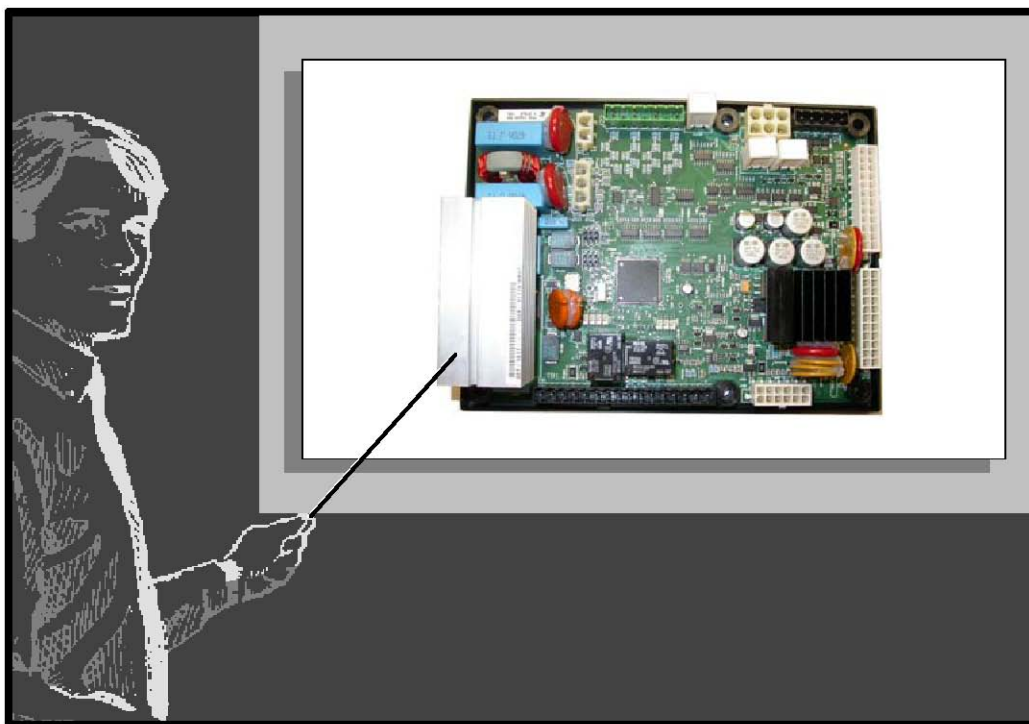




Technical Training Participant's Guide

PowerCommand[®] Control 1302



CMT0949-EN-PG
Updated 2/2008

Revision History

v1.00 (12/2006)

1. Initial draft for product launch QTQ 2007 v1.01 (1/2007)
2. Updated Draft for ASTC 2007
3. Updated version v2.00 (1/2008)

Cummins, Onan, and PowerCommand are all registered trademarks of Cummins Inc. InPower is a trademark of Cummins Inc. Windows is a trademark of Microsoft Corporation.

Copyright © 2006–2007 by Cummins Power Generation

PowerCommand Control 1302 Module

Table of Contents

Preface:	I
<p>This generation of Genset controls will use a new naming system. The preface will identify the various controls and combinations that make up the new control family.</p>	
Introduction:	II
<p>The introduction describes the audience, the purpose, and the structure of the training module.</p>	
Introduction to the PowerCommand Control 1.1, the PowerCommand Control 1302 control board and its options:	1
<p>This lesson presents an overview of the PowerCommand Control 1302. The participant will learn to identify the main features of the PowerCommand Control 1302, its standard features and options.</p>	
PowerCommand Control 1.1 HMI 211 Service Menus:	2
<p>This lesson presents the Setup and Calibration menu system used in the PCC1.1 and HMI 211</p>	
PowerCommand Control 1.1 Sequence of Operation:	3
<p>This lesson presents sequence of operation and feature operation and performance information about the PowerCommand Control 1302.</p>	
PowerCommand Control 1302 Installation:	4
<p>This section provides installation information, procedures, and requirements for the PowerCommand Control 1302.</p>	
PowerCommand Control 1302 Control Setup and InPower:	5
<p>This lesson covers adjustments and configuration details using InPower as the setup tool.</p>	
PCCNet Network for the PCC 1302:	6
<p>This lesson presents an introduction to the PCCNet network and components used with the PCC 1302,</p>	

