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Icons Used In This Guide



REVIEW slides



INDIVIDUAL ACTIVITY



ASK



WRITE



CLASSROOM ACTIVITY



Multimedia



SMALL GROUP ACTIVITY



REFER participants to

Agenda

<u> </u>		
Topic #	Topic Title	Duration
1	Overview	30 Minutes
2	Sensory Inspection	30 Minutes
3	Inspection & Maintenance	90 Minutes
4	Field Trip	120 Minutes
5	Summary	30 Minutes
	Total Time:	300 Minutes



Overview

Purpose The purpose of this module is to:

> Provide the participant with an overview of the tasks involved in inspecting and maintaining the machine room in a traction elevator system.

Objectives

At the end of this lesson, the transit elevator/escalator trainee will be able to:

- Identify the areas and equipment in a traction elevator machine room where cleaning is required.
- Identify the areas and equipment in a traction elevator machine room where lubrications is required.
- Identify the areas and equipment in a traction elevator machine room where inspection is required.
- List unacceptable conditions which require corrective action.
- Perform a sensory inspection of a machine room.
- Perform an inspection of traction elevator machine room.
- Perform an operational test on all safety devices in the machine room.

Materials Mandatory

Make sure you have the following

- PowerPoint Presentation
- Coursebook
- Quizzes
- **Pencils**
- Paper

Optional

You may also want the following for optional activities:

- Chalk board with chalk, large paper with marker, etc.
- Internet connection
- Lab, simulator or out of service elevator
- Bethlehem Elevator Rope® Technical Bulletin 3 on rouging which accompanies Module 7B: Traction Hoistway.
- Bethlehem Elevator Rope® Technical Bulletin 6 on lubricant build-up on ropes which accompanies Module 7B: Traction Hoistway.



Module Length: 300 min

Time remaining: 300 min

This section: 30 min (12 slides)

Section start time:

Section End Time:

Materials Needed

REVIEW introduction slides

Instructor's Notes

DO

In your own words:

Welcome to the course on inspection and maintenance of the electric traction machine room.

SAY

Advance

Machine rooms and their equipment can be modern like we saw in the previous slide, or older like we see here. This is a Otis geared machine from 1926 in Brussels, Belgium.

Advance

✓ PPT slides 1, 2







Module Length: 300 min

Time remaining: 300 min

This section: 30 min (12 slides) Section start time:

Section End Time:

DO	SAY	Materials Needed
Instructor's Notes	In your own words: Today we will Identify the areas and equipment in a traction elevator machine room where cleaning is required Identify the areas and equipment in a traction elevator machine room where lubrications is required Identify the areas and equipment in a traction elevator machine room where inspection is required List unacceptable conditions which require corrective action Advance Perform a sensory inspection of a machine room Perform an inspection of traction elevator machine room Perform an operational test on all safety devices in the machine room Advance	Depart of the precion and Hamitenance: Dectric Traction Machine Room Cutline Identify the areas and equipment in a traction elevator machine room where deaning is required Identify the areas and equipment in a traction elevator machine room where bub rications is required Identify the areas and equipment in a traction elevator machine room where inspection is required Identify the areas and equipment in a traction elevator machine room where inspection is required Ust unacceptable conditions which require corrective action Transit Elevator/Escalator Consortium Thewator Inspection and Hamitenance: Dectric Traction Machine Room Outline Perform a sensory inspection of a machine room Perform an operational test on all safety devices in the machine room Perform an operational test on all safety devices in the machine room Transit Elevator/Escalator Consortium **Jiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii



Module Length: 300 min

Time remaining: 300 min

This section: 30 min (12 slides) Section start time:

Section End Time:

Materials Needed DO SAY In your own words: ✓ PPT slide 5 Lets take a look at some of the key words we **REVIEW** key terms will be defining as move through this module: Physical senses Physical senses Preventive Maintenance Sensory inspection Preventive Maintenance (PM) Sensory inspection Advance W. Transit Flevator/EscalatorConsortiu **Instructor's Notes**



Module Length: 300 min

Time remaining: 300 min

This section: 30 min (12 slides) Section start time:

Section End Time:

Materials Needed

DO **ASK** participants what they remember about safety and elevators SMALL GROUP ACTIVITY **WRITE Instructor's Notes**

In your own words:

Thinking back to other courses or just in general, what do we already know about electric traction machine room?

SAY

Possible maintenance requirements for these machine rooms?

Allow participants to think for a minute and perhaps discuss with a partner ideas as well as write down any ideas. Discuss participant responses and if possible list them on a chalk board or similar.

