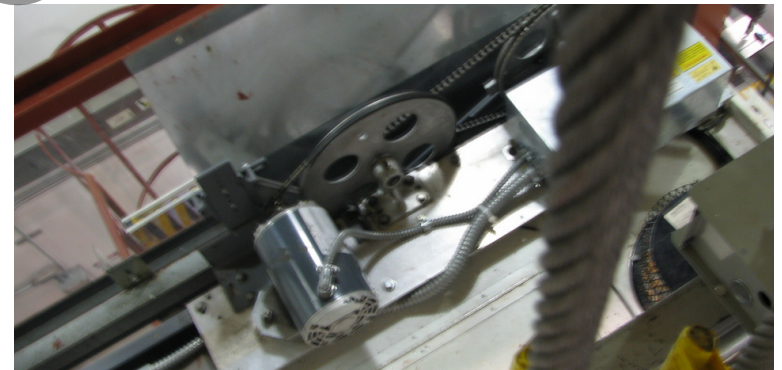
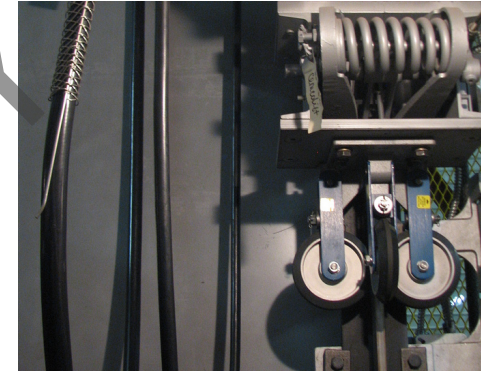


Instructor Guide



302: Advanced Electrical Printreading Module 2: Electronic Sensors

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Table of Contents

Overview.....	4
Escalator Handrail Sensor.....	13
Elevator Door Sensor.....	34
Field Trip/Activity.....	53
Summary.....	54

PREVIEW ONLY

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Icons Used In This Guide



REVIEW slides



ASK



CLASSROOM ACTIVITY



SMALL GROUP ACTIVITY



INDIVIDUAL ACTIVITY



WRITE



Multimedia



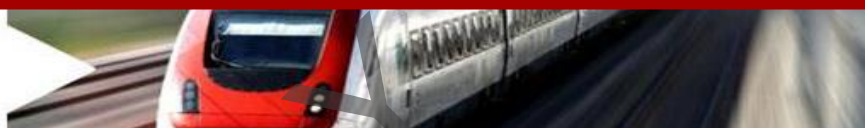
REFER participants to

Agenda

Topic #	Topic Title	Duration
1	Overview	30 Minutes
2	Escalator Hand Rail Sensor	60 Minutes
3	Elevator Door Sensor	60 Minutes
4	Field Tri[Activity]	60 Minutes
5	Summary	30 Minutes
	Total Time:	240 Minutes

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Overview

Purpose The purpose of this module is to:

Provide the participant with methods of interpreting electrical prints as they apply to common electronic sensors in elevator and escalator systems.

Objectives

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

- List common types of solid state sensors in escalator and elevator systems
- Interpret logic diagram for a solid state sensor in an escalator system
- Interpret logic diagram for a solid state sensor in an elevator system

Materials

Mandatory Make sure you have the following

- PowerPoint Presentation
- Coursebook
- Quizzes
- Pencils
- Handouts: Electronic Sensors

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
- Example Handrail Sensor or Sensors for participants to observe
- Sensor logic diagram(s) from your transit authority

