Power Generation

Technical Training

Participant Guide

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Power Generation

Controller

PowerCommand 3.3

Phase 1 Release

CMT6068-EN-PG
Created 10/2008

Revision History

v1.00 (10/2008)

1. Initial draft for product launch QTQ 2008

PowerCommand Control 3300 & HMI 320

Table of Contents

Diagrams: **17**

This section has copies of all prints used in the course.

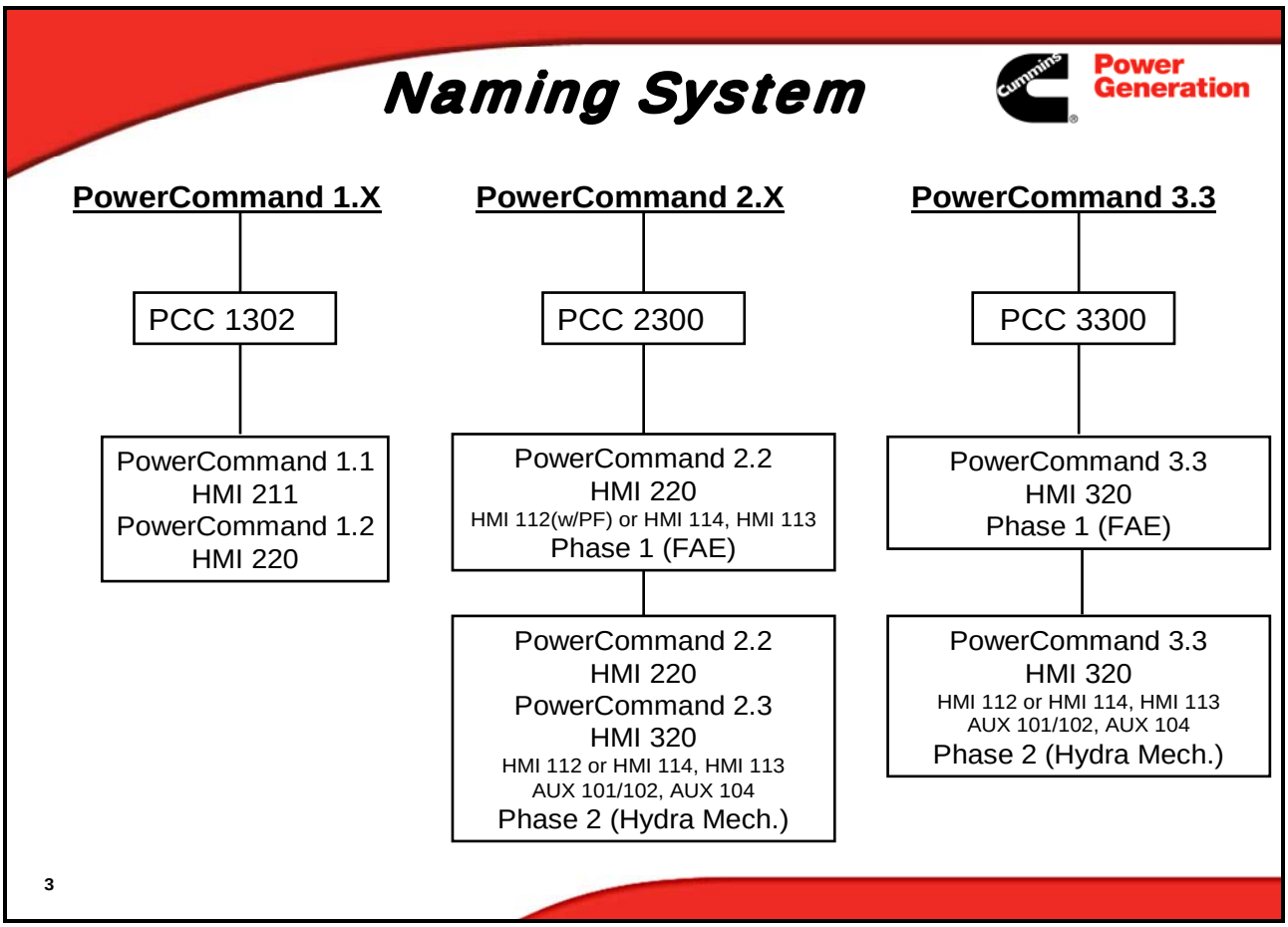
Module Comment Sheet: **18**

Participants are requested to turn in the Comment Sheet at the end of the course to help update the course materials as needed.