Advance

✓ PPT slide 6



- Chalk board or large paper
- Blank Paper
- Writing instruments



Module Length: 300 min

Time remaining: 300 min

This section: 30 min (12 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slide 7 **REVIEW** slide A traction elevator's machine room is typically located at the top of the structure, directly . Locations: top of structure, directly over or over or adjacent to the shaft or hoistway. · ASME Code guidelines for construction and layout - Door configuration **Advance** The machine room must be - Lighting - Ventilation - Fire safety equipment constructed and laid out within the guidelines - Equipment identification Technician ensures code requirements are met of ASME and jurisdictional codes and these Transit Elevator/Escalator Consortiur cover a myriad of guidelines including room Instructor's Notes door configuration, lighting, ventilation, fire safety equipment, identification of equipment, to name a few! **Advance** As such, it is the task of the elevator technician to make sure the machine room meets these code requirements. **Advance**



Module Length: 300 min

Time remaining: 300 min

This section: 30 min (12 slides) Section start time:

SAY

Section End Time:

Materials Needed

DO **REVIEW** slides **ASK** Instructor's Notes

In your own words:

Again, within the electric traction elevator system there are four main areas: we have already covered overhead, length of hoistway, and pit. Now we will cover the machine room.

Advance

Ask

What types of equipment can be found in a machine room?

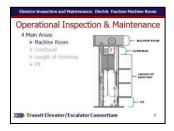
Allow participants to discuss possible answers.

Advance for answers.

The elevator technician can expect to spend much of the work day in the machine room where the hoist motor, brake, gear (where applicable), sheaves, governor, controller, as well as other equipment that supports these major machinery are located.

Do Not Advance

✓ PPT slides 8, 9







Module Length: 300 min

Time remaining: 300 min

This section: 30 min (12 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 9, 10 **REVIEW** slides This equipment must be regularly maintained and serviced to keep the elevators working. Electric Traction Machine Roon The technician generally does preventive Equipment ✓ Hoist motor **ASK** maintenance, such as lubricating and ✓ Gear (when applicable) √ Sheaves √ Governor greasing moving parts, replacing worn parts, ✓ Controller ✓ Any other supporting equipment and adjusting equipment for optimal Transit Elevator/Escalator Consorti performance. Instructor's Notes Advance Electric Traction Machine Room Preventive Maintenance (PM) · Documents detailing procedures for maintenance and · Typically paper, sometimes computerized or both · Records and observations must be kept up-to-date Every transit agency has a system whereby it · Identifies equipment and parts for repair or replacement · Provides checklist of tasks documents all inspection and maintenance of elevator equipment. Transit Elevator/Escalator Consortiur **Ask** What do we know about preventive maintenance? Allow participants to discuss possible answers. Advance for answers.



Module Length: 300 min

Time remaining: 300 min

This section: 30 min (12 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slide 10 **REVIEW** slide The technician is provided with a checklist of **Preventive Maintenance (PM)** procedures Electric Traction Machine Room Preventive Maintenance (PM) that is typically in a paper form but may also · Documents detailing procedures for maintenance and **ASK** . Typically paper, sometimes computerized or both be computerized checklist or a combination of · Records and observations must be kept up-to-date · Identifies equipment and parts for repair or replacement both. Recording maintenance work and · Provides checklist of tasks observations is an essential part of Transit Elevator/Escalator Consortiu maintenance and such records must be kept Instructor's Notes up to date. Good records help in identifying equipment or parts that may need to be repaired or replaced. The checklist also provides a means whereby tasks and procedures are not skipped or forgotten. Advance



Module Length: 300 min

Time remaining: 270 min

This section: 30 min (8 slides)

Section start time:

Section End Time:

Materials Needed

REVIEW slides

DO

Instructor's Notes

In your own words:

A traction elevator's machine room is typically Every technician working in a transit environment must follow two published guidelines for working safely around elevator equipment: one, the Elevator Industry Field Employees' Safety Handbook published by National Elevator Industry, Inc., and, two, the safety policy of the transit authority with which the technician works.

SAY

Advance

Lets look at what a sensory inspection of an electric traction machine room might turn up first.

