*

1. Call the elevator to the top landing.

2. Using the inspection keyswitch in the car operating panel place elevator on INSPECTION.

3. Place a barricade in front of the hoistway door.

4. Move the elevator down using the zoned access keyswitch located adjacent to the doorjamb to a height where the car top can be accessed safely.

5. Turn on the cartop work light.

6. Place the car top stop switch to the STOP position and the cartop inspection switch to the INSPECTION position.

7. Access the car top and assume a safe position.

8. Test and verify the performance of the top of car run station buttons and features.

9. Close hoistway door and move elevator using car top inspection station buttons.

HAD, Pit Inspection Lock and TCI Lock Fault Description and Reset

If Hoistway Access Detection (HAD) determines that the pit or top of car have not been accessed following required procedures, it will not allow the elevator to return to normal service until the fault is reset. Below are the procedures.

Hoistway Access Detection (HAD)

When it is necessary to access the car top or the pit, individuals should safely access them using a safe, industry-accepted procedure (for example, see NEII/Elevator World's Elevator Industry Field Employees' Safety Handbook*).*

The car is on automatic operation and the hoistway door is opened for 4 seconds or more if the car is in flight or stopped between floors, or if a hoistway door is opened when the car is at a landing with the car and hoistway doors closed.

Resetting

The Hoistway Access Detection condition shall be reset under the following conditions:

- Toggling Pit Emergency Stop Switch
- Entering Top of Car Inspection mode

Pit Inspection Lock

When it is necessary to access the car top or the pit, individuals should safely access them using a safe, industry-accepted procedure (for example, see NEII/Elevator World's Elevator Industry Field Employees' Safety Handbook*).*

The hoistway door must be opened and blocked open with a door wedge device before either the pit stop switch or the inspection switch are placed back in normal operation.

A Pit Inspection Lock condition will occur if the pit is not egressed following the prescribed procedure. If the correct procedure is not followed, the elevator will shut down with a Pit Inspection Lock fault. This is to prevent the car from moving if the pit safety switches have been turned back to Normal, but the hoistway door has not been opened.

Resetting

Toggling PIT EMERGENCY STOP SWITCH with the hoistway doors open (Bottom floor only)

Top of Car Inspection Lock

When it is necessary to access the car top or the pit, individuals should safely access them using a safe, industry-accepted procedure (for example, see NEII/Elevator World's Elevator Industry Field Employees' Safety Handbook*).*

Hoistway door must be opened and blocked open with a door wedge device before either the top of car stop switch or the inspection switch are placed back in the normal run position.

A Top of Car Inspection Lock condition will occur if the top of the car is not exited following the proper procedure. If the correct procedure is not followed, the elevator will shut down with a Top of Car Inspection Lock fault. This is to prevent the car from moving if the top of car safety switches have been turned back to Normal, but the hoistway door has not been opened.

Resetting

A Mode change from something other than Top of Car Inspection to (e.g. NORMAL, Access, and Controller Inspection) and then back to Top of Car Inspection will reset the lock-up. (This is done to prevent a mechanic who may have accidentally turned the inspection switch from inspection to normal from being stuck on top of the car due to a Top of Car Inspection Lock condition.)

Manual Reset of the Governor Overspeed Switch

When it is necessary to access the car top or the pit, individuals should safely access them using a safe, industry-accepted procedure (for example, see NEII/Elevator World's Elevator Industry Field Employees' Safety Handbook*).*

1. Place controller on CRI for Control Room Inspection.

2. Place temporary jumper on the required terminals (C-074 and C-075) in the elevator controller to bypass governor overspeed switch. Location to place jumper can be found in the controller wiring diagrams. Installing jumpers should only be carried out by trained and qualified elevator personnel.

3. Run car on CRI to a spot in the hoistway where safe car top access is possible.

4. Place service barricades. Open hoistway door.

5. Place top of car emergency stop switch to the STOP position. Place car on car top inspection by turning the Car Top Inspection switch to INSPECTION and turn on car top light.

6. Test and verify the top of car emergency stop switch, access the car top* and test and verify the UP/DOWN commands.

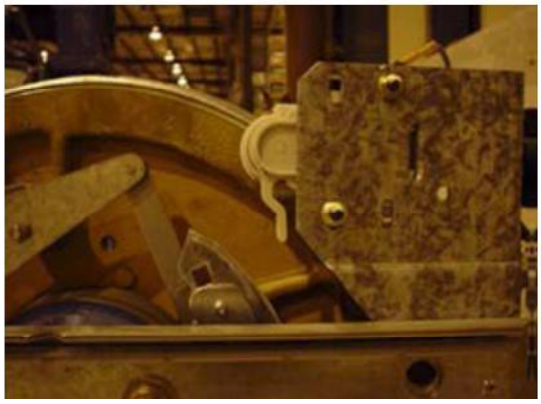
7. Using top of car inspection ride car top up to access governor.

8. Remove top cover from governor.

9. Inspect governor for any visual damage.

10. Manually reset governor overspeed switch (see photos).

OS in the Tripped Position



OS in the Reset or Normal Position

11. Re-install cover on governor.

12. Ride car down to the floor from where the cartop was accessed, open and mechanically block the hoistway door, then egress car top.

13. Turn off car top light, place top of car inspection switch to the NORMAL position and the car top stop switch to the RUN position.

14. Close hoistway door.

15. Place controller circuit breaker (CB1) to the off position.

16. Remove temporary jumper C-074 to C-075, installed from in step 2.

17. Place controller circuit breaker (CB1) to the ON position.

18. Run the car using CRI to confirm correct operation. Turn CRI key switch back to NORMAL and ride car to verify performance.