Participants have a copy of this sheet as the last page in their Participant Guide, but if you need a master we provide one here.

Preface:

The new generation of PowerCommand Controls will use a new easier to understand naming system. The new controls are modular and therefore it can be confusing to know what feature are being used it the genset control system is only referred to by the control board model. There are several combinations of control boards and HMIs



Naming Chart - PCC 1.X, 2.X, 3.X Naming System

The above naming chart shows the naming system for the new series of controls, PowerCommand Control 1.X, 2.X, and 3.X. The X represents the HMI Operator Panel you have with the series of control board.

Here is a list showing how they are structured:

1.X = PCC 1302 control board
2.X = PCC 2300 control board
3.X = PCC 3300 control board

X.1 = HMI 211
X.2 = HMI 220
X.3 = HMI 320

The PCC 2.X and 3.3 will be released in a couple of different phases. These phases will support certain devices as depicted in the visual above and in more detail throughout this training course.

The 2.X, & 3.X series designation will identify the high level of control ability however, there will be several subcategories of different control board features. The first category of 2.X, & 3.3 controls will only work on FAE controlled engines. The next category will be used with hydra mechanical engine applications. As new features and categories develop, additional training courses will also develop.

Series 2.X with FAE control training and 3.3 with FAE control training will be the most comprehensive training programs about the PCC 2300 and PCC 3300 controls. The training programs that follow will concentrate on the specific feature enhancements, HMI, or accessory developments relative to the specific Series. The Series 2.X & 3.3 FAE training will be a prerequisite to any future training program

It has been planned that the PCC 3300 & HMI320 combination will be the only combination available for the high level paralleling gensets. The plan is to only have a PC 3.3 control and never a PC 3.2 or PC 3.4.

Introduction

Welcome!

Welcome to the Particpants Guide for the *PC 3.3 & PowerCommand Control 3300* module! This guide was written by the Cummins Power Generation Technical Training department for your use and reference.

We suggest you read through the entire Introduction to become familiar with the guide's structure. Then, just follow the step-by-step instructions for each lesson.

Module Purpose

The purpose of the *PC 3.3 & PowerCommand Control 3300* module is to help you, the Cummins Power Generation distributor service technician, understand the *PC 3.3 & PowerCommand Control 3300* which is going to replace the specialized gen set control modules. It is also expected that the PowerCommand Control 3300 will be used on many of the Cummins−powered gensets with Full Authority Engines (FAE) and the hydro−mechanical fuel systems.

With this information, our technical force will be better prepared to meet our customers' varying needs.

Module Audience

The primary audience for this module is Cummins Power Generation distributor power generation technicians. We assume participants have previous experience with or knowledge of integrated generator set AC and DC control operation, troubleshooting, and repair procedures. It is a prerequisite to attend a PC 2.X course prior to attending this course.

Module Structure

This module contains lessons on related topics. Each lesson follows a carefully designed training format, including a warm up, presentation, and activity (or exercise).

Lesson Format

Warm ups help participants focus and begin thinking about the lesson topic. The *presentation* portion of the lesson is where participants receive new information. The *activity & Quiz* follows the presentation; it gives participants the chance to practice new skills or work with new ideas.

Module Assessment

After completing all the lessons in the module, participants will complete a *module assessment*. The module assessment lets us evaluate the level of knowledge participants have on the topic after completing the module.