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 240 min This section: 30 min (9 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 464 144 568" data-label="Image"></div> <div data-bbox="154 499 618 549" data-label="Text"> <p>REVIEW module objectives</p> </div> <div data-bbox="28 792 444 839" data-label="Section-Header"> <h3>Instructor's Notes</h3> </div> <div data-bbox="28 892 608 1242" data-label="Form"> <hr/><hr/><hr/><hr/><hr/> </div>	<div data-bbox="676 421 1023 464" data-label="Section-Header"> <h3>In your own words:</h3> </div> <div data-bbox="676 485 917 528" data-label="Text"> <p>Today we will:</p> </div> <div data-bbox="676 535 1381 842" data-label="List-Group"> <ul style="list-style-type: none"> • List common types of solid state sensors in escalator and elevator systems • Interpret logic diagram for a solid state sensor in an escalator system • Interpret logic diagram for a solid state sensor in an elevator system </div> <div data-bbox="676 842 840 885" data-label="Section-Header"> <h3>Advance</h3> </div>	<div data-bbox="1497 471 1729 514" data-label="Text"> <p>✓ PPT slide 3</p> </div> <div data-bbox="1535 528 1854 763" data-label="Image"> </div>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 240 min This section: 30 min (9 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 431 139 534"></div> <div data-bbox="162 468 446 511">ASK participants</div> <div data-bbox="34 554 139 656"></div> <div data-bbox="146 596 539 632">SMALL GROUP ACTIVITY</div> <div data-bbox="34 676 139 779"></div> <div data-bbox="162 711 284 746">WRITE</div> <div data-bbox="30 791 444 839"> Instructor's Notes <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> </div>	<div data-bbox="678 425 1020 468">In your own words:</div> <div data-bbox="678 488 1352 574">Thinking back to other courses or just in general, what do we already know about</div> <div data-bbox="678 591 1392 773"> <ul style="list-style-type: none"> • Interpreting electrical schematics and diagrams? • Electronic sensors in elevators and escalators? </div> <div data-bbox="678 851 1360 1156"> <p><i>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.</i></p> <p>Advance</p> </div>	<div data-bbox="1499 454 1721 496">✓PPT slide 5</div> <div data-bbox="1541 528 1854 762"> </div> <div data-bbox="1514 802 1818 965"> <ul style="list-style-type: none"> ✓ Paper and pencils ✓ Chalk board or similar </div>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 210 min This section: 60 min (23 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564"></div> <div data-bbox="177 504 417 539">REVIEW slide</div> <div data-bbox="34 588 144 688"></div> <div data-bbox="177 615 260 651">ASK</div> <div data-bbox="30 792 444 835">Instructor's Notes</div> <div data-bbox="30 896 610 1239"> <hr/><hr/><hr/><hr/><hr/> </div>	<div data-bbox="676 425 1020 464">In your own words:</div> <div data-bbox="676 489 1358 618">In these situations, the escalator must be serviced by authorized personnel before returning to an operable state.</div> <div data-bbox="676 679 836 715">Advance</div>	<div data-bbox="1499 472 1744 508">✓ PPT slide 10</div> <div data-bbox="1541 529 1854 762"> </div>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 210 min This section: 60 min (23 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564"></div> <div data-bbox="170 492 428 528">REVIEW slides</div> <div data-bbox="34 592 144 692"></div> <div data-bbox="170 621 504 664">REFER participants</div> <div data-bbox="28 792 444 835"> <h3>Instructor's Notes</h3> <hr/><hr/><hr/><hr/><hr/><hr/> </div>	<p>In your own words: <i>REFER participants to the course book for a closer look at the diagrams.</i> <i>Review the component section with participants pointing out the various locations of the parts:</i></p> <ul style="list-style-type: none"> 1 – Sensor assembly 2 – Switch, limit 8 – Lever assembly 12 – Washer, lock 13 – Nut, hex 17 – Screw, cylinder head 18 – Washer, disk 19 – Roller assembly 20 – Shaft roller, cluster 28, 29 – Bracket, handrail mounting <p>Advance</p>	<p>✓ PPT slide 15</p> <div data-bbox="1541 528 1854 763"> </div> <p>✓ Course book</p>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 210 min This section: 60 min (23 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564"></div> <div data-bbox="170 492 409 528">REVIEW slide</div> <div data-bbox="34 592 144 692"></div> <div data-bbox="170 621 502 664">REFER participants</div> <div data-bbox="34 792 444 835"> <h3>Instructor's Notes</h3> <hr/><hr/><hr/><hr/><hr/><hr/> </div>	<div data-bbox="676 428 1023 464">In your own words:</div> <div data-bbox="676 478 1439 821"> <p>The sensors must run synchronously with the step band and the signals from the handrail speed sensors and the step band speed sensor are sent to the controller. In case of a deviation in speed of +/- 5%, a warning lamp in the control cabinet will illuminate. In case of a deviation in speed of +/- 20%, the escalator will switch off.