ATTENTION MECHANICS!
THERE IS A NEW CONTINUING EDUCATION ELEVATOR MAINTENANCE CLASS

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The first two units of this course serve as a generalized guideline for the maintenance of traction elevator systems with many of the operations suited to hydraulics as well. The third unit contains items that are more directly related to Hydraulic Elevators. With such a variety of equipment in use today it would be virtually impossible to document specific maintenance procedures. It will be the goal of this course to demonstrate accepted maintenance procedures and requirements of the more common elevator components. Since periodic testing is an extension of maintenance operations it will also be included as required under the A17.1 2000 Elevator Safety Code.

Contact your local Committee to register for this valuable course.
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As technology changes continue to affect the careers of working Americans on a daily basis, the need for continuous and evolutionary training is the key to success for many occupations. This is especially true for the International Union of Elevator Constructors, as ours is an industry that commands the most skilled and qualified workers the building trades have to offer.

Complex job tasks demand that elevator constructors possess a comprehensive and diverse knowledge of mechanical and electrical practices and, oftentimes, these skills are not inherent but, rather, must be refined over years of practice.

As International Union of Elevator Constructors (IUEC) members realize the importance of the highly skilled craftsman, NEIEP continues to provide the industry with tested, proven, and up-to-date training that is readily available to IUEC members who participate in elevator education. NEIEP began as a product of the 1967 standard agreement between the IUEC and NEII, which focused solely on enhancing the skill levels of IUEC members and heightening job security.

As has been our mission for the last forty years, NEIEP is committed to providing the best and most comprehensive elevator education program available. Individuals who have been associated with NEIEP over the last few years appreciate the commitment that NEIEP Trustees have made to embrace modern technology delivery platforms for the educational program. Using computerized assisted delivery systems in both the classroom and distance learning programs has enabled NEIEP staff curriculum developers to provide cutting-edge training aids. NEIEP curriculum developers are also constantly searching for new and exciting hands-on training labs that will benefit students.

The ratification of the IUEC collective bargaining agreement on July 9, 2002, required NEIEP to respond to changing educational requirements within the elevator industry. The training requirements of the Building and Construction Trade Industry created the need for a Department of Labor registered apprenticeship training program. Development of the apprenticeship program tasked NEIEP with enhancing an already established industry standard curriculum. In response, NEIEP expanded course material and subject matter to support additional skill areas. Examples include OSHA 10 hour certification, diversification and sexual harassment, customer relations, elevator maintenance practices, and the integration of CBT training aids from outside vendors, including Miller Welding and the Crosby Group. Increased training hours have also allowed NEIEP to include “step-up” courses that prepare students for higher proficiency programs. For example, students can attend a basic mathematics course to establish a basis for electrical equations before enrolling in the electricity program. Additionally, integrating motor and generator theory programs with the electricity course offers students the opportunity to acquire hands-on virtual lab experience.

Those connected to the NEIEP program also appreciate the commitment we are making towards implementing advanced technology to enhance program processes. NEIEP’s website has been significantly enhanced to allow instructors to log student attendance and grades, submit monthly payroll reports, and access attendance reports online. Training support material is now available online within the Instructor section of the website in the form of the 36-week-course outline. Provided with course outlines are PowerPoint® slide presentations that can be displayed.

by: James J. Higgins Jr.
NEIEP, Director

"I would like to extend my sincerest appreciation to all who have worked so hard over these past two years to transform the NEIEP program into a Department of Labor compliant training program.”
via laptops and computer projectors. NEIEP has also issued email addresses that follow a uniform syntax for each instructor (e.g., first initial and last name followed by neiep.org: jsmith@neiep.org).

NEIEP committee members can also enjoy improved website functionality, offering the ability to access student records to monitor program progress per their indenture agreements. Committee members can create reports in a single keystroke that display the results of both classroom training and on-the-job training hours. These reports can be generated to comply with contractual reports of an apprentice's status at the conclusion of each school year, as well as for any potential audits that may be conducted by State Apprentice Training Representatives. NEIEP encourages anyone involved with our program to visit us at www.neiep.org and experience first-hand the depth and breadth of functionality offered through our site.

In line with NEIEP’s ongoing commitment to the elevator industry, we are also launching our first issue of the newly designed Lift magazine. Lift provides an informational platform for elevator industry personnel, offering accurate and timely updates on the newest products and technological advances of our industry. NEIEP looks to its readers to offer suggestions for and submit articles for publication to ensure that future issues meet the needs of the industry.

In closing, I would like to extend my sincerest appreciation to all who have worked so hard over these past two years to transform the NEIEP program into a Department of Labor compliant training program—from the unselfish commitment of Local Joint Apprenticeship Committee members, to the devotion of local business representatives. Special thanks are also extended to General President, Dana Brigham; the IUEC Labor Committee; and industry employers who were determined to make education and training a high priority at the collective bargaining table. The future goals of the NEIEP program remain high as we “Lift” the level of education to meet industry challenges.

Sincerely,

James J. Higgins Jr.
NEIEP Director

Focus Articles

Grand Slam Teaching: 10 Techniques of the Successful Coach

Review ten helpful tips for engaging your students and creating a classroom conducive to active learning.

TEN TIPS:
1. Grab Their Interest
2. Introduce and Summarize
3. Valuable Questions
4. Mix It Up
5. Throw ‘em a Curve
6. Teach, Practice, Assess, and Repeat
7. Don’t Assume Prior Knowledge
8. Turn Over the Reigns
9. Anticipate Problems
10. Use What They Know

Codes, Standards, and Safety

Stay apprised of industry codes and standards updates.

The most well-known code within the building transportation industry is the Safety Code for Elevators and Escalators—ASME A17.1. The latest edition of this code was issued April 30 of this year and will become effective October 31, 2004.
Even professional baseball players take time to work with the hitting coach. Taking that one detail for granted can be the difference between a .300+ season and a trip to the triple-A affiliate. The same goes for teaching. If you have been teaching for a while, you know you should take the time to keep your skills fresh, try new ideas, and constantly revitalize your classroom. If it is getting boring for you, just imagine how the students feel. To avoid classroom stagnancy, the following are a few basic techniques to keep you and your students batting a thousand.

1. **Grab Their Interest**
   Let’s face it, most of us cannot command attention and respect with our stunning good looks. Nonetheless, teachers have tools they can draw upon to capture their students’ attention and maintain interest. Learner motivation is often directly linked to teacher enthusiasm, so be upbeat about the material. Obviously, you are good at what you do or you would not be teaching, and most people get good at something because they enjoy it. In the same respect, students who enjoy what they are learning have a much higher success rate, so share the enjoyment with your students. Observing your enthusiasm about the material will make a difference to how they approach new ideas and concepts.

   You might also try to begin each lesson with something interesting; for example, a challenging question, a unique anecdote, or a humorous story that relates to the material. Getting students’ attention and interest from the start is crucial, and any teacher knows that those first minutes can often make or break the entire lesson.

2. **Introduce and Summarize**
   Have you ever asked a school-aged kid the question: “So, what did you do in school today?” The typical answer is: “I dunno.” You could avoid this scenario with your adult learners by introducing and summarizing. This method helps highlight learning objectives at the beginning of each lesson, so students know what to expect. Similarly, summarizing the material at the end of class brings a lesson full-circle and enables students to ask final questions and leave with a more through understanding of the material. It helps to use visual introductions and summaries; that is, write it on the board or present it in a PowerPoint presentation. Sometimes visual aids can make sense out of a barrage of words.

3. **Valuable Questions**
   Teaching adults means leading them to the right answer, not giving it to them. You know the old saying: “Give a man a fish; and he eats for a day. Teach a man to fish; and he eats for a lifetime.” Helping students learn how a process information and come up with resolutions on their own will better prepare them for the job. With this in mind, students will learn more by being asked questions that lead them to finding the answers themselves. When wrong answers are offered, don’t simply offer the correct answer. Instead, ask another question that will help the student better understand the problem and put them on the right track to coming up with the correct answer. After all, how often will the teacher be in the field to give their students the answer?

4. **Mix It Up**
   Incorporate new approaches and media to explain the same material. Each student learns using different methods. Sometimes looking at things in reverse or
from an unfamiliar perspective could be just what a struggling learner needs to figure it out. If the chalkboard is not working, try something else. Use styrofoam cups on a table top, cut-out cardboard models, thumbtacks and string on a bulletin board. Or take a field trip to illustrate your point using a real-life model. Books and classrooms can be too abstract for some learners, so don’t be afraid to get “hands-on” about teaching.