Module Comment Form

Participants will also complete a *module comment form*. This form gives participants the chance to comment on the usefulness and effectiveness of the training module and make suggestions for improvements.

We will use the results from the module assessments and module comment forms to help us determine if there is a need to modify the module.

Please mail the module assessments and comment forms to Cummins Power Generation's Sales and Technical Training department as soon as possible after the training session. The address is:

Cummins Power Generation
Technical Training OUJ3
1400 73rd Avenue NE
Minneapolis, MN 55432

Preview the lessons––Review the lesson objectives and read through the trainer's instructions. Use the *Notes* column to write any comments or additional information you want to include.

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Visual 1-1 PowerCommand Control

Section 1

Introduction to the PCC 3.3, the PowerCommand Control 3300 control board and its options.

Estimated Time: 2.5 hours

Warm Up

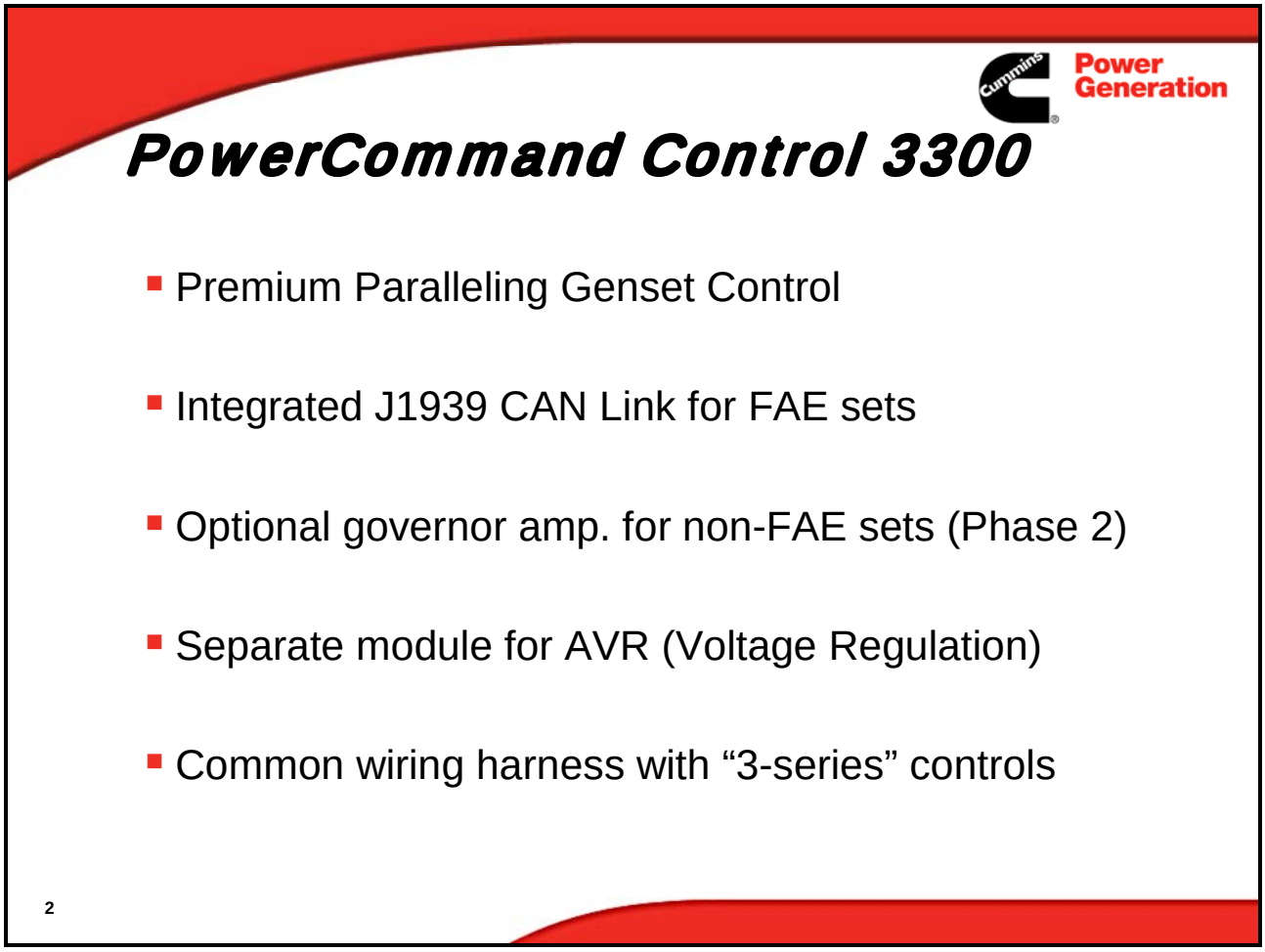
In this lesson we are going to learn about the PowerCommand Control 3300 and its components