</p> </div> <div data-bbox="676 842 840 878">Advance</div> <div data-bbox="676 942 1381 978">REFER participants to the course book</div> <div data-bbox="676 992 1391 1071"> <p>Here is the illustration showing the handrail sensor location.</p> </div> <div data-bbox="676 1078 840 1113">Advance</div>	<div data-bbox="1497 471 1825 506">✓ PPT slides 17, 18</div> <div data-bbox="1535 528 1854 756"> </div> <div data-bbox="1535 778 1854 1006"> </div> <div data-bbox="1535 1056 1816 1092">✓ Course book</div>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 210 min This section: 60 min (23 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564"></div> <div data-bbox="170 492 428 528">REVIEW slides</div> <div data-bbox="34 592 144 692"></div> <div data-bbox="170 621 504 664">REFER participants</div> <div data-bbox="34 792 444 835"> <h3>Instructor's Notes</h3> <hr/><hr/><hr/><hr/><hr/> </div>	<p>In your own words: REFER participants to the course book. Using the larger diagram in your course book, lets trace and interpret logic diagram for a solid state sensor in an escalator system. Looking at area # 1, +24VDC is supplied to the handrail speed sensors originating from TBX/X5 to UJB/X5.</p> <p>Advance</p> <p>Next in area #2, from UJB/X5 and X6 to J20 1 and 2 on Upper DeviceNet Input Card.</p> <p>Advance</p>	<p>✓ PPT slides 21, 22</p> <div data-bbox="1541 528 1854 763"> </div> <div data-bbox="1541 778 1854 1013"> </div> <p>✓ Course book</p>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 210 min This section: 60 min (23 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 468 139 571"></div> <div data-bbox="177 502 260 539">ASK</div> <div data-bbox="28 792 444 835">Instructor's Notes</div> <div data-bbox="28 892 608 1242"> <hr/><hr/><hr/><hr/><hr/> </div>	<div data-bbox="676 425 1439 599"> <p>In your own words: Laura does not understand what is happening in this section of the wire diagram. Explain to Laura what is happening.</p> </div> <div data-bbox="676 649 1246 728"> <p>Call on participants for answer Advance for the correct answer</p> </div> <div data-bbox="676 735 1381 863"> <p>Answer: +24VDC supply to handrail speed sensors originating from TBC/X5 to UJB/X5</p> </div> <div data-bbox="676 871 840 906"> <p>Advance</p> </div>	<div data-bbox="1497 471 1748 506">✓PPT slide 30</div> <div data-bbox="1535 528 1854 763"> </div>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 150 min This section: 60 min (27 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564" data-label="Image"></div> <div data-bbox="170 492 409 528" data-label="Text"> <p>REVIEW slide</p> </div> <div data-bbox="28 792 444 835" data-label="Section-Header"> <h3>Instructor's Notes</h3> </div> <div data-bbox="28 892 608 1242" data-label="Form"> <hr/><hr/><hr/><hr/><hr/> </div>	<div data-bbox="676 428 1023 464" data-label="Section-Header"> <p>In your own words:</p> </div> <div data-bbox="676 471 1429 642" data-label="Text"> <p>Sometimes called door detectors, Advance door sensors typically use infrared technology which works on the principle of beam interruption.</p> </div> <div data-bbox="676 649 1391 778" data-label="Text"> <p>Advance If there is an obstacle, such as a passenger, in the elevator doorway, the sensor will prevent the doors from closing.</p> </div> <div data-bbox="676 785 1429 999" data-label="Text"> <p>Advance Elevator door opening or closing is part of the elevator door sequence of operation which is the logical series of procedures that constitute the task for the controller.</p> </div> <div data-bbox="676 1021 840 1056" data-label="Text"> <p>Advance</p> </div>	<div data-bbox="1497 471 1748 506" data-label="Text"> <p>✓ PPT slide 33</p> </div> <div data-bbox="1535 528 1854 763" data-label="Image"> </div>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 150 min This section: 60 min (27 slides) Section start time: _____ Section End Time: _____