5 Throw ‘em a Curve
Challenge students with a different way of thinking about a problem. Force them to leave their comfort zone. If they are used to seeing a problem handled one way, present a similar problem from a different perspective. Ask for an alternative solution. For example, try the Jeopardy method: Offer them the answer and see if they can come up with the situation or question. If you want to see how well your students have truly grasped a concept, throw ‘em a curveball and see if they can still hit it out of the park.

6 Teach, Practice, Assess, and Repeat
Develop a delivery technique which allows students to take steps in learning from start to finish—from acquisition to mastery. This means that you have to present material, give students a chance to practice it (i.e. make and learn from mistakes!), build on it, and then check their progress. How will you know if they have mastered the material? How will they know when they are good enough? These are all questions you should ask yourself before starting a lesson. Develop a clear plan and keep your eye on the ball.

7 Don’t Assume Prior Knowledge
Make sure everyone is on the same page. Students are quick to say: “Yeah, we know that,” and teachers are quick to buy it. Before you start into new material, make sure your students have the tools and base knowledge they need to be successful in your class. Do a quick check, a review, and a summary of what is needed before you begin your next section. Taking 10 minutes up front, may save hours of confusion and frustration later.

8 Turn Over the Reigns
Sometimes we don’t realize our own lack of understanding on certain material until we have to teach it. Has this ever happened to you? I assure you, it’s happened to every teacher. To activate the learning process, try this process with your students one day. Turn over a learning objective to an individual or a group. No matter how small the section or activity, it can make a world of difference to the student. Passive learning is incomplete learning, so activating the learning process by directly involving the learners can result in mastery of the material. And don’t worry about your students’ ability to handle the material; you’ll find that they tend to live up to expectations…no one want to look like a fool in front of their peers. They will likely do a good job, and you will always be able to adjust if necessary afterward. And believe it or not, you might be able to get a good idea or two from your students! Learning is more often a two-way street than many teachers realize.

9 Anticipate Problems
Avoid awkward moments of fumbling in the classroom by anticipating the material that may give students trouble. Prepare for those moments and have extra material ready to clarify information further. If you have been teaching for a while, you should be able to pinpoint the trouble-spots in the material. Newer teachers need to be a little more objective. Try remembering back to when you were learning the material for the first time. What helped you?

10 Use What They Know
Adult learners bring with them an entire body of experience. Put it to use. You may have a local expert in your classroom, so don’t be afraid to include the student’s knowledge in the curriculum. Realize, too, that learning is a building process—the more we can associate new material with the experiences of our students, the more likely it is that they will be able to process new information effectively.

—Fred Yaniga Jr. teaches German at Butler University in Indianapolis and has been teaching students and teachers for fifteen years.
The most powerful tool mechanics can bring to the job is their brain. Used effectively, the brain can reduce the amount of work needed to complete certain tasks. A routine job made easier by applying good troubleshooting skills will save you significant time and increase efficiency.

Troubleshooting elevator equipment is both challenging and rewarding for mechanics who are properly equipped for the task. Effective troubleshooting requires the ability to gather relevant information, interpret the information effectively, and apply current knowledge and expertise.

When training mechanics on troubleshooting skills, most often training occurs on a previously functioning elevator that has been shut down. When this occurs, it should be assumed that the lift has only a single fault—exceptions to this rule rarely occur. Troubleshooting may also be required for an elevator that is still in operation, but not performing satisfactorily. The most challenging call is for an elevator that fails intermittently.

When troubleshooting any issue, remember the following guidelines:

**Customer Information**

The first step when troubleshooting any issue is gathering pertinent information. This begins when you receive the call and continues until the unit is back in service. Most information should be collected when you arrive at the building, and if not, be sure to ask your building contact for all relevant information on the shutdown unit. Do not accept such vague information as: “One of the eight cars had some sort of problem yesterday.” Ask as many questions as needed and probe your contact or anyone else with relevant knowledge for specific information to help direct your plan of action. During all of this, remember to be patient with your contacts; they are not an expert like you. When you have gathered all the customer information possible, assure your contacts that you will report back to them with a resolution after your investigation is complete. Be sure to honor your commitment to follow-up.

**Machine Room Information**

Typically, your next step will be to gather more information within the machine room. Observe the malfunctioning unit’s controller, scan the controller...
for relays and fault lights familiar to you, and depending on the equipment, ask the following questions:

- Is the car on inspection?
- Is it in automatic or attendant operation?
- Is the safety circuit closed?
- Are the doors open or closed?
- Is the generator running?
- Are any fault lights illuminated?
- Does the car have a demand to run?
- Which switches are in?
- Which switches are out?

Information can also be determined by looking at the walking beams on certain switches. Based on their position, you can determine which switch operated last. This is effective for mechanically interlocked switches like up and down, open and close, and other controller switches. If the close switch was not the last to operate, it can be assumed the doors are not closed. Look on the machine room floor. Controller parts found on the floor may be the cause of the shutdown. While scanning the controller visually, you can also use sense of smell to identify any unusual odors and your hearing for any unusual sounds. You should also be aware of equipment that feels warmer than usual.

A few minutes scanning the controller can help you establish a plan for troubleshooting. The initial inspection of the controller requires only a visual inspection. Do not disturb the controller by pushing in relays and switches, this could cause the car to operate before determining the actual cause of the shutdown. The car may operate until you leave the building, but it will probably fail again.

The sounds of one or multiple properly operating elevator machines in a machine room create a rhythm. When one unit accelerates or decelerates differently than the others, the rhythm is skewed. Note which car sounds different from the others. Then ask yourself the following questions: “Was the car accelerating or decelerating when the sound occurred?” and “Did you hear it when the car was stopping or starting?”

Developing a Plan

Based on the initial information gathered, decide what portion of the circuitry to troubleshoot. Knowledge of the sequence of operation for an elevator is essential and saves time when troubleshooting. The best way to learn the sequence of operation is to observe an elevator when it is running properly. When troubleshooting a shutdown unit, ask yourself “What should the elevator do next?”, “What is the elevator not doing?”, or “What is the elevator doing that it should not?” There is no point in troubleshooting running circuits if the doors are open or the car is on inspection operation. If the doors of the shutdown elevator are open, troubleshooting efforts should be directed to the circuit that closes the doors. If the doors are closed, you should run a registered car or hall call, which is referred to as “demand.”

An elevator with “demand” needs to be “ready to run,” which means that the doors and gate must be closed and the safety circuit must be operational. Never use a jumper to jump out a safety circuit. It is better to correct the fault than to operate the elevator without the safety devices operational. Troubleshooting is similar to putting a puzzle together, as more pieces are assembled, your direction becomes more clear and the solution begins to surface.

Using a Voltmeter Over a Jumper

The next step in troubleshooting is to use a voltmeter. A voltmeter is a diagnostic tool (a jumper is NOT a diagnostic tool). The voltmeter, unlike a jumper, tests light or neon light, provides accurate information, and is safer to use than a jumper. The black lead of the meter is connected to the common side of the circuit to be tested, usually ground, while the red test probe lead is used to gather more information. An example of this would be the door and gate contact circuit. Touching the red test lead to the test points on the controller for the door and gate circuit will produce a meter reading that confirms if these circuits are working properly. Using a jumper to perform this test is dangerous and unprofessional, and in many cases, public fatalities occur
when using jumpers. Skilled, responsible mechanics use a voltmeter to troubleshoot elevator equipment. As measurements are taken, it is important to be patient and thorough. Each troubleshooting step must be logical and provide additional information toward your end resolution.

**IMPORTANT!** Using a voltmeter to troubleshoot only requires the user to have one hand near live equipment. Place your other hand in your pocket or away from the conductive metal controller. Do this to avoid creating an electrical path through your body, or possibly your heart, that can cause injury or death.

Cellular phones can also be an aid in troubleshooting. Calling a more experienced mechanic who can direct you to the correct troubleshooting path is a plus. Troubleshooting success is dependent on the mechanic’s skills and the methods used. The knowledge gained when troubleshooting one elevator can be used on other similar jobs to prevent shutdowns before they occur.

Once the problem has been found, give consideration to any other possible causes to assure the elevator will not fail after you leave the building. Ride the elevator and check its operation. Report to the customer that the elevator has been repaired and is back in service.

**Record Keeping**

ASME A17.1-2000 elevator code section 8.6.1.4 requires that maintenance records be available to the person troubleshooting an elevator. This is a requirement for all new and existing elevators in areas that have adopted the ASME A17.1-2000 code. These records provide the dates and description of all maintenance tasks, examinations, tests, adjustments, repairs, replacements, and callbacks. The callback log will record all problems and corrective action taken. As a comprehensive record of recent events, this log can be a good source of troubleshooting information.

Some elevator companies record various voltages and dates on a form in the machine room. These records can also be used to assist in troubleshooting.