Remote Governor Trip & Reset Confirmation

Due to the location of the governor(s) with the machine-room-less Gen2 system, remote trip and reset features are provided to facilitate testing the governor and resetting the overspeed switch.

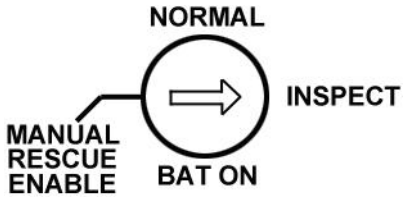
The following procedure is provided to confirm operation of the remote governor trip and reset feature.

To protect the governor trip mechanism, the controller software will not enable governor trip operation if the car is running in a direction opposite to that required for governor activation.

Car Governor

1. Position the elevator one floor below the top terminal landing.

2.. Turn the CIS / MRO keyswitch to the INSPECT position.



3. Place a temporary jumper on GCS I/O board terminals P26-4 to P26-5 (OS switch).

4. Select the service tool sequence (M-2-2-5-1) to access the safety function display. Press the GO ON button to select Safety Checks and set as follows to enable car governor trip feature.

   - CAR Gov Trp:enab (Car Governor Trip: Enabled)

This setting will revert to “disabled” after one start.

5.. Using the controller inspection station, initiate a down inspection run. With the car running down on inspection, press the "GOV TRIP / RESET" button on the GCS I/O board to activate the governor trip solenoid. Confirm that the car stops when the governor trips and the car safeties are applied.

Hold the "GOV TRIP / RESET" button for a period long enough to allow the governor sheave to rotate as least 180 degrees, as it may take that long for the mechanical governor linkages to engage.

6. Release the buttons as soon as the car stops to prevent belt damage.

7. **TURN OFF THE MAINLINE DISCONNECT SWITCH. LOTO - TEST & VERIFY.**

8. Place a temporary jumper on the GCS I/O board P22-8 and P22-7 to bridge the safety-operated switch (SOS).

9. Turn ON the main line disconnect switch.

10. Using the controller inspection station, run the elevator up to release the car safeties and reset the governor mechanism.

11. **TURN OFF THE MAIN LINE DISCONNECT SWITCH. LOTO - TEST & VERIFY.**

12. **Remove the temporary jumper from GCS I/O board plug P26-4 to p26-5 (OS switch).**

13. Turn ON the main line disconnect switch.

14. Select the service tool sequence (M-2-2-5-1) to access the safety function display. Press the GO ON button to select Safety Checks and set as follows to enable Car Governor Reset feature.

    CAR Gov Rst:enab (Car Governor Reset: Enabled)

15..Press the “GOV TRIP / RESET” button on the GCS I/O board to activate the governor reset solenoid. It may be necessary to repeat the procedure several times to reset the car governor switch. Press the “MANUAL RESET” button on the GCS I/O board, cycle the main line disconnect switch and then confirm that the safety circuit is restored indicating that the governor overspeed switch and reset confirmation switch is reset.

16. **TURN OFF THE MAIN LINE DISCONNECT SWITCH. LOTO - TEST & VERIFY.**

17. **Remove the temporary jumper from GCS I/O board plug P22-8 to P22-7 (SOS switch).**

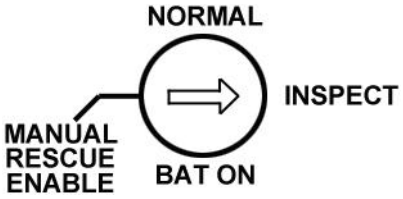
18. Turn ON the main line disconnect switch.

19. Run the car and ensure that the safeties have reset and are not dragging.

Counterweight Governor (if applicable)

1. Position the elevator one floor above the bottom terminal landing.

2.. Turn the CIS / MRO keyswitch to the INSPECT position.



3. Place a temporary jumper on GCS I/O board plug P27-4 to P27-5 (CWOS).

4. Select the service tool sequence (M-2-2-5-1) to access the safety function display. Press the GO ON button to select Safety Checks and set as follows to enable CWT governor trip feature.

   CWT Gov Trp:enab (Counterweight Governor Trip: Enabled)

This setting will revert to “disabled” after one start.

5. Using the controller inspection station, initiate an up inspection run. With the car running up on inspection, press the "GOV TRIP / RESET" button on the GCS I/O board to activate the governor trip solenoid. Confirm that the counterweight stops when the governor trips and the counterweight safeties are applied.

Hold the "GOV TRIP / RESET" button for a period long enough to allow the governor sheave to rotate as least 180 degrees, as it may take that long for the mechanical linkages to engage.

6. Release the buttons as soon as the car stops to prevent belt damage.

7. Using the controller inspection station, run the elevator down to release the counterweight safeties and reset the governor mechanism.

8. **Remove the temporary jumper on GCS I/O board plug P27-4 to P27-5 (CWOS switch).**

9. Select the service tool sequence (M-2-2-5-1) to access the safety function display. Press the GO ON button to select safety checks and set as follows to enable CWT governor reset feature.

   CWT Gov Rst:enab (Counterweight Governor Reset: Enabled)

10. Press the "GOV TRIP / RESET" button on the GCS I/O board to activate the governor reset solenoid. It may be necessary to repeat the procedure several times to reset the counterweight governor switch. Press the "MANUAL RESET" button on the GCS I/O board, cycle the main line disconnect switch and then confirm that the safety circuit is restored indicating that the governor overspeed switch and reset confirmation switch is reset.

11. Run the car to ensure the safeties have reset and are not dragging

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