We will see the standard and optional components, and learn their functions.

Objectives

After completing this lesson, the participants should be able to:

- Identify the PCC 3.3 standard components.
- Identify the PCC 3.3 & PowerCommand Control 3300 optional components.
- Describe the main functions of the PowerCommand Control 3300 and its features.
- Describe the standard operator interface (switch and LED).
- Use the Operator menus on the optional control panel.



Visual 1-2 Introduction to the PowerCommand Control 3300

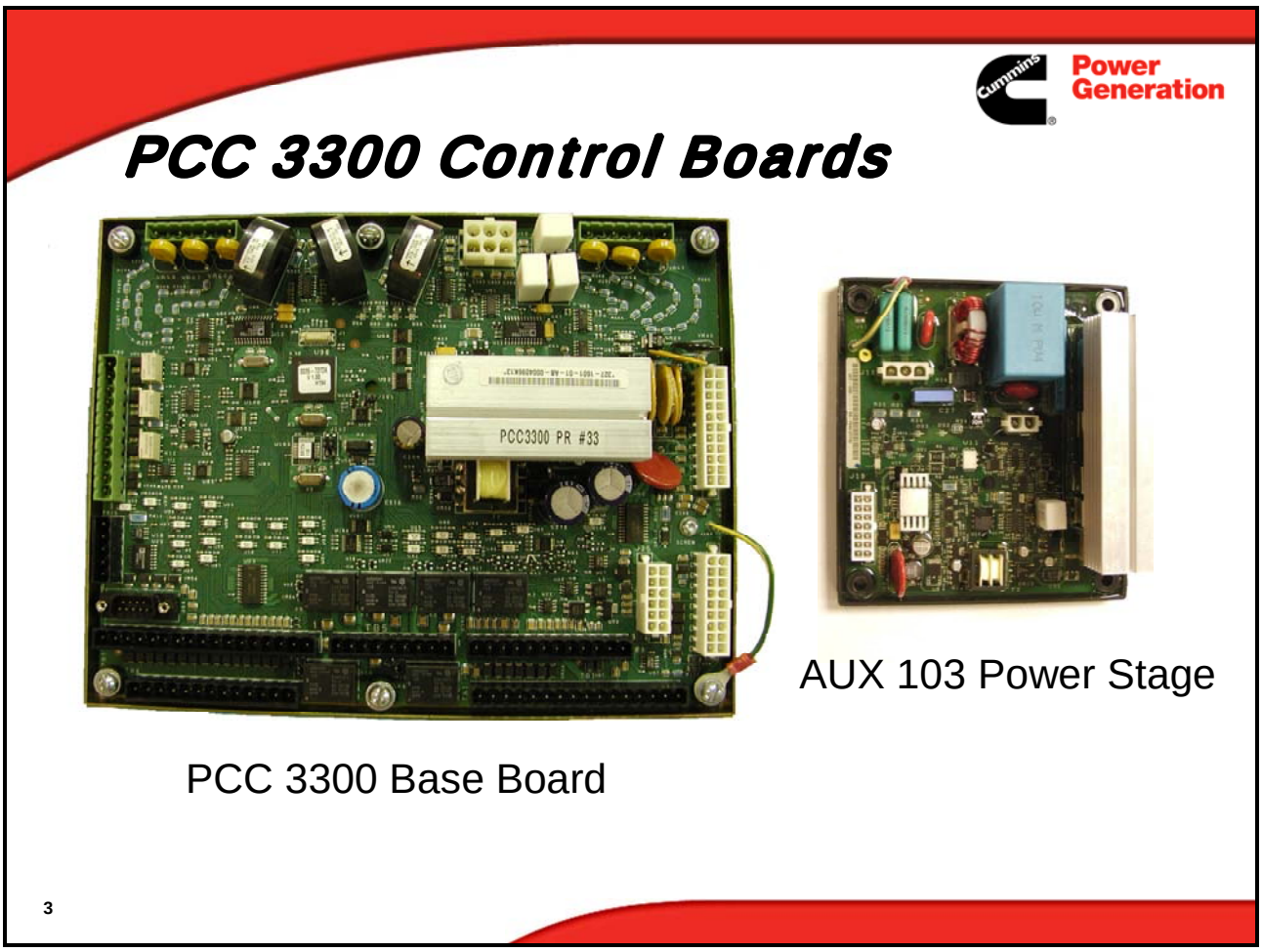
Participant’s Text

The PowerCommand Control 3300 is a highly integrated control providing complete genset control and protection.

The Phase 1 release of this new control will support Lean Burn Natural Gas (LBNG) gensets and Diesel FAE engine-driven sets

The phase 2 release will support a governor drive module which is needed for diesel sets equipped with electric actuator.

Notes:



Visual 1-3 The PCC 3300 Control Board

Participant's Text

The PCC 3300 board uses the same large potting shell as used in the MCM3320 and PCC 2300.

The control board provides many connectors for input and output information.

- Many of the connectors are common among all "3-series" controls.

This is the primary board of the control system and is call the Base board.

Notes:

Participant's Text

There are14 connection points on the PCC 3300:

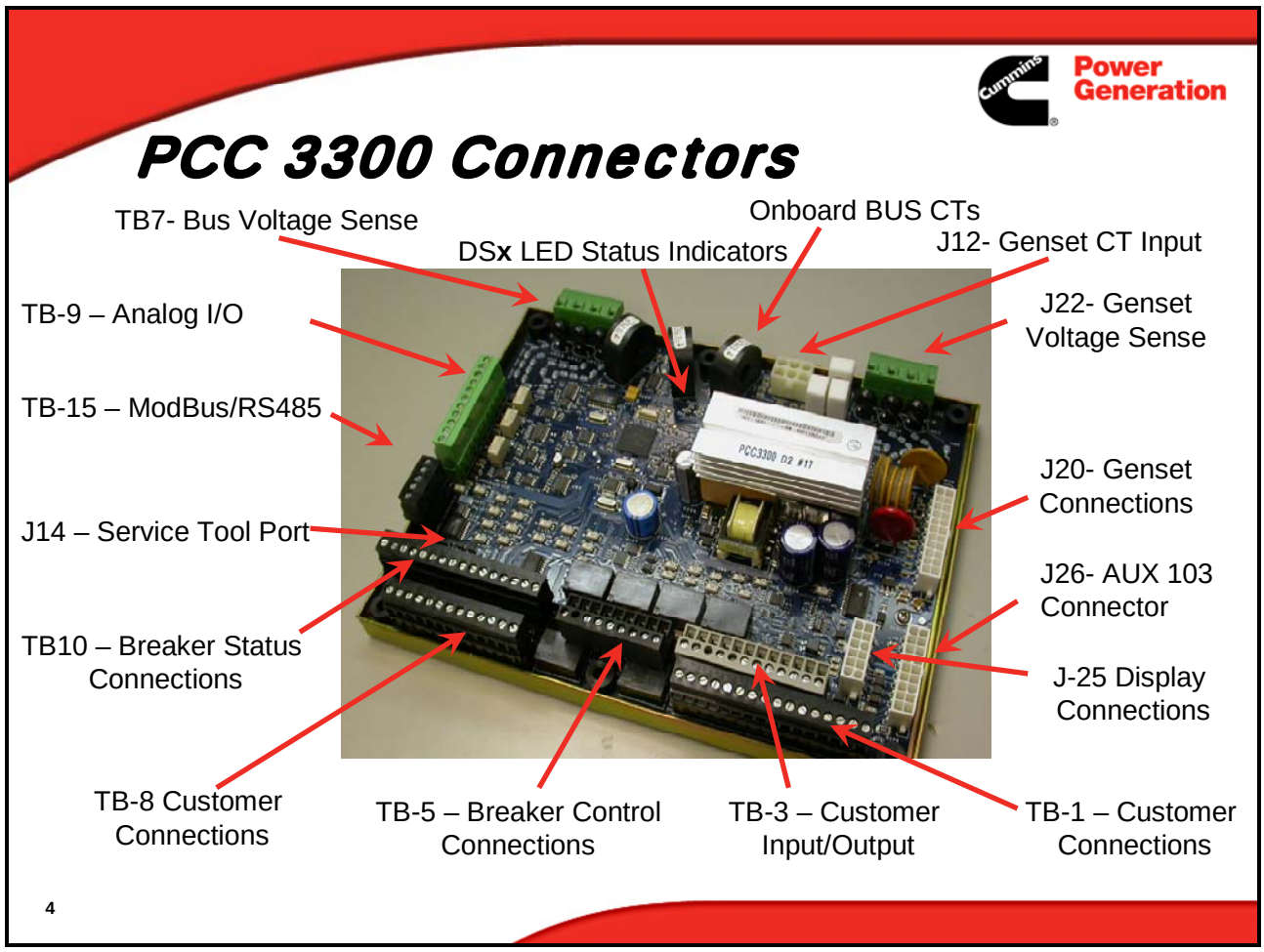
- **J** Connections – Common Connectors.
- **TB** Connections – Customer Connections and Feature inputs.

3 CT connection on the PCC 3300:

3 connection points on the AUX 103 Power Stage:

- J17 – Excitation Output (X1, X2)
- J18 – AVR Power (PMG)
- J19 – AVR Control Communications

Notes:



Visual 1-4 Control Board Connectors

Participant's Guide

DS**x** – Status indicators: DS3 flashes to let you know the control board is operating properly.

CT1, 2, & 3 – Onboard Bus CTs

J12 – Generator CT inputs

J14 – Connection port for InPower.