**NOTE:** ASME A17.1-2000 elevator code section 8.6.1.6.3 requires that up-to-date wiring diagrams be available in the machine room.

**Troubleshooting Using the Half-Splitting Method**

One example of applying analytical thinking and electrical knowledge to efficiently resolve a problem is the half-splitting method. Half-splitting is a method used by experienced troubleshooters, and is not commonly used by new mechanics. Half-splitting reduces the time necessary to locate a malfunction on an elevator, requiring fewer steps, but more analytical thinking during each troubleshooting step on the part of the mechanic.

**Figure A** is a simplified wiring diagram from NEIEP’s Year 4 Chapter 2 Unit 7 and offers a basic scenario for the following examples.

This example offers a representation of the steps required when the half-splitting method is not applied. It begins when a building owner reports that their single elevator will not respond when they press the hall button to call the elevator. Upon arrival, the mechanic checks in with the building owner’s contact person to determine if any additional information is available. The person reports that the elevator is still shut down and is located at the lobby floor. The mechanic goes to the machine room to gather more information.

Once in the machine room, checking the selector...
shows that the car is located at the lobby landing. The mechanic determines that the generator is not running. Knowing that the generator will not start unless the elevator has either a car or hall call to create a demand to run, the mechanic checks to see if any hall or car call relays are energized. A down hall call for the third floor is energized. This call has energized the LU relay that should start the generator when LU 5-6 contact energizes ERT relay; however, ERT relay is not energized.

The mechanic sets his meter to read direct current (DC). The black lead is connected to the negative lead on the rectifier, which is connected to the building ground. The red test probe will be used to measure for DC voltage at various test points to determine why ERT relay is not energized. The mechanic begins by measuring the voltage at the plus (+) lead on the rectifier and finds it is 120 VDC. Moving the test probe to the knife switch (KS2) it also reads 120 VDC on both sides of KS2. The mechanic continues by testing both sides of fuse 5 and then each side of the overload contacts (3P, 2P, 1P) and finds 120 VDC at each point. Checking test points C69, C68 (PKS), C14, and C15 reveals 120 VDC at each of these points as well. Checking at test point C65 shows no reading on the voltmeter. The mechanic determines that the problem is between test points C15 and C65. The only two pieces of equipment between

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**Figure A**

Troubleshooting Using the Half-Splitting Method
these two points is the emergency stop switch in the car and the inspection plug on the car top. The mechanic correctly determines that someone has turned the in-car stop switch to the Off position. The mechanic’s solution is to open the hoistway door with the door release tool and turn the in-car stop switch to the On position. Prior to returning the car to normal operation, the mechanic rides the car and checks its operation.

Several steps were required to locate the problem using the above method. Using the half-splitting method reduces the number of steps needed to locate the same problem.

In this next example, the Half-Splitting Method is applied. Consider the following:

The mechanic begins by measuring the voltage at the middle of the circuit to be tested. (The voltage expected from the rectifier on this system is between 115 and 130 VDC.) Connecting the red probe to test point C14, the mechanic can read the measurement of 120 VDC. This tells the mechanic that the rectifier is producing 120 VDC and that all items in the circuit between the rectifier and C14 are complete circuits. Moving the red test probe to C65 provides no voltage reading on the meter. This shows that the open circuit is between C14 and C65. The final move of the red test probe is to C15 that measures 120 VDC. The only items between C15 and C65 are the in-car stop switch and the car top inspection plug. The resolution is the same as previously stated.

With the red test probe on C14, the reading is 120 VDC. What do we actually know from this reading? We know that the rectifier is supplying 120 VDC and that all items in the circuit between the rectifier and C14 are complete circuits. Moving the red test probe to C65 provides no voltage reading on the meter. This shows that the open circuit is between C14 and C65. The final move of the red test probe is to C15 that measures 120 VDC. The only items between C15 and C65 are the in-car stop switch and the car top inspection plug. The resolution is the same as previously stated.

With the red test probe on C14, the reading is 120 VDC. What do we actually know from this reading? We know that the rectifier is supplying 120 VDC, that the parking switch (PKS) is turned on, the overloads have not tripped, fuse five is not blown, and the controller knife switch (KS2) is in its proper position. While this seems like a lot to gather from only one reading there is actually more we know. We know that the transformer (TRF) is working, that fuses 1, 2 and 3 are good, and that the
three mainline fuses are okay. The voltage from the rectifier would be lower if the transformer was defective or any of these six fuses were blown.

On your next troubleshooting experience try to determine how much information you can determine from each move of your test probe. Good luck in your troubleshooting!

**Testing Hall Lantern Lamps**

Another routine task that can be accomplished more efficiently with the application of brain power and some electrical knowledge is checking hall lantern bulbs on one or several cars in a group. Some mechanics check hall lantern bulbs by going floor to floor and stepping out of the elevator to see if the bulb lit. This is time consuming and in many cases can be performed quickly from the machine room.

*Figure B* is a method that can be used to check most selector contact operated hall lantern bulbs from the elevator machine room. Some solid state systems that do not have a direct wire from the lamp to the controller cannot be tested with this method.

This particular elevator has a selector with floor bar studs that light the hall lanterns. These studs can be used to check the continuity of each hall lantern bulb's filament. The test procedure shown uses an analog meter. A digital meter could be used in its place. The positive lead of the voltmeter is connected to the lantern supply as shown. The voltmeter is placed on a scale that can read the voltage type and range that the red lead is connected to. The black lead is connected to the common side of the circuit to verify the supply voltage. Now remove the black lead and use it to briefly touch each hall lantern selector stud or controller terminal as shown. The meter will read the supply voltage if the hall lantern filament is not broken and the wiring and fixture are intact. This test will also detect loose bulbs that only need to be tightened. Make a list of defective bulbs for each car, so when you go to change the defective bulbs, you have a list from which to work. Repeating this test after replacing lamps can expose other circuit failures such as loose connections if the no voltage reading persists. This test can be done using a test lamp in place of a meter on relay systems. When it is done using a test lamp of the same wattage and voltage as the lantern bulb, it will glow at half brilliance if the lantern bulb is good. Remember, one quick touch is all that is needed for this test. The lanterns at the floors will also light at half brilliance.

This test is not effective for floors with additional circuitry such as the lobby. Often, lobbies use several bulbs in parallel, which makes this test unsatisfactory. This test will work for any single bulb such as position indicators or tell-tale lights. Review your wiring diagram to see where this test could save you time and make your work easier and more effective.

*The most powerful tool mechanics can bring to the job is their brain.*
11 TIPS for Using JUMPER Clips

by: Bud Johnson.
Local #14, Buffalo, NY

The number one concern of all elevator constructors must be safety—personal safety as well as that of co-workers and the riding public. Unsafe work practices and the improper use of tools and materials can be deadly.

Jumpers are a necessary tool in the performance of many tasks in our industry. By definition, a jumper is a length of wire used to create a parallel circuit to an existing circuit. If a circuit is jumped, all switches and connections in that circuit will no longer interrupt the current. Inadvertent failure to remove a jumper from a safety or door circuit has caused fatalities. The following list of suggestions are provided to ensure that you are never involved in a safety tragedy.

1. Always perform a job-hazard analysis.

2. Know the actual voltage and current.

3. Each time jumpers are used they should be inspected for damage. This will help prevent shocks and shorting accidents. Jumpers should also be tested for continuity on a regular bases, a simple visual check of a jumper is sometimes not sufficient to determine its usefulness.

4. Know the actual voltage and current.

5. It is imperative that the elevator is out of normal service and under control of the constructor before the installation of any jumpers.

6. Avoid jumping door locks and gate at the same time, and be sure the clips are securely fastened so they will not fall off.

7. When you install a jumper, put a note on the controller to designate the location and circuit. This will ensure that you double-check the area before leaving the job.

Clip jumpers are not diagnostic tools and should never be used in place of a meter. When trouble shooting a controller with a meter, you will never accidentally complete an open circuit. Flashing an open circuit with a jumper can cause the elevator to move in an unsafe condition.
On construction or modernization jobs, jumpers may be on for long periods of time. Make sure the jumpers really stand out. Make them bright colors and give them big loops. Make a list of all jumpers and post the list for all to see. When a jumper is removed take it off the list.

Always store your clip jumpers in the same place. You will know were to find them and they will be protected from damage.

Carry a minimum number of jumpers and keep that number consistent. If you enter a motor room with three jumpers, make sure you leave with three.

Each jumper should be a different color. Jumpers of the same color will blend together and be difficult to differentiate. Make it a practice never to install a jumper on a controller that is the same color as the factory installed wiring.

