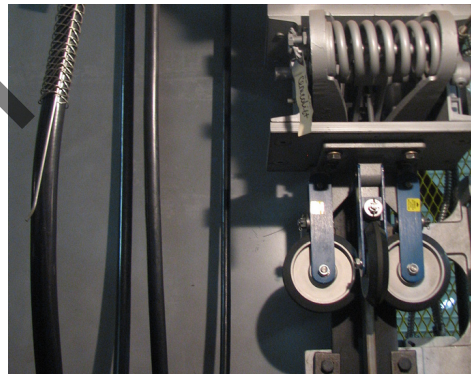
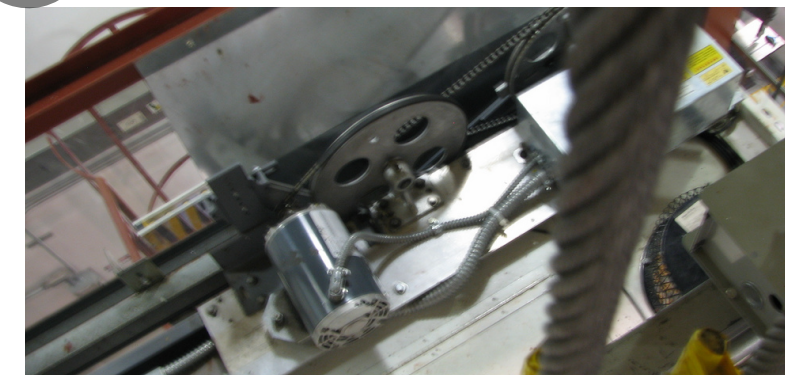
Instructor Guide





214: Elevator: Electrical Systems
Module 7: Drive Motor Circuits

TRANSIT ELEVATOR/ESCALATOR CONSORTIUM

Table of Contents

Icons Used In This Guide

- **REVIEW** slides
- **INDIVIDUAL ACTIVITY**
- **ASK**
- **WRITE**
- **CLASSROOM ACTIVITY**
- Multimedia
- **SMALL GROUP ACTIVITY**
- **REFER** participants to

Agenda

Topic #	Topic Title	Duration
1	Overview	30 Minutes
2	Drive Motors	60 Minutes
3	Drive Power Circuits	60 Minutes
4	Field Trip	90 Minutes
5	Motor Protection, Faults, Starters	60 Minutes
6	Wiring Configurations	30 Minutes
7	Motor Replacements	30 Minutes
8	Field Trip	60 Minutes
9	Summary	30 Minutes
	Total Time:	450 Minutes

Overview

Purpose The purpose of this module is to:

Provide the participant with an overview of the circuits that operate the drive motor system.

Objectives

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

- Identify the types of drive motors associated with each type of elevator system.
- Describe the types of overload protection and their method of operation.
- List and describe the different types of possible motor faults.
- List and describe the different types of starters.
- Identify and trace the wiring configuration for a drive motor using a schematic.
- Describe the method used to change out a drive motor specific to the elevator.

Materials

Mandatory Make sure you have the following

- PowerPoint Presentation
- Coursebook
- Quizzes
- Pencils

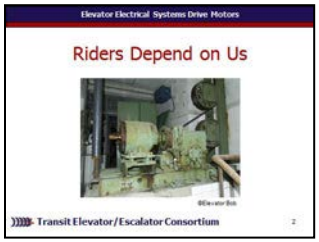
Optional You may also want the following for optional activities:

- Chalk board with chalk, large paper with marker, etc.
- Internet connection
- Lab, simulator or out of service elevator
- Sample starters
- Examples of various motors and drives

Elevator – Drive Motor Circuits

Instructor's Guide

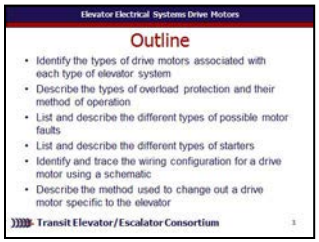
Module Length: 450 min Time remaining: 450 min This section: 30 min (11 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
REVIEW introduction slides **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Welcome to the course on Elevator Electrical Systems, Drive Motors. ***Advance*** Hopefully you will never encounter this, and this module is a step in the direction of knowing elevator drive motor systems and how to avoid this situation. ***Advance***	✓PPT slides 1, 2  

Elevator – Drive Motor Circuits

Instructor's Guide

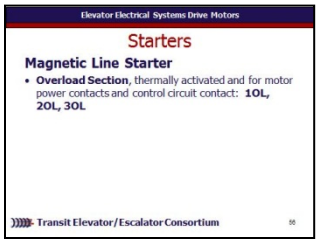
Module Length: 450 min Time remaining: 450 min This section: 30 min (11 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
REVIEW module objectives **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Today we will - Identify the types of drive motors associated with each type of elevator system. - Describe the types of overload protection and their method of operation. - List and describe the different types of possible motor faults. - List and describe the different types of starters. - Identify and trace the wiring configuration for a drive motor using a schematic. - Describe the method used to change out a drive motor specific to the elevator. ***Advance***	✓PPT slide 3 

Elevator – Drive Motor Circuits

Instructor's Guide

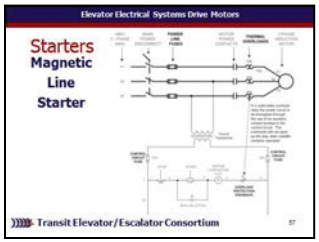
Module Length: 450 min Time remaining: 210 min This section: 60 min (20 slides) *Section start time:* _____ *Section End Time:* _____

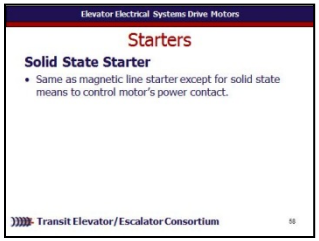
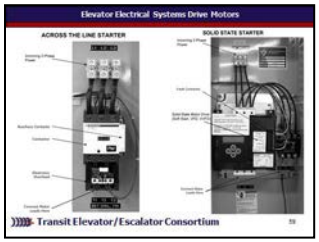
DO	SAY	Materials Needed
REVIEW slides **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** The final main section of a magnetic line starter is the Overload section designated as 1OL, 2OL, and 3OL for the motor's power contacts and OL for the control circuit contact. These contacts are thermally activated in the event that motor becomes overloaded. As previously described, the overloads provide electrical protection for the motor by monitoring and sensing the motor's normal running current. In the event that the motor for some reason becomes overloaded, which means that it's being worked beyond its design capability, the overload control contact will break the circuit to the magnetic coil or solid state control which then opens the power contacts to the motor bringing it to a stop thereby preventing any heat damage to the drive motor. ***Advance***	✓PPT slides 57 

Elevator – Drive Motor Circuits

Instructor's Guide

Module Length: 450 min Time remaining: 210 min This section: 60 min (20 slides) *Section start time: _____* *Section End Time: _____*

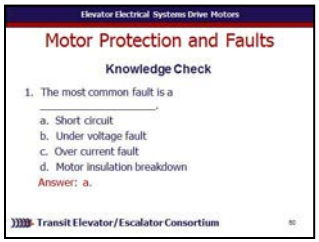
DO	SAY	Materials Needed
REVIEW slides **CLASSROOM ACTIVITY** **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** ***[Demonstrate: Point out the various parts of the starter as illustrated on the schematic and described below.]*** Here is a schematic showing the power lugs for connecting the supply wires known as the Line Side designated as terminals L1, L2, L3, and you can see the lugs for connecting the wire leads directly to the motor again known as the Load Side designated as T1,T2, T3. You can see the magnetic coil connected to the control circuit as well as the Overload section designated as 1OL, 2OL, and 3OL for the motor's power contacts and OL for the control circuit contact. Again, these contacts are thermally activated in the event that motor becomes overloaded. ***Advance***	✓PPT slides 58 

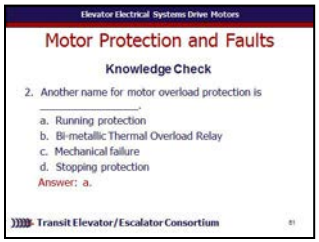
DO	SAY	Materials Needed
REVIEW slides **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** A solid state starter operates the same as a magnetic line starter except this type uses solid state means to control the motor's power contacts. ***Advance*** ***[<u>Compare</u>: Point out the various parts of the starter as illustrated on the photo and described previously.]*** ***Advance***	✓PPT slides 59, 60  

Elevator – Drive Motor Circuits

Instructor's Guide

Module Length: 450 min Time remaining: 210 min This section: 60 min (20 slides) *Section start time:* _____ *Section End Time:* _____

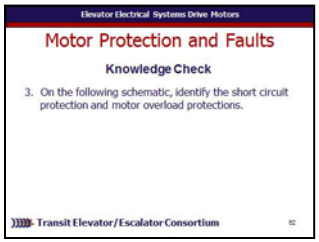
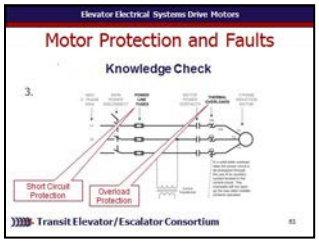
DO	SAY	Materials Needed
ASK **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** The most common fault is a _____. a. Short circuit b. Under voltage fault c. Over current fault d. Motor insulation breakdown ***Call on participants for answer*** ***Advance once given the correct answer*** Answer: a. ***Advance***	✓PPT slide 61 

DO	SAY	Materials Needed
ASK **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Another name for motor overload protection is _____. a. Running protection b. Bi-metallic Thermal Overload Relay c. Mechanical failure d. Stopping protection ***Call on participants for answer*** ***Advance once given the correct answer*** Answer: a. ***Advance***	✓PPT slide 62 

Elevator – Drive Motor Circuits

Instructor's Guide

Module Length: 450 min Time remaining: 210 min This section: 60 min (20 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
ASK **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** On the following schematic, identify the short circuit protection and motor overload protections. ***Call on participants for answer*** ***Advance once given the correct answer*** Answer: see diagram ***Advance***	✓PPT slides 63, 64  

Elevator – Drive Motor Circuits

Instructor's Guide

Module Length: 450 min | Time remaining: 120 min | This section: 30 min (4 slides) | *Section start time: _____* | *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slides **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Before removing a drive motor from the elevator, the elevator should be suspended in the hoistway by having the counterweight landed on the landing blocks in the pit. This will prevent any unintended movement. All electrical power should be removed and the machine should be locked and tagged out. Before disconnecting motor and control wires, all wires should be tagged. Disconnect the motor from the brake pulley. Remove lock down bolts that secure the motor to the base plate. Check for any shims under the base of motor. When using the same motor, count and separate the shims so that the same shims will go in the same location and order. The shims are there to correct any deviation in aligning the shafts. ***Advance***	✓PPT slides 74 

Elevator – Drive Motor Circuits

Instructor's Guide

Module Length: 450 min | Time remaining: 90 min | This section: 60 min | *Section start time: _____* | *Section End Time: _____*

DO	SAY	Materials Needed
ASK **CLASSROOM ACTIVITY**	**In your own words:** ***[At instructor's discretion, take time to visit the field and look for examples drive motor systems.*** ***Advance.***	✓PPT slide 76 

Instructor's Notes

_____

_____

_____

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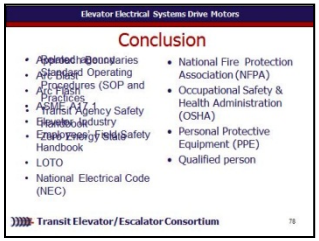
_____

Module Length: 450 min | Time remaining: 30 min | This section: 30 min (4 slides) | *Section start time: _____* | *Section End Time: _____*

DO	SAY	Materials Needed
CLASSROOM ACTIVITY **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Lets take a look at some of the key words we have defined as moved through this module. ***Read slide. Discuss definitions as a group.*** ***Advance.*** ***Read slide. Discuss definitions as a group.*** ***Advance.*** ***Read slide. Discuss definitions as a group.*** ***Advance.***	✓PPT slide 79 

Elevator – Drive Motor Circuits

Instructor's Guide

Module Length: 450 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 80 ✓Quizzes ✓ Pencils