PowerCommand Control 1302 ModBus: 7

This lesson presents the basic concepts of ModBus communications, the ModBus feature on the PCC 1302, and some of the available tools to use with this feature.

PowerCommand Control 1302 PGICAN: 8

This section introduces the basics about the J1939 CAN communications available on the PCC 1302, for use with Full Authority Engine controls.

Glossary: 9

This section lists the most common terms used throughout this training module pertaining to the PowerCommand family of Controls.

Activities: 10

Copies of Participant In-class and Homework Activities, and each Section Quiz are found in this section.

Appendix: 11

This section contains several useful guides and lists.

Diagrams: 12

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

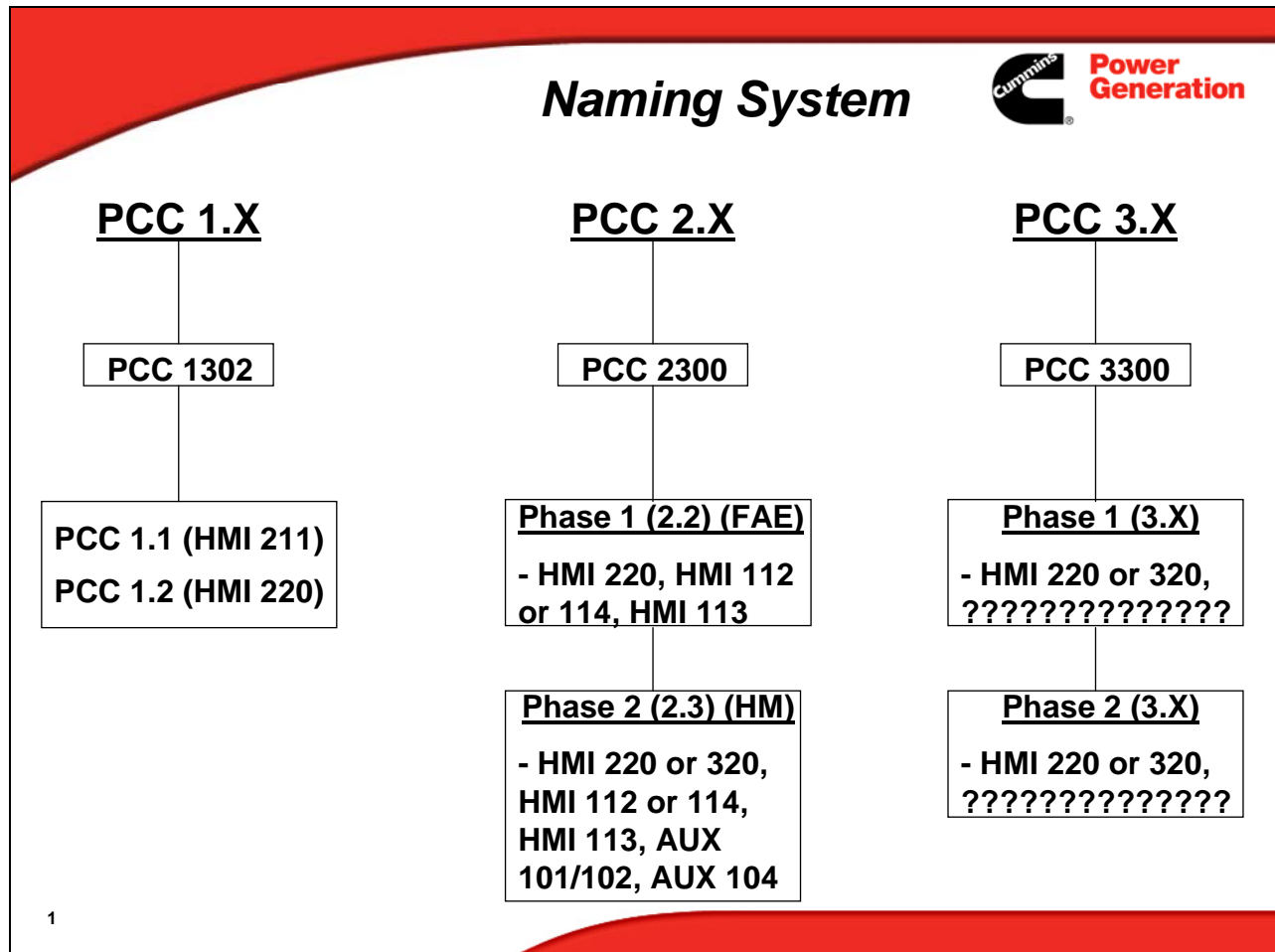
Module Comment Sheet : 13

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 if 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.X 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.X 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.X 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.X FAE training will be a prerequisite to any future training program

Introduction

Welcome!

Welcome to the Instructor's Guide for the *PowerCommand Control 1302* module! This guide was written by the Cummins Power Generation Sales and 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 *PowerCommand Control 1302* module is to help you, the Cummins Power Generation distributor service technician, understand the *PowerCommand Control 1302* which is going to replace the specialized Onan gen set control modules (e.g., DN, GN). It is also expected that the PowerCommand Control 1302 will be used on many of the Cummins-powered gensets with Full Authority Engines (FAE) and the hydro-mechanical fuel systems up to 1500 kW.

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.

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* 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
Sales and Technical Training OIJ3
1400 73rd Avenue NE
Minneapolis, MN 55432

Preparing for the Training Session

To simplify your preparations for the training session, we've broken out your major tasks.

Coordinate the session

- Arrange for a location, date, and time convenient for the session participants. Plan the session as far in advance as possible.