Be certain of the consequences of jumping any circuit. To increase your awareness of the procedure, try altering your routine, such as wearing your wristwatch on the other arm as a reminder. Following these eleven tips will make the practice of using clip jumpers a safer process for all elevator constructors. No safety process can ever be too detailed when lives are at stake.

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**NEIEP Introduces Interactive Software**

The 2004/2005 School year will see the introduction of some valuable interactive tools available for instructors and their students. Below is a description of the Maxton Valve and Basic Electricity software soon to be available on the NEIEP web site.

**Maxton UC4 Valve Software**

This Demonstration Program provided by Maxton simulates real-world hydraulic elevator valve adjustment properties. It can be used by Instructors in the classroom supplementing the Year 3 Basic Hydraulic Theory Lessons and by students on their personal computers. It uses a simulated elevator hoistway with a moving car that responds well to user input valve adjustments. Even though only one type of valve is simulated here it gives the user a good sense of the adjustment process. Continual speed, acceleration and deceleration rates are indicated for determining the results of your adjustments. A realistic graphical hoistway run and approach to floor provide a fun learning experience.
There are many codes and standards that govern how you install, repair, and maintain elevators, escalators, moving walks, and dumbwaiters. This column is dedicated to keeping you apprised of the ever-involving changes to industry codes and standards.

The most well-known code within the building transportation industry is the Safety Code for Elevators and Escalators—ASME A17.1. The latest edition of this code was issued April 30 of this year and will become effective October 31, 2004. Be aware, however, that the updated code may not be enforced at your place of employment until it is adopted as the local elevator code.

Some of the more significant changes to ASME A17.1-2000 include:

**Installation instructions shall be provided for all fire resistive elevator doors and frames. The instructions will include critical information on the required interface between the entrance frame and hoistway wall. It is recommended that a copy is presented to the firm installing the hoistway walls (2.11.18).**

The installation of doorframes is critical to maintain their intended fire rating. New types of fastening systems are continually appearing. If a drywall or masonry tradesman on the job does not recognize the system used by your entrances, the methods used may jeopardize the integrity of the installation.

This portion of the installation is not the responsibility of the elevator constructor, however, providing information when available can help prevent mistakes. Be certain installation documentation has been provided to those who complete the hoistway enclosure meeting the doorframes. Upon Inspection, you may be called upon to verify their proper installation.

**Requirements for hoistway intrusion devices added to code. They are only permitted to sound an alarm (2.14.1.7.3).**

Those involved with elevator service in housing projects and dormitories are familiar with the problems of the riding public gaining access to elevator car tops for entertainment value. Devices to sense the presence of an unauthorized intruder on a car top have been developed and are an attractive tool to building owners to reduce their liabilities in self-induced injury cases. When these detection devices are triggered, it may not affect the operation of the elevator in any way. Their function is limited to sounding an alarm or otherwise alerting those in authority of the intrusion.

**Side emergency exits are now prohibited (2.14.1.10).**

The situation that would warrant evacuation of an elevator car through the side emergency exits is enough to send chills through the veins of even the most seasoned elevator man. The list of things that could go wrong in this type of rescue seems endless. The adoption of the 2004 A17.1 Elevator Safety Code makes side emergency exits a thing of the past. The dangers and liabilities of transferring passengers between emergency exits simply outweigh the advantages. Provisions to permanently seal side exits in older units may be discussed with your local authority.
Freight elevator loading signs clarified for general understanding by those not familiar with ASME A17.1 terminology (2.16.5.1.1).

Prohibit machine room inspection operation with door circuits bypassed (2.26.1.4.4).

Switches to place a car on inspection are included in the controller on most installations. In some cases, up and down direction switches are also added for serviceability. Some recent installations have also included a switch that bypasses door lock and gate circuits at the controller. For safety reasons, these switches also prevent automatic operation in this mode. When any combination of these switches is provided, the car must be prevented from operating from the machine room in any switch mode with doors or gate bypassed. Operation of a car with door and gate contacts bypassed can only occur from inside or on top of the car and at the hoistway access switch.

Require emergency communications from within car to authorized personnel when “HELP” button pushed, in lieu of an emergency alarm (2.27.1). Elevator location must automatically transmitted and verbal communications provided, as well as provide a visual call acknowledgement signal (2.27.1).

Installations in most areas have been meeting this provision for several years under ADA requirements. It is now included in the A17.1 2004 edition. The device must auto dial to a 24-hour available service prepared to handle emergencies. The call for help may also be directed to an onsite station that is staffed 24 hours, such as a security operations area.

Require a locked Fire Operation panel at the top of the COP. All firefighters’ emergency control switch to be inside panel, including a firefighters’ stop switch (2.27.3).

Included with death and taxes are Fire Service changes. For over 30 years, additions and changes to this area of the code have kept elevator people in curious anticipation of what could be next. The 2004 revision is no exception. The focus this year is in the car station. Operation will remain as in the past; however, the three position keyed switch will be located behind a locked panel accompanied by the Call Cancel button and a non-keyed Stop button.

Requirement added for hydraulic elevator plunger gripper (LifeJacket®) when provided (3.17.3).

Although their installation does not preclude required hydraulic plunger testing, plunger grippers can arrest the rapid decent of a down-traveling direct-action hydraulic elevator. The A17.1 section requires that once deployed, the rate of deceleration of the car must fall within limits similar to traction cars with safeties. The considerations are meant to help reduce passenger injury caused by quick stop. In addition, damage to the piston, caused by engagement (including distortion and diameter change), must be minimal.

Requirement added for escalators with dynamic skirts (NextStep® Escalator) (6.1.3.3).

The term dynamic skirts is used to describe escalators whose skirts are made up of individual sections integral to the step. In this configuration, friction between an object on the step and the traditional stationary skirt is eliminated. Clearances become critical to avoid creating new pinch and shear hazards. These clearances are addressed in this new section.
Private Residence Elevator interlocks and car door contacts are now required to be type tested (5.3.1.7.4, 5.3.1.8.2 and 8.3.3.4).

**Require a written Maintenance Control Program (MCP) for all equipment. The MCP is to be available to all elevator personnel and must describe the procedures to maintain the equipment in compliance with the code (8.6.1.2.1).**

Elevator equipment manufacturers provide the guidelines necessary to compile an effective maintenance program for their equipment. Frequency of operations and types of lubricants are items that must be included. These items are to be logged (electronically or on paper), and records are required to be accessible when necessary.

Requirements for replacement of components within listed and labeled devices (e.g. interlocks, car door contacts, fire doors, etc.) clarified (8.6.3.7).

Listed and labeled devices are those that have undergone testing by an independent testing laboratory and have met requirements for certification. Alterations to these devices are not permitted in any way during their lifetime. Replacement and renewable parts used in these devices are also subject to the same testing. Substitution or fabrication of the contacts of a car call button may be acceptable, but not of a listed or labeled device.

This article offers a high-level description of some of the major changes to elevator codes and standards, and does not reflect all the changes. For a comprehensive list of changes and explanations, it is recommended that readers review the ASME A17.1-2004 and/or the ASME A17.1 Handbook, 2004 Edition. The ASME A17.1 requirement number is provided at the end of each recorded change to assist readers in locating a specific change.
Performing Periodic Safety Tests

It’s not the good ol’ days

by: Norman B. Martin, Chief Elevator Inspector, QEIS, State of Ohio

There are very few maintenance procedures performed on existing elevators and escalators that are more important than the performance of the periodic safety-tests. The purpose of these tests is to confirm that the most critical mechanical and electrical protective devices of the elevator and escalator systems are in compliance with the standards under which they were installed. In the “good ol’ days,” the simple placing of test weights on a traction elevator and setting the safeties was regarded as a complete test by many within the industry. In today’s world, this can no longer be the case.

This article is not a how-to reference for performing safety-tests, but rather is intended to be an initial outline of the importance of using background reference materials that emphasize the important responsibilities of safely conducting a consistent, high quality safety test on existing traction/drum elevators. In addition, this article outlines the various items that are included in a typical periodic safety-test, beyond just hitting the safeties. Conducting of acceptance tests for traction elevators, hydraulic elevators, and escalators, as well as periodic tests for hydraulic elevators and escalators will be discussed in future articles.

Before a properly trained mechanic begins periodic testing, and before a certified inspector observes a test, each should be familiar with two reference materials that are considered the salient publica-

tions in reference to national standards for periodic testing. (These publications are in addition to any specific company procedures or reference guides.) These reference items include:

1. **ASME A17.1 Elevator Safety Code**: The first reference item is the national elevator safety standard. Typically, the American Society of Mechanical Engineers (ASME) A17.1 Standard is adopted by most states and municipalities in the United States. This standard outlines the specific requirements for performing a periodic test on an elevator in section (8.11). The local jurisdictional authority determines the frequency of the periodic tests (typically annual no-load tests and five-year full-load tests). The ASME committee that formulates the standards for safety tests is comprised of members from various elevator companies, suppliers, industry consultants, and labor and jurisdictional authorities. No new items are placed into the standard without using procedures that ensure that a favorable consensus is achieved by the various members of the ASME A17.1 committee.