Advance

✓ PPT slides 11, 12







Module Length: 300 min

Time remaining: 270 min

This section: 30 min (8 slides)

Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slide 13 **REVIEW** slide During a **sensory inspection** a good elevator technician relies on the physical senses of Sensory Inspection **Physical Senses** sight, smell, hearing, and touch while **ASK** inspecting and maintaining the elevator. Inside Machine Room: dim/no lighting, items that should not be in the machine room, dust/dirt. **Ask** What may indicate a problem within an identified which machines go with which elevator where applicable, scoring on the brake drum, missing guards, clarity of oil. electric traction machine room as indicated by Transit Elevator/Escalator Consortium sight? Instructor's Notes Discuss possible answers Advance for sample answers Outside Machine Room: Clutter blocking access, signage Inside Machine Room: dim/no lighting, items that should not be in the machine room. dust/dirt, overflowing drip pans (geared only), clearly identified which machines go with which elevator where applicable, scoring on the brake drum, missing guards, clarity of oil. Advance



Module Length: 300 min

Time remaining: 270 min

This section: 30 min (8 slides)

Section start time:

Section End Time:

Materials Needed

DO **REVIEW** slide **ASK**

Instructor's Notes

In your own words:

Ask What may indicate a problem within an electric traction machine room as indicated by smell?

SAY

Discuss possible answers Advance for sample answers

Inside Machine Room: excessive oil, burnt oil, burning coils, overheating brakes, burnt components or overheating electrical wires Advance

✓ PPT slide 14





Module Length: 300 min

Time remaining: 270 min

This section: 30 min (8 slides)

Section start time:

Section End Time:

Materials Needed DO SAY In your own words: ✓ PPT slide 15 **REVIEW** slide **Ask** What may indicate a problem within an electric traction machine room as indicated by Sensory Inspection **Physical Senses** hearing? Outside Machine Room: sound of sliding, clicking **ASK** Discuss possible answers Inside Machine Room: rattling, knocking (geared Advance for sample answers Outside Machine Room: sound of sliding, Transit Elevator/Escalator Consortiu clicking Instructor's Notes Inside Machine Room: rattling, knocking (geared only), noises from the sheaves, dragging on the brake drum. Brush chatter. Advance



Module Length: 300 min

Time remaining: 270 min

This section: 30 min (8 slides)

Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slide 16 **REVIEW** slide **Ask** What may indicate a problem within an electric traction machine room as indicated by **Physical Senses** touch? What May indicate a problemeat **ASK** Discuss possible answers Advance for sample answers Inside Machine Room: excessive heat near Transit Elevator/Escalator Consorti bearing housing (both) and gear case (geared Instructor's Notes only), stagnant air/inadequate ventilation, improper heating and cooling inside the machine room. Excessive heat on the brake shoe. With more experience, you will become more familiar with the normal sights, smells, sounds and feel of the system. During a sensory inspection, check for deviations from this norm. Advance



Module Length: 300 min

Time remaining: 270 min

This section: 30 min (8 slides)

Section start time:

Section End Time:

Materials Needed DO SAY In your own words: Lets see what we have learned so far: ✓ PPT slide 17 **ASK** The rattling, knocking (geared only), noises Sensory Inspection from the sheaves, dragging on the brake Knowledge Check . The rattling, knocking (geared only), noises from the sheaves, dragging on the brake drum and brush drum and brush chatter would all be detected sensory inspection by a _____ sensory inspection. d. touch a. sight Transit Elevator/Escalator Consortiu smell hear Instructor's Notes touch Call on participants for answer Advance once given the correct answer Answer: c. hear Advance



Module Length: 300 min

Time remaining: 270 min

This section: 30 min (8 slides)

Section start time:

Section End Time:

Materials Needed

ASK Instructor's Notes

In your own words:

Dim lighting, dust, clutter, missing guards, scoring on the brake drum, missing signs, and overflowing drip pans would be all detected by a ______ sensory inspection.

SAY

- a. sight
- b. smell
- c. hear
- d. touch

Call on participants for answer
Advance once given the correct answer

Answer: a. sight

Advance

✓ PPT slide 18

	Sensory Inspection
	Knowledge Check
2.	Dim lighting, dust, clutter, missing guards, scoring on the brake drum, missing signs, and overflowing drip pans would be all detected by asensory inspection. a. sight b. smell c. hear d. touch



Module Length: 300 min

Time remaining: 270 min

This section: 30 min (8 slides)

Section start time:

Section End Time:

Materials Needed

ASK

Instructor's Notes

DO

In your own words:

Describe a possible brake problem which would be indicated by touch.

SAY

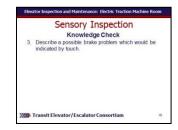
Call on participants for answer Advance once given the correct answer

Answer:

Inside Machine Room: excessive heat near bearing housing (both) and gear case (geared only), stagnant air/inadequate ventilation, improper heating and cooling inside the machine room. Excessive heat on the brake shoe.