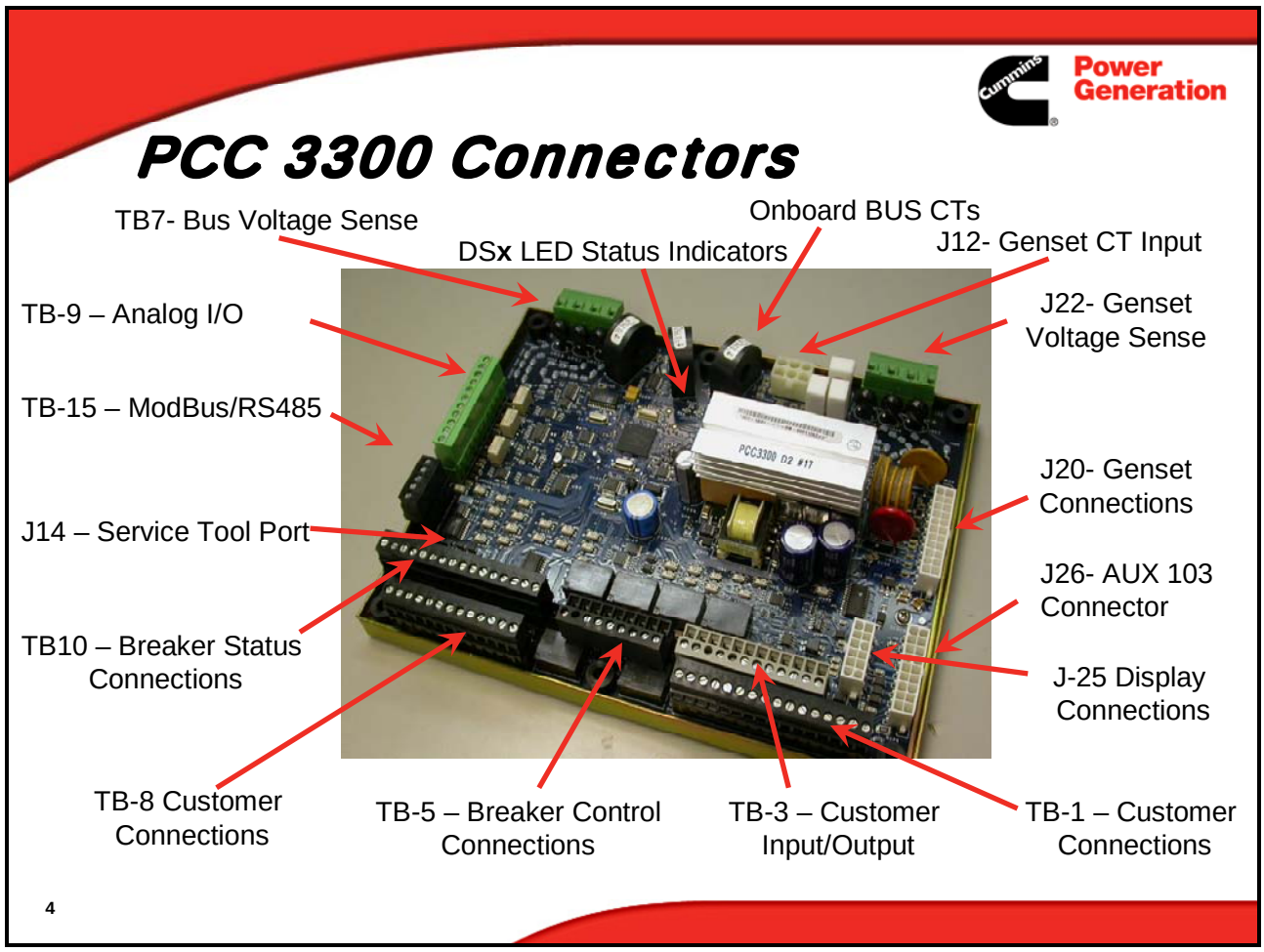
J20 – Genset Accessories connection

J22 – Genset voltage sense

J25 – Operator Panel (HMI) connection

J26 – AUX 103 & Interconnect

Notes:



Visual 1-4A Control Board Connectors

Participant's Guide

TB1 – Customer I/O connections

TB3 – Customer I/O connections

TB5 – Circuit breaker control connection

TB7 – Bus/utility voltage sense

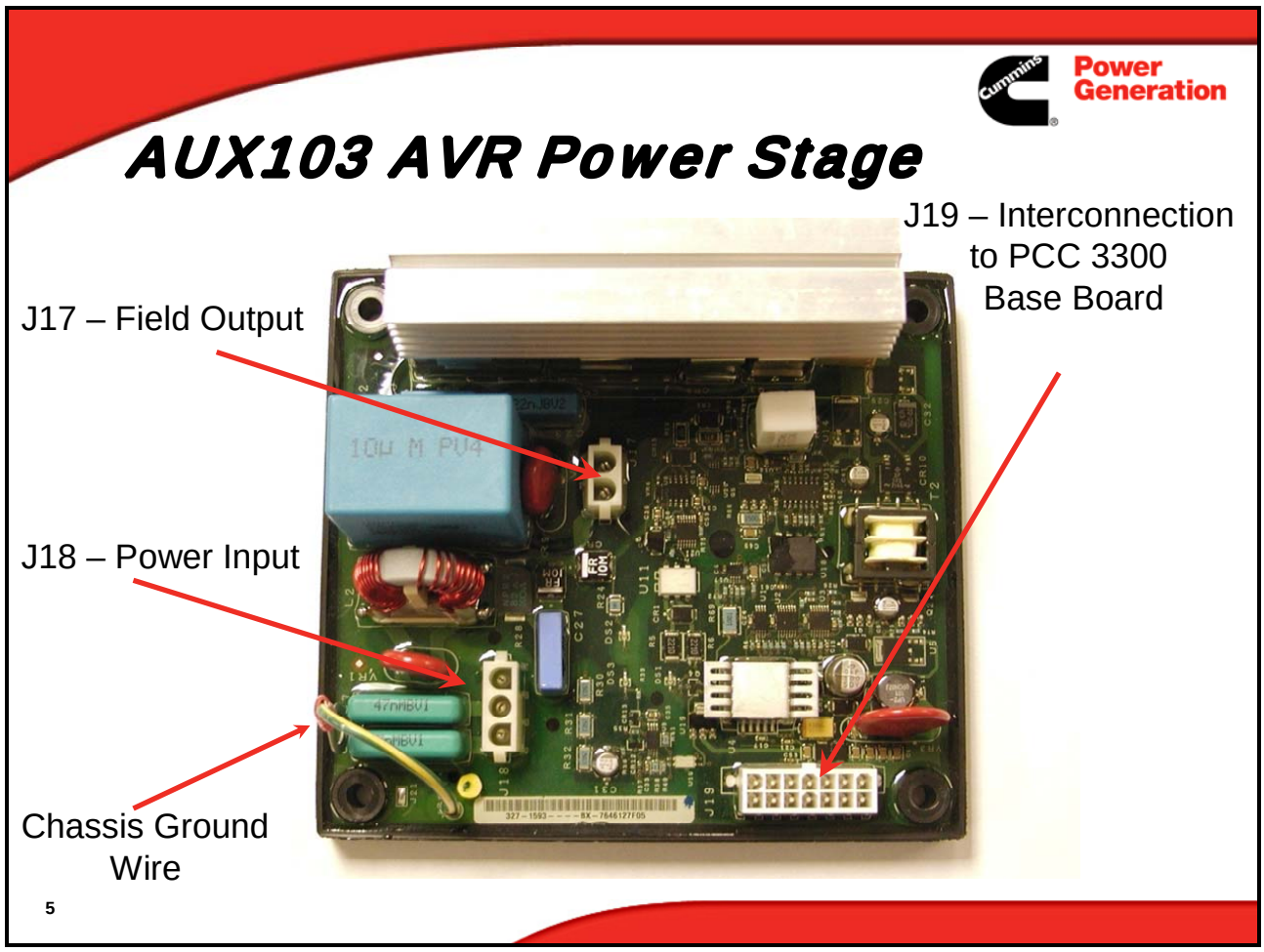
TB8 – Customer I/O connections

TB9 – Analog control I/O connections

TB10 – Circuit breaker control connection

TB15 – RS485 / ModBus Communication connection

Notes:



Visual 1-5 Automatic Voltage Regulator Module

Participant's Text

The AVR Module is used with all PC 3.3 gensets.

There are 3 connectors on the board.

- J17 provides the excitation output.
- J18 provides the power input
- J19 connects to J26 on the 3300 Control Board.

Notes:

Visual 1-6 Optional operator panel

Participant's Text

HMI 320 Operator Panel is also highly populated with display and control features.

- Multiple LEDs for status and operator information
- Large graphical display for menus and information display.
- Multiple buttons for operation and control.

Same physical size and layout as the HMI 220 but has a much larger display.

Notes: