Escalator Specific Electrical Systems

Course 209

PARTICIPANT GUIDE

Transit Elevator/Escalator Training Consortium

Escalator: Electrical Systems

Participant Guide

Transit Elevator/Escalator Maintenance Training Consortium

COURSE 209

REVISION INDEX

Any additions, deletions, or revisions are to be listed below.

Revision No.	Date	Section	Description of Change	Revision Author
1.	08-25-2015		Final edits of 10-31-2012 version	Transportation Learning Center – Amri Joyner

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TABLE OF CONTENTS

LIST OF FIGURES

Page

HOW TO USE THE PARTICIPANT GUIDE

Purpose of the Course

The purpose of the *Escalator: Electrical Systems Course* is to assist the participant in demonstrating proper safety procedures and a working knowledge of the functions of various escalator and elevator components, controls, and assemblies.

Approach of the Book

Each course module begins with an outline, a statement of purpose and objectives, and a list of key terms. The *outline* will discuss the main topics to be addressed in the module. A list of *key terms* identifies important terminology that will be introduced in this module. *Learning objectives* define the basic skills, knowledge, and abilities course participants should be able to demonstrate to show that they have learned the material presented in the module. A list of *key terms* identifies important terminology that will be introduced in each course module.

MODULE 1

General Electrical Safety Procedures

Outline

Purpose and Objectives

The purpose of this module is to provide participants with a basic knowledge of safety procedures and to demonstrate best practice safety behaviors during the testing and maintenance of vertical transportation electrical systems.

Following the completion of this module, the participant should be able to complete the objectives with an accuracy of 75% or greater:

- Identify safety oversight sources
- Discuss and list the safety rules for avoiding electrical shock
- Explain shock protection boundaries of energized electrical equipment
- Describe the types of PPE which may be required when working on live equipment
- Describe several causes of electrical burns
- Demonstrate Lockout/Tagout (LOTO) Procedures
- Explain the reason for grounding of electrical equipment
- Determine dangerous levels of electrical current as it relates to the human body
- Identify general safety practices

Key Terms

- Approach Boundary
- Arc Blast
- Arc Flash
- American Society of Mechanical Engineers (ASME)
- ASME A17.1
- Electrical Shock
- Elevator Industry Field Employees' Safety Handbook (EIFESH)
- Lockout/Tagout (LOTO)
- National Electrical Code (NEC)
- National Fire Protection Association (NFPA)
- Occupational Safety & Health Administration (OSHA)
- Personal Protective Equipment (PPE)
- Qualified Person
- Ventricular Fibrillation
- Zero Energy State

The **governor speed device** is attached to the high-speed (input) shaft of the gear reducer, just beyond the machine brake in the drive machine. It consists of a proximity sensor and pulsar disc. The pulsar disc has magnetic strips that are evenly spaced within the disc. As the disc rotates, these magnetic strips pass by the proximity sensor. As this happens, a signal is created and sent to a switch. The switch has upper and lower set points to stop the escalator at +/- 20% of the nominal motor speed. The signal is a square wave, ON when detecting the magnet and OFF when no magnet is found.

Figure 3.8 illustrates several speed sensing systems.