Advance

✓ PPT slide 19





Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

DO **REVIEW** slide **REFER** participants to Course book

In your own words: Have participants turn to page in their course book. Instruct participants to take additional notes for each component on this page. Advance

SAY

✓ PPT slide 20

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Room sheet.	2		/	- 8
Motor	12	- 2		
Desired machine:		8		
Desiress Inschole:	100			
Brake	1	- 26		
Sovemor	12	7		
Sheeve		1		
Controller		707mm		
Space provided below	Ter addition			
3		_		

Course book

Instructor's Notes



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed DO SAY In your own words: ✓ PPT slides 21, 22 **REVIEW** slides Lets look at the areas and equipment we will want to focus on for maintenance and Operational Inspection & Maintenance inspection of an electric traction machine √Room Check room. √Sheaves √ Governor ✓ Room Check √ Controller ✓ Motor Transit Elevator/Escalator Consorti ✓ Gear Instructor's Notes √Brake Operational Inspection & Main √ Sheaves √ Brake √ Governor √Sheaves √ Controller Advance m Transit Elevator/Escalator Consortiu We'll start with a room check. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slide 23 **REVIEW** slide Among the tasks that an elevator technician must take care of in the machine room are: . Floor is free of oil, grease and dirt Make sure that the machine room floor is free · Empty trash cans, remove debris and sweep · Check for water infiltration · Ensure all maintenance fluids are sealed, identified of oil, grease and dirt. and stored properly · Communication equipment is working as designed · Fire extinguisher is identified and charged **Advance** Empty trash cans, remove debris · Machine room lighting is properly operating · All equipment guards and covers are in place and sweep floor. The elevator machine room Transit Elevator/Escalator Consortiun must be cleaned to prevent the hazards of Instructor's Notes slipping, tripping, fire, and contamination of equipment. **Advance** Check for any water infiltration. **Advance** Check that all maintenance fluids are sealed, identified and stored in an inflammable storage cabinet. Only equipment and materials necessary for operating and maintaining the elevator is allowed to be stored in the machine room. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 23, 24 **REVIEW** slides Check that communications equipment is working as designed. · Floor is free of oil, grease and dirt **Advance** Check that a fire extinguisher is · Empty trash cans, remove debris and sweep · Check for water infiltration · Ensure all maintenance fluids are sealed, identified clearly identified in the machine room and is and stored properly · Communication equipment is working as designed · Fire extinguisher is identified and charged fully charged. · Machine room lighting is properly operating · All equipment guards and covers are in place **Advance** Check that all machine room Transit Elevator/Escalator Consortiu lighting is adequate and receptacles are Instructor's Notes operational. Room Check Check that all equipment guards and covers are in place. Advance Transit Elevator/Escalator Consortiu Here is a photo of an electric traction machine room and items to be checked. Review photo and indicated items with participants. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

REVIEW slide



REFER participants to Course book

DO

instr	uct	or's	NO	tes	

In your own words:

Have participants turn to page in their course book. Instruct participants to add any additional notes as per specific transit authority procedures related to electric traction machine room check at this time. Advance

SAY

✓ PPT slide 25

			m Checklist	
Conserved	Clean	Laborate	Perfectional Nation	
Room sheek	1			
Motor	196	- 20		
Deared machine		~		
Descript machine	16			
Dress.	×	- X		
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Course book