2. **ASME A17.2 Inspector Guide**: In addition to the ASME A17.1 standard, there is an Inspector’s Guide published by ASME that provides commentary on specific recommended procedures for conducting periodic tests. The ASME guide provides useful testing procedure detail without the burden of repeating the specific reference standards that are found in ASME A17.1. For example, the reference tables for the proper length of slide marks on older equipment (1950s and before) can be found only in the ASME A17.2 Inspectors Guide and not in the current ASME A17.1 standard.
The above references are essential for every mechanic’s and inspector’s library. These references are critical and ensure the performance of a quality safety test that complies with the national safety standard. Other valuable resources include the following materials:

- **ASME A17.1 Handbook**: The ASME A17.1 Handbook is a commentary on the entire ASME A17.1 standard and is an indispensable reference. The most recent edition of the ASME published handbook covers the 2000 edition of the ASME A17.1 standard. Persons conducting safety tests and persons needing additional insight into other portions of the elevator safety code will find the explanations for the various code items very informative.

- **Field Employees’ Elevator Testing Manual**: This recently published manual is designed to provide a guide to persons assigned the task of performing various tests on electric and hydraulic passenger and freight elevators in the presence of a certified Elevator Inspector.

- **NEIEP Educational Materials**: Year-1 describes installation and operation. Year-4 describes maintenance and testing.

In addition to the above reference materials, every inspector and mechanic is encouraged obtain the Qualified Elevator Inspector (Q.E.I.) certification. The relatively small amount of time and investment associated with obtaining a Q.E.I. certification is worth it to ensure the knowledge and tools necessary to keep pace in an ever-changing regulatory environment.

Combining technical skills and industry knowledge with an understanding of the safety standards enables mechanics to conduct proper safety tests. The ASME A17.1 standard now utilizes the term “periodic tests” to reference annual and five year safety-tests. The requirements outlined in ASME A17.1 section 8.11 are listed in the following tables. Table A lists the tests normally conducted annually with no load on the car. Table B lists the test items for the typical full-load five year test.

### Table A - ASME A17.1 – Section 8.11.2.2 Periodic Tests Requirements; (Category ‘1’)

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oil Buffers</strong></td>
<td>Perform a visual inspection of the structural aspects of both the car and counterweight buffer components. Confirm that the oil buffer will return after being compressed as described in the Inspector Guide and that all compression switches function.</td>
</tr>
<tr>
<td><strong>Safeties</strong></td>
<td>Perform a visual inspection of all components. Safeties are to be set while the car is in motion at a slow speed in the down direction with no weight on the car.</td>
</tr>
<tr>
<td><strong>Governors</strong></td>
<td>Perform a visual inspection of all components and operate the governor to ensure proper operation. Some governors may need to be cleaned and serviced depending upon their operating environments. Confirm that the seal is in place. If the seal is broken, then a test of the governor will be required.</td>
</tr>
<tr>
<td><strong>Slack-Rope Devices on Winding Drum Machines</strong></td>
<td>Operate devices manually.</td>
</tr>
<tr>
<td><strong>Normal and Final Terminal Stopping Devices</strong></td>
<td>Devices are to be visually inspected and manually tested as outlined in the ASME A17.2 Inspector Guide.</td>
</tr>
<tr>
<td><strong>Firefighters’ Emergency Operation</strong></td>
<td>Perform testing of Phase I and Phase II key switches. The testing of fire alarm-initiating devices is normally conducted by the local fire inspector or building representative.</td>
</tr>
<tr>
<td><strong>Standby or Emergency Power Operation</strong></td>
<td>Confirm the interconnection to emergency power systems are operational. Additional testing of actual emergency power systems is dependent upon the local building code and other Life Safety standards.</td>
</tr>
<tr>
<td><strong>Power Operation of Door Systems</strong></td>
<td>Door closing forces are to be tested.</td>
</tr>
<tr>
<td><strong>Broken Rope, Tape, or Chain Switch</strong></td>
<td>Manually test.</td>
</tr>
</tbody>
</table>
ASME UPDATES

Table B - ASME A17.1 - Section 8.11.2.3
Periodic Tests Requirements; (Category 5)²
Begin with the same visual inspections as conducted in category 1 tests plus:

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Car and Counterweight Safeties</strong></td>
<td>Set the car safeties at rated (full operational) speed with a capacity load placed on the car platform. The counterweight safeties are tested by conducting the test without a load on the car, but the test must be conducted at rated speed in the up direction. Compare slide distances to tables provided in ASME A17.2 for conformance. See the ASME A17.2 Inspector Guide for additional procedures.</td>
</tr>
<tr>
<td><strong>Governors</strong></td>
<td>Upon confirming the rated speed (full capacity load in the up direction) of the car, test and confirm the calibration of the governor electrical and mechanical tripping speeds for both the car and counterweight safeties as well as the governor pull-through force for type B safeties. See the ASME A17.2 Inspector Guide for commentary on conducting a governor pull-through test.</td>
</tr>
<tr>
<td><strong>Oil Buffers</strong></td>
<td>Buffers are to be compressed by the car at rated (full operational) speed with a capacity load in the car. Counterweight oil buffers are to be compressed at rated speed without a load on the car.</td>
</tr>
<tr>
<td><strong>Braking System</strong></td>
<td>For elevators that carry passengers, the machine brake is to be tested with 125% of the rated load on the platform and demonstrate that the car can be lowered to the bottom terminal landing; stop and hold the car with its load. The elevator is not required to lift a 125% capacity load. See the ASME A17.2 Inspector Guide for capacities required for class C-2 freight elevators.</td>
</tr>
<tr>
<td><strong>Emergency and Standby Power Operation</strong></td>
<td>Perform tests as required by the local building code.</td>
</tr>
<tr>
<td><strong>Emergency Terminal Stopping and Speed Limiting Devices</strong></td>
<td>See the ASME A17.2 Inspector Guide for procedures.</td>
</tr>
<tr>
<td><strong>Power Operation of Doors</strong></td>
<td>Confirm that door operation only occurs within the landing zone. See the ASME A17.2 Inspector Guide for recommended procedures.</td>
</tr>
<tr>
<td><strong>Leveling Zone and Leveling Speed</strong></td>
<td>Confirm the leveling zone distance. Refer to the ASME A17.2 Inspector Guide and manufacturer's procedures to confirm operation.</td>
</tr>
<tr>
<td><strong>Inner Landing Zone</strong></td>
<td>Confirm operation is in compliance for static control elevators.</td>
</tr>
<tr>
<td><strong>Emergency Stopping Distance</strong></td>
<td>Demonstrate that, whenever a car or counterweight fully compresses its buffers, either the driving machine loses traction or the driving system “stalls.”</td>
</tr>
</tbody>
</table>

In the “good ol’ days,”
the simple placing of test weights on a traction elevator and setting the safeties was regarded as a complete test by many within the industry. In today’s world, this can no longer be the case.
As shown in the tables, the requirements for conducting periodic tests are more than just dragging the test weights to the elevator. References are comprehensive and, when procedures are performed correctly, they can be time consuming. As more complicated devices are added to existing elevators (such as ascending car protection and unintended car movement), periodic testing continues to be a critical element in ensuring public safety. Adhering to the national consensus safety standard and procedures helps to ensure that the public is given the highest level of protection. It is strongly encouraged that mechanics and inspectors become familiar with all the items mentioned in this article and continue to enhance skills and expand knowledge. ASME’s goal is to provide safe transportation to the elevator riding public. Achieving this goal is dependent upon everyone’s commitment to excellence.

Article Endnotes

1Safety tests, maintenance procedures or inspections should not be conducted on any elevator or escalator device without the technical and inspection personnel first being thoroughly familiar with the device being tested as well as being familiar with all safety guides issued by the employer. Supplemental reference materials are contained in the 2000 edition of the Field Employee Safety Handbook, available from Elevator World (www.elevator-world.com).


6The QEI certification is required by the ASME A17.1 Standard for inspectors that observe the safety-tests, but the certification is not mandatory at this time for those who are performing the tests in many jurisdictional areas (see ASME A17.1 rule 8.11.1.1). See your specific jurisdictional authority for their requirements. The QEI certification process exposes the applicant to the entire ASME A17.1 standard, the A17.2 inspector guide as well as the NFPA 70 - National Electric Code and other associated documents. Information regarding the obtaining of QEI certifications can be obtained by contacting the National Association of Elevator Safety Authorities International, Phone: (602) 266-9701, or www.naesai.org.