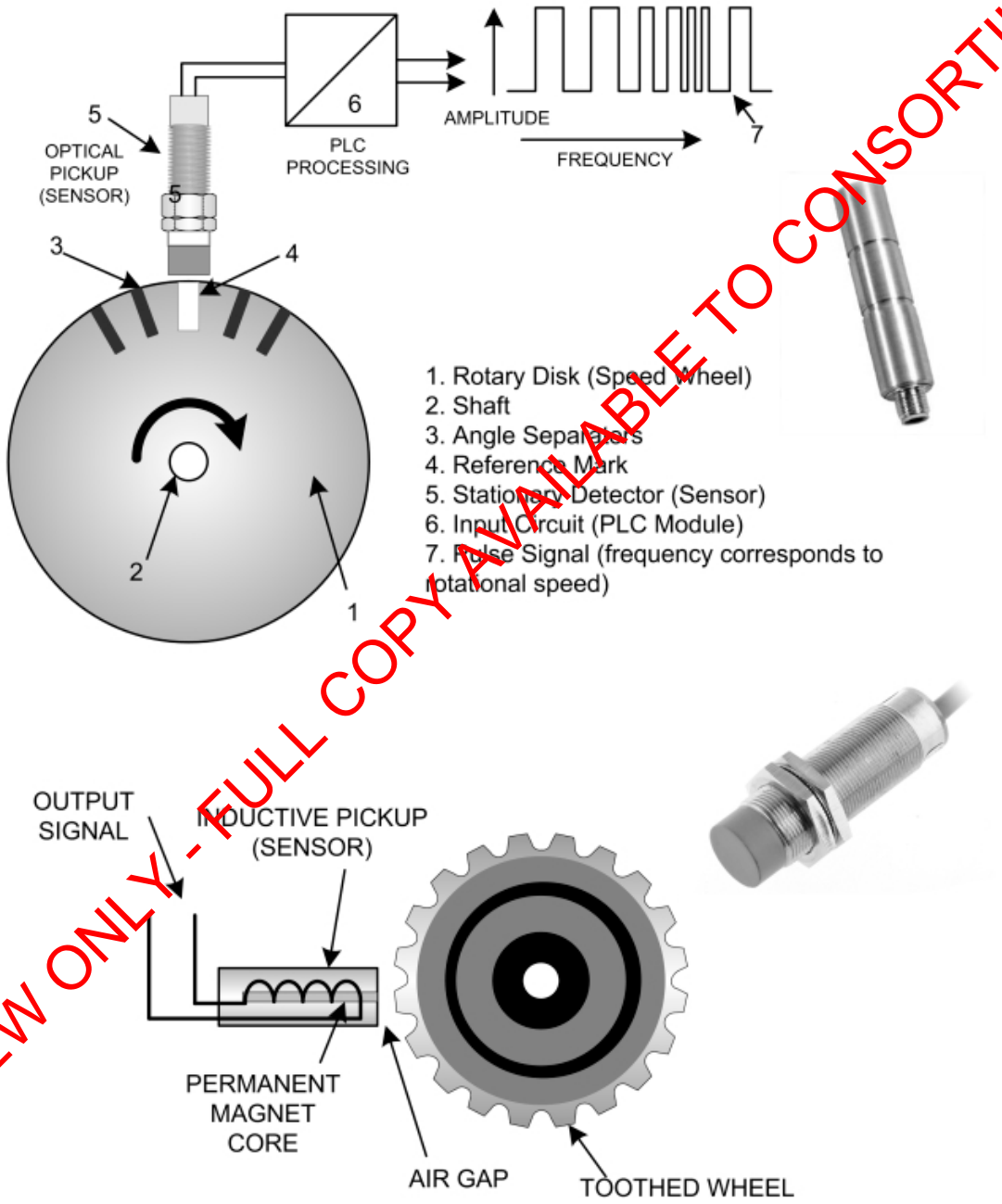

Figure 3.8 Examples of Speed Sensing Systems

Mechanical System Safety Circuits

Mechanical system safety circuits are incorporated in the escalator to protect the mechanical systems of a transit escalator. This type of protection shuts down electrical power to the escalator drive to prevent extensive damage to the mechanical parts.

The **step upthrust** safety device stops the escalator when a step is forced upward before entering the combplate. This device prevents the step from crashing into the combplate, causing damage to the step, comb fingers and, possibly, other components. When the riser end of the step is displaced upward more than 5mm (0.20 in.), it will trip a lever arm on the limit switch. The switch cuts off electrical power to the motor and brake, stopping the escalator before the step enters the combplate with any load up to the brake rated load with the escalator running.

The **broken step chain** device cuts electrical power to the escalator motor and brake, stopping the escalator in the event of drive chain breakage or excessive sag in either of the step chains. This limit switch must be manually reset before the reset at the controller can occur. In modular systems this device may be attached to the tension carriage in the lower truss of the escalator and it will cause the escalator to stop if the tension carriage moves too far forward or backward. The modular system device consists of a plunger-type limit switch mounted on a bracket attached to the truss and a kicker that will actuate the switch if moved too far in either direction.

Step lateral displacement devices detect when a step experiences a sideward displacement at either side of the step riser or at the step chain axle due to wear or failure. Typically, this type of device is a rotary-style limit switch. The switch cuts electrical power to the motor and brake, stopping the escalator and the limit switch must be manually reset.

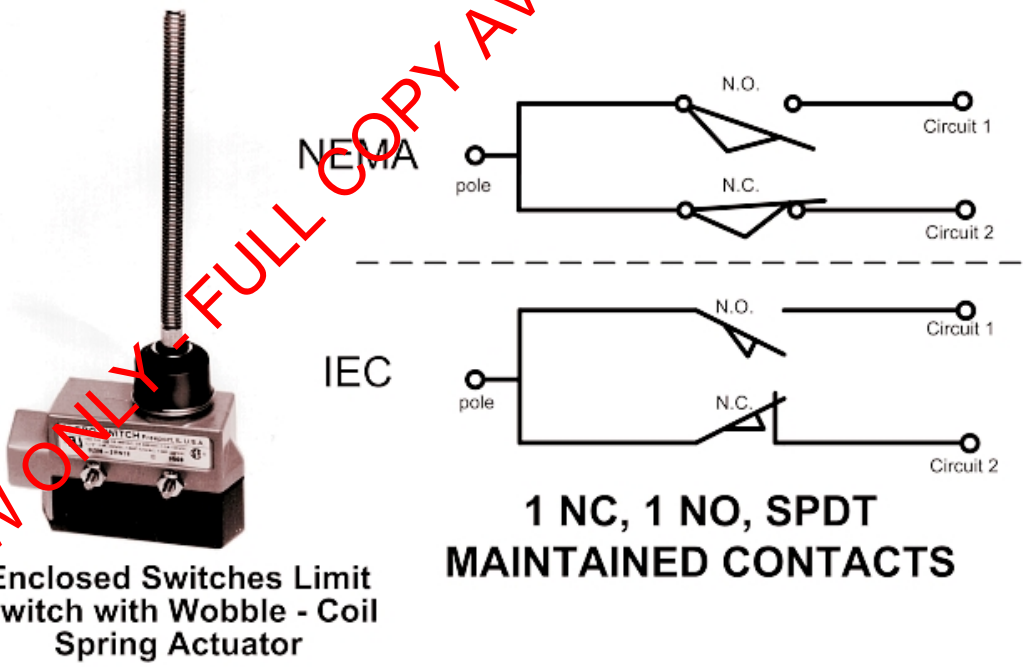

Figure 3.9 Mechanical System Safety Circuits