- Try to arrange for a quiet, seminar-type meeting place, away from the participants' regular work area.
- Do as much as possible to help make participants comfortable.
- Arrange for refreshments and meals, if appropriate.

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.

Practice your presentation--You'll feel more at ease if you practice the presentation portion of each lesson at least once before the session. The participants will also be more attentive if you appear organized and prepared.

Organize and prepare the module training materials--Make copies of the module assessment and the module comment forms (found at the back of this trainer's guide) for each participant to complete at the end of the module.

- Review the *Materials Needed* section at the beginning of each lesson and order the appropriate number of participant's guides, sales literature, and materials in advance from Onan's Literature department using a copy of the form found at the end of this section.
- *Note:* We recommend you order materials two to three weeks in advance of your session.
- *Note:* You will also have to order kits of InPower service software, a manual, and a hardware or software lock for the training participants.

Arrange for training equipment--For most Service Training lessons, you will need an overhead or slide projector and screen (with remote control, if available), a flipchart stand with paper and markers (or a whiteboard or blackboard and chalk), and specific hardware to use as a demonstrator unit for the lesson.

Since each technician attending the course will be bringing a laptop PC and using the PC during the course of instruction, you may want to alert your IS department in case the technicians' PCs need tweaking to operate properly.

Confirm attendance--A few days before the session, verify who will be attending. We recommend conducting the session with three to ten participants.

Set up the room--Plan to arrive at least 30 minutes before the session begins. Check the lighting, acoustics, and temperature of the room. Find out how to adjust the lighting and temperature.

- Make sure all equipment (such as slide and overhead projectors, extra bulbs, flipchart stands) is in place and in working order before the session begins.
- If possible, have tables large enough for three participants to have their guides and a demonstrator on the table at the same time.