7See the full edition of the ASME A17.1 Standard for the specific language.

8Ibid.
NEIEP WEB SITE DEVELOPMENTS

Regarding the functionality for instructors to submit attendance and grade forms via the web site, we are happy to report that this system is fully functional and many instructors across the country are taking advantage of this convenient system.

Additional functionality has been made available with this attendance and grade submission via the web. Instructors can now access course summaries on screen as well as in printer-friendly versions, they can submit makeup attendance for individual students in individual classes, and they can review attendance and make changes to the current month's records, as they remain editable in a pending folder until the 7th of the following month. Basic information and policies for instructors new to this process can be found on the “class attendance and grades” page within the site.

As well, instructors are no longer required to submit separate payroll paperwork, as the instructor hours are taken from the attendance data.

Other Developments

* neiep.org email addresses for all instructors are available. Please see the article at right for more information. Email for committee members is forthcoming. Please look for notification that your NEIEP email address is ready to access. We ask that all NEIEP instructors and eventually committees regularly check these addresses for important notices and information.

* Continual posting of PowerPoint presentations and other Instructor Support Materials on the web site. Our contributors are working to stay ahead of the lessons, but sometimes it’s difficult to accommodate everyone’s schedules. Please contact jhenson@neiep.org with concerns or special requests regarding the instructor presentations.

The Student Gateway now contains functionality for students as well. They may download a pre-filled out makeup verification form there, as well as view their attendance and grades for currently enrolled and active courses. Instructors, please encourage your students to use the web site.

The best way to familiarize yourself with the advanced functions of your web site is to login and explore. When questions arise, please contact us at neiep@neiep.org.

Instructor Webmail Available

By now all NEIEP instructors have received a letter detailing their new neiep.org email accounts. Please check your mailbox at home if you have not had a chance to read this important information.

Registering for NEIEP email is a different process than registering for the NEIEP web site. Instructors must have a registered web site account in order to activate webmail. Information regarding web registration can be found at the home page, www.neiep.org. Once your site account is active, sign in normally to begin the webmail activation. If you have an email account available for use, you will notice a link for Webmail among the choices on the left (see example below).

NEIEP Instructor Shirts

One item that will only be available to instructors who register for webmail is a NEIEP shirt for instructors. Please register your account so you can receive the order form for this shirt.
FOCUS

APPRENTICE Training

by: Rick White
Manager, Technical Learning and Development
Otis Elevator

The elevator industry’s Apprenticeship Program has been up and running now for several years. Although there have been some start up challenges, the program offers an exciting opportunity for participants willing to make a commitment to becoming successful mechanics in a rewarding trade.

Many of us seasoned mechanics completed the original NEIEP curriculum at our own pace. Those of us who had the opportunity to become card mechanics in four or five years did so by attending local NEIEP classes religiously, successfully completing modules, and ultimately passing the mechanic’s exam. Others did not. And many never took the opportunity to complete all the elective courses, which are now a required part of the program.

Times have changed. The elevator industry has now adopted the proven training process used by many building trades and industries. The apprenticeship process is recognized by state and federal authorities as creating a better trained, safer, and more productive workforce. It’s a win-win situation for all.

With that in mind, let’s look at the Apprenticeship Program from a slightly different point of view. We should all realize what the apprentice expects from the program—a quality education and a rewarding career. But there are two other key expectations for the program.

First, there are the expectations of a company (in this case Otis) and what the company’s customers expect out of their qualified apprenticeship graduates. Second are the customers’ expectations.

Manufacturer Expectations

Although we tend to only think about what the apprentice receives from the program, there are also benefits for the employer. As a manufacturer that installs and services a wide variety of products, Otis depends on the Apprenticeship Program to provide a workforce that has successfully completed the required classroom training and practical work experience. We need those employees to work safely and to be highly productive in a competitive global economy.

We provide the Otis- (or manufacturer-) specific training that’s required to install or service our products, and we depend on the Apprenticeship Program to provide a solid foundation of basic training that each manufacturer or service company can build on.

For example, in the new equipment market, Otis and other manufacturers may have a unique process for installing and aligning guide rails using special tooling, rigging, etc. What we expect from our mechanics and apprentices is that they have the core training and skills required to complete the task. These skills include:

- The ability to work safely in a challenging work environment (Module 1.1)
- Prepping rails, installing fishplates, setting brackets plum, safe hoisting techniques, installing rails, and basic rail alignment at the bracket and the fishplate (Modules 1.6, 7 and 8)
FOCUS

On the service side of the business, our expectations are the same, but for a different set of skills. If we assign a mechanic to a maintenance route, he or she should have foundation training for that side of the business.

For example, the new route mechanic will need to be trained on the Otis- or manufacturer-specific maintenance and troubleshooting processes. We expect a graduate of the Apprenticeship Program to have the core training required to complete the task. These include:

- The ability to work safely around moving and rotating equipment (Module 1.1)
- The ability to use a voltmeter safely and effectively in a logical troubleshooting process (Module 2.3)
- The ability to identify core circuits (i.e., safety devices, door and gate locks, inspection circuits, etc.) used in any manufacturer’s wiring diagrams (Module 4.2)
- A solid understanding of and the ability to troubleshoot basic electrical components used in industry elevator and escalator control systems (Module 2.2)

Customer Expectations

One group we certainly can’t forget about is our customers, who ultimately pay our bills (Module 1.3). Customers include those who actually pay the bills and the tenants who occupy their buildings. This group also benefits from having qualified apprentices and mechanics working in their buildings. Three key reasons apply:

**Number One - Safety (Module 1.1)**

The apprentice, the manufacturer, and the customer do not want anyone on site to have any type of accident, severe or not, lost time or not. The Apprenticeship Program addresses safety as the first topic in the first year and maintains that safety theme throughout the program. As a manufacturer, Otis takes this to the next level, making safety a part of the daily work culture.

Installing equipment safely in a customer’s building ensures that there is no time lost due to an accident, not to mention investigations required by local authorities, manufacturers, and insurance companies. It’s simply time wasted. Accidents involving the public add more grief when litigation occurs.

**Number Two - Productivity**

The key here is that as an industry, we need to work smarter, not harder. Apprentice Program graduates are trained in every aspect of the industry. Customers are looking for a safe work environment and an on-time delivery of our product. When this occurs, it’s another win-win situation for all.

As we become more productive, our cost becomes more competitive, and customers will continue to come back to us for future projects. “Us” can be defined as manufacturers and service companies employing IUEC members.

**Number Three - Customer Relations (Module 1.3)**

Every apprentice completes a four-hour Customer Relations Module (1.3) in the first year of the program. They need to recognize their responsibility as front line representative of their company and the IUEC. This used to be an elective topic in the previous NEIEP curriculum, which few people took advantage of and most people viewed as unnecessary. The Apprenticeship Program now addresses this because one inappropriate word, look, or gesture to a customer, from anyone, could cause the loss of a contract or have an employee removed from a site.

Every elevator company strives to provide some level of customer satisfaction. Otis’ goal is to take that concept to the next level by not simply satisfying, but delighting our customers. Our vision is to be the leader in service excellence. This commit-
Apprentice Training (cont.)

ment must be evident in the actions of every Otis professional, including apprentices, mechanics, and all other Otis employees worldwide.

Field Training, Looking Forward

The Elevator Industry Apprenticeship Program is here to stay. Will it change as technology and products evolve? The answer is yes, and that’s a good thing. Topics will be added or updated as needed. Delivery methods will evolve as technology places more and more resources online. And who knows what types of communication delivery devices we’ll be carrying around in our shirt pockets or on our wrists in just five years. Does anyone remember life before Nextel’s?

There are different mind sets in the industry in reference to views on field training. Some say that as products become simpler to install and maintain, less training is required. Others advocate that new apprentices still require training on old technology (i.e., relay based systems and MG sets), meaning more training. And there are those that believe as products become simpler to install and maintain, they are actually more difficult to work on after installation and require a higher level of training.

So what camp are we all in today? Time will tell. Today the industry needs qualified elevator mechanics that have completed the Apprenticeship Program and understand the competitive world we live and work in. The smarter workers and companies have the competitive edge. It’s no different in the elevator industry.

The Apprenticeship Program is today’s solution for our workforce. The program, coupled with the training we offer as a manufacturer, makes our workforce safe, competitive, and successful. It is important to understand as well that completing the Apprenticeship Program doesn’t mean the training stops. To stay competitive, today’s elevator mechanic needs to stay on top of technology and take advantage of the additional training, tooling, and process improvements that are available from their employer and NEIEP. If additional elective courses are forthcoming from NEIEP, they should be considered must-take.

Regardless of any one opinion, the Apprenticeship Program is the training answer for the elevator industry. It’s a program that the manufacturers and the IUEC leadership support 100%...today and into the future.

Remember, we need to work smarter, not harder every day we’re out there. The Apprenticeship Program, your employer, and your co-workers provide that smart resource. And when you’re out working smarter, always keep safety in mind. Make it a point to be careful, whatever you’re doing—at work, at home, on the road, or wherever your future takes you.
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ONGOING Education...

It’s ALWAYS Time!

by : Ellis Smith
Retired, Local #8
San Francisco, CA

With the NEIEP school season starting, it is once again time to remind our members, apprentices, helpers, and mechanics that ours is one of the fastest changing crafts in the building trades. And, as such, ongoing education is critical to remain on top of new standards and excel within the industry.

Over the years, the most common complaint from members regarding NEIEP’s program is that it is too basic. Be assured that this has changed, having augmented the program with new and improved curriculum and computer-assisted education. These improvements, coupled with on-the-job experience and a few outside courses, provide the education required to excel in the industry. The bottom line is that to be successful everyone should enroll in the NEIEP program and benefit from the exceptional knowledge and experience that can be gained.

The rate of change in any industry is rapid. New technologies are emerging on a daily basis and will continue to do so. Even the most advanced technologies of the past decade are nothing in comparison to what is on the horizon, and the only way to maintain pace with industry change is through ongoing education—period.

As a NEIEP Chairman many years ago, I have heard every excuse for not enrolling in the program, including: “My NEIEP application was lost in the mail, eaten by the baby, eaten by the dog, eaten by the washing machine, eaten by the NEIEP chairman.” There have also been such excuses as: “I live too far, too close. I get off too early, too late, too little, too much. I don’t need the NEIEP program because I am too smart, too dumb, too apathetic!” The point is that no excuse is good enough. Education is a necessity in this industry and one that should be valued by everyone involved.

Every apprentice needs to realize that this is a mechanics’ trade, and the result of your education should be your journeyman’s card. Education is part of the job and an important factor in your future. And, rest assured, without ongoing education, you will not have a future in this industry.
Having had the misfortune of being on a 350ft/min elevator that failed to slowdown at the bottom terminal and hit the buffer at full speed can really make you question just what is that buffer good for. It was totally unexpected and came as a real shock. If you have ever experienced a buffer strike or a safety set from inside the car, you know exactly what I mean. All those tales you’ve heard about how those big springs were a failsafe safety feature in the event of an elevator failure, have been since debunked.

So what is the buffer good for? A good answer is: To protect the equipment. This is true but it’s true probably for more reasons than you might think. One requirement for a buffer as spelled out in the Elevator Safety Code is simply being capable of slowing a loaded car or counterweight to a stop at the speed of gravity when traveling at 115% of rated speed. This means that a passenger on the car perceives his body weight doubling as the buffer compresses. At the same instant, the weight of the counterweight on the other end of the ropes is decreased by its own weight, making it weightless. By design, this is called a gravity stop and is what should happen if all goes well during a test. If that same car lands on concrete or a buffer that doesn’t work, things change. Besides doing heavy damage to the car and sling, the counterweights will weigh less than zero and continue to float up due to inertia after the car stops. In addition, the ropes will leave their sheaves and as the counterweight descends and re-tensions the ropes, many bad things can occur.

The worst-case scenario is that shackles are pulled loose and the counterweight ends up in the pit with the car. The distance required to bring a car or counterweight to a stop without the ropes going slack is called the gravity stopping distance. As you may have guessed, it is directly related to speed. Without going through the math or the charts in the Code Book, you can get that distance from the length of the stroke specification on your buffer data plate. The other thing this dimension reveals is the distance that the counterweights or car will continue to travel if that buffer doesn’t work during a test.

The buffer is one of the least demanding pieces of equipment in the system, yet should not be ignored. Besides checking the lubrication level and cleaning the buffer switch, there are other aspects of buffer maintenance to take into consideration. For example, When you check the lubrication level, be sure that the oil has not been mixed with water. All may appear normal, but if it is an oil/water mixture, corrosion may be taking place inside the buffer. Such occurrences as a flooded pit can replace your buffer oil with water and you would never know it. Disassembling a buffer is dangerous and should not be attempted. To check for signs of water, simply drain the buffer and check for signs of corrosion. Also, before performing a rated speed buffer test, run the car onto the buffer at inspection speed and safely position yourself or a coworker to observe...
FOCUS

the low speed buffer compression. The car should settle in softly to the end of stroke. If it appears to land hard, as if the buffer did nothing, DO NOT go ahead with the high-speed test. Instead, seek the help of an industry expert. Remember, buffer and safety testing is hard on equipment, even when everything goes right. Careful pre-test inspections and the support of experienced staff can help reduce equipment damage.

Once you are satisfied that the car compressed the buffer without unexpected reaction, the release of traction can then be tested. Continue to run the landed car or counterweight down by allowing the drive sheave to continue a short distance. The ropes should stop and allow the sheave to turn freely. A similar traction test is also performed during pre-inspection and before a rated speed safety test. Re-roping and re-grooving are two operations after which this simple test must be performed.

The same gravity stopping distance requirement as with buffers is also true for the car and counterweight safeties. The minimum safety slide distance is closely related to the length of the buffer stroke. The 115% of rated speed requirement figure of the buffer is also the minimum governor trip speed allowable by code. At this speed, stopping an over speeding car or counterweight becomes the burden of the safeties. The minimum and maximum governor trip speeds are a large part of the criteria used for determining the safety slide distance. If a governor trips at the lowest setting allowed (115% of rated speed), it will require considerably less distance to come to a gravity stop than if it were to trip at the maximum speed allowed. The distances between min and max allowable slide vary greatly with the speed. The min and max distances for a 200 ft/min car are 4” and 22” an 18” difference. For a car traveling 1000 ft/min it must come to a stop in between 75” and 222” or somewhere within a range of more than 12 feet. These slide figures are from the ASME 17.1 table used for acceptance tests of Type B safeties at governor tripping speed. The Table used for five-year periodic testing is from A17.2. This test is required at rated speed and rated load. The slide figures on the latter table are lower due to tripping the governor by hand at rated speed compared to a normal governor overspeed trip that is over 15% higher.

Other factors involved in determining stopping distance are the brief time periods required for the governor and safety to react. If a car is accelerating rapidly, the speed can be well above the governor tripping speed by the time the safeties react. Rust and improper rail lubrication can also affect slide distance. During a five-year speed rated load test, the car speed must be checked and corrected before the test. A car traveling slower that rated speed may not achieve the minimum slide distance required. Do not adjust safeties unless directed to do so by your supervisor. Safeties rarely require field adjustment. If you are having trouble meeting the slide criteria, you should double check your pre-test items, including speed, governor trip, pull through, and safety operation.
My last high school English paper was on cybernetics—automatic operating machines that replaced manual labor. I graduated from high school in 1957 and started working part-time for a small contractor that worked on building electronic photo-eye amplifiers and new code required anti-creep controllers for city water supplied hydraulic elevators. Working for this company, I was responsible for routine elevator maintenance and was also involved in converting elevators to operatorless automatic controls in department stores and office buildings.

I picked up my probationary helper’s card the summer of 1959 at IUEC Local 19 and got my first taste of working in the field. The company engineer began designing his own controllers for small modernizations and oil hydraulic elevators and offered me full time employment. This marked the end of my formal college education. Instead, I enrolled in a correspondence electronics class, as well as participated in the company’s once-a-week education course taught by one of our engineers.

Working for a small independent company with limited overhead, we were offered detailed engineering schematics of elevator operation—each page dedicated to a single part. This type of training material read much like a story. An example of these types of schematic statements would be: “If the safety circuit is made up, the door operator was not at the door close limit, a direction to run had been set, the call stop relay was not energized, and the doors were not opening, then the door close relay would be energized.” Myself and many other students found that much of the material was more suited for electrical engineers, so I began teaching with hands-on material, written more for layman.

After NEIEP became part of our labor negotiations, I participated in a few NEIEP modules, even though I already had my mechanic’s card. It wasn’t until the late 1980’s that I received and accepted an offer to teach NEIEP classes. About that same time I took the pilot elective NEIEP class on computers and...
wrote a few short notes of concern regarding the new module. For the following school year, Local 19 registered me for the NEIEP Electronic Lab Instructor’s Training.