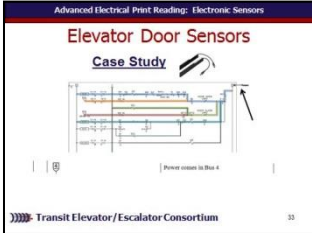
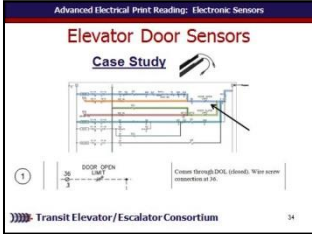
DO	SAY	Materials Needed
<div data-bbox="28 464 139 564"></div> <div data-bbox="170 496 409 531">REVIEW slide</div> <div data-bbox="28 592 139 702"></div> <div data-bbox="170 606 415 685">CLASSROOM ACTIVITY</div> <div data-bbox="28 792 444 835">Instructor's Notes</div> <div data-bbox="28 892 608 1242"> <hr/><hr/><hr/><hr/><hr/> </div>	<p>In your own words: This diagram is also in your course book. Lets consider the sequence of operation with this diagram. Suggestion A: Lecture – Explain each section of the diagram using the following PPT slides.</p> <p><u>OR</u></p> <p>Suggestion B: Participant Demonstration – Assign pairs of students to a section of the diagram. Allow them 5 minutes to review, discuss, and prepare short explanation of their assigned drawing section. Participant pairs should then take turns using the following PPT slides to lead the class through their assigned section. Advance</p>	<p>✓PPT slide 38</p> <div data-bbox="1541 531 1854 763"> <p>Advanced Electrical Print Reading: Electronic Sensors Elevator Door Sensors Case Study Overview of Print</p> </div>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 150 min This section: 60 min (27 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div> REVIEW slide</div> <div> REFER participants</div> <div><h3>Instructor's Notes</h3><div></div><div></div><div></div><div></div><div></div></div>	<p>In your own words: <i>REFER participants to course book if needed during review of diagram.</i></p> <p>Again, you may use your course books for a better view of the diagram if needed. Beginning with area #1, power comes in to Bus 4.</p> <p>Advance</p> <p>Continuing on in area # 1, comes through DOL (closed), and a wire screw connection at 36.</p> <p>Advance</p>	<p>✓ PPT slides 39, 40</p> <div></div> <div></div> <p>✓ Course book</p>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 150 min This section: 60 min (27 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564"></div> <div data-bbox="170 492 409 528">REVIEW slide</div> <div data-bbox="34 592 144 692"></div> <div data-bbox="170 621 506 664">REFER participants</div> <div data-bbox="28 792 444 835">Instructor's Notes</div> <div data-bbox="28 892 608 1242"> <hr/><hr/><hr/><hr/><hr/> </div>	<p>In your own words: <i>REFER participants to course book if needed during review of diagram.</i></p> <p>Looking at area #4, once power goes through resistor (47K1W), DCL information goes to the controller.</p> <p>Advance</p> <p>In area #5, Plug-on DC2 to DC coil to DO (closed). Once DC opens, DO closes.</p> <p>Advance</p>	<p>✓ PPT slides 47, 48</p> <div data-bbox="1541 528 1854 756"> </div> <div data-bbox="1541 778 1854 1006"> </div> <p>✓ Course book</p>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 150 min This section: 60 min (27 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 468 139 571"></div> <div data-bbox="177 502 260 539">ASK</div> <div data-bbox="28 792 444 835"> <p>Instructor's Notes</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> </div>	<div data-bbox="676 425 1023 464">In your own words:</div> <div data-bbox="676 471 1309 511">Lets see what we have learned so far:</div> <div data-bbox="676 531 1338 574">Name the abbreviation for the following:</div> <div data-bbox="772 596 1329 953"> <p>_____ Down Call</p> <p>_____ Door Closing Function</p> <p>_____ Door Open Limit Output</p> <p>_____ Door Closed Power Output</p> <p>_____ Door Open</p> <p>_____ Nudging Output</p> </div> <div data-bbox="676 1002 1242 1082"> <p><i>Call on participants for answer</i></p> <p><i>Advance for the correct answer</i></p> </div>	<div data-bbox="1497 471 1744 511">✓PPT slide 53</div> <div data-bbox="1541 528 1854 763"> </div>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 150 min This section: 60 min (27 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 468 139 571"></div> <div data-bbox="177 502 260 539">ASK</div> <div data-bbox="28 792 444 835">Instructor's Notes</div> <div data-bbox="28 892 608 1242"> <hr/><hr/><hr/><hr/><hr/> </div>	<div data-bbox="676 425 1329 821"> <p>In your own words: Yes or No. DO on the following ladder diagram stands for Door Open, and the diagram indicates the circuit is closed.</p> <p><i>Call on participants for answer</i> <i>Advance for the correct answer</i> Answer: Yes Advance</p> </div>	<div data-bbox="1497 471 1742 506">✓PPT slide 56</div> <div data-bbox="1541 528 1854 763"> </div>

Elevator-Escalator – Electronic Sensors

Instructor's Guide



Module Length: 240 min Time remaining: 30 min This section: 30 min (3 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 459 144 568"></div> <div data-bbox="177 488 423 568">CLASSROOM ACTIVITY</div> <div data-bbox="34 602 144 711"></div> <div data-bbox="170 631 562 668">INDIVIDUAL ACTIVITY</div> <div data-bbox="34 792 444 839"> <p>Instructor's Notes</p> <hr/><hr/><hr/><hr/><hr/> </div>	<p>In your own words:</p> <p><i>Administer quizzes.</i></p>	<ul style="list-style-type: none"> ✓ PPT slides 62 ✓ Quizzes ✓ Pencils <div data-bbox="1510 631 1823 863"> </div>