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 26, 27 **REVIEW** slides Lets move on and look at the motor. Advance Operational Inspection & Maintenance ✓ Motor With the elevator running, listen and observe the hoist motor for: Unusual noises. Correct the defect if possible. **Advance** Discoloration, mica levels, Instructor's Notes eccentricity, cleanliness, excessive sparking, With Motor Running · Unusual noises, correct if possible and brush chatter on the armature and Discoloration, mica levels, eccentricity, cleanliness excessive sparking, and brush chatter on the armature and commutator commutator. · Excessive noise and heat in the motor bearings **Advance** Excessive noise and heat in the motor bearings. Transit Elevator/Escalator Consortium Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slide 28 **REVIEW** slide With Power Off: Grease bearings on hoist motor. With Power Off **Advance** Confirm that the rubber on the · Grease bearings on hoist motor · Confirm rubber on encoder roller is intact and making contact with brake drum, ensure tension encoder roller is intact and is making contact Visually inspect electrical connections to brush rigging for heat damage, burn marks and fraying with the brake drum, and that the tension Check brushes are moving freely. Vacuum dust around brushes spring is in place. Correct defect if possible. Transit Elevator/Escalator Consortiur **Advance** Visually inspect electrical Instructor's Notes connections to the brush rigging for heat damage, burn marks and fraying, due to over current or loose connections. Correct defect if possible. Check that the brushes are moving freely in the brush holder. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 29, 30 **REVIEW** slides Check the wear on the brushes and replace as required. Use the correct brush as With Power Off continued replacement. · Check wear on brushes, replace with correct bru · Ensure brush is seated with correct pressure **Advance** Ensure that the brush is properly Inspect field coils and interpoles for damage breakdown and loose connections. Tighten where seated with the correct pressure against the commutator. Transit Elevator/Escalator Consor Advance Instructor's Notes Inspect the field coils and interpoles (where applicable) for damage, insulation breakdown and loose connections. Tighten loose connections where indicated. Advance Transit Elevator/Escalator Consorti Here is a photo of an electric traction motor and areas to be checked. Review photo and indicated items with participants. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 31, 32 **REVIEW** slides If Motor Generator is present and with the elevator running, listen and observe the motor Motor - Generator With Motor Running generator set for: · Unusual noises, correct if possible Discoloration, mica levels, eccentricity, cleanliness excessive sparking, and brush chatter on the Unusual noises. Correct defect if possible. armature and commutator Excessive noise and heat in the motor bearings **Advance** Discoloration, mica levels, eccentricity, cleanliness, excessive sparking. and brush chatter on the armature and Instructor's Notes Motor - Generator commutator. With Power Off Grease bearings on motor generator set **Advance** Excessive noise and heat in the · Visually inspect electrical connections to brush rigging for heat damage, burn marks and fraying · Check brushes are moving freely motor bearings. · Check wear on brushes, replace with correct brush · Ensure brush is seated with correct pressure Advance · Inspect field coils for damage, breakdown and loose connections. Tighten where needed. Transit Elevator/Escalator Consortiun With Power Off: Grease bearings on hoist motor. Confirm that the rubber on the encoder roller is intact and is making contact with the brake drum, and that the tension spring is in place. Correct defect if possible. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slide 32 **REVIEW** slide Visually inspect electrical connections to the brush rigging for heat damage, burn marks Motor - Generator With Power Off and fraying, due to over current or loose · Grease bearings on motor generator set Visually inspect electrical connections to brush rigging for heat damage, burn marks and fraying connections. Correct defect if possible. · Check brushes are moving freely · Check wear on brushes, replace with correct to **Advance** Check that the brushes are moving · Ensure brush is seated with correct pressure Inspect field coils for damage, breakdown and loose connections. Tighten where needed. freely in the brush holder. Transit Elevator/Escalator Consortiun **Advance** Check the wear on the brushes Instructor's Notes and replace as required. Use the correct brush as replacement. **Advance** Ensure that the brush is properly seated with the correct pressure against the commutator. **Advance** Inspect the field coils and interpoles (where applicable) for damage, insulation breakdown and loose connections. Tighten loose connections where indicated. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

REVIEW slide

DO

In your own words:

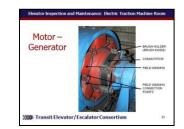
Here is a photo of an electric traction motor generator and areas to be checked.

SAY

Review photo and indicated items with participants.

Advance

✓ PPT slide 33



Instructor's Notes



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

ASK

DO

Instructor's Notes

In your own words:

Lets see what we have learned so far: Describe what should happen in a room check of an electric traction machine room.

SAY

Call on participants for answer Advance once given the correct answer

Answer:

Floor is free of oil, grease and dirt Empty trash cans, remove debris and sweep Check for water infiltration

Ensure all maintenance fluids are sealed. identified and stored properly Communication equipment is working as

Designed

Fire extinguisher is identified and charged Machine room lighting is properly operating All equipment guards and covers are in place Advance

✓ PPT slide 34





Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Knowledge Check

Materials Needed DO SAY In your own words: Describe a difference between inspection and ✓ PPT slide 35 **ASK** maintenance of a motor and a motor-Operational Inspection & Maintenance generator. Describe a difference between inspection and maintenance of a motor and a motor-generator. Call on participants for answer Advance once given the correct answer Answer: Transit Elevator/Escalator Consorti On a motor with the power off, confirm rubber on encoder roller is intact and making contact Instructor's Notes with brake drum, ensure tension spring is in place. This does not need to be conducted with a motor generator. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

REVIEW slide



REFER participants to Course book

DO

instructor's Notes				

Instructor's Notes

In your own words:

Have participants turn to page in their course book. Instruct participants to add any additional notes as per specific transit authority procedures related to electric traction machine room check at this time. Advance

SAY

✓ PPT slide 36



Course book



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

SAY

Section End Time:

Materials Needed

REVIEW slides

DO

Instructor's Notes

In your own words:

Lets move on and look at the Gear.

Advance

Gear

Inspection and maintenance of the gear machinery means that the technician should clean, check for wear, change oil, flush, and lubricate. Observe in operation, listen for noise, check motion, and check bearings. Advance

✓ PPT slides 37, 38







Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: **REVIEW** slides With the car running, observe the operation of the gearbox: Advance Check the worm shaft for excessive play or With Power Off backlash, leaking seals, noise and excessive · Grease bearings heat Observe and verify through access covers Instructor's Notes that the helical gear is carrying oil and being lubricated. Check the oil level of the gear case and add lubricant as required. With Power Off: Advance Grease bearings. Advance Here is a photo of an electric traction gear unit

and areas to be checked.

participants. Advance

Review photo and indicated items with

✓ PPT slides 39, 40







Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

DO **REVIEW** slide **REFER** participants to Course book

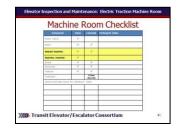
Instructor's Notes

In your own words:

Have participants turn to page in their course book. Instruct participants to add any additional notes as per specific transit authority procedures related to electric traction machine room check at this time. Advance

SAY

✓ PPT slide 41



Course book



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 42, 43 **REVIEW** slides Lets move on and look at the Brake. Advance Operational Inspection & Mainter For the Drive Machine Brake and with the √Brake elevator running: Check that the brake lifts and sets, without Transit Elevator/Escalator Consorti delay. Instructor's Notes **Advance** Visually inspect for clearance With Elevator Running · Check brake lifts and sets, without delay between the brake pads and drum. The brake Inspect clearance between brake pads and drum - Brake pad should not drag - If dragging, correct pad should not be dragging. If it is dragging, Check brake switches for proper adjustment and - Correct as required with power off correct the defect. **Advance** Check that the brake switches are Transit Elevator/Escalator Consortiur properly adjusted and secured. Correct the defect as required with the power off. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 44, 45 **REVIEW** slides With Power Off: Verify that all fasteners are in place (e.g. Drive Machine Brake With Power Off springs, pivot pins, cotter pins, nuts, etc). · Verify all fasteners are in place Springs, pivot pins, cotter pins, nuts, etc **Advance** Examine the brake lining for Examine brake lining for uneven wear · Clean brake assembly, lubricate pivot points Inspect brake coil for damage, insulation breakdown uneven wear. - Tighten loose connections if needed **Advance** Clean the brake assembly and Transit Elevator/Escalator Consorti lubricate brake pivot points. Instructor's Notes **Advance** Inspect the brake coil for damage, Drive Machine Brake insulation breakdown (if possible) and loose connections. Tighten loose connections, if required. Advance))))) Transit Elevator/Escalator Consortiur Here is a photo of an drive machine brake and areas to be checked. Review photo and indicated items with participants. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

REVIEW slide



REFER participants to Course book

DO

Instructor's Notes						

In your own words:

Have participants turn to page in their course book. Instruct participants to add any additional notes as per specific transit authority procedures related to electric traction machine room check at this time. Advance

SAY

✓ PPT slide 46



Course book



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

ASK

Instructor's Notes

DO

In your own words:

Lets see what we have learned so far: Checking worm shaft for excess play and checking for leaking seals should be done with for the inspection and maintenance of gears...

SAY

- a. power off
- b. the car running

Call on participants for answer Advance once given the correct answer

Answer: b. the car running

Advance

✓ PPT slide 47

Op	erational Inspection & Mainte	nance
1.	Knowledge Check Checking worm shaft for excess play and che for leaking seals should be done with for the inspection and maint	
	of gears a. power off b. the car running	onanoo
))))))-	Transit Elevator/Escalator Consortium	47



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO	SAY	Materials Needed
? ASK	In your own words: Check brake lifts and sets without delay with a. power off b. elevator running	✓ PPT slide 48 Checator Inspection and Haintenance: Electric Traction Hacknes Room
Instructor's Notes	Call on participants for answer Advance once given the correct answer Answer: b. elevator running Advance))))))-Transit Elevator/Escalator Consortium 4



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

REVIEW slides

DO

Instructor's Notes

In your own words:

Lets take a look at sheaves.

Advance

Typically the drive sheave and sometimes a secondary sheave are located in the elevator machine room.

SAY

Advance Grease all sheave bearings in machine room. Although not in the machine room, there are other sheaves that must also be greased.

Advance The elevator technician must also check grooves for wear and seating path and shape.

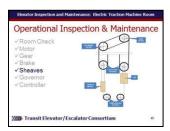
Advance

Here is a illustration of sheaves and areas to be checked.

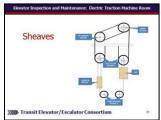
Review photo and indicated items with participants. Advance

✓ PPT slides 49, 50, 51

Materials Needed









Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slide 52 **REVIEW** slide Look for wear, breakage, rust (rouging) and fraying ropes. Check that terminating ends Ropes are securely fastened. Make sure they are not - Wear, breakage, rust (rouging) and fraying - Terminating ends are securely fastened - No dragging on pit floor dragging on the pit floor. If they are dragging - Mark ropes with chalk to indicate location of this means that runby space may be unexamined rope section - Later examine from other area inadequate. Transit Elevator/Escalator Consortiur Advance Instructor's Notes Experienced mechanics will mark the ropes with chalk to indicate the location of the unexamined section of ropes, later examining them from the machine room or other areas such as the overhead machinery space or from the pit. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slide 53 **REVIEW** slide Check for crown wear, broken strands, or reduced cable diameter. Some transit agencies provide their mechanics with a - Crown wear - Broken strands - Reduced cable diameter pocket-sized gauge to check rope diameter Secure attachment at safety carrier or attachment point, adjust accordingly Governor rope defects, report & follow transit agency and whether or not the diameter may be worn Clean dirt and grease contamination beyond allowable specifications. Transit Elevator/Escalator Consortiu **Advance** Report defects with the governor Instructor's Notes rope and follow the standard maintenance procedures of the transit agency. Check that there is a secure attachment at the safety carrier or safety attachment point and adjust accordingly. Advance Clean dirt and grease contamination. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

SAY

Section End Time:

Materials Needed

REVIEW slide



REFER participants to **Bethlehem Elevator**

DO

Rope Technical Bulletin 3 & 6

Instructor's Notes

In your own words:

Direct attention and share with participants:

- Bethlehem Elevator Rope® Technical Bulletin 3 on rouging which accompanies Module 7B: Traction Hoistway.
- Bethlehem Elevator Rope® Technical Bulletin 6 on lubricant build-up on ropes which accompanies Module 7B: Traction Hoistway.

Advance

✓ PPT slide 46



Bethlehem **Elevator Rope** Technical Bulletin 3 & 6



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

DO **REVIEW** slide **REFER** participants to Course book Instructor's Notes

In your own words: Have participants turn to page in their course book. Instruct participants to add any additional notes as per specific transit authority procedures related to electric traction machine room check at this time. Advance

SAY

✓ PPT slide 54



Course book



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 56, 57 **REVIEW** slides Lets move on and look at the Governor. Advance Operational Inspection & Maintenance √Room Check √Gear Electrically trip the governor switch and √ Brake √Sheaves √ Governor confirm that the elevator does not operate. Reset the switch and clean as required. If the Transit Elevator/Escalator Consort switch is not functioning as designed, correct Instructor's Notes the defect as required. Governor Electrically trip governor switch - Confirm non-operation of elevator **Advance** Grease the governor sheave - Reset switch, clean as required - If switch is not functioning, correct as required Grease governor sheave bearing being careful not to lubricate the - Be careful not to lubricate the governor rope Inspect governor rope for evidence of lubricant - Additional lubricant may prevent application of governor rope. · Clean build up of dirt and lubricant **Advance** Inspect the governor rope for any Transit Elevator/Escalator Consortium evidence of lubricant. The additional lubricant may interfere with the ability of the governor to retard the governor rope and apply the safety. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 57, 58 **REVIEW** slides Clean any build up of dirt and lubricant. Advance · Electrically trip governor switch - Confirm non-operation of elevator - Reset switch, clean as required - If switch is not functioning, correct as required Check the governor rope data tag and verify Grease governor sheave - Be careful not to lubricate the governor rope Inspect governor rope for evidence of lubricant that the rope complies with the specification - Additional lubricant may prevent application of · Clean build up of dirt and lubricant on the governor marking plate. Inspect the Transit Elevator/Escalator Consortiu governor rope. Instructor's Notes **Advance** Check the running clearance Governor · Check governor rope data tag between the governor rope and the governor - Verify rope complies with governor marking pla - Inspect governor rope Check running clearance between governor rop jaw. · Check governor trip speed calibration seal is intact **Advance** Check that the governor trip speed calibration seal is intact.))) Transit Elevator/Escalator Consortiun Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed DO SAY In your own words: **REVIEW** slide Have participants turn to page in ✓ PPT slide 58 their course book. Machine Room Checklist Instruct participants to add any additional **REFER** participants to notes as per specific transit authority Course book procedures related to electric traction machine room check at this time. Advance Instructor's Notes Course book



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: ✓ PPT slides 60 **REVIEW** slides Controllers will be addressed in Module 9. Other Equipment · Lubricate bearings So the last part we want to review for machine · Fan blades and related equipment - Clean and examine - Replace exhaust fan helt as required room inspection is other equipment. Any Mechanical ventilation Check proper operation of cooling/heating systems Perform full emergency power test other equipment will require the following: Lubricate bearings Wik Transit Flevator/Escalator Consorti **Advance** Clean and examine fan blades and Instructor's Notes related equipment. Replace machine room exhaust fan belt as required. **Advance** Check that the mechanical ventilation, cooling and heating systems are operating properly. **Advance** Perform a full emergency power test. Advance



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

ASK

Instructor's Notes

DO

In your own words:

Lets see what we have learned so far: Yes or No. When greasing governor sheave, be careful not to lubricate the governor rope.

SAY

Call on participants for answer Advance once given the correct answer

Answer: Yes.

Advance

✓ PPT slide 61

Operational Inspection & Maintenance Knowledge Check Yes or No. When greasing governor sheave, be careful not to lubricate the governor rope. Transit Elevator/Escalator Consortiu



Module Length: 300 min

Time remaining: 240 min

This section: 90 min (43 slides) Section start time:

Section End Time:

Materials Needed

ASK

Instructor's Notes

DO

In your own words:

When inspecting ropes, what extra step does an experienced mechanic take?

SAY

Call on participants for answer Advance once given the correct answer

Answer: Experienced mechanics

- Mark ropes with chalk to indicate location of unexamined rope section
- Later examine from other area

Advance

✓ PPT slide 62

Operational Inspection & Maintenance Knowledge Check 2. When inspecting ropes, what extra step does an experienced mechanic take? Transit Elevator/Escalator Consortiu



Module Length: 300 min

Time remaining: 150 min

This section: 120 min

Section start time:

Section End Time:

Materials Needed DO SAY In your own words: ✓ PPT slide 63 **ASK** Take time to visit the field to provide an example demonstration and opportunities Time for a Field Trip for participants to perform the following **CLASSROOM** tests: **ACTIVITY** Perform a sensory inspection of a machine room Perform an inspection of traction elevator Instructor's Notes machine room Perform an operational test on all safety devices in the machine room Advance



Module Length: 300 min

Time remaining: 30 min

This section: 30 min (4 slides)

Section start time:

Section End Time:

DO SAY **Materials Needed** In your own words: [Read slide. ✓ PPT slides 64, 65, 66 **CLASSROOM** For each objective, briefly review what **ACTIVITY** Conclusion was learned in this module or ask · Identify hoistway areas and associated components. · Identify hoistway areas and associated components, participants to share what they have which require cleaning · Identify hoistway areas and associated components, which require lubrication learned for each learning objective and · List all hoistway auxiliary lighting which require inspection briefly discuss as a class.] Transit Elevator/Escalator Consortiu Advance Read slide. Instructor's Notes Conclusion · Perform a sensory inspection of the hoistway For each objective, briefly review what · Perform an inspection of components in a traction elevator hoistway · Perform an operational test on all safety devices in was learned in this module or ask Perform an operational test on all auxiliary lights participants to share what they have learned for each learning objective and manual Elevator/Escalator Consortium briefly discuss as a class.] Advance Conclusion · Deflector Sheaves · Heat/smoke detectors Lets take a look at some of the key words we Hoistway vent · Limit switches · Overhead Clearance have defined as moved through this module. Physical senses · Secondary spaces · Sensory Inspection Read slide. Discuss definitions as a · Sprinkler heads Transit Elevator/Escalator Consortiun group. Advance



Module Length: 300 min

Time remaining: 30 min

This section: 30 min (4 slides)

Section start time:

Section End Time:

DO	SAY	Materials Needed
CLASSROOM ACTIVITY INDIVIDUAL ACTIVITY Instructor's Notes	In your own words: Administer quizzes.	✓ PPT slides 67 ✓ Quizzes ✓ Pencils Ground Heater Safety Procedures Quiz Time """ Transit Elevator/Escalator Consortium 15