At the training seminar, I was greeted by the lab training director and his three assistants. They wanted to know what I had in mind for a hands-on computer to be used as a lab tool in the module. In response, I offered information on several small programmable logic controllers (PLC) that can be programmed using elevator schematic diagrams. I had already figured out how to use an eight-input-eight-output PLC to drive a four stop seven segment PI display with direction arrows and lighted push buttons for my employer’s sales department. The NEIEP training instructor asked me to make a demonstration model and present it to them at a winter workshop. I was unaware that the main reason for the workshop was to start building the newly required NEIEP basic electronics module.

At that workshop, I became a team member for writing the new module, as well as designing the supporting lab additions. One of my high school friends owned a printed circuit board (PCB) manufacturing company and he allowed his night design engineer to tutor me on a CAD program for PCB design. I was also added to the lab instructor’s training group. The computer module lab was put on hold.

I was introduced to instructor Ron McKay at a NEIEP training seminar and was asked to look at his approach for a controller lab to support print reading and trouble shooting training. NEIEP had already purchased their own generic four stop collective controller schematic, and I was asked to work with Ron on designing a new lab. It was nice to meet another individual interested in teaching safe troubleshooting techniques by using classroom labs.

I was working forty plus hours a week designing and building fireman service additions, emergency generator sequencers, special operation controllers, and adjusting new installations. I was also dedicating over fifty hours a week to the NEIEP Four Stop Controller Lab (HCL). At times, I would wake up at two in the morning recalling a service callback problem, go downstairs to my computer to add another error to the HCL, then go back to bed until I would rise again at 5:00 a.m.

With nearly two thousand hours of making prototype HCL boards for Ron to test and write the supporting text, I felt it was time for me to take early retirement. Even though I did not have a contract with NEIEP to manufacture HCL labs, I felt I could not pass up the opportunity to offer the elevator industry my field experience. With slightly over four thousand hours into the HCL, I shipped a large wooden box to NEIEP with a working hand wired HCL mounted inside. Ron’s questions and suggestions were most helpful in completing that assembled proto-type lab. It took me another three thousand hours to create a custom I/O expander board, reduce the size of the other twelve circuit boards, and create the chassis layout.

NEIEP and I agreed on a contract. My sole proprietor electronic manufacturing business became incorporated. Some of the lab problems that were identified after production reminded me of engineering oversights similar to all custom elevators I have worked on. By the time the last HCL was manufactured, I had given the design over eleven thousand engineering hours.

My electronic business closed at the end of year 2003 with a loss, but without regrets. This journey has been very gratifying and has offered me many rewards. During my time in business, I was able to pass on what others had taught me, and I was able to employ several people from a single mother to members of my community with special needs.
Contributor of the Year: Michael J. CAPOZZI
Local #1, New York City

In my 14 years in the elevator industry, I have received experience and knowledge in construction, adjusting, modernization, and service. Recently, my career has focused on the service aspect of the industry, where I have been predominately exposed to Dover (ThyssenKrupp) and Otis equipment. The types of elevator equipment varied from relay logic to solid state microprocessors. Customer relations has also become an important part of my everyday job description.

Michael Capozzi Stats:

Education
1979-1981 - Queensborough Community College, Bayside, NY, Electrical technology
1981-1985 - City College of NY; Bachelor of Electrical Engineering

Job-related Education
1993-2003 - NEIEP, Teaching, Basic Train the Trainer and Lab Workshops
2000-2003 - ThyssenKrupp, Adjustors courses on T4, TAC20, and TAC50

Employment
2003 - Present - Schindler Elevator (Long Island Branch)
Maintaining the Otis equipment until the new Schindler TX-Express controllers are installed. (Schindler is modernizing 103 Otis 21UCLS controllers.)

2000 –2003 - Service Technician for ThyssenKrupp Elevator
Maintained, adjusted, and serviced various types of elevators and escalators in mid-town Manhattan, including equipment from manufacturers such as Dover (TKE), Otis, Motion Control, and Hyundai.

1997-2000 - Construction Adjusting and Service, Serge Elevator
Adjusted and tested of new construction Serge equipment. Performed PLC programming changes and worked closely with field engineering on product enhancements.

1989 – 1997 - Construction and Service Adjustor Helper, Dover Elevator
Assisted and learned the various skills necessary to service and adjust various types of hydraulic and traction elevators.
SPOTLIGHT ON...

Specialized Educational Skills
Instruments PLC software applications for the elevator industry.

1993 - NEIEP Highlights
Helped to write and design a lab trainer that is currently used in the Year-4 curriculum. The lab allows students to experiment on various circuits found in the circuit tracing text.

2003 - Completed a three unit chapter on Maintenance of the elevator system, which focuses on the machine room, hoistway, and car maintenance tasks and procedures for generic equipment and is now an integral part of the Year 4 curriculum. It is also a great course for the continuing education of Mechanics.

Lifetime Achievement!
Mike is most proud of his family. He is married to Marie and has two boys: Michael, 9, and Christopher, 4.

NEIEP Introduces Interactive Software (cont.)

Basic Electricity Software
Neiep has secured an Enterprise Wide License for use of interactive basic electricity programs. They can be used by the student for independent practice, augmenting classroom lessons, or as self-guided instructional aids for the Distance Learning student. They are targeted at Year 2 Basic Electricity and Year 4 Basic Solid State but may also be used at the instructor's discretion for areas of Year 3. The programs have a light, easy to use format that is entertaining and educational. Instructors may choose to use them in the classroom as an addition to their PowerPoint presentations or as a competitive team challenge. Extra features are described in the manual section of each program. Any of the following programs can be downloaded and installed on your computer:

- Basic Circuits Challenge
- DC Circuits Challenge
- AC Circuits Challenge
- Solid State Challenge
- Power Supply Challenge
- Op-Amp Challenge
- Digital Challenge
INSTRUCTORS of the YEAR!

Charles K. Sicher
Local #85, Lansing, MI

Instructor Stats:
Elevator Industry Experience: 11 years
Area of NEIEP Curriculum Expertise: Electronics
Educational Background: Two Associates degrees, working toward Bachelor's in electrical/electronic engineering.
Hobbies: Hunting, fishing, boating, camping, Internet sales.
Reason for Being NEIEP Instructor: I enjoy learning and studying, so teaching allows me to encourage others to enrich themselves through study.
Techniques Recommended: Applying analogy to compare the material to something that the student is familiar with goes a long way in ensuring understanding. It's often helpful to compare the electronics in an automobile or ATV to that found in the elevator industry.
Formula for Success: I believe that the best formula for success is always to have a positive attitude and approach to your work and studies.
Advice for Other Instructors: Not all students learn at the same pace. Learn to recognize those who require different presentation or application of the curriculum so everyone learns equally.

Gerald Brunette
Local #25, Denver, CO

Instructor Stats:
Elevator Industry Experience: 18 years construction, 23 years repairs
Educational Background: C.V.D. study
Hobbies: Painting, sculpture, silversmithing, ironwork.
Reason for Being NEIEP Instructor: To pass on the knowledge and experiences of a satisfying and fun career.
Techniques Recommended: Be honest, admit mistakes, and find answers to questions not covered in text.
Formula for Success: Listen, argue, and explain; don't just lecture. Include the students and offer them hands-on experience.
Advice for Other Instructors: Re-read text every year, update and rework your notes, and pass on as much as your can. Men who cared built this program. Men who care work to fill an important need. I am proud to be a part of this continuing process of education.
Instructor Stats:

**Elevator Industry Experience**: 20 years

**Area of NEIEP Curriculum Expertise**: Electrical and electronic portions of Years 2 and 4

**Educational Committee**: Member of Local 12 JAC

**Educational Background**: 2 years at Missouri Institute of Technology and several technical courses

**Hobbies**: Electronics and aviation, crafts/woodworking, winemaking, and sailing. As a pilot, I would love to build my own airplane someday, but most of my time is spent on home improvement, gardening, and my honey-do list!

**Reason for Being NEIEP Instructor**: It is extremely rewarding to see the light bulb come on when students understand.

**Techniques Recommended**: Use acronyms for remembering; for example, ELI the ICE MAN. Use lots of drawings on the white board.

**Formula for Success**: I'm not sure exactly how successful I am, but if someone doesn't get it, I try another method or analogy. Labs help prove points. I make up and distribute lots of worksheets for extra homework.

**Advice for Other Instructors**: Do not read the text to the class! Keep it lively, and make sure that everyone participates. Inject humor into your presentations.

**General Comments**: This is the finest education program of any craft or trade. I am very pleased to a be a part of it. I tell my students I hope they are smarter and better than the previous generation so our workforce continually improves. After all, these younger apprentices will be paying for my pension! (That’s not too selfish, is it?)