Conducting the Training Session

Introductions

At the beginning of the session, have each person introduce himself or herself and say a few words about his or her experience with the subject to be covered.

As an alternative, you might want to let participants interview each other and introduce the person they interviewed to the group. If participants do not know each other, make name tags and table top name tents and ask participants to use them throughout the session.

Expectations

After introductions, label a flipchart page with the word *Expectations*. Ask the participants what expectations they have for the session, then explain which of their expectations you will be able to address. If you will not be able to address all of the participants' expectations, arrange to follow up on their concerns at a later date.

Lessons

The first time you conduct the training for this module, follow the step-by-step lesson instructions. Feel free to add comments from your own experience, but follow the structure of the module. Once you are familiar with the module you can modify the session for the specific needs of the group.

Participant Check List

Use this check list to help you prepare for the training session.

Before You Begin

- ✓ Review the Participant guide and understand the lesson objectives.
- ✓ Prepare yourself to gain the most from the training session.

Participants

- ✓ The training does not end when you are dismissed at the end of the day. Read ahead and prepare for the next days instruction
- ✓ Practice and be comfortable using InPower software.

Materials

(See *Materials Needed* section at beginning of each lesson)

- ✓ Each section lists the materials needed. Notify the Instruction if you find that you are missing important materials.
- ✓ Is your Participant Guides complete?
- ✓ Do you have materials for taking proper notes?

Equipment

(See *Equipment Needed* section at beginning of each lesson)

- ✓ Do you have a working laptop with the necessary software as required for the course?
- ✓ PC with InPower, dongle, and RS485 cable.
- ✓ You should have been notified in advance if you needed any supporting equipment (meters, small hand tools, etc...) for this course.
- ✓ Be aware of the electrical power systems and the wall power supply. You may need to provide you own converters and/or transformer systems for you to operate your computer on wall power.
- ✓ Extension cords – you may need to provide one for powering your computer.

Practice

- ✓ Review the lesson instructions and practice what you have learned.
- ✓ Refer to your of the training materials and note in your review

Room Setup

This Page Intentionally Left Blank



Visual 1-1 PowerCommand Control

Section 1

Introduction to the PCC 1.1, the PowerCommand Control 1302 control board and its options.

Estimated Time: 4 hours

Equipment Needed

Highlighter, Post-it note pads, Notepad and pencil

PowerCommand Control 1302, HMI 211, and simulator for each pair of participants

Materials Needed

One for each participant:

PowerCommand Control 1302 Participant's Guide

Guide CMT0949-EN-PG

Warm Up

In this lesson we are going to learn about the PowerCommand Control 1302 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 1.1 standard components.
- Identify the PCC 1.1 & PowerCommand Control 1302 optional components.
- Describe the main functions of the PowerCommand Control 1302 and its features.
- Describe the e standard operator interface (switch and LED).
- Use the Operator menus on the optional control panel.



PowerCommand Control 1302

- Single-Board Control for Gas sets
- J1939 CAN Link for FAE sets
- Optional governor amp. for non-FAE sets PCC
- 1302 is a superset of the PCC 1301
- J1939 CAN Link, PMG Input, and
- Common wiring harness with “3-series” controls

2

Visual 1-2 Introduction to the PowerCommand Control 1302

Participant's Text

Notes

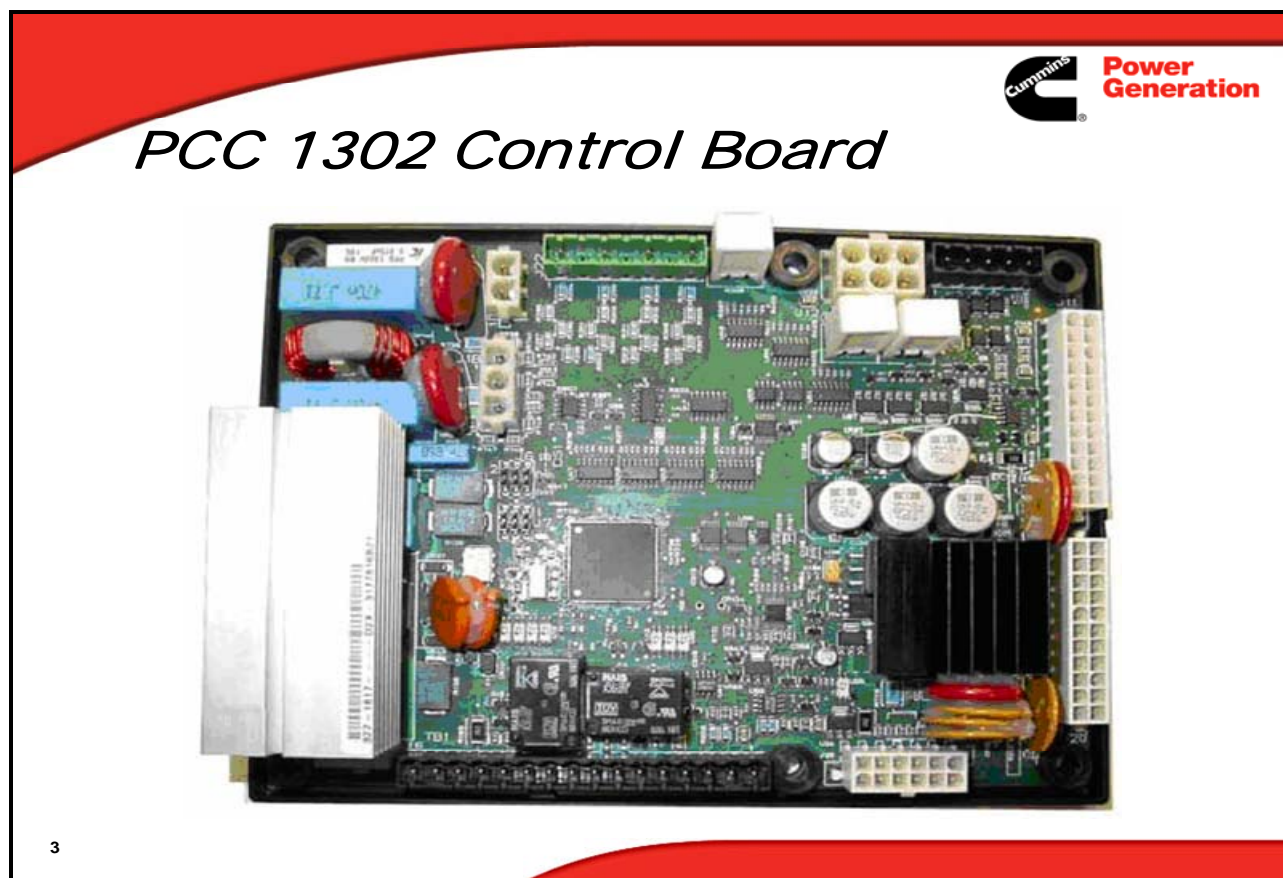
The PowerCommand Control 1302 is a single integrated control providing complete genset control and protection.

Single-board control for gaseous gensets and Diesel FAE engine-driven sets

Governor amplifier needed for diesel sets equipped with electric actuator.

Multiple applications:

- Non-Cummins engines
- Cummins engines



Visual 1-3 The PCC 1302 Control Board

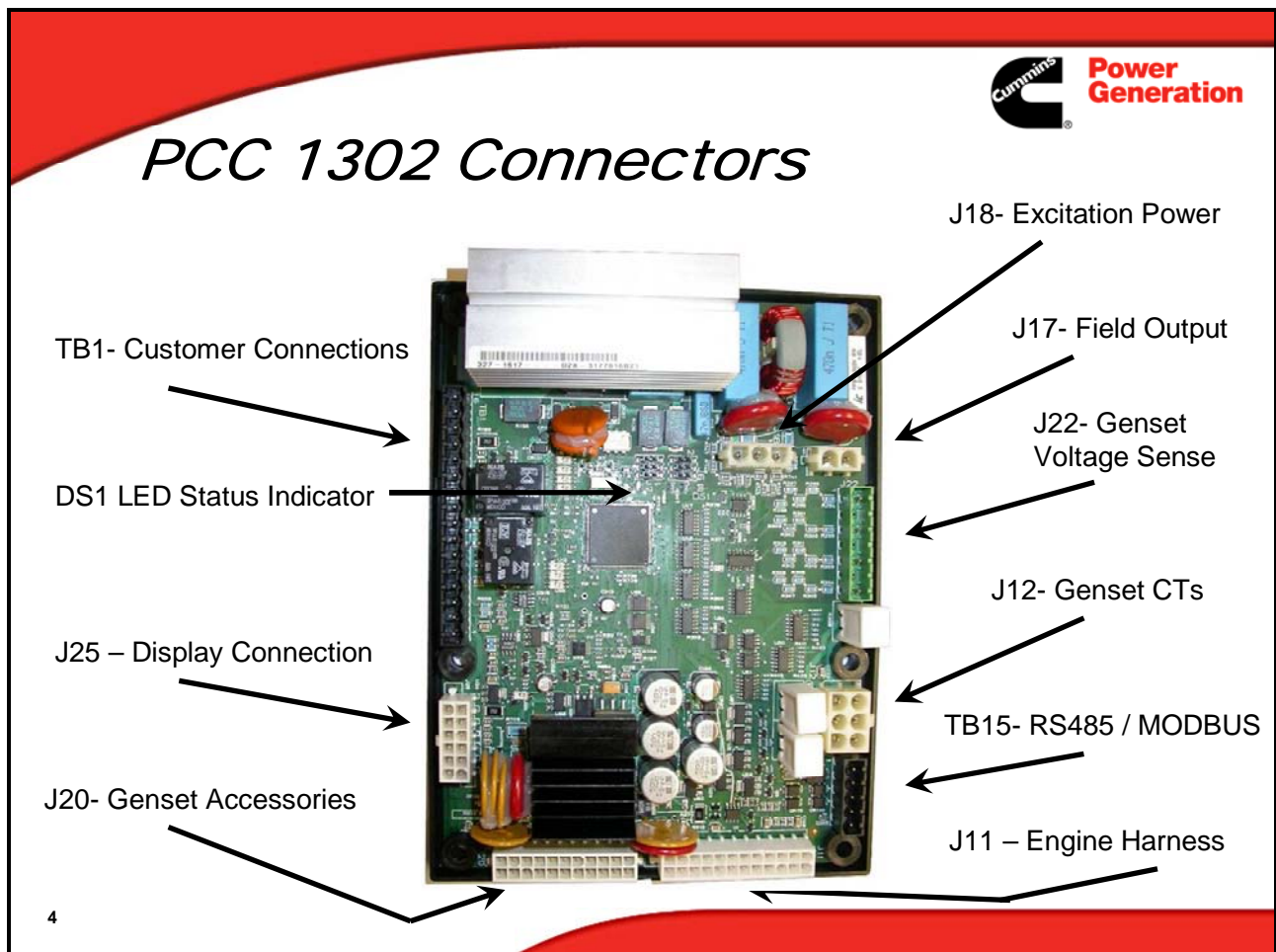
Participant's Text

Notes

Single board in large potting shell

More connectors than the PCC 1301

- Connectors are common among all “3-series” controls.
- PCC 1302, PCC 2300, PCC 3300
- This allows customers to upgrade genset capabilities by just purchasing and installing a new Control Board.

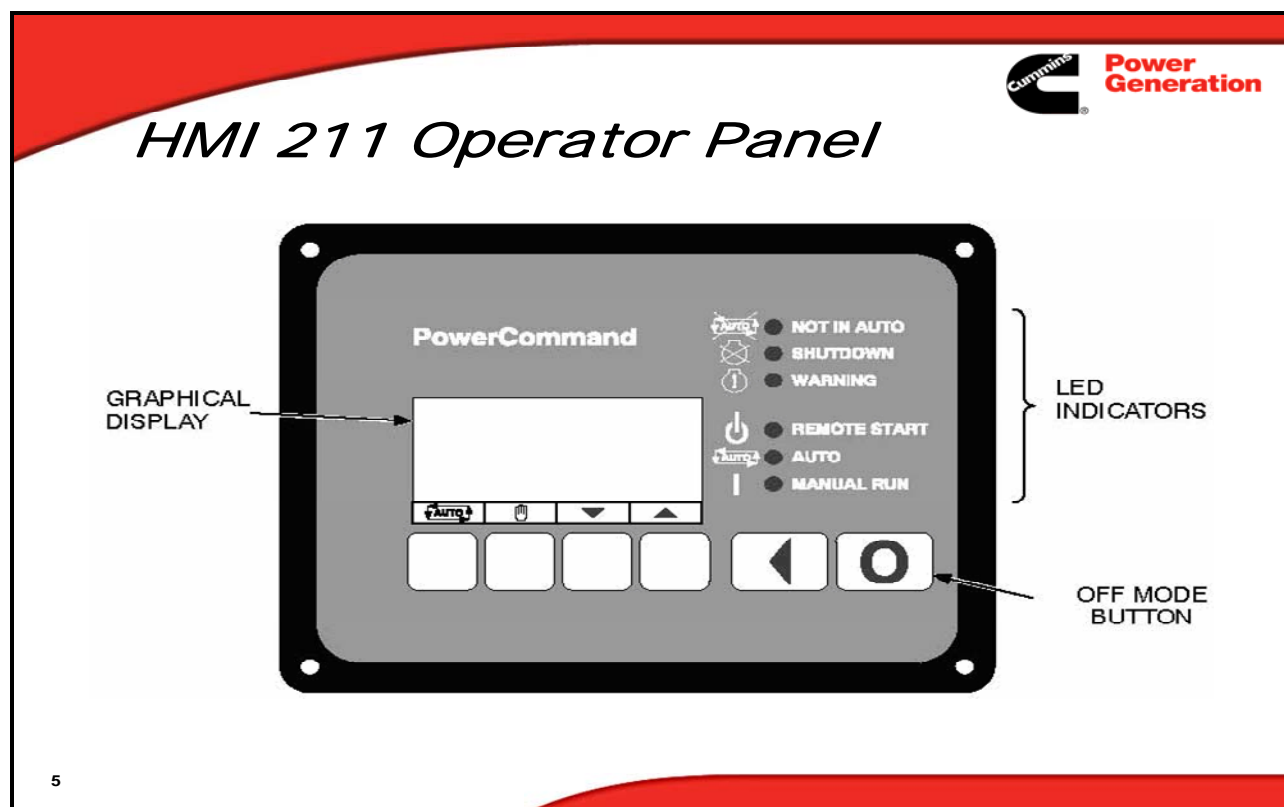


Visual 1-4 Control Board Connectors

Participant’s Guide

Trainer’s Guide

- J11 – Connections to the engine harness and/or the ECM.
- J12 – CT Inputs
- J17 – Exciter Field Output
- J18 – AVR Power Supply
- J20 – Genset Accessories Harness
- J22 – Genset Voltage Sense
- J25 – Operator Panel (HMI) Harness
- TB1 – Customer Connections
- TB15 – RS485 / Service Tool Connections
- DS1 – Status indicator. DS1 flashes to let you know the control board is operating properly.



Visual 1-5 Optional operator panel

Participant's Text

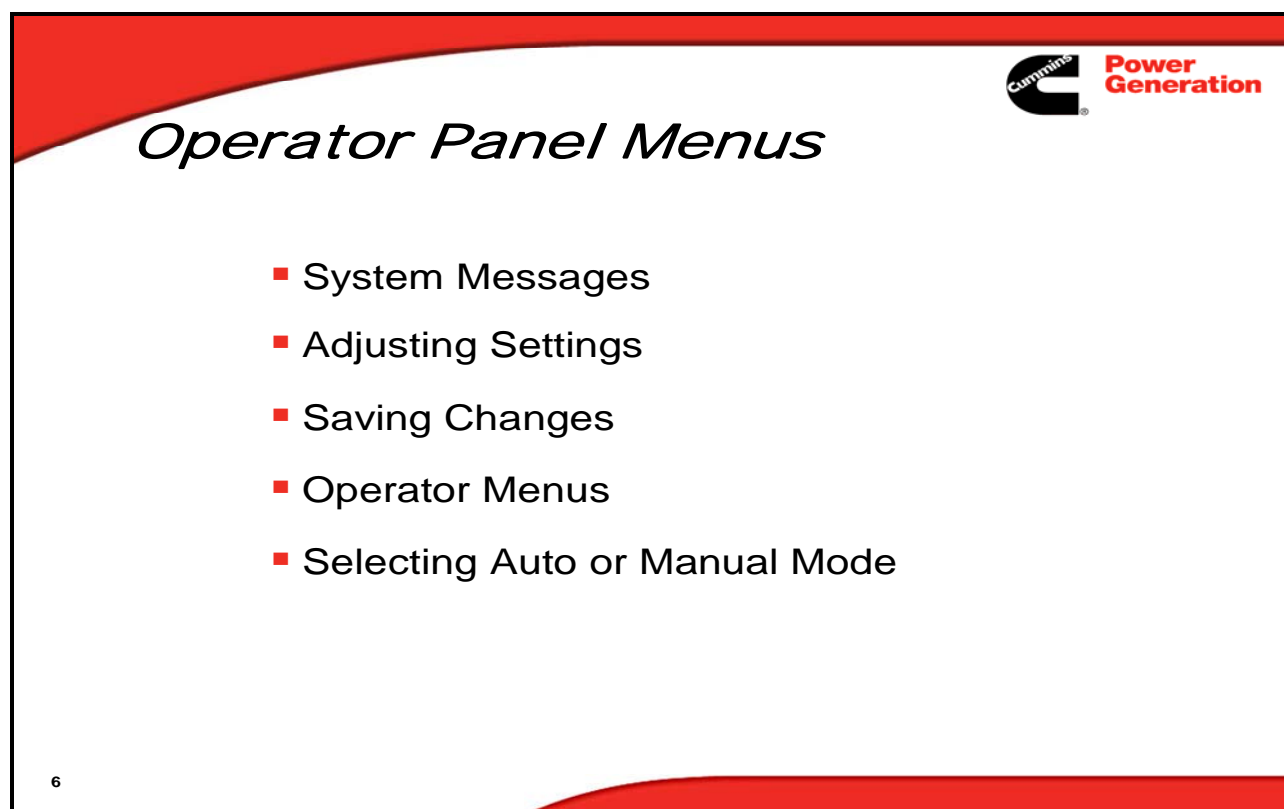
Notes

Six LEDs for operator information

- Not in Auto
- Shutdown
- Warning
- Remote Start
- Auto
- Manual Run

Graphical display for menus and information display.

- Four "soft" buttons
- Two "Fixed" buttons



Visual 1-6 Operator Panel Menus

Participant's Text

Notes

Refer to the 900-0661 Operator/Installation Manual for the menus used with the PCC 1302 Operator Panel.

The panel allows easy scrolling for monitoring of the following parameters.

- Engine Temp / Oil Pressure / Battery VDC
- Load kVA / Frequency / Speed
- L1-L2 V / L2-L3 V / L3-L1 V
- L1-N V / L2-N V / L3-N V
- L1 Amps / L2 Amps / L3 Amps