Installation Manual

Generator Set

QSB7 Engine with PowerCommand® 1.1 or 2.3 Control

C125D6D (Spec A-B)
C150D6D (Spec A-B)
C175D6D (Spec A-B)
C200D6D (Spec A-B)

English
Original Instructions
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1 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. This manual contains important instructions that should be followed during installation and maintenance of the generator set and batteries.

Safe and efficient operation can be achieved only if the equipment is properly operated and maintained. Many accidents are caused by failure to follow fundamental rules and precautions.

1.1 Warning, Caution, and Note Styles Used in This Manual

The following safety styles and symbols found throughout this manual indicate potentially hazardous conditions to the operator, service personnel, or equipment.

⚠ DANGER
Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

⚠ WARNING
Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION
Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE
Indicates information considered important, but not hazard-related (e.g., messages relating to property damage).

1.2 Save These Instructions

This manual contains important instructions for the generator set that should be followed during installation, operation and maintenance of the generator set and batteries.

Thoroughly read the operator manual before operating the generator set. Safe operation and top performance can only be obtained when equipment is properly operated and maintained.

The following symbols in this manual alert you to potential hazards to the operator, service person and equipment.

⚠ DANGER
Alerts you to an immediate hazard that will result in severe personal injury or death.

⚠ WARNING
Alerts you to a hazard or unsafe practice that can result in severe personal injury or death.

⚠ CAUTION
Alerts you to a hazard or unsafe practice that can result in personal injury or equipment damage.

1.3 General Information

This manual should form part of the documentation package supplied by Cummins with specific generator sets. If this manual has been supplied in isolation, please contact your authorized dealer.

NOTICE
It is in the operator's interest to read and understand all warnings and cautions contained in the documentation relevant to the generator set operation and daily maintenance.

1.4 General Precautions

- Keep multi-type ABC fire extinguishers accessible.
- Make sure that all fasteners are secure and torqued properly.
- Keep the generator set and its compartment clean. Do not store any items in the generator set compartment.
- Before working on the generator set, make sure the generator set is shut down and disabled.
    1. Press the generator set's "O" (Off) button or the red STOP button on the local display (whichever is applicable) to stop the generator set. Allow the generator set to thoroughly cool to the touch.
    2. If applicable, turn off and disconnect the battery charger from the AC source before disconnecting the battery cables.
    3. Disconnect the negative (–) cables from the battery and secure it from contacting the battery terminals to prevent accidental starting.
- Use caution when making adjustments when the generator set is running, hot, or when parts are electrically live, as all situations may cause personal injury or death.
- Used engine oil has been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale, or come into contact with used oil or its vapors.
- Do not work on the generator set when mentally or physically fatigued or after consuming alcohol or drugs.

NOTICE
Only trained and authorized personnel shall maintain or service the generator set.

NOTICE
The installation of the generator set shall provide enough ventilation to ensure that gases generated by vented batteries during charging, or caused by equipment malfunction, are removed.

1.4.1 General Safety Precautions

⚠ WARNING

Hot Pressurized Liquid

Contact with hot liquid can cause severe burns.

Do not open the pressure cap while the engine is running. Let the engine cool down before removing the cap. Turn the cap slowly and do not open it fully until the pressure has been relieved.

⚠ WARNING

Moving Parts

Moving parts can cause severe personal injury.

Use extreme caution around moving parts. All guards must be properly fastened to prevent unintended contact.

⚠ WARNING

Toxic Hazard

Used engine oils have been identified by some state and federal agencies to cause cancer or reproductive toxicity.

Do not ingest, breathe the fumes, or contact used oil when checking or changing engine oil. Wear protective gloves and face guard.

⚠ WARNING

Electrical Generating Equipment

Incorrect operation and maintenance can result in severe personal injury or death.

Do not operate equipment when fatigued, or after consuming any alcohol or drug.

Make sure that only suitably trained and experienced service personnel perform electrical and/or mechanical service.

⚠ WARNING

Toxic Gases

Substances in exhaust gases have been identified by some state and federal agencies to cause cancer or reproductive toxicity.

Do not breathe in or come into contact with exhaust gases.

⚠ WARNING

High Noise Level

Generator sets in operation emit noise, which can cause hearing damage.

Wear appropriate ear protection at all times.

⚠ WARNING

Hot Surfaces

Contact with hot surfaces can cause severe burns.

The unit is to be installed so that the risk of hot surface contact by people is minimized. Wear appropriate PPE when working on hot equipment and avoid contact with hot surfaces.

⚠ WARNING

Toxic Hazard

Ethylene glycol, used as an engine coolant, is toxic to humans and animals.

Wear appropriate PPE. Clean up coolant spills and dispose of used coolant in accordance with local environmental regulations.

⚠ WARNING

Combustible Liquid

Ignition of combustible liquids is a fire or explosion hazard which can cause severe burns or death.

Do not store fuel, cleaners, oil, etc., near the generator set. Do not use combustible liquids like ether.

⚠ WARNING

Combustible Gases

Generator sets in operation have combustible gases under pressure, which if ignited can cause eye and ear damage.

Wear appropriate eye and ear protection at all times.

⚠ WARNING

Combustible Gases

Generator sets in operation have combustible gases under pressure, which if ignited can cause severe injury.

Do not operate the generator set with any doors open.

⚠ WARNING

Fire Hazard

Materials drawn into the generator set, as well as accumulated grease and oil, are a fire hazard. Fire can cause severe burns or death.

Keep the generator set and the surrounding area clean and free from obstructions. Make sure the generator set is mounted in a manner to prevent combustible materials from accumulating under the unit.

⚠ WARNING

Automated Machinery

Accidental or remote starting of the generator set can cause severe personal injury or death.

Isolate all auxiliary supplies and use an insulated wrench to disconnect the starting battery cables (negative [–] first).

NOTICE

Keep multi-type ABC fire extinguishers close by. Class A fires involve ordinary combustible materials such as wood and cloth. Class B fires involve combustible and flammable liquid fuels and gaseous fuels. Class C fires involve live electrical equipment. (Refer to NFPA No. 10 in the applicable region.)

NOTICE

Before performing maintenance and service procedures on enclosed generator sets, make sure the service access doors are secured open.

NOTICE

Stepping on the generator set can cause parts to bend or break, leading to electrical shorts, or to fuel leaks, coolant leaks, or exhaust leaks. Do not step on the generator set when entering or leaving the generator set room.

1.5 Generator Set Voltage Is Deadly

- Generator set output connections must be made by a trained and experienced electrician in accordance with all applicable codes.
- This generator set and the public utility may only be connected to house circuits by means of the automatic transfer switch.

⚠ CAUTION

Improper connections can lead to electrocution of utility workers and damage to equipment. Make sure that the connections are installed properly by a trained technician.

- Use caution when working on live electrical equipment. Remove jewelry, and make sure clothing and shoes are dry. Stand on a dry wooden platform.

1.6 Fuel and Fumes Are Flammable

Fire, explosion, and personal injury or death can result from improper practices.

- DO NOT permit any flame, cigarette, pilot light, spark, arcing equipment, or other ignition source near the generator set or fuel system.
- Fuel lines must be adequately secured and free of leaks. Fuel connection at the engine should be made with an approved flexible line. Do not use copper piping on flexible lines because copper will become brittle if continuously vibrated or repeatedly bent.
- Be sure all fuel supplies have a positive shutoff valve.
- Be sure the battery area has been well-ventilated prior to servicing near it. Lead-acid batteries emit a highly explosive hydrogen gas that can be ignited by arcing, sparking, smoking, etc.

1.7 Starting Batteries

⚠ WARNING

Toxic Hazard

The electrolyte in starting batteries is a dilute sulfuric acid that is harmful to the skin and eyes. It is also electrically conductive and corrosive.

Always:

1. ***Wear full eye protection and protective clothing;***
2. ***If the electrolyte contacts the skin, wash it off immediately with water;***
3. ***If the electrolyte contacts the eyes, flush them thoroughly and immediately with water and seek medical attention; and***
4. ***Wash spilled electrolyte down with an acid neutralizing agent. A common practice is to use a solution of one pound (500 grams) bicarbonate of soda (also known as baking soda or sodium bicarbonate) to one gallon (4 liters) of water.***
5. ***Continue to add the bicarbonate of soda solution until the evidence of reaction (that is, foaming) has stopped.***
6. ***Flush the resulting liquid with water and dry the area.***

1.8 Batteries Can Explode

Batteries can explode, causing severe skin and eye burns and can release toxic electrolytes.

⚠ WARNING

Combustible Gases

Batteries can explode, causing severe skin and eye burns, and can release toxic electrolytes.

Do not dispose of the battery in a fire, because it is capable of exploding. Do not open or mutilate the battery. Do not charge frozen batteries.

⚠ WARNING

Electric Shock Hazard

Batteries present the risk of high short circuit current.

When servicing the generator set:

- ***Remove watches, rings, or other metal objects.***
- ***Use tools with insulated handles.***

NOTICE

Servicing of batteries must be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

- Wear safety glasses.
- Do not smoke.
- Do not charge frozen batteries.
- To prevent arcing when disconnecting the battery:
    1. Press the Off switch from the display and then press the E-Stop button (if equipped).

2. Disconnect AC power from any battery chargers.
3. Remove the negative (-) battery cables to prevent starting.

- To prevent arcing when reconnecting the battery:
  1. Reconnect the positive (+) cables.
  2. Reconnect the negative (-) cables.
  3. Reconnect the battery charger to AC power supply.
- When replacing the generator set battery, always replace it with a battery as specified in this manual.

1.9 Moving Parts Can Cause Severe Personal Injury or Death

- Do not wear loose clothing or jewelry near moving parts, such as cooling fans.
- Keep hands away from moving parts.
- Keep guards in place over fans.

1.10 Exhaust Gases Are Deadly

- Provide an adequate exhaust system to properly expel discharged gases away from enclosed or sheltered areas, and areas where individuals are likely to congregate. Visually and audibly inspect the exhaust system daily for leaks per the maintenance schedule. Make sure that exhaust manifolds are secured and not warped. Do not use exhaust gases to heat a compartment.
- Make sure the unit is well ventilated.

1.10.1 Exhaust Precautions

⚠ WARNING

Hot Exhaust Gases

Contact with hot exhaust gases can cause severe burns.

Wear personal protective equipment when working on equipment.

⚠ WARNING

Hot Surfaces

Contact with hot surfaces can cause severe burns.

The unit is to be installed so that the risk of hot surface contact by people is minimized. Wear appropriate PPE when working on hot equipment and avoid contact with hot surfaces.

⚠ WARNING

Toxic Gases

Inhalation of exhaust gases can cause asphyxiation and death.

Pipe exhaust gas outside and away from windows, doors, or other inlets to buildings. Do not allow exhaust gas to accumulate in habitable areas.

⚠ WARNING

Fire Hazard

Contaminated insulation is a fire hazard. Fire can cause severe burns or death.

Remove any contaminated insulation and dispose of it in accordance with local regulations.

The exhaust outlet may be sited at the top or bottom of the generator set. Make sure that the exhaust outlet is not obstructed. Personnel using this equipment must be made aware of the exhaust position. Position the exhaust away from flammable materials - in the case of exhaust outlets at the bottom, make sure that vegetation is removed from the vicinity of the exhaust.

The exhaust pipes may have some insulating covers fitted. If these covers become contaminated they must be replaced before the generator set is run.

To minimize the risk of fire, make sure the following steps are observed:

- Make sure that the engine is allowed to cool thoroughly before performing maintenance or operation tasks.
- Clean the exhaust pipe thoroughly.

1.11 The Hazards of Carbon Monoxide

Carbon monoxide (CO) is an odorless, colorless, tasteless and non-irritating gas. You cannot see it or smell it. Red blood cells, however, have a greater affinity for CO than for oxygen. Therefore, exposure even to low levels of CO for a prolonged period can lead to asphyxiation (lack of oxygen) resulting in death. Mild effects of CO poisoning include eye irritation, dizziness, headaches, fatigue and the inability to think clearly. More extreme symptoms include vomiting, seizures and collapse.

Engine-driven generator sets produce harmful levels of carbon monoxide that can injure or kill you.

1.11.1 Special Risks of CO near the Building

⚠ WARNING

Toxic Gases

Carbon monoxide (CO) gas can cause nausea, fainting, or death. Occupants can be exposed to lethal levels of CO when the generator set is running. Depending on air temperature and wind, CO can accumulate in or near the building.

To protect yourself and others from the dangers of CO poisoning, it is recommended that reliable, approved, and operable CO detector alarms are installed in proper locations in the building as specified by their manufacturer.

1.11.2 Protecting Yourself from CO Poisoning

- Locate the generator set in an area where there are no windows, doors, or other access points into the building.
- Make sure all CO detectors are installed and working properly.
- Pay attention for signs of CO poisoning.
- Check the exhaust system for corrosion, obstruction, and leaks every time you start the generator set and every eight hours when you run it continuously.

2 Introduction

2.1 About This Manual

⚠ WARNING

Improper installation can result in severe personal injury, death and damage to equipment. The installation must comply with all applicable building codes (including project permits and inspections). The installer should be properly trained and licensed to perform electrical and mechanical equipment installations (including gaseous fuel installation).

NOTICE

Manuals are updated from time to time to reflect changes in the equipment and its specifications. The most up-to-date version of this manual is found on the QuickServe website (https://quickserve.cummins.com/info/index.html).

This manual is a guide for the installation of the generator set models listed on the front cover. Proper installation is essential for top performance, reliable operation, and safety. Read through this manual before starting the installation. This manual covers outdoor applications only; for other installations, refer to the *T-030: Liquid-Cooled Generator Set Application* manual available from your Cummins distributor.

NOTICE

The installation must comply with all applicable building codes.

See the generator set's specific operator manual for operation and maintenance and specific service manual for service.

Refer to the Model Specifications section for specific information about the system and its components.

Refer to the Outline and System Drawings appendix and the Wiring Diagrams appendix for specific information about installation and wiring connections.

2.2 Schedule of Abbreviations

This list is not exhaustive. For example, it does not identify units of measure or acronyms that appear only in parameters, event/fault names, or part/accessory names.

Abbr.	Description	Abbr.	Description
AC	Alternating Current	LED	Light-Emitting Diode
AMP	AMP, Inc. (part of Tyco Electronics)	MFM	Multifunction Monitor
ANSI	American National Standards Institute	Mil Std	Military Standard
ASOV	Automatic Shut Off Valve	MPU	Magnetic Pickup
ASTM	American Society for Testing and Materials (ASTM International)	NC	Normally Closed

Abbr.	Description	Abbr.	Description
ATS	Automatic Transfer Switch	NC	Not Connected
AVR	Automatic Voltage Regulator	NFPA	National Fire Protection Agency
AWG	American Wire Gauge	NO	Normally Open
CAN	Controlled Area Network	NWF	Network Failure
CB	Circuit Breaker	OEM	Original Equipment Manufacturer
CE	Conformité Européenne	OOR	Out Of Range
CCA	Cold Cranking Ampere	OORH/ ORH	Out Of Range High
CFM	Cubic Feet per Minute	OORL/ORL	Out Of Range Low
CGT	Cummins Generator Technologies	PB	Push Button
CMM	Cubic Meters per Minute	PCC	PowerCommand® Control
CT	Current Transformer	PGI	Power Generation Interface
DC	Direct Current	PGN	Parameter Group Number
DEF	Diesel Exhaust Fluid	PI	Proportional/Integral
DPF	Diesel Particulate Filter	PID	Proportional/Integral/ Derivative
EBS	Excitation Boost System	PLC	Programmable Logic Controller
ECM	Engine Control Module	PMG	Permanent Magnet Generator
ECS	Engine Control System	PPE	Personal Protective Equipment
EMI	Electromagnetic Interference	PT	Potential Transformer
EN	European Standard	PTC	Power Transfer Control
EPS	Engine Protection System	PWM	Pulse-Width Modulation
E-Stop	Emergency Stop	RFI	Radio Frequency Interference
FAE	Full Authority Electronic	RH	Relative Humidity
FMI	Failure Mode Identifier	RMS	Remote Monitoring System
FSO	Fuel Shutoff	RMS	Root Mean Square
Genset	Generator Set	RTU	Remote Terminal Unit
GCP	Generator Control Panel	SAE	Society of Automotive Engineers
GND	Ground	scfh	Standard Cubic Feet of gas per Hour
HMI	Human-Machine Interface	SCR	Selective Catalytic Reduction
IC	Integrated Circuit	SPN	Suspect Parameter Number

Abbr.	Description	Abbr.	Description
ISO	International Organization for Standardization	SW_B+	Switched B+
LBNG	Lean-Burn Natural Gas	UL	Underwriters Laboratories
LCD	Liquid Crystal Display	UPS	Uninterruptible Power Supply
LCT	Low Coolant Temperature		

2.3 Related Literature

Before any attempt is made to operate the generator set, the operator should take time to read all of the manuals supplied with the generator set and familiarize themselves with the warnings and operating procedures.

NOTICE

A generator set must be operated and maintained properly if you are to expect safe and reliable operation. The Operator manual includes a maintenance schedule and a troubleshooting guide.

The Health and Safety manual must be read in conjunction with the Operator manual for the safe operation of the generator set.

- Health and Safety Manual (0908-0110)

The relevant manuals appropriate to your generator set are also available, the documents below are in English:

- Installation Manual for QSB7 Engine with PCC1.1/2.3 Control (A056K983)
- Operator Manual for QSB7 Engine with PCC1.1 Control (A056K985)

  or

  Operator Manual for QSB7 Engine with PCC2.3 Control (A060H298)
- Generator Set Service Manual for QSB7 Engine with PCC1.1 Control (A056K987)

  or

  Generator Set Service Manual for QSB7 Engine with PCC2.3 Control (A060H299)
- Recommended Spares List (RSL) by model:
  - C125D6D (A060Y780)
  - C150D6D (A060Y785)
  - C175D6D (A060Y790)
  - C200D6D (A060Y796)
- Parts Manual for QSB7 Engine with PCC1.1/2.3 Control (A056K989)
- Standard Repair Times - CX Family (0900-0912)
- Service Tool Manual (A043D529)
- Failure Code Manual (F1115C)
- Engineering Application Manual *T-030: Liquid Cooled Generator Sets* (A040S369)
- Engine Operation and Maintenance Manual (4021531)
- Engine Service Manual (4021271)

- Warranty Administration Manual (4021290)
- Global Commercial Warranty Statement (A028U870)
- Emission Warranty Statement (Federal Emissions EPA Title 40 CFR Part 90 Component Warranty) (A028X278)
- Seismic Certification (A045V378)

2.4 Before Installation

Before beginning the installation of the generator set, verify that the unit was correctly selected. Check the following features:

- Model
- Specifications
- Options
- Fuel Supply

2.5 Model Specifications

TABLE 1. MODEL VARIATIONS (ALL MODELS 60 HZ)

Model	kW	Phase	Amps	Voltage (L-N/L-L) V
C125D6D	125	1	520.8	120/240
		3	433.7	120/208
		3	410.0	127/220
		3	375.9	120/240
		3	187.9	277/480
		3	150.4	347/600
C150D6D	150	1	625.0	120/240
		3	520.4	120/208
		3	492.1	127/220
		3	451.1	120/240
		3	225.5	277/480
		3	180.4	347/600
C175D6D	175	1	729.2	120/240
		3	607.2	120/208
		3	574.1	127/220
		3	526.2	120/240
		3	263.1	277/480
		3	210.5	347/600

Model	kW	Phase	Amps	Voltage (L-N/L-L) V
C200D6D	200	1	833.3	120/240
		3	693.9	120/208
		3	656.1	127/220
		3	601.4	120/240
		3	300.7	277/480
		3	240.6	347/600

TABLE 2. COLD WEATHER SPECIFICATIONS (ALL MODELS)

Temperature	Description	Battery Type	Group
Above 10 °C (50 °F)	No starting aids required.	2 Standard	34
-17 to 10 °C (0 to 50 °F)	All starting aids (battery heater, 1500 W coolant heater) recommended. Factory options available.	2 Standard	34
Below -17 °C (0 °F)	All starting aids (battery heater, 2000 W coolant heater, oil pan heater) recommended. Factory options available.	2 Standard	34

NOTICE

For NFPA 110 applications, a coolant heater is required. A factory option is available.

TABLE 3. FUEL CONSUMPTION (GAL/HR)

Full Load Rating	C125D6D	C150D6D	C175D6D	C200D6D
Standby	10.10	11.69	13.28	14.88
Prime	9.30	10.74	12.17	13.60

TABLE 4. FUEL TANK PART NUMBERS

Option	Tank Type	Capacity Min. (Hr)	C125D6D	C150D6D	C175D6D	C200D6D
C319-2	Basic	24	A058J692	A058J694	A058J694	A058J695
C320-2	Basic	48	A058J695	A056Y394	A056Y394	A056Y394
C301-2	Regional	24	A056Y392	A056Y392	A056Y392	A056Y392
C303-2	Regional	48	A056Y394	A056Y394	A056Y394	A056Y394
C305-2	Regional	72	A056Y394	A055S002	A055S002	A055S002
C307-2	Regional	96	A055S002	NA	NA	NA

TABLE 5. ENGINE SPECIFICATIONS (ALL MODELS)

Type	Specification
Engine	4 Cylinder-in-line, liquid-cooled, 4-stroke • *QSB7:* C125D6D, C150D6D, C175D6D, C200D6D
Aspiration	Turbocharged and charge air cooled
Displacement	6686 cc (408 in^3)
Compression Ratio	17.2:1
Fuel	ASTM number 2D fuel (refer to the engine operator and maintenance manual)
Coolant	50/50 coolant solution (50% pure water and 50% anti-freeze)
Coolant Fill Rate	Maximum 3 GPM
Fuel Flow	Maximum fuel flow: • C125D6D-C200D6D: 15 gal/hr
	Maximum fuel inlet restriction with clean filter: 17 kPa (5 in. Hg)
	Maximum return restriction: 20 kPa (6 in. Hg)

TABLE 6. LUBRICATING OIL SYSTEM SPECIFICATIONS (ALL MODELS)

Type	Value
Lubricating Oil Pressure at Rated Speed (Minimum)	*G5 engine:* 310 kPa (45 psi)
Oil Recommendation	15W40 (refer to the engine operator and maintenance manual)
Lubricating Oil Capacity:	
--Full at High Mark on Dipstick	17.5 L (18.5 qt)
--Low Mark on Dipstick	15 L (15.8 qt)

TABLE 7. GENERATOR SET SIZE SPECIFICATIONS

Enclosure Type	Size (L x W x H)
Open/Weather	2867 x 1016 x 1841 mm (112.9 x 40 x 72.5 in); does not include exhaust discharge elbow
Sound Level 1	3621 x 1016 x 1841 mm (142.6 x 40 x 72.5 in)
Sound Level 2	4061 x 1016 x 1841 mm (159.9 x 40 x 72.5 in)

TABLE 8. OPEN UNIT WET WEIGHT

Model	kg	lb
C125D6D	1390	3064
C150D6D	1442	3179
C175D6D	1480	3262

Model	kg	lb
C200D6D	1583	3491

NOTICE
Maximum I_2= 8%.

TABLE 9. GENERATOR SET DERATING GUIDELINES

Power	Model	Derate
Standby	C125D6D	Engine power available up to 3850 m (12633 ft) at ambient temperatures up to 40° C (104° F) and 2695 m (8842 ft) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.
	C150D6D	Engine power available up to 3425 m (11237 ft) at ambient temperatures up to 40° C (104° F) and 2298 m (7540 ft) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.
	C175D6D	Engine power available up to 2947 m (9670 ft) at ambient temperatures up to 40° C (104° F) and 1812 m (5945 ft) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.
	C200D6D	Engine power available up to 2148 m (7049ft) at ambient temperatures up to 40° C (104° F) and 1086 m (3563 ft) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.
Prime	C125D6D	Engine power available up to 3136 m (10290 ft) at ambient temperatures up to 40° C (104° F) and 2466 m (8090 ft) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.
	C150D6D	Engine power available up to 2743 m (9000 ft) at ambient temperatures up to 40° C (104° F) and 2151 m (7057 ft) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.
	C175D6D	Engine power available up to 2316 m (7600 ft) at ambient temperatures up to 40° C (104° F) and 1674 m (5492 ft) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.
	C200D6D	Engine power available up to 1944 m (6377 ft) at ambient temperatures up to 40° C (104° F) and 811 m (2660 ft) at 50° C (122° F). Consult your Cummins distributor for temperature and ambient requirements outside these parameters.

TABLE 10. CONTROL SPECIFICATIONS (ALL MODELS)

Control
PowerCommand® 1.1 (Standard)
PowerCommand® 2.3 (Optional)

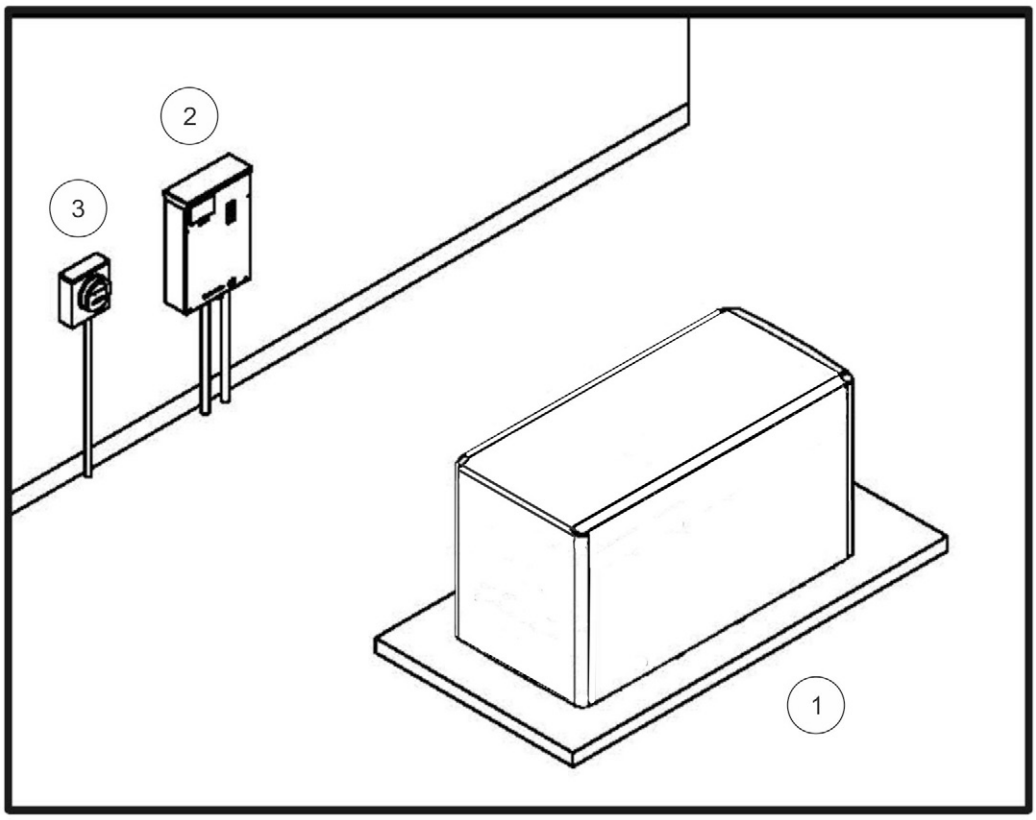
TABLE 11. DC SYSTEM SPECIFICATIONS (ALL MODELS)

Type	Value
Nominal Battery Voltage (VDC)	12
Battery Group	34
Battery Type	Lead acid (wet)
Minimum Cold Crank Amps (CCA)	2 batteries x 850 CCA (per battery) = Total 1700 CCA

3 Pre-Installation Considerations

3.1 Pre-Installation Considerations Introduction

Before installation begins, certain items must be considered. Prior coordination reduces delays and the amount of time power has to be interrupted.



No.	Description	No.	Description
1	Generator Set	3	Electrical Meter
2	Transfer Switch		

FIGURE 1. SITE PREPARATION EXAMPLE

Areas of consideration:

- Location of the generator set - this is one of the first decisions to be made, as it affects all other aspects of the installation, such as:
  - Length of electric wiring
  - Length of fuel lines
  - Site preparation:
    - Access to the site
    - Trenches

    - Site preparation materials needed
- Automatic transfer switch location and connections
- Tools and materials required
- Accessories required (if any) for the customer's application (utility power may be required at the generator set; make plans accordingly)

NOTICE
Depending on the locality and use of the generator set, it may be necessary to obtain an air quality emissions permit before installation begins. Check with local pollution control or air quality authority to determine permit requirements.

3.2 Installation Codes and Standards for Safety

NOTICE
The generator set installer bears sole responsibility for following all applicable local codes and regulations.

The following list of codes and standards may apply to the installation and operation of the generator set. This list is for reference only and not intended to be inclusive of all applicable codes and standards. The address of each agency is listed so that copies of the codes may be obtained for reference. Installation codes and recommendations are subject to change, and may vary by location or over time.

TABLE 12. INSTALLATION CODES AND STANDARDS FOR SAFETY RECOMMENDATIONS

NFPA 70 - National Electrical Code NFPA 37 - Installation and Use of Stationary Combustion Engines and Gas Turbines NFPA 110 - Standard for Emergency and Standby Power Systems	National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
CSA Electrical Bulletin CSA 22.1 Canadian Electrical Code CSA B139 Installation Code for Oil-Burning Equipment CSA C22.2 No. 100 Motors and Generators CSA C22.2 No. 14 Industrial Control Equipment	Canadian Standards Association Housing and Construction Materials Section 178 Rexdale Blvd. Rexdale, Ontario, Canada M9Q 1R3
California Administrative Code - Title 25 Chapter 3	State of California Documents Section P.O. Box 1015 North Highlands, CA 95660

3.3 Required Items for Installation

Tools and materials are used for the installation of this generator set. These items are identified in the following sections. Please refer to local codes and standards, because they may affect the materials required.

3.3.1 Materials Required

NOTICE

Refer to local codes and standards, which may affect material requirements.

NOTICE

If a 100% rated breaker is used, 90 °C wire must be used for L1, L2, and L3 with the wire size determined by the 75 °C ampacity tables.

NOTICE

A UL-listed grounding electrode terminal within its ratings and suitable for the application must be installed and labeled “Grounding Electrode Terminal”.

Electrical Materials:

NOTICE

Class 1 wiring methods must be used for connecting the generator set.

- Four code compliant AC power wires will be needed: L1, L2, N and Gnd (add another wire for 3-phase for a total of 5 AC wires)
- For RA switches, 4 DC control wires will be needed from the generator to the transfer switch.
- Wire sizes (DC control and power and AC sense only):
  - DC control or AC sense wires under 1000 feet circuit length => 18-14 AWG of the insulation type below
  - DC control or AC sense wires 1000 - 2000 feet circuit length => 10-14 AWG of the insulation type below
- All AC and DC wires and cables must be rated 75 °C minimum, stranded copper, and rated for wet locations.
  - For wire sizes 14 AWG and larger, use insulation types: RHW, RHW-2, THHW, THW, THW-2, THWN, THWN-2, XHHW, XHHW-2, USE-2, ZW-2
  - For wire sizes 16 and 18 AWG, use insulation types: FFH-2, KFF-2, PAFF, PFF, PGFF, PTFF, RFH-2, RFHH-2, RFHH-3, SFF-2, TFF, TFFN, ZFF
- Code compliant 20 A, 120 VAC, GFCI protected circuit for alternator heater, battery charger, coolant heater, oil heater, and/or battery heater (if equipped)
- Code compliant conduit for all wires

Mounting Materials:

- Four base tie-down bolts

NOTICE

Regional fuel tanks require six bolts to attach to the ground.

NOTICE

Seismic zone installations require compliance to specific mounting configurations.

Fuel Materials:

- Flexible fuel line
- UL listed pipe thread sealant
- Fuel pipe to the remote tank

3.3.2 Tools Required

Use appropriate lifting techniques to position the generator set in place.

3.3.3 Loose Parts Shipped With the Generator Set

The following loose parts are shipped with the generator set:

- One enclosure key (where applicable)
- Battery tie-down
- Sound level 2 baffle (where applicable)
- Fuel tank vent extensions (where applicable)
- Fuel tank riser blocks (where applicable)
- Literature - Operator Manual, Installation Manual, Health and Safety Manual, and Warranty Statements

4 Installation

4.1 Site Assessment and Preparation

Proper component location and site preparation have a very important impact on completing a successful installation. The major components and sources of power needed for installation include the following items:

- Generator set
- Transfer switch
- Electrical utility
- Fuel source
- Accessories (may be required under certain conditions)

4.1.1 Generator Set Installation Suggestions and Guidelines

- Locate the generator set on stable ground, not subject to flooding. Generator set should not be installed where significant water runoff from a roof or downspouts is present. Sump pump discharge should be routed away from the generator set.
- Locate and orient the generator set such that prevailing winds will carry exhaust gases and fuel leaks away from the house or occupied areas.
- This unit is to be installed so that the risk of contact by people is minimized.

4.1.2 Picking a Location

⚠ WARNING

Electrical Generating Equipment

Incorrect operation and maintenance can result in severe personal injury or death.

Make sure that only suitably trained and experienced service personnel perform electrical and/or mechanical service.

⚠ WARNING

Incorrect installation

Incorrect installation of the generator set, service or parts replacement, can result in severe personal injury, death, and/or equipment damage.

Service personnel must be trained and experienced to perform electrical and mechanical component installation.

NOTICE

Depending on your location and intended use, additional laws and regulations may require for you to obtain an air quality emissions permit before beginning installation of your generator set. Be sure to consult local pollution control or air quality authorities before completing your construction plans.

Generator set location is decided mainly by related systems such as ventilation, wiring, fuel, and exhaust. The set should be located as near as possible to the main power service entrance. Exhaust gases must not be able to enter or accumulate around inhabited areas.

Provide a location away from extreme ambient temperatures and protect the generator set from adverse weather conditions.

Use the following information to locate the generator set for optimal operating conditions:

Leveling: Level the generator set from side-to-side within + 3.5°, and end-to-end within +2.5°.

Placement:

- Generator sets should be a minimum of 5 m (16.4 ft) apart to allow for adequate access.
- Make sure that the air inlets are not obstructed by surrounding trees, buildings, or other obstructions.
- Make sure noise distribution (to prevent echoing) is kept to a minimum.
- Consider exhaust for immediate neighbors.
- The prevailing wind direction should be considered so that the engine combustion air inlet is upwind and the exhaust discharge is downwind.
- The immediate area around the proposed location of the mounting surface should be evaluated for proper drainage so that moisture run-off is sufficient to prevent ponding around the unit(s).

4.1.3 Laying the Foundation

When laying the foundation:

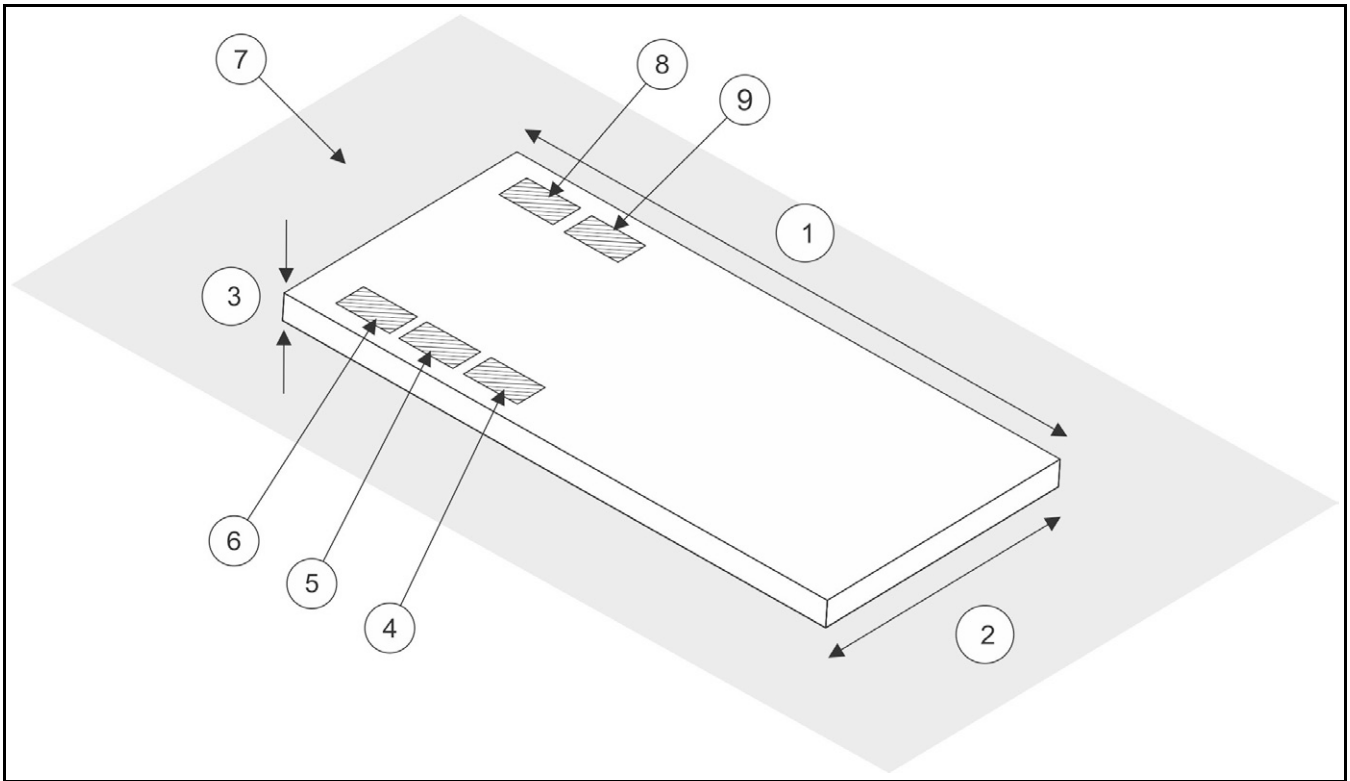
1. Clear obstructions, and make sure that there is adequate clearance for access.
2. Level the ground, and make sure that the ground is compact and settled. Ensure that it is stable ground, not subject to flooding.
3. Prepare the concrete pad.
   - The pad should be constructed of reinforced concrete with a 28-day compressive strength of at least 17,237 kPa (2500 psi).
   - The pad should be at least 127 mm (5 in) deep and extend at least 150 mm (6 in) beyond the skid on all sides.

NOTICE
Refer to the foundation drawing for stub-up dimensions.

NOTICE
Seismic installation may require a different pad and securing devices.

NOTICE
Local codes and standards may have different requirements.

4. Lift the generator set onto the pad, and secure it.



No.	Description	No.	Description
1	Pad Length (Must Extend Minimum 152 mm/6 in Beyond Skid)	6	Circuit Breaker 3 Stub-Up (Optional)
2	Pad Width (Must Extend Minimum 152 mm/6 in Beyond Skid)	7	1.5 m/5 ft Clearance (Shaded Area)
3	Pad Thickness (Minimum 127 mm/5 in)	8	Accessory 120 VAC, 20A Max Wire Stub-Up (240 VAC, 15A for High Wattage Coolant Heater)
4	Circuit Breaker 1 Stub-Up	9	Generator Set Control Wire Stub-Up (DC)
5	Circuit Breaker 2 Stub-Up (Optional)		

FIGURE 2. CONCRETE PAD PREPARATION

4.1.4 Lifting and Moving the Generator Set

⚠ WARNING

Heavy Load

The generator set is heavy. Handle with care.

Dropping the generator set can cause severe personal injury or death. Use appropriate lifting techniques to move the generator set. Keep feet and hands clear when lifting the generator set.

⚠ CAUTION

The generator set is shipped with oil in the engine crankcase. Keep the generator set upright.

4.1.5 Mounting the Generator Set

Mount the generator set on a substantial and level base such as a concrete pad. A non-combustible material must be used for the pad. Verify that the mounting pad is level by length, by width, and diagonally.

NOTICE
Seismic installation may require specific anchorage.

4.2 Fuel System

NOTICE
The factory-installed sub-base fuel tanks meet the fuel system requirements. Please verify that they also meet local codes and standards.

Cummins engines normally use a diesel fuel specified to ASTM D975 grade 2. Refer to the Engine Operator Manual for additional information.

In all fuel system installations, cleanliness is of the utmost importance. Make every effort to prevent entrance of moisture, dirt, or contaminants of any kind into the fuel system. Clean all fuel system components before installing.

NOTICE
A fuel filter/strainer/water separator of 100-120 mesh or equivalent (approximately 150 microns nominal) must be fitted between the main tank and day tank if a factory sub-base tank is used as a day tank.

Use only compatible metal fuel lines to avoid electrolysis when fuel lines must be buried. Buried fuel lines must be protected from corroding.

NOTICE
Never use galvanized or copper fuel lines, fittings, or fuel tanks. Condensation in the tank and lines combines with the sulfur in diesel fuel to produce sulfuric acid. The molecular structure of the copper or galvanized lines or tanks reacts with the acid and contaminates the fuel, resulting in possible engine damage.

An electric solenoid valve in the supply line is recommended for all installations and required for indoor automatic or remote starting installations that do not use the factory sub-base fuel tank. Connect the solenoid wires to the generator set “Switched B+” circuit to open the valve during generator set operation.

NOTICE
Never install a shutoff device in fuel return line(s). If the fuel return line(s) is blocked or exceeds fuel restriction limit, engine damage will occur.

NOTICE
A base mounted fuel tank may be part of the generator set build. An additional external fuel system may be required if the onboard fuel capacity is not sufficient for the application.

4.2.1 Fuel Selection and Recommendations

For fuel specifications, see the Model Specifications section.

NOTICE

Fuel systems must be installed by qualified service technicians. Improper installation presents hazards of fire and improper operation, resulting in severe personal injury or property damage.

In all fuel system installations, cleanliness is extremely important.

- Make every effort to prevent fuel contamination from:
  - Moisture
  - Dirt
  - Excess thread sealant
  - Contaminants of any kind
- Clean all fuel system components before installing.

If applicable, refer to the Engine Operator Manual for complete fuel requirements.

⚠ WARNING

The generator set is heavy. Dropping the generator set can cause severe injury or death. Do not lift the generator set with fuel in the tank (where applicable). Keep hands and feet clear when lifting the generator set.

⚠ WARNING

Do not mix gasoline, alcohol, or gasohol with diesel fuel. This can cause an explosion.

⚠ CAUTION

Due to the precise tolerances of diesel injection systems, it is extremely important that the fuel be kept clean and free from dirt or water. Dirt or water in the system can cause severe damage to both the fuel pump and fuel injectors.

4.2.2 Fuel Return Restrictions (or Pressure) Limit

Fuel return drain restriction (consisting of friction head and static head) between the engine injector return line connection and the fuel tank must not exceed the limit stated in the Model Specifications. Fuel return lines must not contain a shutoff device. Engine damage will occur if the engine is run with the return fuel lines blocked or restricted.

4.2.3 Fuel Lines Routing

⚠ WARNING

Explosive hazard.

Fuel leaks create fire and explosion hazards which can result in severe personal injury or death.

Always use flexible tubing between the engine and fuel supply to avoid line failure and leaks due to vibration. The fuel system must meet all application codes.

⚠ WARNING

Sparks and hot surfaces.

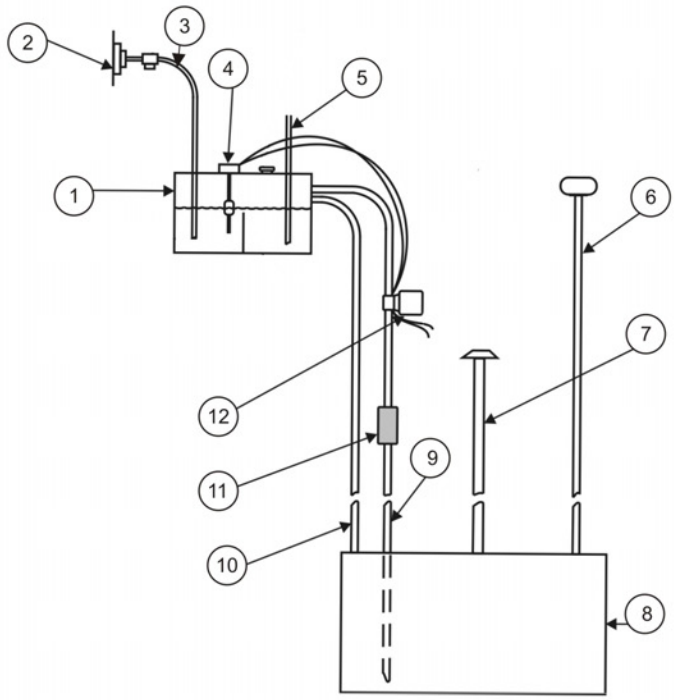
Sparks and hot surfaces can ignite fuel, leading to severe personal injury or death.

Do not route fuel lines near electrical wiring or hot exhaust parts.

NOTICE

Fuel lines must be routed and secured to maintain a 12.7 mm (½ inch) minimum clearance from electrical wiring and a 51 mm (2 inch) minimum clearance from hot exhaust parts.

A flexible fuel hose(s) or section of flexible fuel hose(s) must be used between the engine's fuel system and fuel supply and return line(s) to protect the tank's fuel system from damage caused by vibration, expansion, and contraction. The fuel hose must be installed according to all applicable codes and standards.



No.	Description	No.	Description
1	Day Tank (Sub-Base)	7	Fill Pipe
2	Engine Fuel Pump	8	Main Fuel Tank
3	Supply Line	9	Supply Line
4	Float Switch	10	Overflow Line
5	Return Line	11	120 Mesh Fuel Strainer
6	Vent Pipe	12	Fuel Transfer Pump Electric Motor Driven

FIGURE 3. TYPICAL FUEL SUPPLY INSTALLATION (USING FACTORY SUB-BASE TANK AS DAY TANK)

4.2.4 Engine Fuel Connections

Identification tags are attached to the fuel supply line and fuel return line connections. All models require a fuel return line from the injectors to the tank.

4.2.5 Supply Tank

Locate the fuel tank as close as possible to the generator set and within the restriction limitations of the fuel pump.

Install a fuel tank that has sufficient capacity to supply the generator set operating continuously at full rated load for the planned period of operation or power outage.

If the fuel inlet restriction exceeds the defined limit due to the distance/customer-supplied plumbing between the generator set and the main fuel tank, a transfer tank (sometimes referred to as a day tank) and auxiliary pump will also be required. If an overhead main fuel tank is installed, a transfer tank and float valve will be required to prevent fuel head pressures from being placed on the fuel system components.

4.2.6 Fuel Inlet Pressure/Restriction Limit

Engine performance and fuel system durability is compromised if the fuel inlet pressure or restriction limits are not adhered to. Fuel inlet pressure or restriction must not exceed the limits stated in the model-specific generator set *Specification Sheet*.

4.2.7 Day Tank

Some generator set installations may include a fuel day tank. They are used when fuel inlet restriction limits cannot be met, or the supply tank is overhead and presents problems of high fuel head pressure for the fuel inlet and return lines.

4.2.7.1 Supply Tank Lower Than Engine

⚠ WARNING

Fuel spillage.

Spilled fuel presents the hazard of fire or explosion which can result in severe personal injury or death.

Provide an overflow line to the supply tank from the day tank.

NOTICE

The supply tank top must be below the day tank top to prevent siphoning from the fuel supply to the day tank.

With this installation, the day tank is installed near the generator set, below the fuel injection system and within the fuel inlet restriction limit. Install a fuel transfer pump, to pump fuel from the supply tank to the day tank. A float switch in the day tank controls operation of the auxiliary fuel pump.

Provide a return line from the engine injection system return connection to the day tank. Plumb the return line to the bottom of day tank. Provide a day tank overflow line to the supply tank in case the float switch fails to shut off the fuel transfer pump.

4.2.7.2 Supply Tank Higher Than Engine

With this installation, the day tank is installed near the generator set, above the fuel injection system and within the fuel return restriction limit. Include an automatic fuel shutoff valve in the fuel line between the fuel supply tank and the day tank to stop fuel flow when the generator set is off.

Provide a return line from the engine injection system return connection to the day tank. Plumb the return line to the bottom of day tank.

NOTICE

Spilled fuel can create environmental hazards. Check local requirements for containment and prevention of draining to sewer and ground water.

4.3 Engine Exhaust

The exhaust system for this generator set is complete and was designed specifically for this generator set. Do not modify or add to the exhaust system of this generator set.

⚠ WARNING

Exhaust gas is deadly. Make sure that the exhaust system terminates away from building vents, windows, doors, and sheltered spaces that may not have ample fresh air ventilation.

⚠ WARNING

Engine discharge air and exhaust carry carbon monoxide gas (odorless and invisible) which can cause asphyxiation and death. Never use engine discharge air or exhaust for heating a room or enclosed space.

4.4 Electrical Connections

⚠ WARNING

Improper installation can lead to electrocution and damage to property. Electrical connections must be made by a licensed electrician.

⚠ WARNING

Automatic startup of the generator set during installation can cause severe personal injury or death. Make sure the generator set is shut down and disabled:

1. ***Press the generator set's "O" (Off) button to stop the generator set. Allow the generator set to thoroughly cool to the touch.***
2. ***Turn off and disconnect the battery charger from the AC source before disconnecting the battery cables.***
3. ***Disconnect the negative (–) cable from the battery and secure it from contacting the battery terminals to prevent accidental starting.***

NOTICE

Refer to regional codes and the National Electrical Code (NFPA 70) for all electrical installation requirements.

NOTICE

Class 1 wiring methods must be used for connecting the generator set.

4.4.1 Electrical Preparations

NOTICE

Be sure to account for any needed accessories, such as a remote display, etc.

1. Connect the conduit to the generator set. Refer to the specific outline drawing in the Outline and System Drawings section for the size and location of the hole provided for electrical conduit connection. The existing hole may be increased in size to match conduit used.

4.4.2 AC Connections

⚠ WARNING

Automated Machinery

Accidental or remote starting of the generator set can cause severe personal injury or death.

Isolate all auxiliary supplies and use an insulated wrench to disconnect the starting battery cables, negative (–) cable first.

NOTICE

If a 100% rated breaker is used, 90 °C (194 °F) wire must be used with the wire size determined by the 75 °C (167 °F) ampacity tables.

NOTICE

When using a circuit breaker with an adjustable, electronic trip unit, the amperage and trip curve settings may need adjustment to match the generator set load wiring, or downstream loads and circuit breakers. An accessory seal kit (part number A026M166) is available to tamper-proof the adjustable settings.

1. Make sure the generator set is shut down and disabled:
   a. Press the Off switch from the display and then press the E-Stop button to stop the generator set. Allow the generator set to thoroughly cool to the touch.
   b. Turn off and disconnect the battery charger from the AC source before disconnecting the battery cables.
   c. Disconnect the negative (–) cable from the battery and secure it from contacting the battery terminals to prevent accidental starting.
2. Open the enclosure side panel to access the main circuit breaker box.
3. Place the circuit breaker handle in the OFF position.
4. Remove the bolts holding the circuit breaker cover.
5. Connect the conductors to the circuit breaker load-side terminals, neutral lug, and equipment grounding lug. For grounding and neutral connections, look for the symbols on the generator set circuit breaker box (shown below, and in the next image at the bottom).

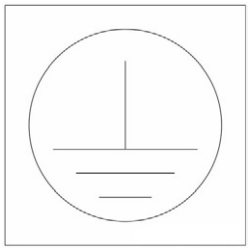
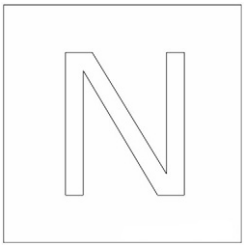
Equipment Grounding Conductor Symbol	Equipment Neutral Connection Symbol
	

FIGURE 4. SYMBOLS ON CIRCUIT BREAKER BOX

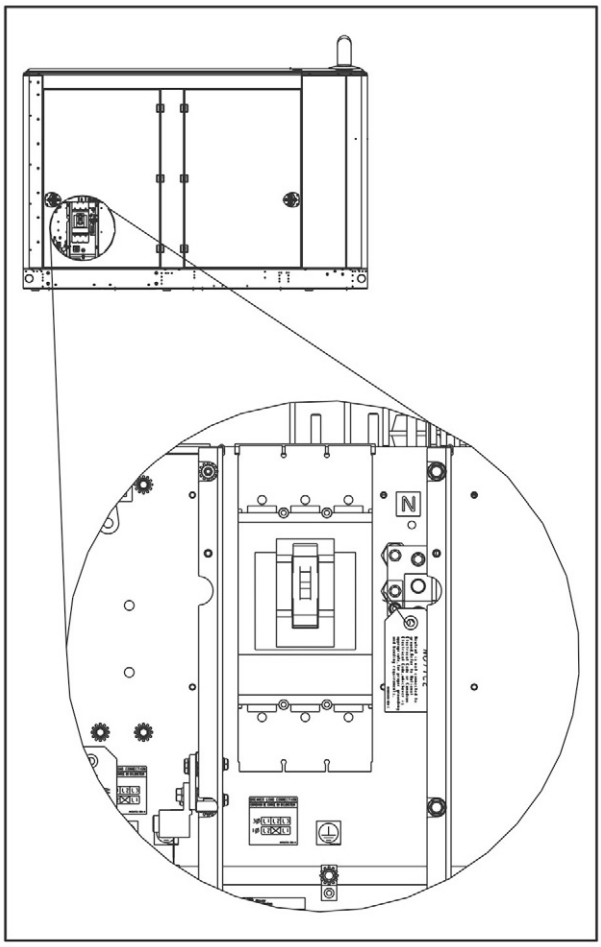


FIGURE 5. CIRCUIT BREAKER AC LOAD CONNECTIONS LOCATION (SYMBOLS SHOWN AT BOTTOM)

6. Torque the circuit breaker terminals per specifications on the circuit breaker label.
7. Torque the neutral lug. For torque values within the Circuit Breaker Outline see (A055B603 Circuit Breaker Outline Drawing).
8. Torque the equipment grounding lug. For torque values within the Circuit Breaker Outline see (A055B603 Circuit Breaker Outline Drawing).
9. Fill in the stub-up openings with an approved duct seal or mastic tape to keep out insects and rodents.
10. Install the circuit breaker cover.

4.4.2.1 Factory Option and Accessory Connections

NOTICE
Use copper conductors only.

Here are the AC powered options or accessories available:

- Alternator heater
- Battery charger
- Battery warmer
- Engine coolant heater
- Oil heater

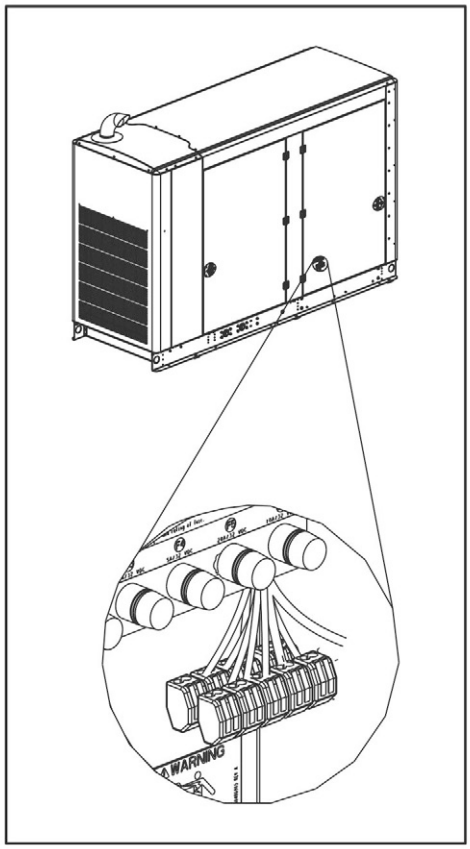


FIGURE 6. AC ACCESSORY CONNECTIONS

The alternator heater, battery charger, battery warmer, engine coolant heater, and oil heater require power from a 120 VAC, 20 Amp protected circuit from the main distribution panel. The high wattage coolant heater operates at 240 VAC, 15 Amp circuit. Use 12 AWG 75 °C (167 °F) conductors to make connection to the generator set AC distribution connector.

4.4.3 DC Connections

NOTICE
When selecting and installing conduit to the generator set, account for any needed accessories, such as a remote display, etc.

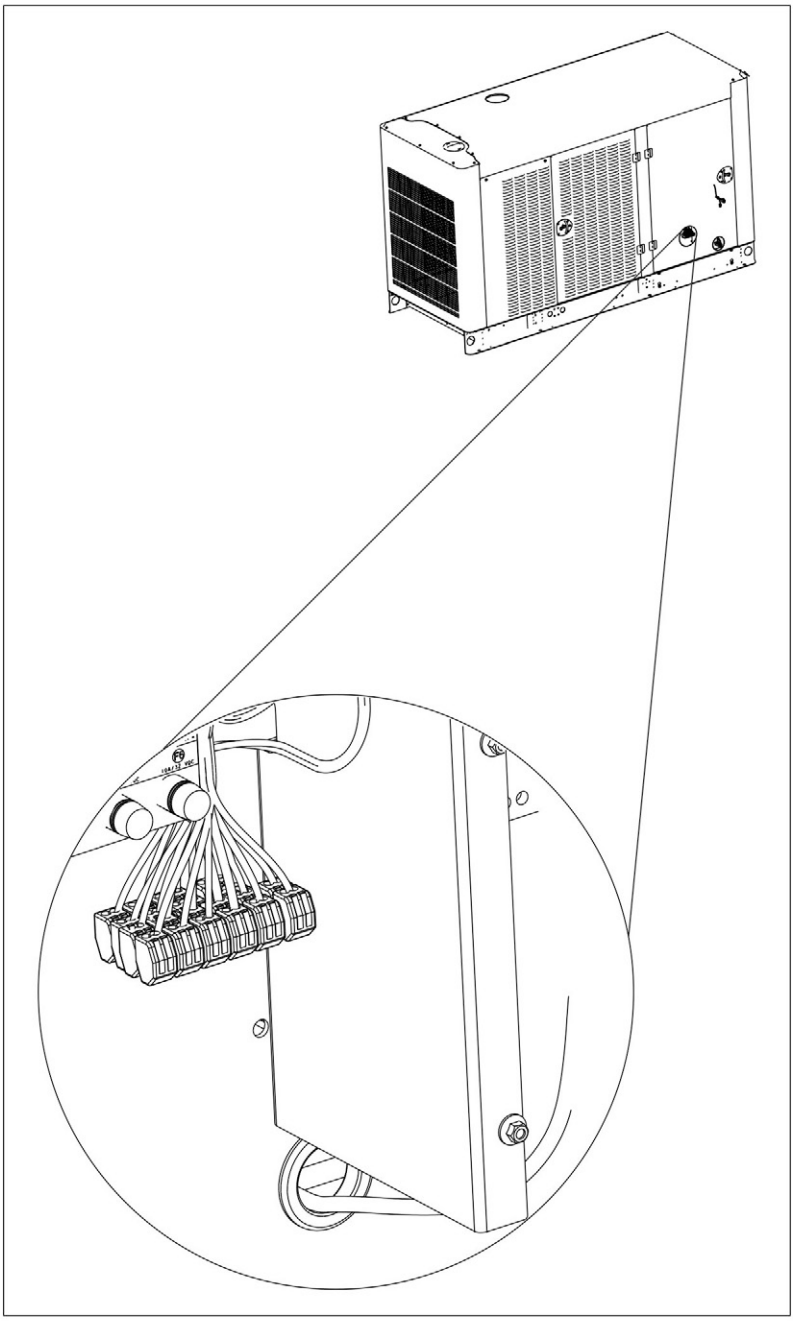


FIGURE 7. DC CUSTOMER CONNECTIONS

4.4.4 Grounding

NOTICE
The generator set is shipped from the factory with the neutral and equipment ground not bonded together.

Refer to local codes and standards for grounding procedures.

4.4.5 Battery

The generator set requires 2 12V batteries connected in parallel (negatively grounded) for engine cranking and powering the electronic control system. When the generator set is running, the batteries are charged from the engine-driven battery alternator. When the set is not running, an AC powered battery charger is needed to keep the batteries charged.

⚠ CAUTION
Ensure that the AC power to the battery charger is disconnected when installing the battery.

⚠ CAUTION
Wear proper safety protection when working around batteries. Keep open flames and sparks away from the equipment.

NOTICE
Only personnel knowledgeable of batteries and required precautions should perform or supervise battery servicing. Keep unauthorized personnel away from batteries.

To connect the batteries:

1. Connect the positive battery terminals.
2. Connect the negative battery terminals.
3. Make sure that the batteries are secured to the battery tray with the straps provided.
4. Make sure that the black and red battery cable boots are in place.

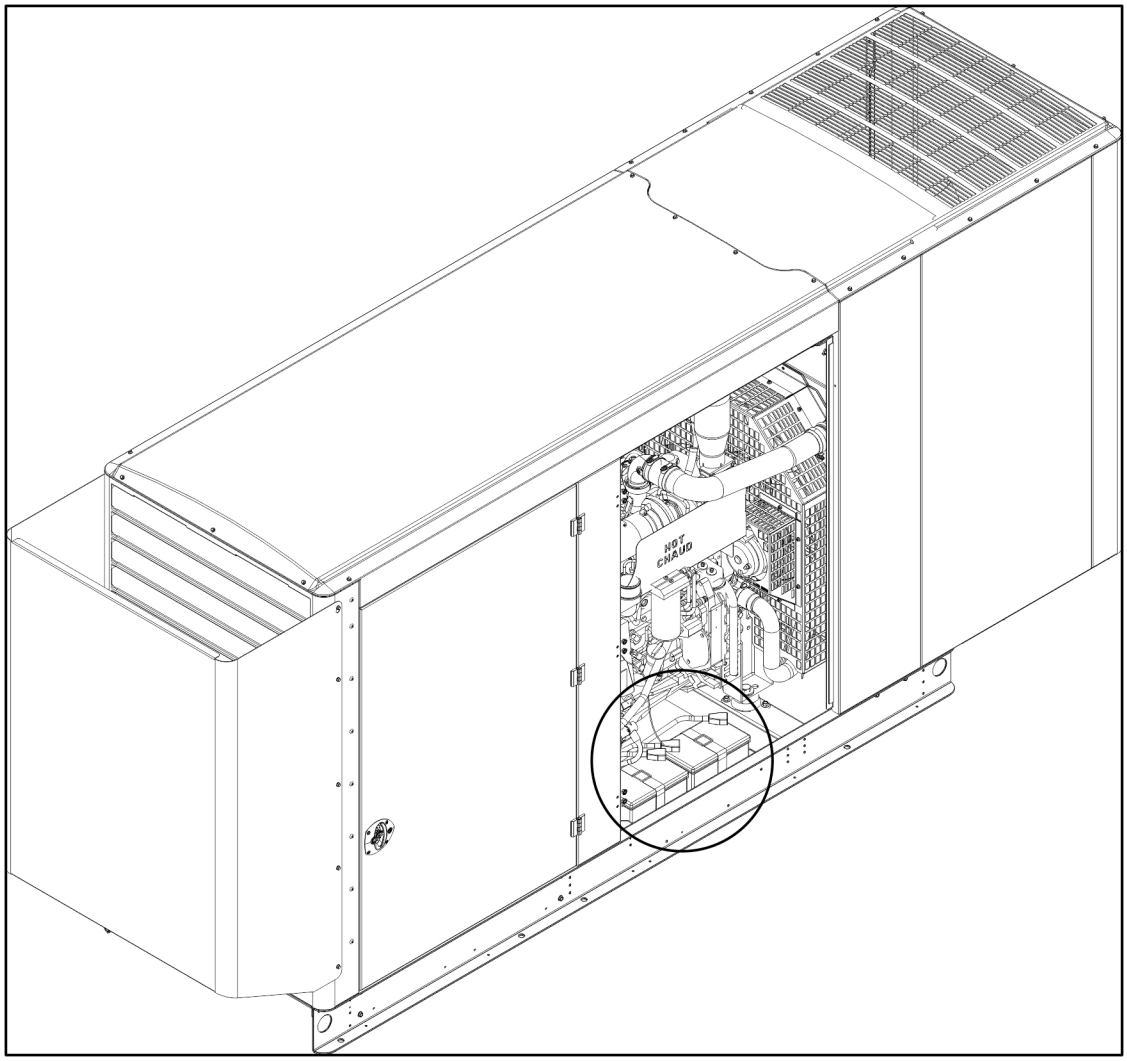


FIGURE 8. BATTERY LOCATION

Refer to the Model Specifications section for battery specifications.

An optional thermostatically controlled battery heater is available for more reliable starting in ambient temperatures below –18 °C (0 °F).

To prevent injury due to accidental startup, do not connect the battery cables to the batteries until the installation has been completed; tools, rags, and body parts are away from any rotating parts or electrically live parts; and it is time to start the set.

5 Startup and Configuration PowerCommand 1.1

5.1 Brightness and Contrast

The Screen Adjust screen allows the contrast, brightness, and units to be set. To access the Screen Adjust screen:

1. From any Information screen, hold down the up and down arrows simultaneously for two seconds to gain access to the Service Menu screen.
2. Select **Screen Adjust**.

To adjust the contrast, brightness, or units from the Screen Adjust screen:

1. From the Screen Adjust screen, select **Adjust** to access the screen variables.
2. Press the right arrow to move between the variables.
3. Adjust settings, and press **Save** to save any changes.

When updating these settings, the functions of the keys are as follows:

- The horizontal right arrow key is used to select successive blocks for editing settings on the screen.
- Select the left arrow to return to the previous screen.
- Adjust values by using the + or - keys on the Adjust screen of the Display Setup screen.
- Press **Save** to save any changes. After saving, the Save button changes to the Adjust button.

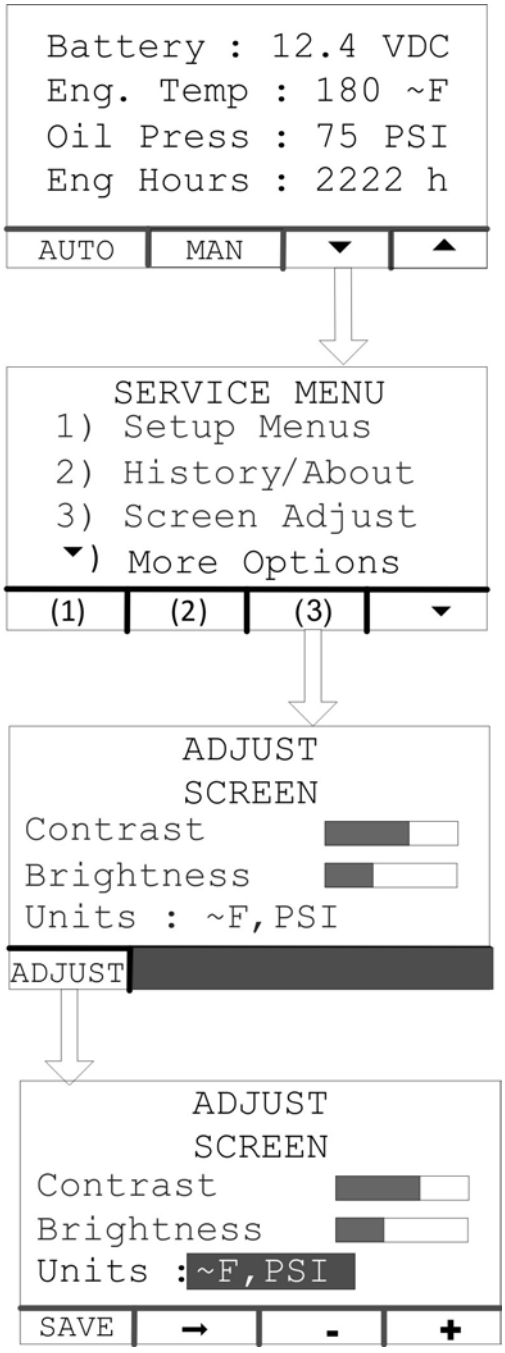


FIGURE 9. BRIGHTNESS AND CONTRAST SCREEN NAVIGATION

NOTICE
Adjusting the brightness on the operator panel adjusts the brightness of both the LCD backlight and the LEDs on the display. The contrast should never be 0 or 100% on any of the screens. The default value for Brightness is 50%.

5.2 History and About Menu

To access the History/About screen:

1. From any Information Menu, hold down the up and down arrows simultaneously for two seconds. The Service Menu appears.
2. Select **History/About**.
3. Advance through the screens to view information about the generator set, control, and display.

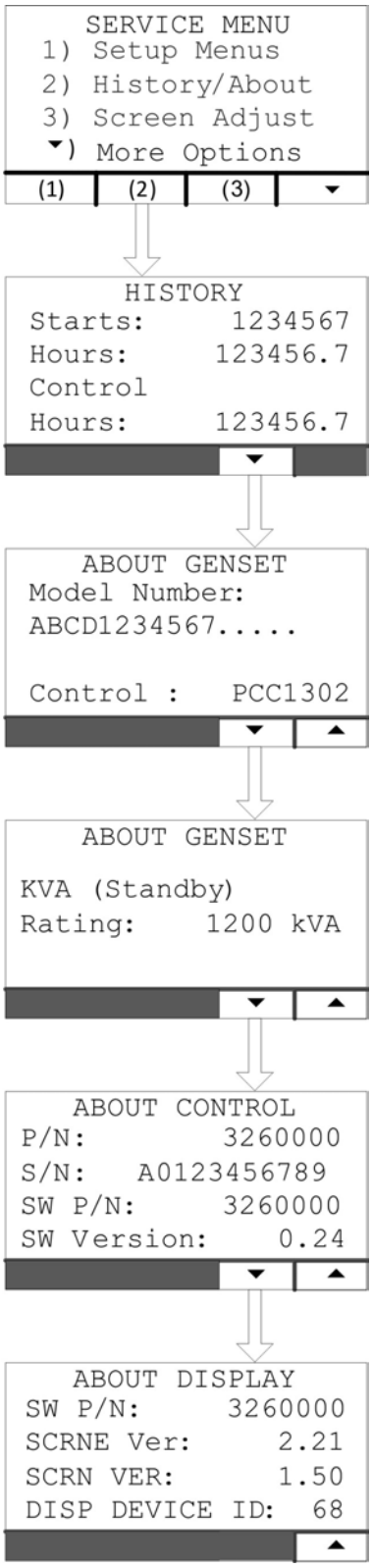


FIGURE 10. HISTORY/ABOUT MENU

5.3 InPower Service Tool

The InPower™ service tool can be used in troubleshooting to perform tests, verify control inputs and outputs, and test protective functions. Refer to the InPower User's Guide, provided with the InPower software for test procedures.

5.4 Checklist

Tick	General Items
	Generator set wattage capacity is sufficient to handle maximum anticipated load.
	At least 3 feet (914.4 mm) of clearance (or greater for housing door) is provided around the entire generator set for service and ventilation.
	The generator set is located in an area not subject to flooding.
	All operating personnel have read and are familiar with the generator set Operator manual, all health and safety procedures, warnings, cautions, precautions, and the other documentation supplied with the generator set.
	All operators have been thoroughly briefed on preventative maintenance procedures.
	All operators have read and understand all important safety instructions.
	Generator Set Support
	The floor, roof, or earth on which the generator set rests is strong enough and will not allow shifting or movement. Observe local codes on soil bearing capacity due to freezing and thawing.
	The generator set is properly supported and retained to an approved base
	The supporting base is large enough and is of non-combustible material, extending 6 inches (152.4 mm) all around the generator set.
	Cooling Air Flow
	Generator set air inlet is faced into direction of strongest, prevailing winds.
	Air inlet openings are unrestricted and are at least 1 to $1^{1}/_{2}$ times larger than air outlet area.
	Cooling air outlet is on downwind side of building (if not, wind barrier is constructed).
	Proper ducting material (sheet metal, canvas) is used between radiator and air outlet.
	Diesel Fuel System
	Fuel tanks meet or exceed all Local, State, or National codes (if applicable).
	Fuel lines are properly installed, supported, and protected against damage.
	The fuel filters have been installed.
	Approved flexible fuel line is installed between the main fuel supply and the generator set’s fuel system near the generator set, to protect it against damage caused by vibration, expansion, and contraction.
	Strainer or fuel screen (100 to 200 mesh) is installed in the fuel supply line to protect the fuel lift pump, day tank transfer pump, or float valve seat from fuel tank debris (if applicable).
	The fuel filter assembly shipped with the generator set is installed and operational (if applicable).
	Fuel supply shutoff valves are installed to prevent fuel flow in case of leaks.
	No shutoff valves are installed on engine fuel return line (if applicable).

Tick	General Items
	External fuel pumps are connected and operational at all times - generator set started or shut down (if applicable).
	Fuel tanks are filled with the correct grade / type of fuel (if applicable).
	Fuel system is properly primed.
	No fuel leaks are found in supply line or engine fuel system.
	Rupture basin switch wiring is connected correctly to display an alarm in case of a fuel leak.
	Exhaust System
	The breather tube routing is set up to blow the fumes away from the generator set (if applicable)
	Operators are thoroughly briefed on the dangers of carbon monoxide gas.
	If the installation includes a heavy duty air cleaner, it has been installed.
	Areas around generator set are well ventilated. No possibility of exhaust fumes entering building doors, windows, or intake fans.
	Exhaust gases are piped safely outside and away from building.
	The correct length of approved rigid pipe is connected to the generator set flexible pipe using approved securing methods with no weight resting on engine exhaust components. There are no bends in flex section.
	Condensation drain is provided in lowest section of exhaust piping.
	Exhaust piping is insulated to guard against burns to personnel.
	Exhaust piping passing through walls or ceilings have approved fire-proof materials and are in compliance with all codes.
	Exhaust piping is large enough in diameter to prevent excessive back pressure on engine.
	Verify that the pyrometer meters are functioning.
	AC and DC Wiring
	For bottom entry circuit breaker installations, the cable chute has been installed (if applicable).
	Wire sizes, insulation, conduits and connection methods all meet applicable codes.
	AC and DC wires are separated in their own conduit to prevent electrical induction.
	All load, line and generator connections are well made and correct.
	Flexible conduit is used between the generator and the building or surrounding structure.
	Check phase rotation.
	Generator Set Pre-Start
	Generator set engine is properly serviced with oil and coolant.
	Battery charger is installed using the appropriate cable size and is operational.
	Battery charger is configured for the proper DC battery voltage, battery type, and float voltage.
	Batteries are properly installed, serviced and charged.
	Battery temperature sensor is connected and operational (if applicable).
	Engine coolant heater is connected and operational.
	All generator set covers and safety shields are installed correctly.

Tick	General Items
	All fuel and coolant shutoff valves are operational.
	Radiator fan and other external moving parts including drive belts are unrestricted.

5.5 Startup

⚠ WARNING

Automated Machinery

Accidental or remote starting of the generator set can cause severe personal injury or death.

Isolate all auxiliary supplies and use an insulated wrench to disconnect the starting battery cables, negative (–) cable first.

After verifying that the installation was completed correctly, start and test the system. Make sure to connect the battery cables to the battery with the positive (+) cable first.

Read through the Operator Manual and perform the maintenance and pre-start checks as instructed.

The generator set is shipped from the factory with the proper level of engine oil and coolant, but each should be checked before the generator set is started. Start and operate the generator set following all the instructions and precautions in the Operator Manual. Ensure that the bonding bolts are installed into the service panels before leaving the site.

NOTICE

Before leaving the site, if the generator set is ready to be placed in service, put the generator set in Auto mode to provide automatic standby power.

NOTICE

Contact your local Cummins service representative if you encounter a fault code.

5.6 Starting at the Operator Panel (Manual Run Mode)

NOTICE

Make sure that all Pre-start Checks are carried out before starting the generator set. Do not attempt to start the generator set until it is safe to do so. Warn all others in the vicinity of the generator set and connected load equipment that the generator set is about to start.

STARTING IN MANUAL RUN MODE

1. Make sure the main circuit breaker is in the open position.
2. To start the generator set in the **Manual Run** mode:
   a. Press the **Manual** button 

on the operator panel.
   b. Press the **Start** button 

within ten seconds.

NOTICE

Failure to press the Start button within this time will result in the generator set changing to the Off mode. Refer also to the Selecting Manual Run Mode section.

NOTICE

If the mode change access code feature has been enabled, enter the access code when prompted. See the Passwords and Mode Change Access section.

3. The PowerCommand® control will initiate a starter cranking signal and will perform an automatically sequenced manual start, under a complete engine protection system combined with full monitoring capability. This will activate the engine control system and the starting procedure. The starter will begin cranking and, after a few seconds, the engine will start and the starter will disconnect.

   If the engine fails to start, the starter will disengage after a specified period of time and the control will indicate a Fail to Start shutdown.

   To clear a Fail to Start shutdown:

   a. Press the **Stop** button. 

   b. Press the **Reset** button. 

4. Before attempting to re-start, wait a minimum of two minutes for the starter motor to cool and then repeat the starting procedure. If the engine does not run after a second attempt, refer to the Troubleshooting section of the operator manual.

DISABLING MANUAL MODE

To disable Manual mode, change to **Auto** or **Off** mode. If the generator set is running when it leaves **Manual** mode, it will continue to run if **Auto** mode has been selected and the remote start signal is active. If there is no active remote start signal, the generator set will stop.

5.7 Starting from Remote Location (Auto Mode)

NOTICE

Make sure that all Pre-start Checks are carried out before starting the generator set. Do not attempt to start the generator set until it is safe to do so. Warn all others in the vicinity that the generator set is about to start.

1. To start the generator set in the **Auto Run** mode, select the **Auto** button from the operator panel. 

Refer also to the Selecting Auto Mode section.

   Once the PowerCommand® control receives a remote start signal, and after a Time Delay to Start, the control will initiate the starting sequence as above. The Remote Start LED will be lit.

NOTICE

If the mode change access code feature has been enabled, enter the access code when prompted. See the Passwords and Mode Change Access section.

NOTICE

When the generator set is operating in the Remote Start mode, removing the Remote Start command does not shut off the engine if the load is more than 10%, the cooldown timer is set to zero, and the control is configured for a single unit (not in parallel). The generator set continues to operate until it runs out of fuel, the E-stop button is used, or the load is removed.

2. To disable **Auto** mode, change to **Manual** or **Off** mode.

5.8 Cold Starting with Loads

NOTICE

Make sure that all pre-start checks are carried out before starting the generator set. Do not attempt to start the generator set until it is safe to do so. Warn all others in the vicinity that the generator set is about to start.

Use a coolant heater if a separate source of power is available. The optional heater available from Cummins will help provide reliable starting under adverse weather conditions. Be sure the voltage of the separate power source is correct for the heater element rating.

Cummins recommends equipping standby generator sets (life safety systems) with engine water jacket coolant heaters to maintain the coolant at a minimum of 32 °C (90 °F) and, for most applications, accept the emergency load in ten seconds or less. Although most Cummins generator sets will start in temperatures down to -32 °C (-25 °F) when equipped with engine water jacket coolant heaters, it might take more than ten seconds to warm the engine up before a load can be applied when ambient temperatures are below 4 °C (40 °F).

The **Low Coolant Temp** (Code 1435) message along with the lighting of the **Warning** LED are provided to alert the operator of a possible delay in accepting the load. The engine cold sensing logic initiates a warning when the engine water jacket coolant temperature falls below 21 °C (70 °F). In applications where the ambient temperature falls below 4 °C (40 °F), a cold engine may be indicated even though the coolant heaters are connected and functioning correctly. Under these conditions, although the generator set may start, it may not be able to accept load within ten seconds. When this condition occurs, check the coolant heaters for correct operation. If the coolant heaters are operating correctly, other precautions may be necessary to warm the engine before applying a load.

5.8.1 Checking Coolant Heater Operation

⚠ WARNING

Hot Surfaces

Contact with the hot surfaces can cause severe burns.

Avoid contact with hot parts. Allow hot parts to completely cool.

Do not touch the cooling system outlet hose. The coolant heater is operating if radiant heat can be felt with your hand held close to the outlet hose and the engine is not running.

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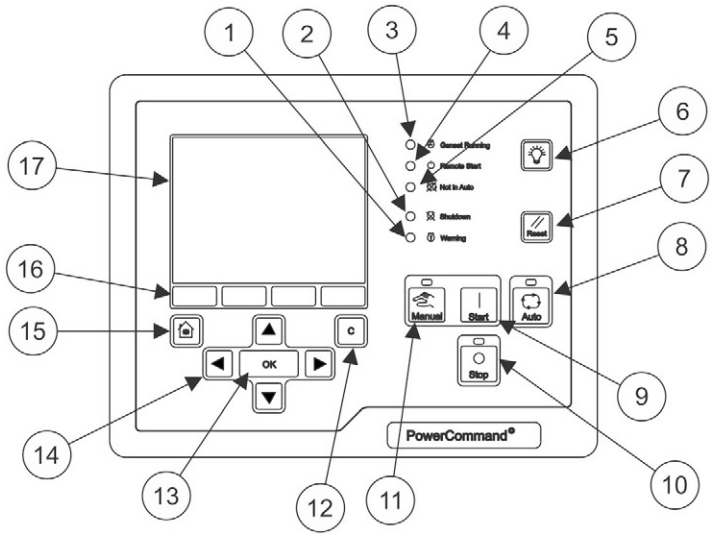
6 Startup and Configuration PowerCommand 2.3

6.1 Operator Panel

The figure below shows the features of the front panel. It includes five lamp indicators; the graphical display with four menu select and seven menu navigation buttons; and six control mode buttons. This display panel enables the operator to look at the status, adjust the settings, and start and stop the generator set.



No.	Description	No.	Description
1	Indicator Lamp – Warning	10	Stop Button
2	Indicator Lamp – Shutdown	11	Manual Button
3	Indicator Lamp – Genset Running	12	Previous Menu Button (or Clear)
4	Indicator Lamp – Remote Start	13	Item Select Button (OK)
5	Indicator Lamp – Not in Auto	14	Menu Navigation Buttons (Up, Down, Left, Right)
6	Lamp Test Button/Panel Lamp On-Off	15	Home Button
7	Reset Button	16	Menu Select Buttons (for use with Item 17)
8	Auto Mode Button	17	Graphical Display
9	Start Button		

FIGURE 11. OPERATOR PANEL

6.1.1 Operator Panel - Initial Operator Menu

Figure 12 on page 47 shows the initial menu which is displayed over two pages. Use the soft-key buttons below the up and down arrows (▲ and ▼) to toggle between the two pages.

Use the soft-key buttons below Genset, Alternator, or Engine to short-cut to those menus.

Pressing the **Home** button  from any screen will return the display to the main menu screens.

6.1.1.1 Initial Menu Data

This menu displays the information available through the menus.

TABLE 13. INITIAL DATA MENU

Name	Description	
History/About	Use this screen to view historical information about your generator set.	
Faults:	If there are no active Faults, these screens will not be available.	
	Active Shutdowns	Use this screen to view active Shutdown faults.
	Active Warning	Use this screen to view active Warning faults.
	History	Use this screen to view faults that have been cleared.
Genset Data	Use this screen to view the status of the generator set.	
Alternator Data	Use this screen to view the status of the alternator.	
Engine Data	Use this screen to view the status of the engine.	
Advanced Status:	---	
	Genset	Use this screen to view power, energy, phase difference, and other detailed generator set information.
	Controller	Use this screen to view sequences of operation, configurable inputs and outputs, and other detailed controller information.
	Engine	Use this screen to view pressures, voltages, temperatures, and other detailed engine information.
Help	Use this screen to obtain more information regarding the operator panel.	
Adjust	The use of these screens is restricted to authorized personnel only.	
Genset Setup		
Paralleling Basic Setup		
OEM Setup		
PCCnet Setup		
Modbus Setup		
Display Options		
Clock Setup		
Configurable IO		
Calibration		
Save/Reserve		

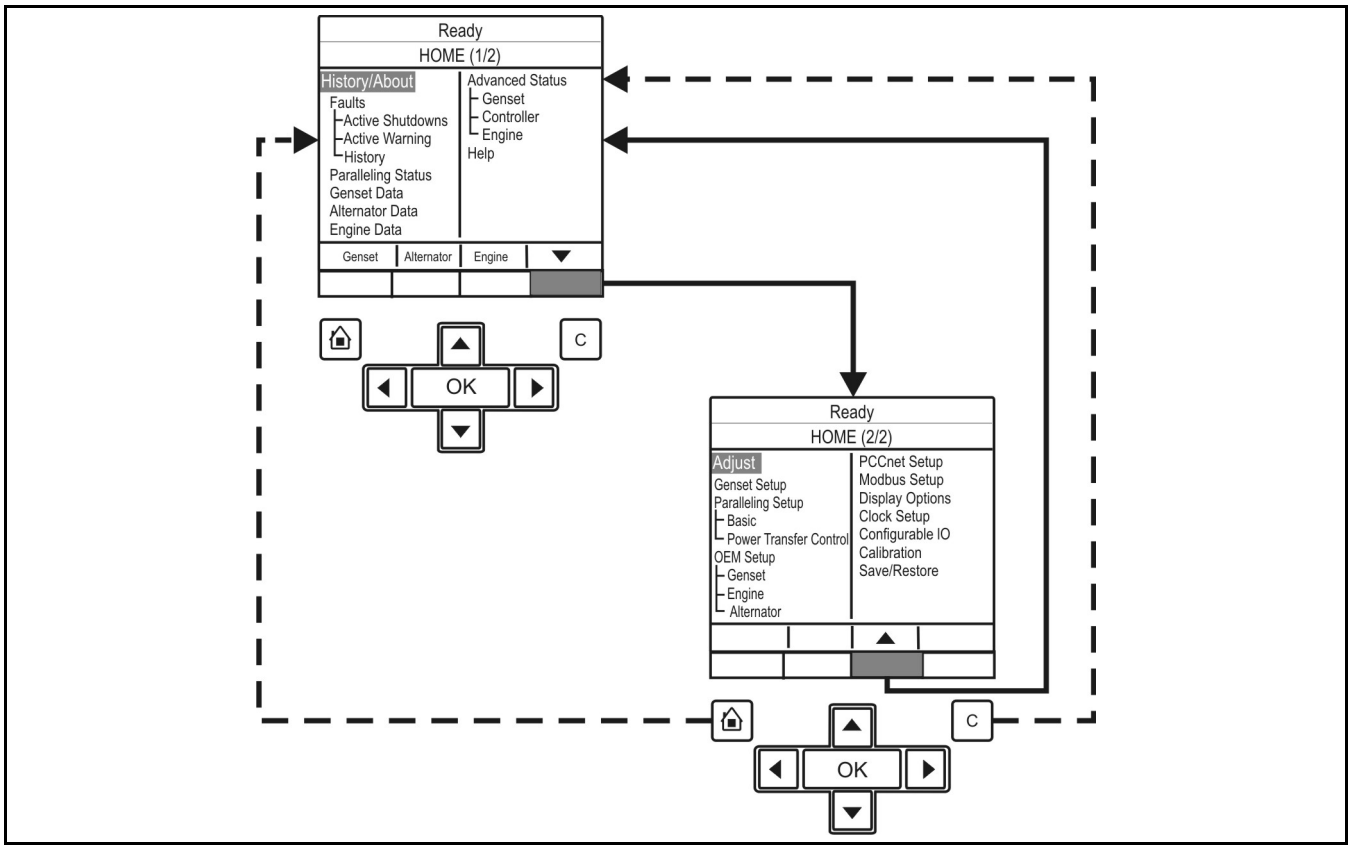


FIGURE 12. INITIAL OPERATOR MENU

- Press the **Home** Button to return to the main menu at any time.
- Press the **C** Button to return to the previous menus. Settings will not be saved when this button is pressed.

6.1.2 Operator Panel - Engine Data Operator Menu

The Engine Data Menu - Typical Data figure shows a block representation of a typical Engine Data menu. To navigate from the Home menu (HOME [1/2]), press the soft-key button below the function button indicating Engine. This will take you directly to the Engine menu.

The Engine Data menu is displayed on one page.

6.1.2.1 Engine Data Menu

Use this menu to look at the status of the engine.

TABLE 14. ENGINE DATA MENU

Name	Description	Allowed Values
Pressure		
Oil	Monitor point for Oil Pressure	0 - ~993 kPa (0 - ~145 psi)
Boost	Monitor point for Boost Absolute Pressure	0 - ~1014 kPa (0 - ~148 psi)

Name	Description	Allowed Values
Fuel Rail	Monitor point for Fuel Outlet Pressure	0 - ~249364 kPa (0 - ~36404 psi)
Fuel Inlet	Monitor point for Fuel Supply Pressure	0 - ~993 kPa (0 - ~145 psi)
Coolant	Monitor point for Coolant Pressure	0 - ~993 kPa (0 - ~145 psi)
Crankcase	Monitor point for Crankcase Pressure	–244 - ~260 kPa (–35.67 - ~38 psi)
Ambient	Monitor point for Barometric Absolute Pressure	0 - ~253 kPa (0 - ~37 psi)
Temperature		
Coolant	Monitor point for Coolant Temperature	N/A
Oil	Monitor point for Oil Temperature	–40 - ~210 °C (–40 - ~410 °F)
Manifold	Monitor point for Intake Manifold Temperature—	–40 - ~210 °C (–40 - ~410 °F)
Fuel Inlet	Monitor point for Fuel Temperature	–40 - ~210 °C (–40 - ~410 °F)
Aftercooler	Monitor point for Aftercooler Temperature	–40 - ~210 °C (–40 - ~410 °F)
Other		
Engine Hrs	Total engine run time	
Engine Speed	Monitor point for Average Engine Speed	
Batt Voltage	Battery voltage value	

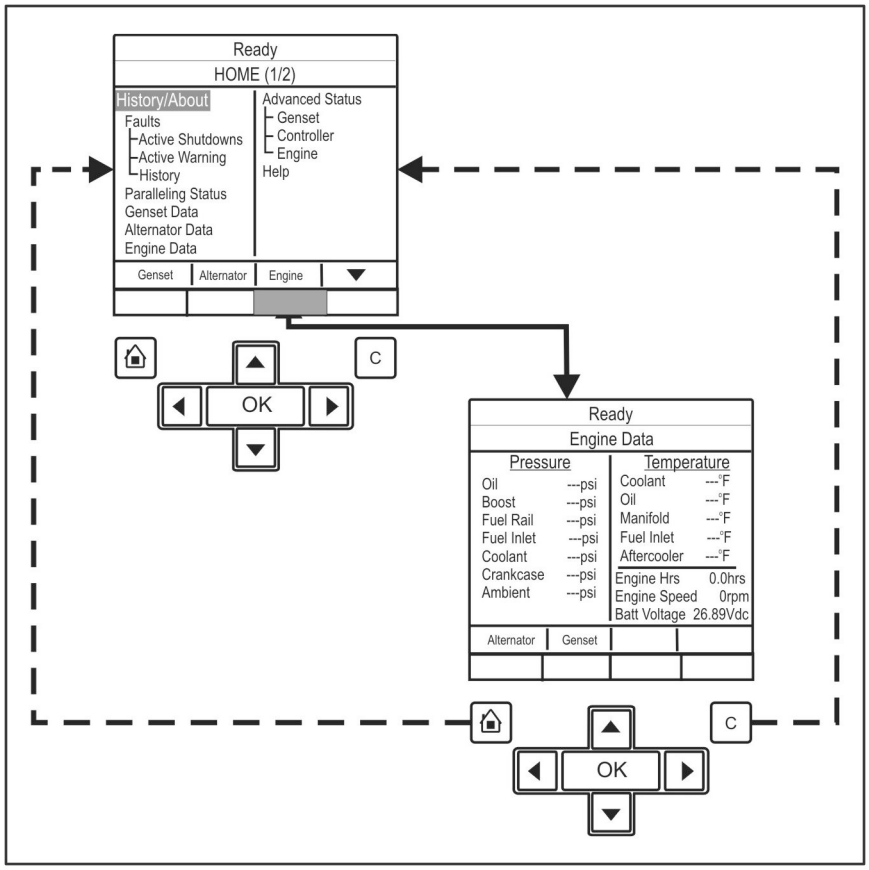


FIGURE 13. ENGINE DATA MENU - TYPICAL DATA

- Press the **Home** Button to return to the main menu at any time.
- Press the **C** Button to return to the previous menus. Settings will not be saved when this button is pressed.

6.1.3 History/About Menu

Figure 14 on page 51 shows a block representation of a typical History/About menu.

To navigate from the Home menu, toggle down until the History/About line of text is highlighted, and press the OK button. This information is displayed over three pages. Use the two soft-key buttons below the up and down arrows (▲ and ▼) to toggle between the pages.

This screen displays the historical information about the generator set.

TABLE 15. HISTORY/ABOUT MENU

Name	Description
Starts	Total number of start attempts.
Runs	Total number of generator set runs.
Engine Hours	Total engine run time.
Control Hours	Controller ON time in seconds. Upper limit is 136 years.
Kw Hours	Generator set total net kWh accumulation.

Name	Description
Gen Mod #	Number identifying the model of the generator set. (Password level: 2)
Gen Ser #	Serial number identifying the generator set.
Nominal Voltage	Generator set nominal Line-to-Line voltage.
Wye/Delta	Delta or Wye for Generator set connection.
Rating Select	Selects Standby/Prime/Base application rating.
Contr Type	Used by the PC tool.
Firmware Ver	Version of software loaded into the control. Obtained from PowerCommand® 2.3 Filename.
Calib Part	The unique calibration part number loaded into the control.
Calib Date	The revision date of the calibration part number loaded into the control.
ECM Code	The calibration coded the ECM is sending.
HMI Firm Ver	Parameter: HMI Local Parameter.
HMI Boot Ver	Parameter: HMI Local Parameter.
50 Hz Load Profile*	This shows how long the generator set has been running (50 Hz operation) at various percentages of its rated load.
60 Hz Load Profile*	This shows how long the generator set has been running (60 Hz operation) at various percentages of its rated load.
* When using the Load Profile Graph table (for 50 Hz or 60 Hz), the upper line’s value indicates 100% of table.	

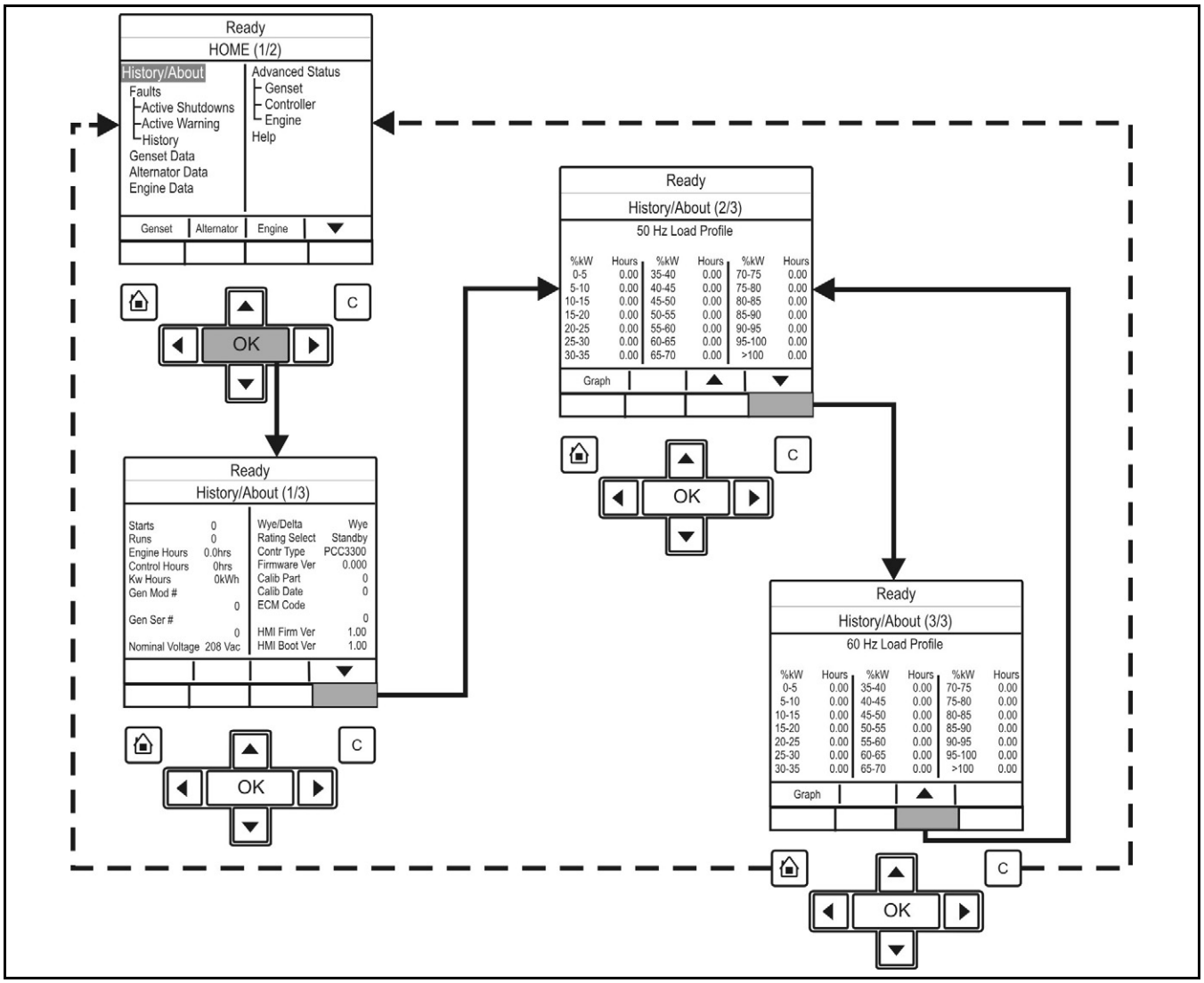


FIGURE 14. HISTORY/ABOUT MENU - TYPICAL DATA

- Press the **Home** Button to return to the main menu at any time.
- Press the **C** Button to return to the previous menus. Settings will not be saved when this button is pressed.

6.1.4 Contrast

The Display Options screen allows the contrast to be set.

1. From any Information screen, hold down the up and down arrows simultaneously for two seconds to gain access to the Service Menu screen.
2. Select **Display Options**.
3. From the Display Options screen, select **Adjust** to access the screen variables.
4. Press the right arrow to move to the Contrast variable.
5. Adjust the setting and press **Save** to save any changes. When updating this setting, the functions of the keys are as follows:

TABLE 16. KEY FUNCTIONS ON THE DISPLAY OPTIONS SCREEN

Key/Button	Function
Horizontal right arrow key	Select successive blocks for editing settings on the screen
Left arrow key	Return to the previous screen
+ or - keys	Adjust values on the Adjust screen of the Display Setup screen
Save button	Save any changes; after saving, the **Save** button changes to the **Adjust** button

NOTICE
The following screen represents the standard view. If using a remote operator panel, which may be purchased as an option, the screen may look slightly different. This procedure applies to both operator panels.

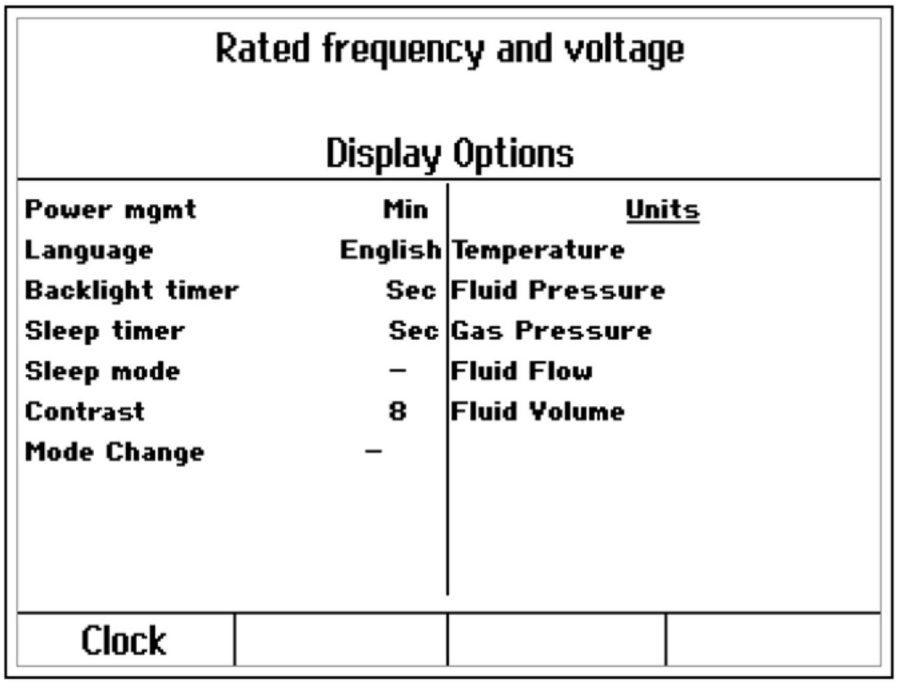


FIGURE 15. DISPLAY OPTIONS SCREEN

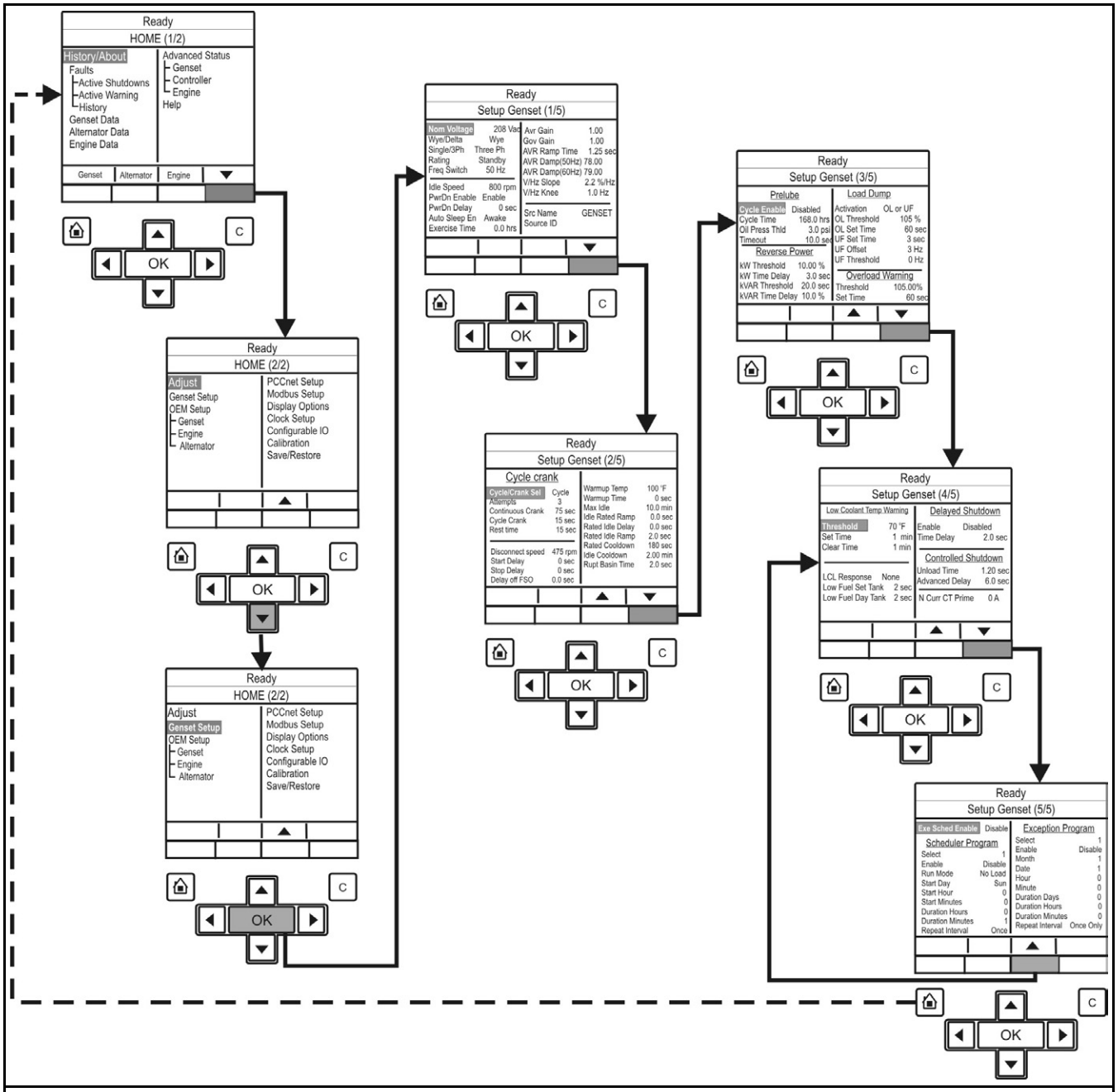
6.1.5 Genset Setup Menu

Use the Genset Setup menu to view generator setup data. The figure below shows block representations of the Genset Setup menu and sub-menus.

1. Use the two soft-key buttons below the up and down arrows (▲ and ▼) to page down to the second page of the HOME (2/2) menu.
2. In the HOME (2/2) menu, use the up and down arrows (▲ and ▼), to highlight the Genset Setup text.
3. With the Genset Setup text highlighted, press the **OK** button. This will display the Setup Genset menu.
4. Use the two soft-key buttons below the up and down arrows (▲ and ▼) to page through the five pages of generator setup data.

NOTICE

If any of these settings need to be changed, please contact your authorized service center.



Press the **Home** Button to return to the main menu at any time.

Press the **C** Button to return to the previous menus. Settings will not be saved when this button is pressed.

FIGURE 16. GENSET SETUP MENU - TYPICAL DATA

6.2 InPower Service Tool

The InPower™ service tool can be used in troubleshooting to perform tests, verify control inputs and outputs, and test protective functions. Refer to the InPower User's Guide, provided with the InPower software for test procedures.

6.3 Checklist

Tick	General Items
	Generator set wattage capacity is sufficient to handle maximum anticipated load.
	At least 3 feet (914.4 mm) of clearance (or greater for housing door) is provided around the entire generator set for service and ventilation.
	The generator set is located in an area not subject to flooding.
	All operating personnel have read and are familiar with the generator set Operator manual, all health and safety procedures, warnings, cautions, precautions, and the other documentation supplied with the generator set.
	All operators have been thoroughly briefed on preventative maintenance procedures.
	All operators have read and understand all important safety instructions.
	Generator Set Support
	The floor, roof, or earth on which the generator set rests is strong enough and will not allow shifting or movement. Observe local codes on soil bearing capacity due to freezing and thawing.
	The generator set is properly supported and retained to an approved base
	The supporting base is large enough and is of non-combustible material, extending 6 inches (152.4 mm) all around the generator set.
	Cooling Air Flow
	Generator set air inlet is faced into direction of strongest, prevailing winds.
	Air inlet openings are unrestricted and are at least 1 to $1^{1}/_{2}$ times larger than air outlet area.
	Cooling air outlet is on downwind side of building (if not, wind barrier is constructed).
	Proper ducting material (sheet metal, canvas) is used between radiator and air outlet.
	Diesel Fuel System
	Fuel tanks meet or exceed all Local, State, or National codes (if applicable).
	Fuel lines are properly installed, supported, and protected against damage.
	The fuel filters have been installed.
	Approved flexible fuel line is installed between the main fuel supply and the generator set’s fuel system near the generator set, to protect it against damage caused by vibration, expansion, and contraction.
	Strainer or fuel screen (100 to 200 mesh) is installed in the fuel supply line to protect the fuel lift pump, day tank transfer pump, or float valve seat from fuel tank debris (if applicable).
	The fuel filter assembly shipped with the generator set is installed and operational (if applicable).
	Fuel supply shutoff valves are installed to prevent fuel flow in case of leaks.
	No shutoff valves are installed on engine fuel return line (if applicable).

Tick	General Items
	External fuel pumps are connected and operational at all times - generator set started or shut down (if applicable).
	Fuel tanks are filled with the correct grade / type of fuel (if applicable).
	Fuel system is properly primed.
	No fuel leaks are found in supply line or engine fuel system.
	Rupture basin switch wiring is connected correctly to display an alarm in case of a fuel leak.
	Exhaust System
	The breather tube routing is set up to blow the fumes away from the generator set (if applicable)
	Operators are thoroughly briefed on the dangers of carbon monoxide gas.
	If the installation includes a heavy duty air cleaner, it has been installed.
	Areas around generator set are well ventilated. No possibility of exhaust fumes entering building doors, windows, or intake fans.
	Exhaust gases are piped safely outside and away from building.
	The correct length of approved rigid pipe is connected to the generator set flexible pipe using approved securing methods with no weight resting on engine exhaust components. There are no bends in flex section.
	Condensation drain is provided in lowest section of exhaust piping.
	Exhaust piping is insulated to guard against burns to personnel.
	Exhaust piping passing through walls or ceilings have approved fire-proof materials and are in compliance with all codes.
	Exhaust piping is large enough in diameter to prevent excessive back pressure on engine.
	Verify that the pyrometer meters are functioning.
	AC and DC Wiring
	For bottom entry circuit breaker installations, the cable chute has been installed (if applicable).
	Wire sizes, insulation, conduits and connection methods all meet applicable codes.
	AC and DC wires are separated in their own conduit to prevent electrical induction.
	All load, line and generator connections are well made and correct.
	Flexible conduit is used between the generator and the building or surrounding structure.
	Check phase rotation.
	Generator Set Pre-Start
	Generator set engine is properly serviced with oil and coolant.
	Battery charger is installed using the appropriate cable size and is operational.
	Battery charger is configured for the proper DC battery voltage, battery type, and float voltage.
	Batteries are properly installed, serviced and charged.
	Battery temperature sensor is connected and operational (if applicable).
	Engine coolant heater is connected and operational.
	All generator set covers and safety shields are installed correctly.

Tick	General Items
	All fuel and coolant shutoff valves are operational.
	Radiator fan and other external moving parts including drive belts are unrestricted.

6.4 Startup

⚠ WARNING

Automated Machinery

Accidental or remote starting of the generator set can cause severe personal injury or death.

Isolate all auxiliary supplies and use an insulated wrench to disconnect the starting battery cables, negative (–) cable first.

- After verifying that the installation was completed correctly, start and test the system. Make sure to connect the battery cables to the battery with the positive (+) cable first.
- Read through the operator manual and perform the maintenance and pre-start checks as instructed.
- The generator set is shipped from the factory with the proper level of engine oil and coolant, but make sure to check each before starting the generator set.
- Start and operate the generator set following all the instructions and precautions in the operator manual.
- Before leaving the site:
  - Ensure that the bonding bolts are installed into the service panels.
  - If the generator set is ready to be placed in service, put the generator set in Auto mode to provide automatic standby power.
  - Make sure the circuit breakers are in the ON position.

NOTICE

Contact your local Cummins service representative if you encounter a fault code.

6.5 Before Starting

NOTICE

One operator should be in complete charge, or working under the direction of someone who is in charge. Remember that, upon starting the engine, cables and switchgear will become energized, possibly for the first time. Furthermore, equipment that does not form part of the generator set installation may become electrically charged. Only authorized and competent personnel should carry out this work.

NOTICE

Do not use the Emergency Stop button to shut down an engine unless a serious fault develops. The Emergency Stop button must not be used for a normal shut-down as this will prevent a cooling down run in which the lubricating oil and engine coolant carry the heat away from the engine combustion chamber and bearings in a safe manner.

NOTICE

Diesel engines only: **Avoid off-load running for other than short periods. A minimum loading of 30% is recommended. The engine must be shut down as soon as possible after the appropriate functions have been checked.**

NOTICE

Gaseous engines only**: Avoid running the generator set at no-load and light-loads for extended periods.**

Before attempting to start the generator set, the operator should read through this entire manual and the specific literature provided as part of the documentation pack supplied with the generator set. It is essential that the operator be completely familiar with the generator set and the PowerCommand® control.

The sub-sections below cover the systems used to start and stop the generator set.

Before starting the generator set, make sure that exhaust and fuel fittings are tight and properly positioned, and that proper maintenance and pre-start checks have been performed.

During starting, automatic checks are carried out for the integrity of various protection systems. The PowerCommand® control will not allow the generator set to continue the starting sequence if the integrity of a sensor is considered to be in doubt.

The generator set can be configured for a number of starting cycles (one to seven) with set times for crank and rest periods for all starting modes (manual/remote). The default setting is for three start cycles, composed of fifteen seconds of cranking and 30 seconds of rest.

NOTICE

The number of starting cycles, and the crank and rest times are set from within the Setup menu. Trained and experienced service personnel are required to change the default setting. Contact your authorized Cummins distributor.

6.5.1 Initial Pre-Start Checks

⚠ WARNING

Electric Shock Hazard

Voltages and currents present an electrical shock hazard that can cause severe burns or death.

Make sure that only personnel who are trained and experienced work with distribution voltages. Even after generator set shutdown, an electrical shock hazard may still exist, caused by induced or residual voltage within the alternator or cables. Some interfaces may display zero voltage even when voltages are present.

⚠ WARNING

Hot Pressurized Liquid

Contact with hot liquid can cause severe burns.

Do not open the pressure cap while the engine is running. Let the engine cool down before removing the cap. Turn the cap slowly and do not open it fully until the pressure has been relieved.

Before starting, competent personnel must make the following checks to make sure that the unit is ready for operation:

TABLE 17. INITIAL PRE-START CHECKS

Check	Description
Generator Set Grounding	Grounding (earthing) must be checked prior to performing service or inspection procedures that may expose personnel to conductors normally energized with voltages greater than 600 Volts. Contact your authorized Cummins distributor.
Insulation Testing[1]	This must be performed on all generator sets before initial start-up and after the generator set grounding procedure has been completed. Insulation testing for low voltage (less than 600 Volts) generator sets is recommended by Cummins. These tests are used to verify that the windings are dry before the generator set is operated, and to develop a base line for future test comparisons. Contact your authorized Cummins distributor.
Lubrication[2]	Check the engine lubrication oil level and ensure that the correct level is always maintained.
Coolant[3,4,5]	Check the engine coolant level and ensure that the level is always maintained. Fill the cooling system to the bottom of the fill neck in the radiator fill or expansion tank. Do not check the level while the engine is hot.

[1]When wire insulation-testing an alternator, failure to protect the voltage regulator, control and diodes could result in permanent damage to one or more of the electronic components.

[2]*Generator sets shipped dry only:* They must be filled with the correct type and quantity of oil before use. Be sure to check the oil level before initial start. Failure to fill to the recommended level can result in equipment damage.

[3]*Generator sets that require a mix of anti-freeze and DCA inhibitor only:* You must comply with Cummins requirements for the correct type and concentration of anti-freeze and DCA inhibitor. Warranty claims for damage will be rejected if the incorrect mix is used. Consult your authorized Cummins distributor for the correct anti-freeze specifications and concentration for your operating conditions.

[4]*Radiators with two fill necks only:* Both fill necks must be filled after the cooling system has been drained.

[5]*Generator sets shipped dry only:* The engine must be filled with the correct type and quantity of coolant before use. Be sure to check coolant level(s), before the initial start.

6.5.2 Operator's Pre-Start Checks

⚠ WARNING

Arc Flash and Shock Hazard

Electric arc flash can cause electrical shock, severe burns, or death.

Make sure the alternator is dry before the generator set is operated.

⚠ WARNING

Hot Pressurized Liquid

Contact with hot liquid can cause severe burns.

Do not open the pressure cap while the engine is running. Let the engine cool down before removing the cap. Turn the cap slowly and do not open it fully until the pressure has been relieved.

NOTICE

***Radiators with 2 fill necks only:* Both fill necks must be filled when the cooling system has been drained.**

TABLE 18. OPERATOR'S PRE-START CHECKS

Check	Description
Fuel Supply (Diesel Only)	Make sure that: • The fuel tank is filled to the normal level with clean water-free fuel and that the fuel system is primed. • All the valves required for operation are open. • There are no leaks and that all fittings are tight. • If equipped, the auxiliary fuel system is properly connected.
DEF Supply (If Equipped)	Make sure that: • The DEF tank is filled to the normal full level with DEF. • If equipped, the auxiliary DEF system is properly connected.
Lubrication	With the engine stationary, check the engine lubrication oil level and make sure that the correct level is always maintained.
Coolant	Check the engine coolant level and make sure that the level is always maintained at the coolant expansion tank. Fill the cooling system to the bottom of the fill neck in the radiator fill or expansion tank. Do not check while the engine is hot.
Cooling Air Inlet/Outlets	Make sure that the cooling air inlets/outlets are unobstructed.
Exhaust Outlet	Make sure that: • Exhaust components are secured and not warped. • The exhaust outlet is unobstructed. • No combustible materials are near the system. • Gases are discharged away from building openings. • There are no leaks and that all fittings are tight.
Batteries	Make sure that the batteries are charged, and that all connections are clean, correct and tight (if applicable).
Auxiliary Powered AC Supplies	Make sure that all auxiliary equipment is receiving power from the customer's supply.
Emergency Stop	Make sure that the emergency stop button is fully operational.

6.5.3 Starting at the Operator Panel (Manual Run Mode)

NOTICE

Make sure that all Pre-start Checks are carried out before starting the generator set. Do not attempt to start the generator set until it is safe to do so. Warn all others in the vicinity of the generator set and connected load equipment that the generator set is about to start.

STARTING IN MANUAL RUN MODE

1. Make sure the main circuit breaker is in the open position.

2. To start the generator set in the **Manual Run** mode:

   a. Press the **Manual** button 

   on the operator panel.

   b. Press the **Start** button 

   within ten seconds.

NOTICE
Failure to press the Start button within this time will result in the generator set changing to the Off mode. Refer also to the Selecting Manual Run Mode section.

NOTICE
If the mode change access code feature has been enabled, enter the access code when prompted. See the Passwords and Mode Change Access section.

3. The PowerCommand® control will initiate a starter cranking signal and will perform an automatically sequenced manual start, under a complete engine protection system combined with full monitoring capability. This will activate the engine control system and the starting procedure. The starter will begin cranking and, after a few seconds, the engine will start and the starter will disconnect.

   If the engine fails to start, the starter will disengage after a specified period of time and the control will indicate a Fail to Start shutdown.

   To clear a Fail to Start shutdown:

   a. Press the **Stop** button. 

   b. Press the **Reset** button. 

4. Before attempting to re-start, wait a minimum of two minutes for the starter motor to cool and then repeat the starting procedure. If the engine does not run after a second attempt, refer to the Troubleshooting section of the operator manual.

DISABLING MANUAL MODE

To disable Manual mode, change to **Auto** or **Off** mode. If the generator set is running when it leaves **Manual** mode, it will continue to run if **Auto** mode has been selected and the remote start signal is active. If there is no active remote start signal, the generator set will stop.

6.5.4 Starting from Remote Location (Auto Mode)

NOTICE
Make sure that all Pre-start Checks are carried out before starting the generator set. Do not attempt to start the generator set until it is safe to do so. Warn all others in the vicinity that the generator set is about to start.

1. To start the generator set in the **Auto Run** mode, select the **Auto** button from the operator panel. 

   Refer also to the Selecting Auto Mode section.

   Once the PowerCommand® control receives a remote start signal, and after a Time Delay to Start, the control will initiate the starting sequence as above. The Remote Start LED will be lit.

NOTICE

If the mode change access code feature has been enabled, enter the access code when prompted. See the Passwords and Mode Change Access section.

NOTICE

When the generator set is operating in the Remote Start mode, removing the Remote Start command does not shut off the engine if the load is more than 10%, the cooldown timer is set to zero, and the control is configured for a single unit (not in parallel). The generator set continues to operate until it runs out of fuel, the E-stop button is used, or the load is removed.

2. To disable **Auto** mode, change to **Manual** or **Off** mode.

6.5.5 Cold Starting with Loads

NOTICE

Make sure that all pre-start checks are carried out before starting the generator set. Do not attempt to start the generator set until it is safe to do so. Warn all others in the vicinity that the generator set is about to start.

Use a coolant heater if a separate source of power is available. The optional heater available from Cummins will help provide reliable starting under adverse weather conditions. Be sure the voltage of the separate power source is correct for the heater element rating.

Cummins recommends equipping standby generator sets (life safety systems) with engine water jacket coolant heaters to maintain the coolant at a minimum of 32 °C (90 °F) and, for most applications, accept the emergency load in ten seconds or less. Although most Cummins generator sets will start in temperatures down to -32 °C (-25 °F) when equipped with engine water jacket coolant heaters, it might take more than ten seconds to warm the engine up before a load can be applied when ambient temperatures are below 4 °C (40 °F).

The **Low Coolant Temp** (Code 1435) message along with the lighting of the **Warning** LED are provided to alert the operator of a possible delay in accepting the load. The engine cold sensing logic initiates a warning when the engine water jacket coolant temperature falls below 21 °C (70 °F). In applications where the ambient temperature falls below 4 °C (40 °F), a cold engine may be indicated even though the coolant heaters are connected and functioning correctly. Under these conditions, although the generator set may start, it may not be able to accept load within ten seconds. When this condition occurs, check the coolant heaters for correct operation. If the coolant heaters are operating correctly, other precautions may be necessary to warm the engine before applying a load.

6.5.5.1 Checking Coolant Heater Operation

⚠ WARNING

Hot Surfaces

Contact with the hot surfaces can cause severe burns.

Avoid contact with hot parts. Allow hot parts to completely cool.

Do not touch the cooling system outlet hose. The coolant heater is operating if radiant heat can be felt with your hand held close to the outlet hose and the engine is not running.

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Appendix A. Outline and System Drawings

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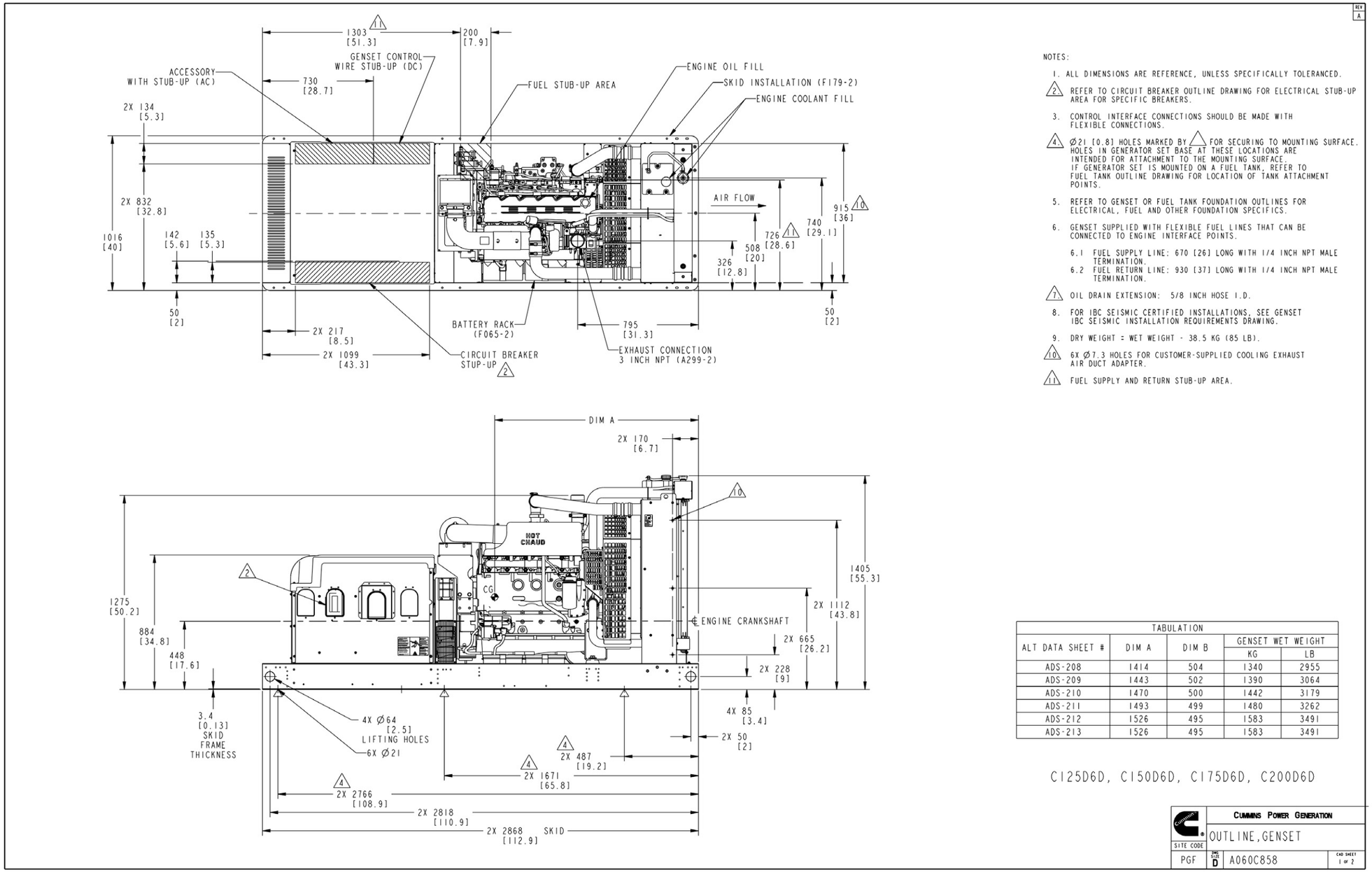
A.0 A060C858 Outline Drawing



NOTES:

1. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.
2. REFER TO CIRCUIT BREAKER OUTLINE DRAWING FOR ELECTRICAL STUB-UP AREA FOR SPECIFIC BREAKERS.
3. CONTROL INTERFACE CONNECTIONS SHOULD BE MADE WITH FLEXIBLE CONNECTIONS.
4. Ø21 [0.8] HOLES MARKED BY △ FOR SECURING TO MOUNTING SURFACE. HOLES IN GENERATOR SET BASE AT THESE LOCATIONS ARE INTENDED FOR ATTACHMENT TO THE MOUNTING SURFACE. IF GENERATOR SET IS MOUNTED ON A FUEL TANK, REFER TO FUEL TANK OUTLINE DRAWING FOR LOCATION OF TANK ATTACHMENT POINTS.
5. REFER TO GENSET OR FUEL TANK FOUNDATION OUTLINES FOR ELECTRICAL, FUEL AND OTHER FOUNDATION SPECIFICS.
6. GENSET SUPPLIED WITH FLEXIBLE FUEL LINES THAT CAN BE CONNECTED TO ENGINE INTERFACE POINTS.
   - 6.1 FUEL SUPPLY LINE: 670 [26] LONG WITH 1/4 INCH NPT MALE TERMINATION.
   - 6.2 FUEL RETURN LINE: 930 [37] LONG WITH 1/4 INCH NPT MALE TERMINATION.
7. △ OIL DRAIN EXTENSION: 5/8 INCH HOSE I.D.
8. FOR IBC SEISMIC CERTIFIED INSTALLATIONS, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENTS DRAWING.
9. DRY WEIGHT = WET WEIGHT - 38.5 KG (85 LB).
10. △ 6X Ø7.3 HOLES FOR CUSTOMER-SUPPLIED COOLING EXHAUST AIR DUCT ADAPTER.
11. △ FUEL SUPPLY AND RETURN STUB-UP AREA.

TABULATION				
ALT DATA SHEET #	DIM A	DIM B	GENSET WET WEIGHT	
			KG	LB
ADS-208	1414	504	1340	2955
ADS-209	1443	502	1390	3064
ADS-210	1470	500	1442	3179
ADS-211	1493	499	1480	3262
ADS-212	1526	495	1583	3491
ADS-213	1526	495	1583	3491

C125D6D, C150D6D, C175D6D, C200D6D

CUMMINS POWER GENERATION		
OUTLINE,GENSET		
SITE CODE	DWG SIZE	CAD SHEET
PGF	D A060C858	1 OF 2

FIGURE 17. OUTLINE DRAWING SHEET 1 OF 2

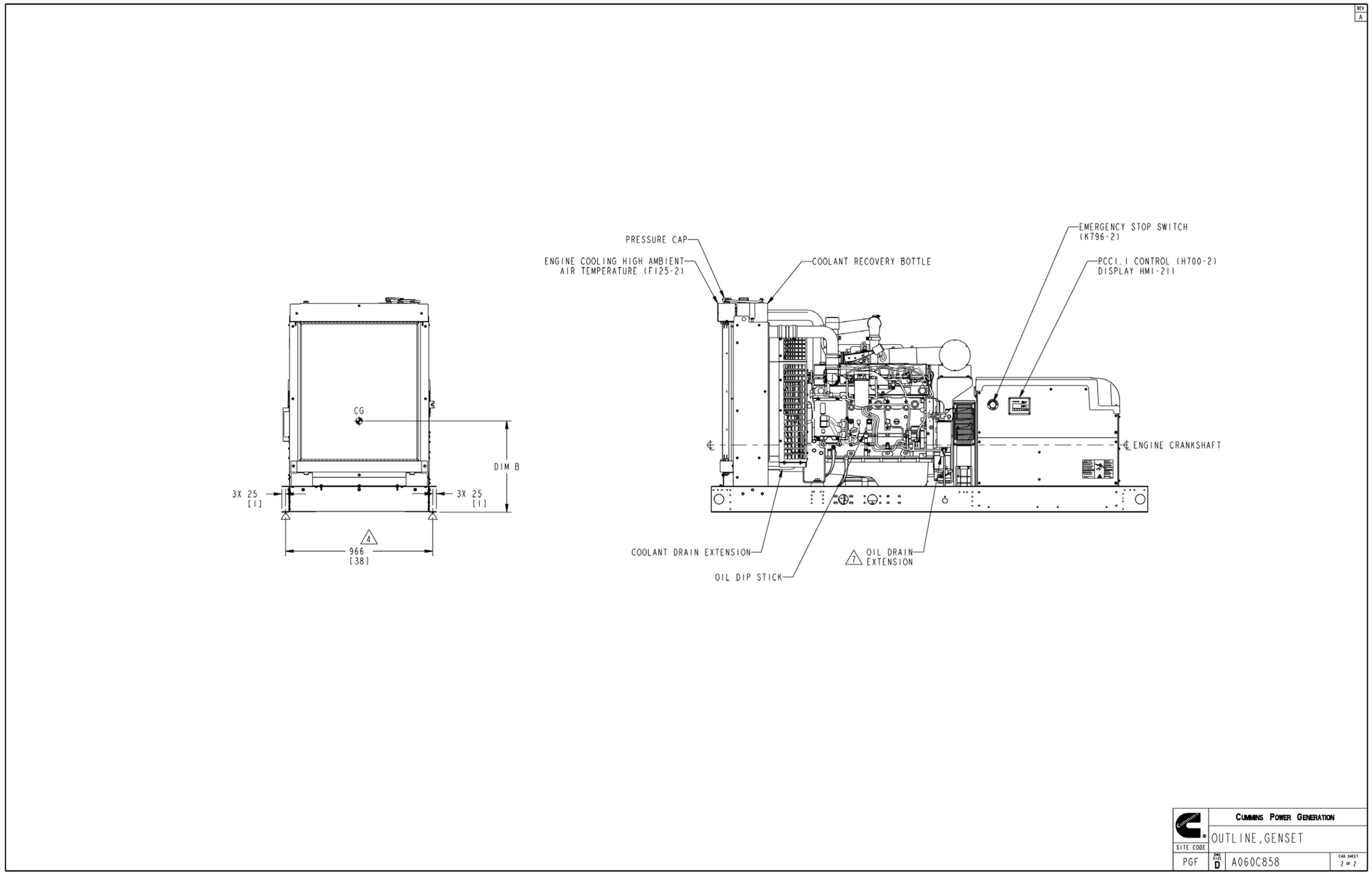


FIGURE 18. OUTLINE DRAWING SHEET 2 OF 2

A.1 A060G756 Generator Set Outline Drawing, Options

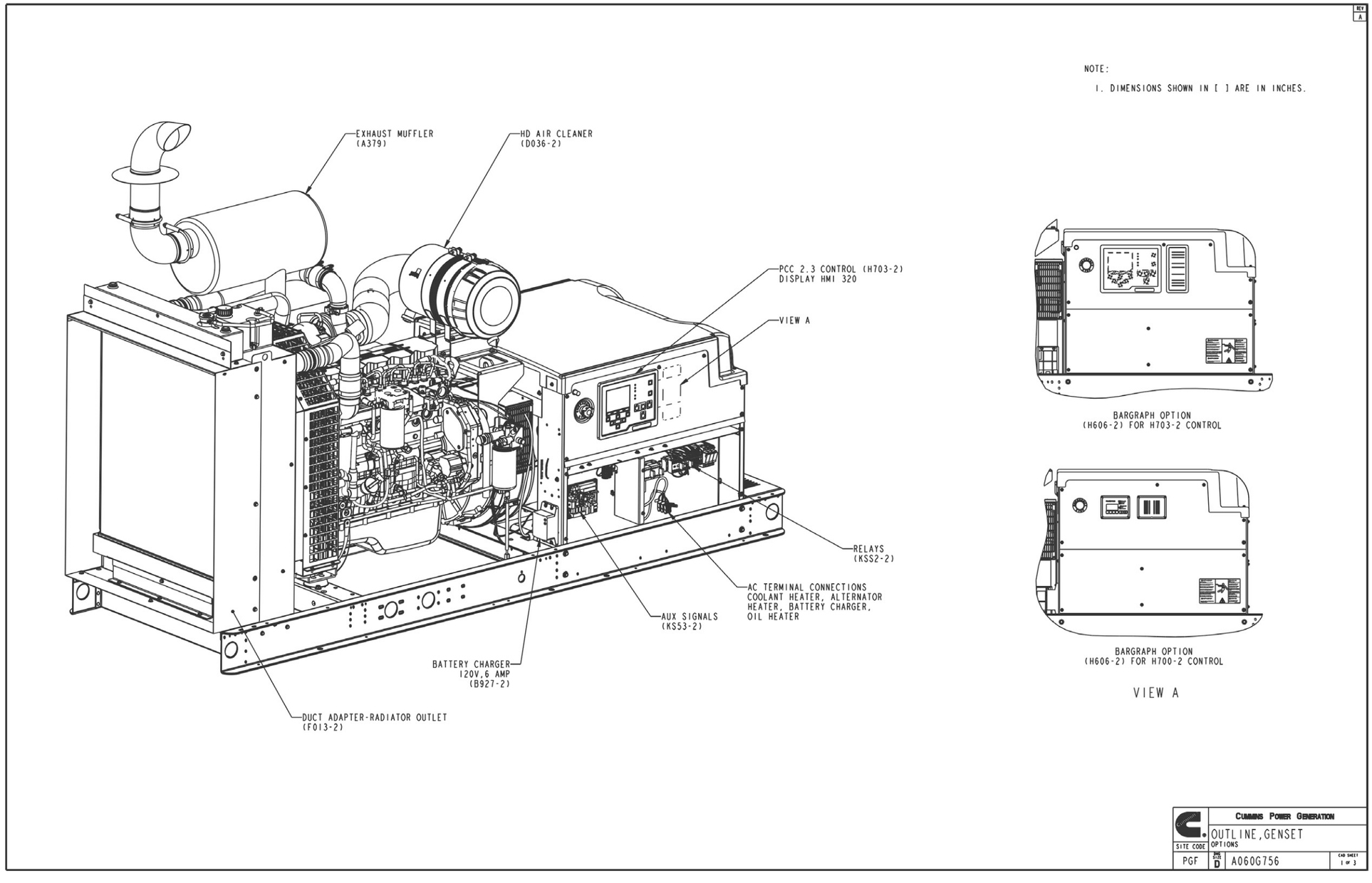


FIGURE 19. GENERATOR SET OUTLINE DRAWING, OPTIONS (SHEET 1 OF 3)

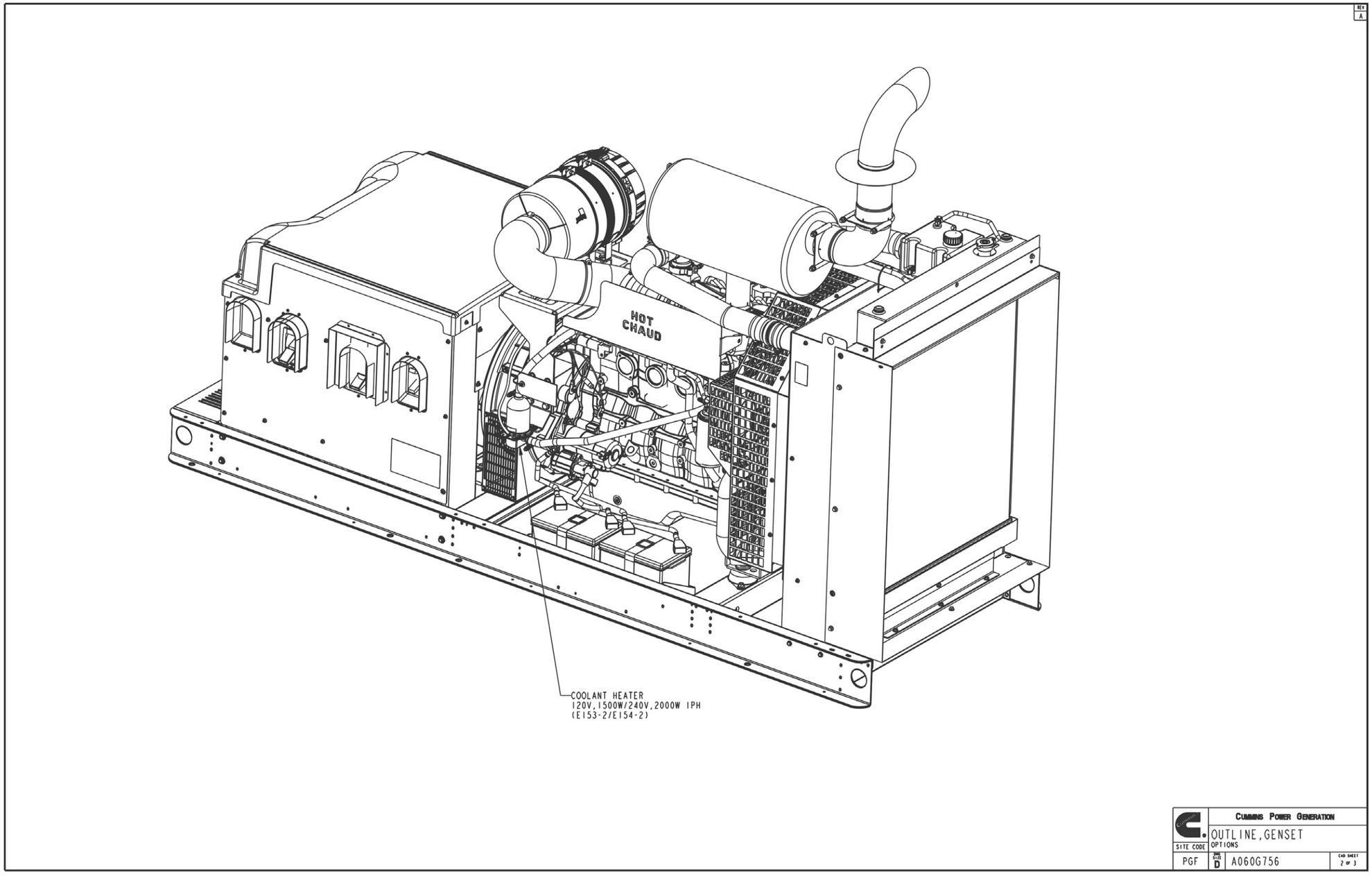


FIGURE 20. GENERATOR SET OUTLINE DRAWING, OPTIONS (SHEET 2 OF 3)

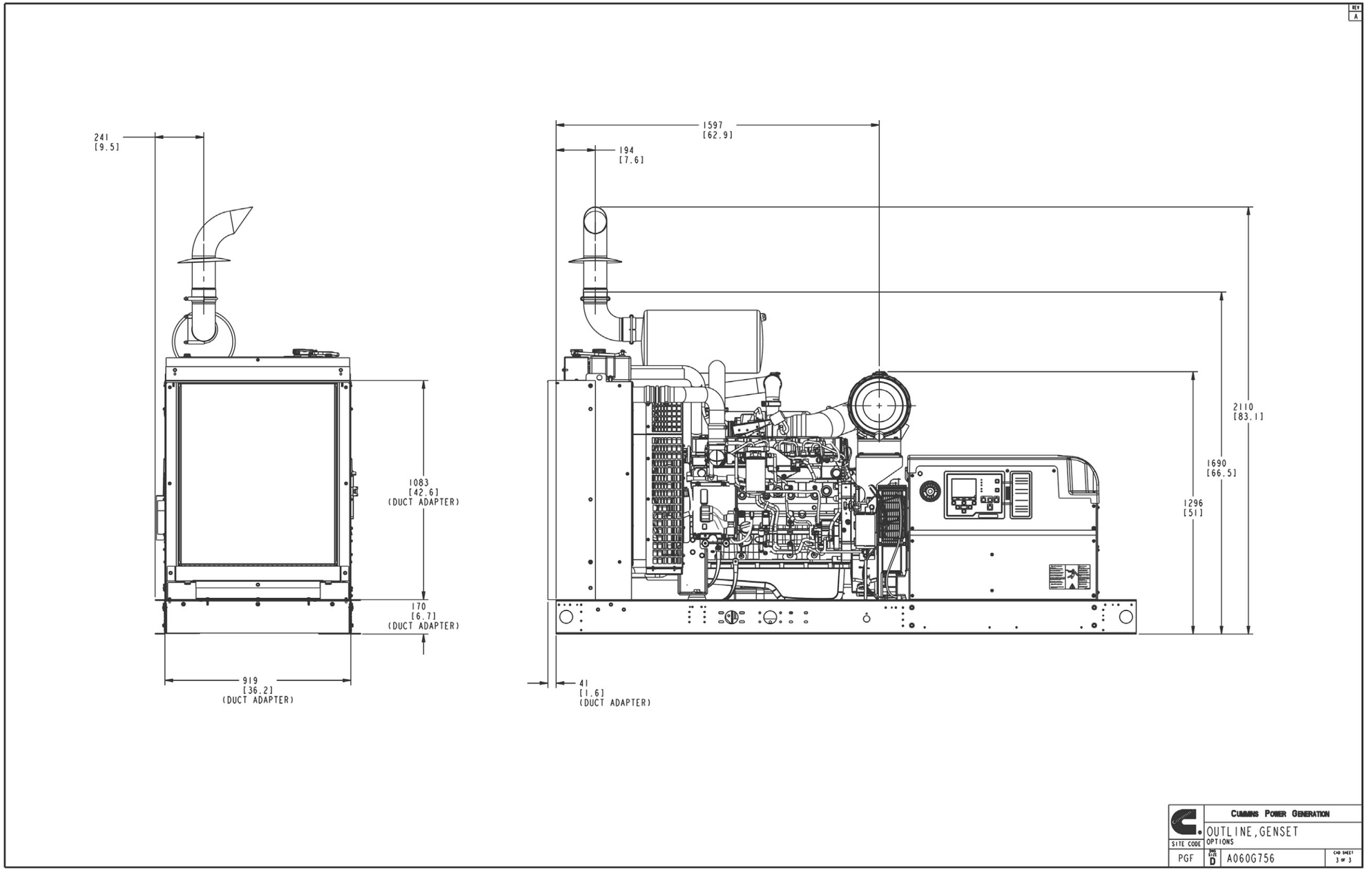


FIGURE 21. GENERATOR SET OUTLINE DRAWING, OPTIONS (SHEET 3 OF 3)

A.2 A060C609 Outline Enclosure Drawing

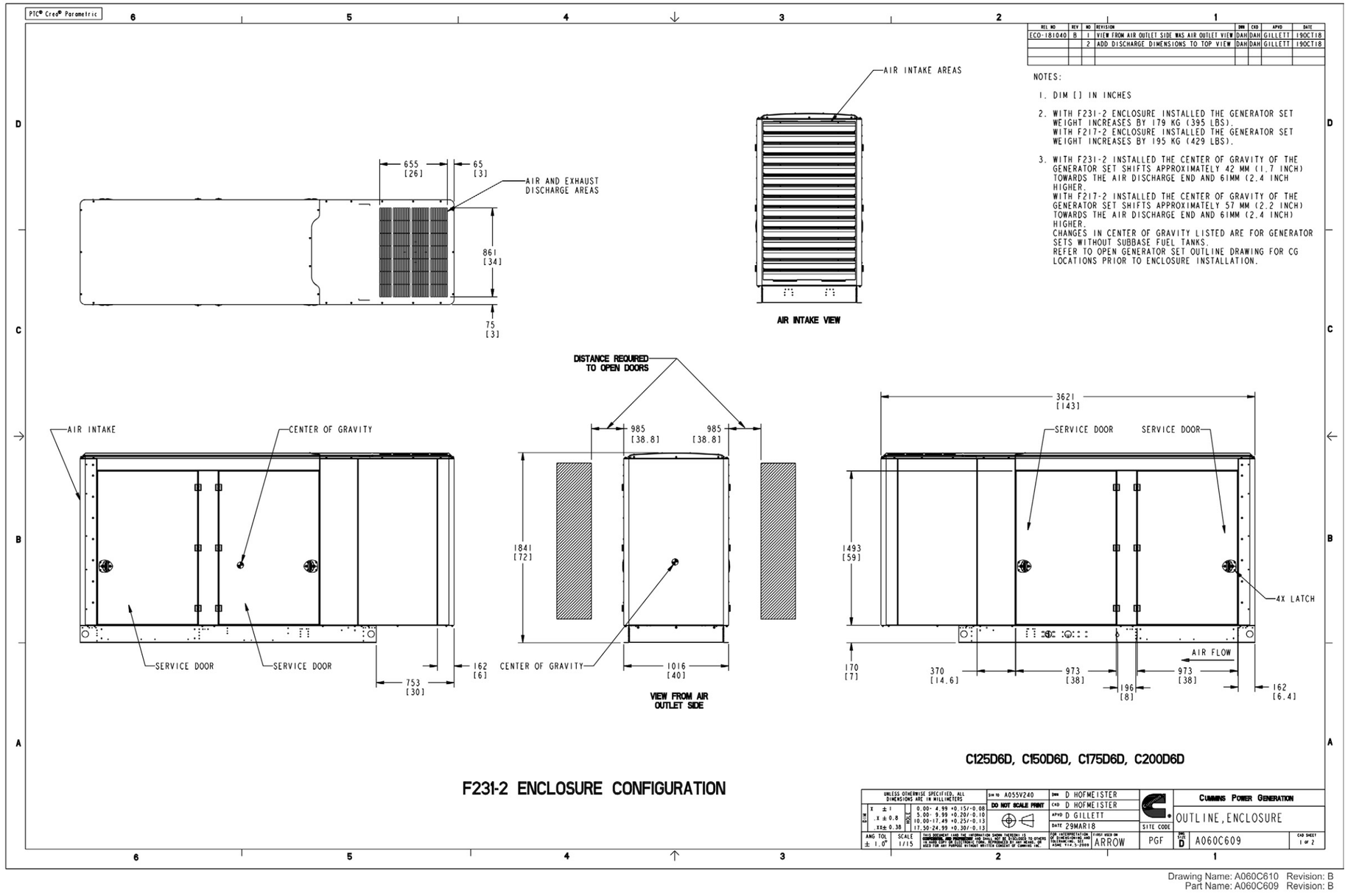
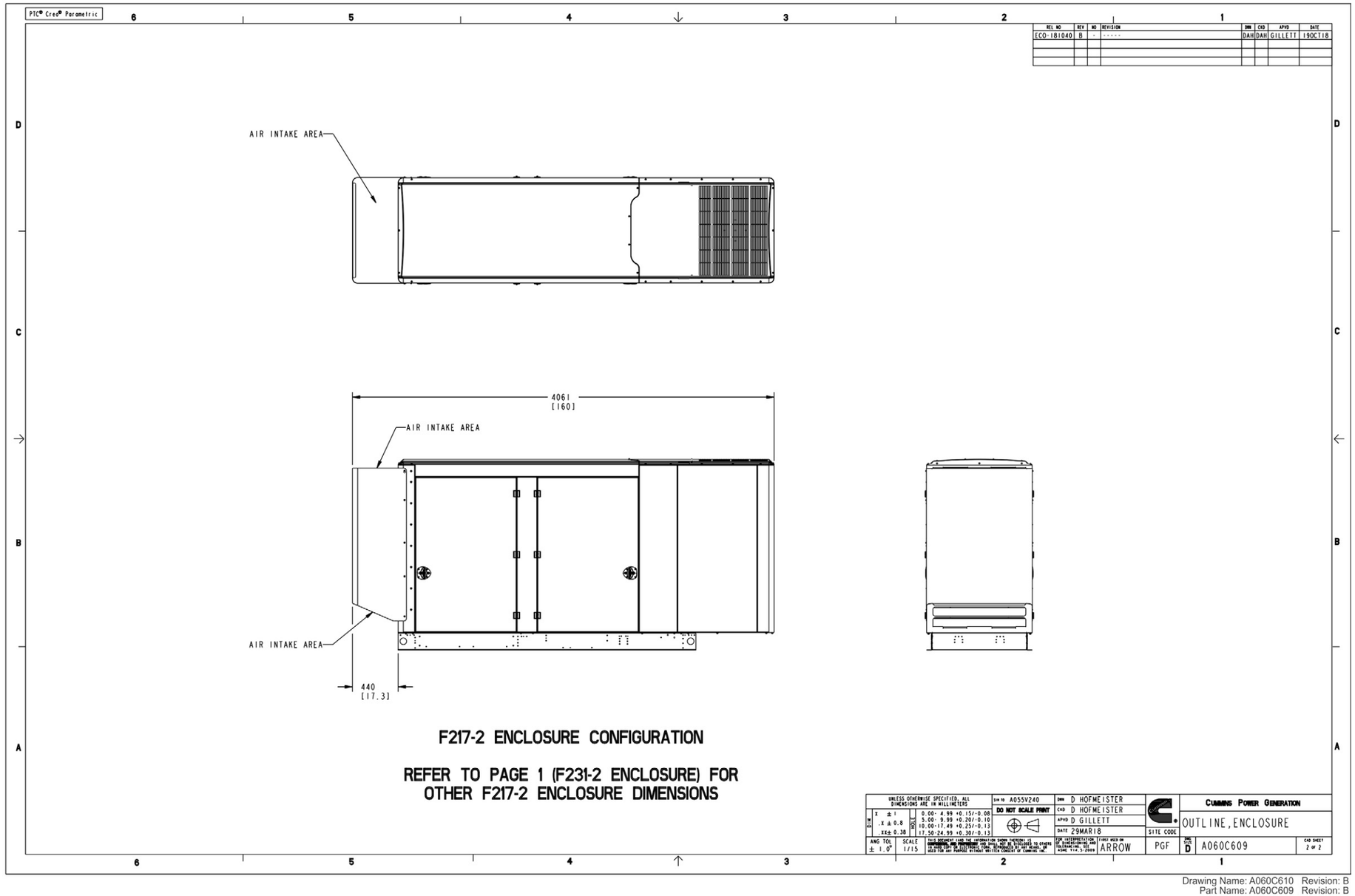


FIGURE 22. OUTLINE ENCLOSURE DRAWING (SHEET 1 OF 2)



Drawing Name: A060C610 Revision: B
Part Name: A060C609 Revision: B

FIGURE 23. OUTLINE ENCLOSURE DRAWING (SHEET 2 OF 2)

A.3 A060C611 Outline Enclosure Drawing

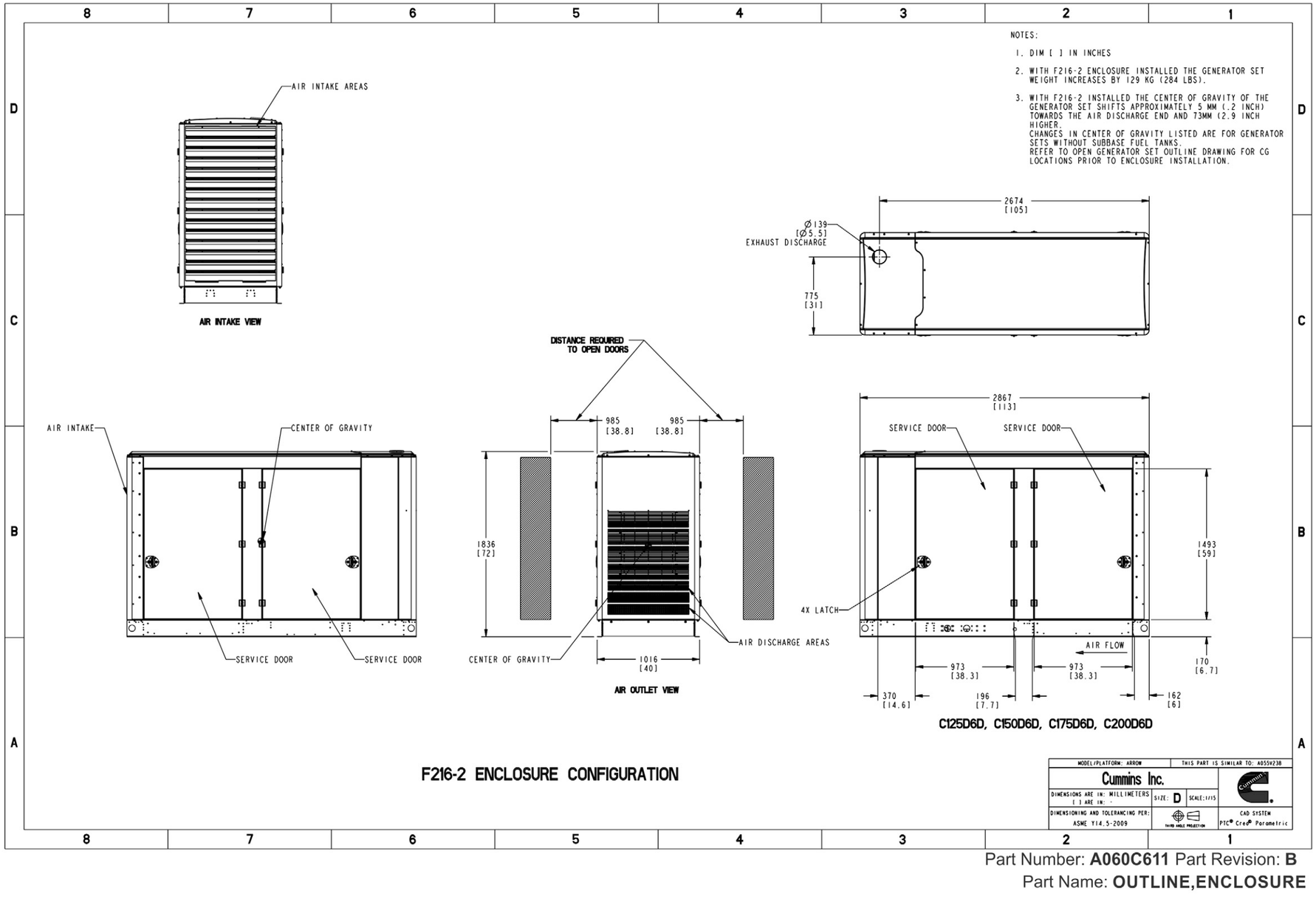


FIGURE 24. OUTLINE ENCLOSURE DRAWING

A.4 A060C864 Generator Set Outline Drawing

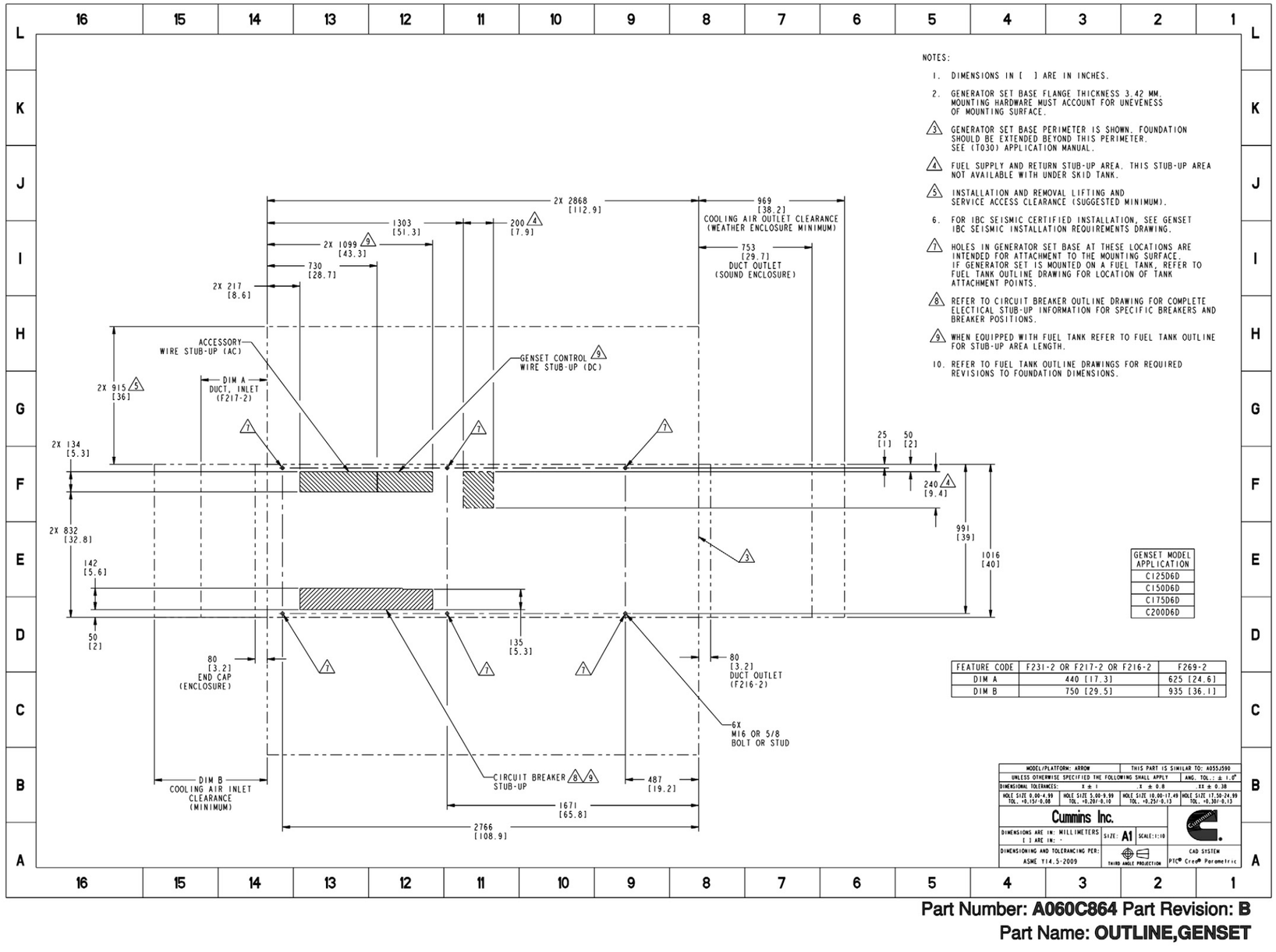


FIGURE 25. GENERATOR SET OUTLINE DRAWING

A.5 A057P198 Tank Outline Drawing

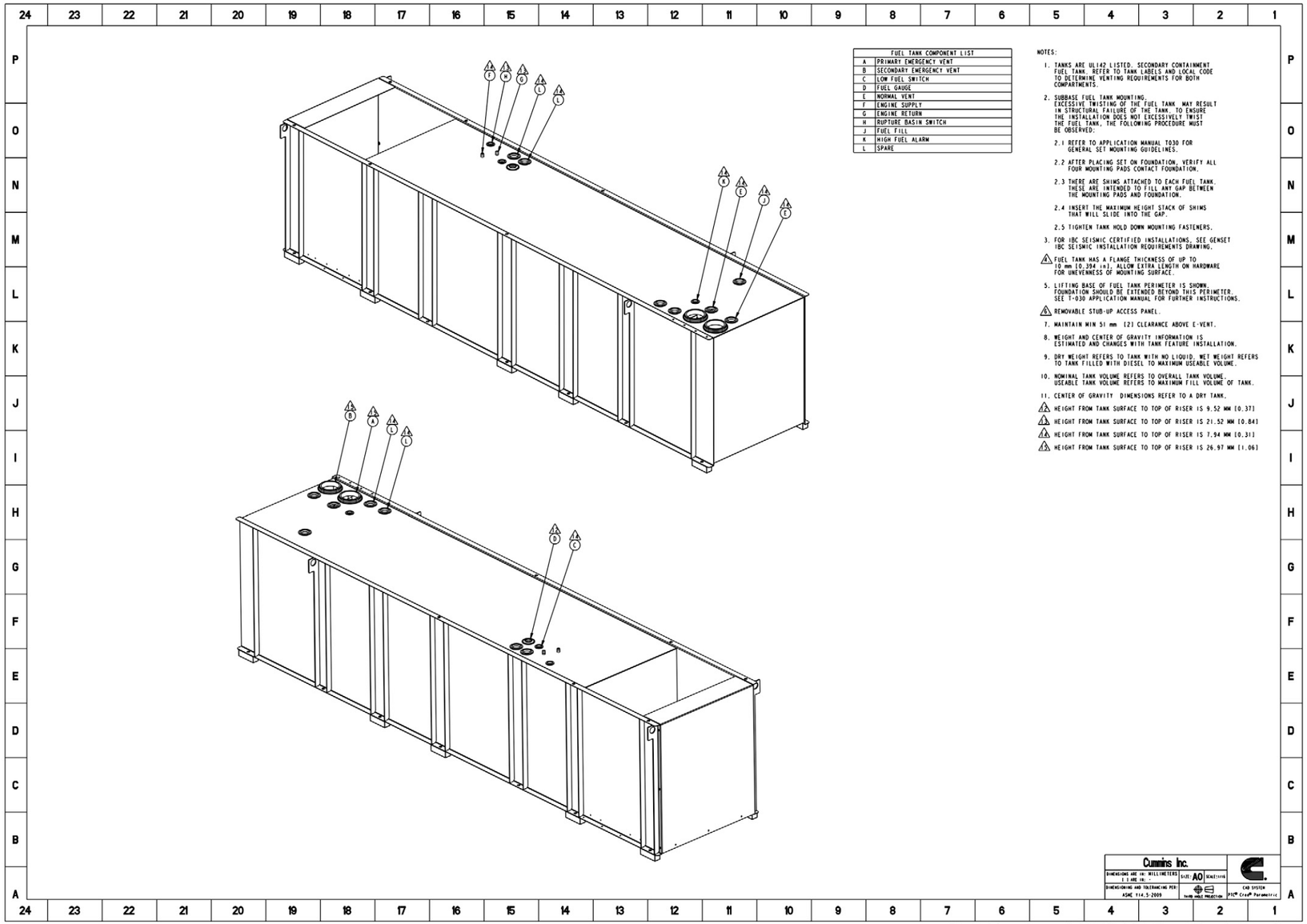
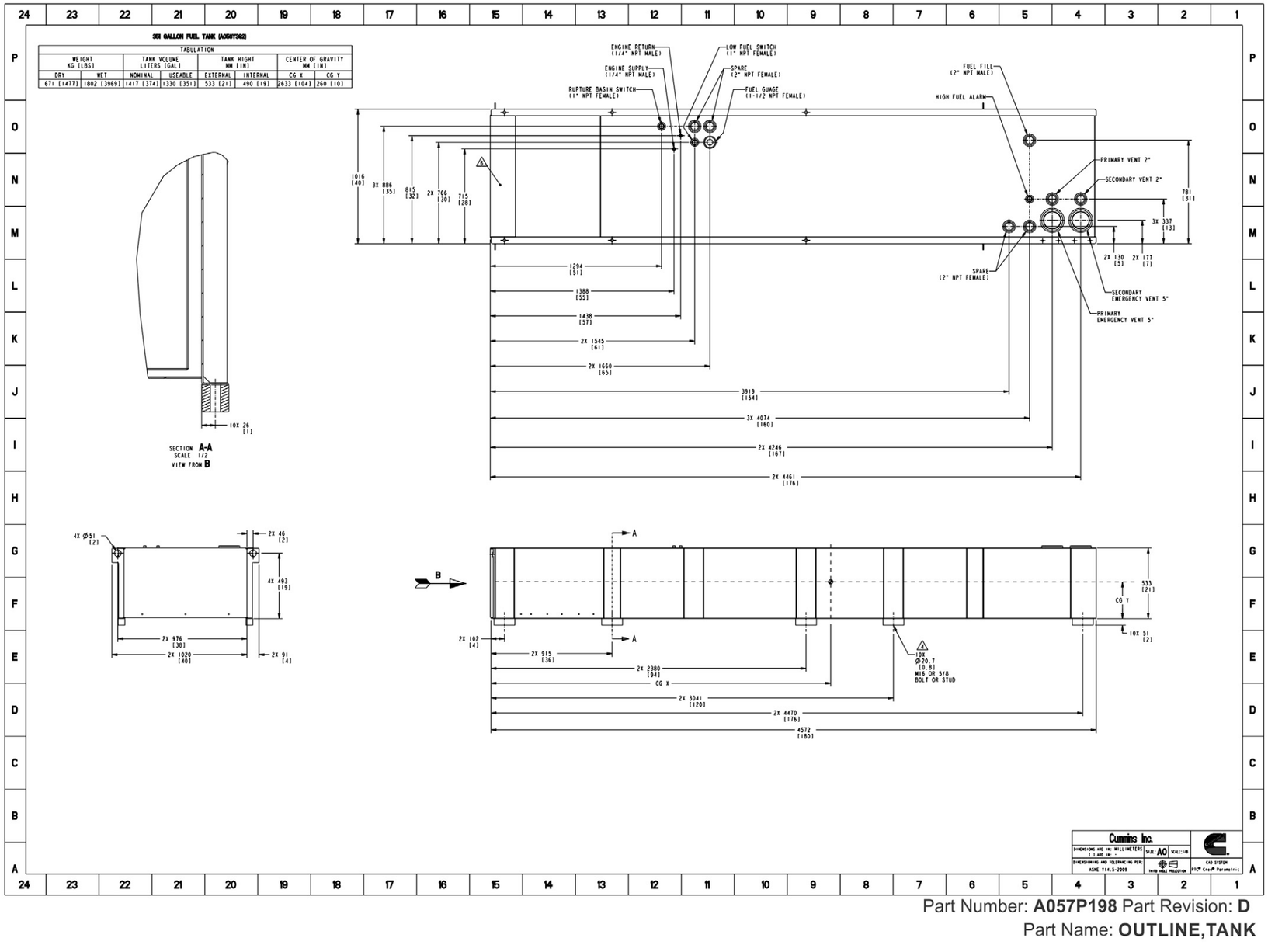


FIGURE 26. TANK OUTLINE DRAWING (SHEET 1 OF 4)



Part Number: **A057P198** Part Revision: **D**
Part Name: **OUTLINE,TANK**

FIGURE 27. TANK OUTLINE DRAWING (SHEET 2 OF 4)

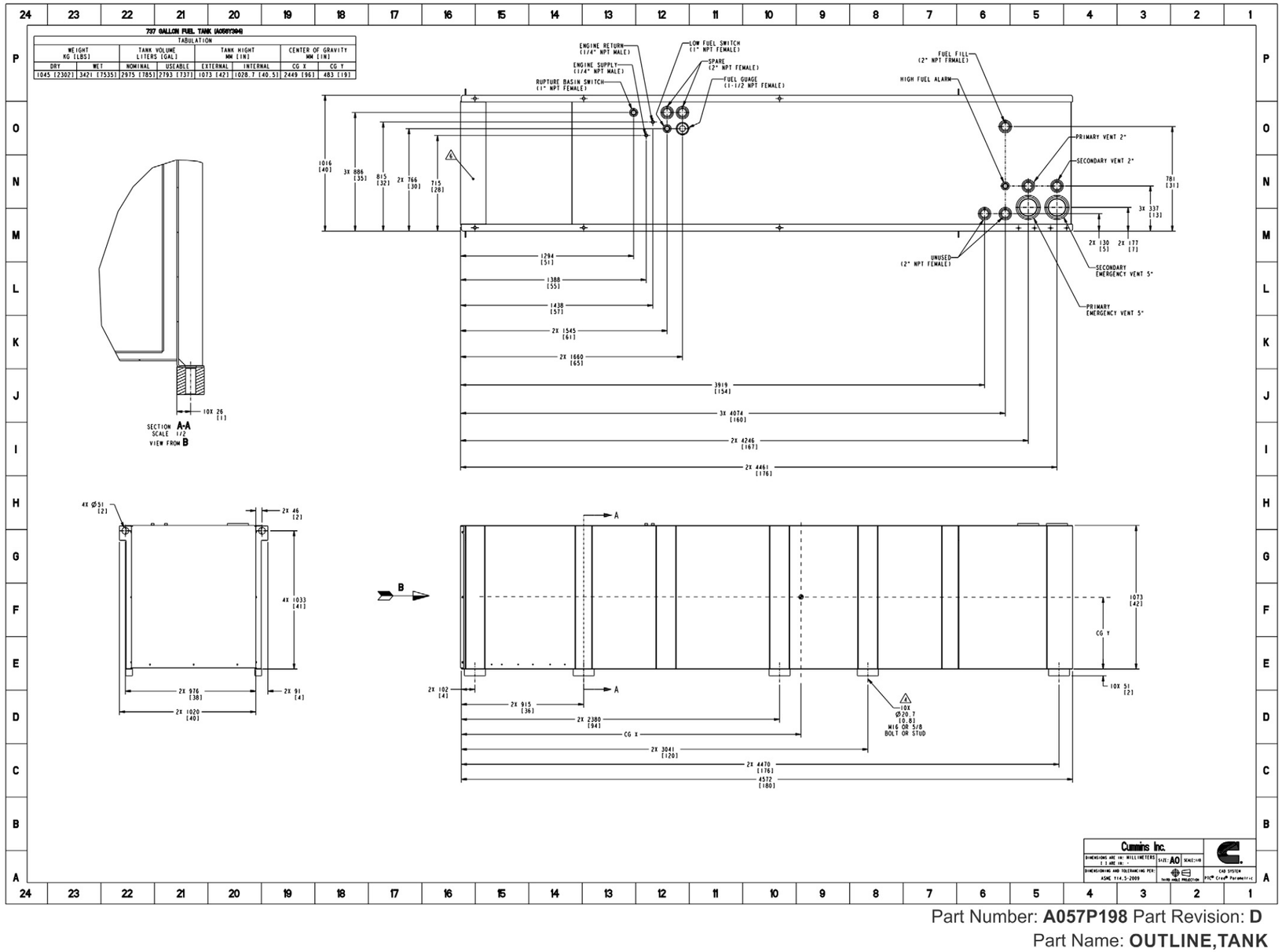


FIGURE 28. TANK OUTLINE DRAWING (SHEET 3 OF 4)

A056T394 TANK DEPTH CHART			
HEIGHT(IN)	HEIGHT(MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.35	12.7	3	10
2	50.8	32	39
4	101.6	71	77
6	152.4	109	116
8	203.2	148	155
10	254.0	187	194
12	304.8	226	232
14	355.6	264	271
16	406.4	303	310
18	457.2	342	349
20	508.8	381	387
22	558.8	419	426
24	609.6	458	465
26	660.4	497	504
28	711.2	536	542
30	762.0	574	581
32	812.8	613	620
34	863.6	652	659
36	914.4	691	697
38.4	975.9	737	744
40	1016.0		775
40.5	1028.7		785

A056T392 TANK DEPTH CHART			
HEIGHT(IN)	HEIGHT(MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.35	8.9	0	7
2	50.8	32	39
4	101.6	71	77
6	152.4	109	116
8	203.2	148	155
10	254.0	187	194
12	304.8	226	232
14	355.6	264	271
16	406.4	303	310
18	457.2	342	349
18.5	468.9	351	358
19.3	490.2		374

Cummins Inc.

Part Number: **A057P198** Part Revision: **D**

Part Name: **OUTLINE,TANK**

FIGURE 29. TANK OUTLINE DRAWING (SHEET 4 OF 4)

A.6 A060C231 Tank Outline Drawing

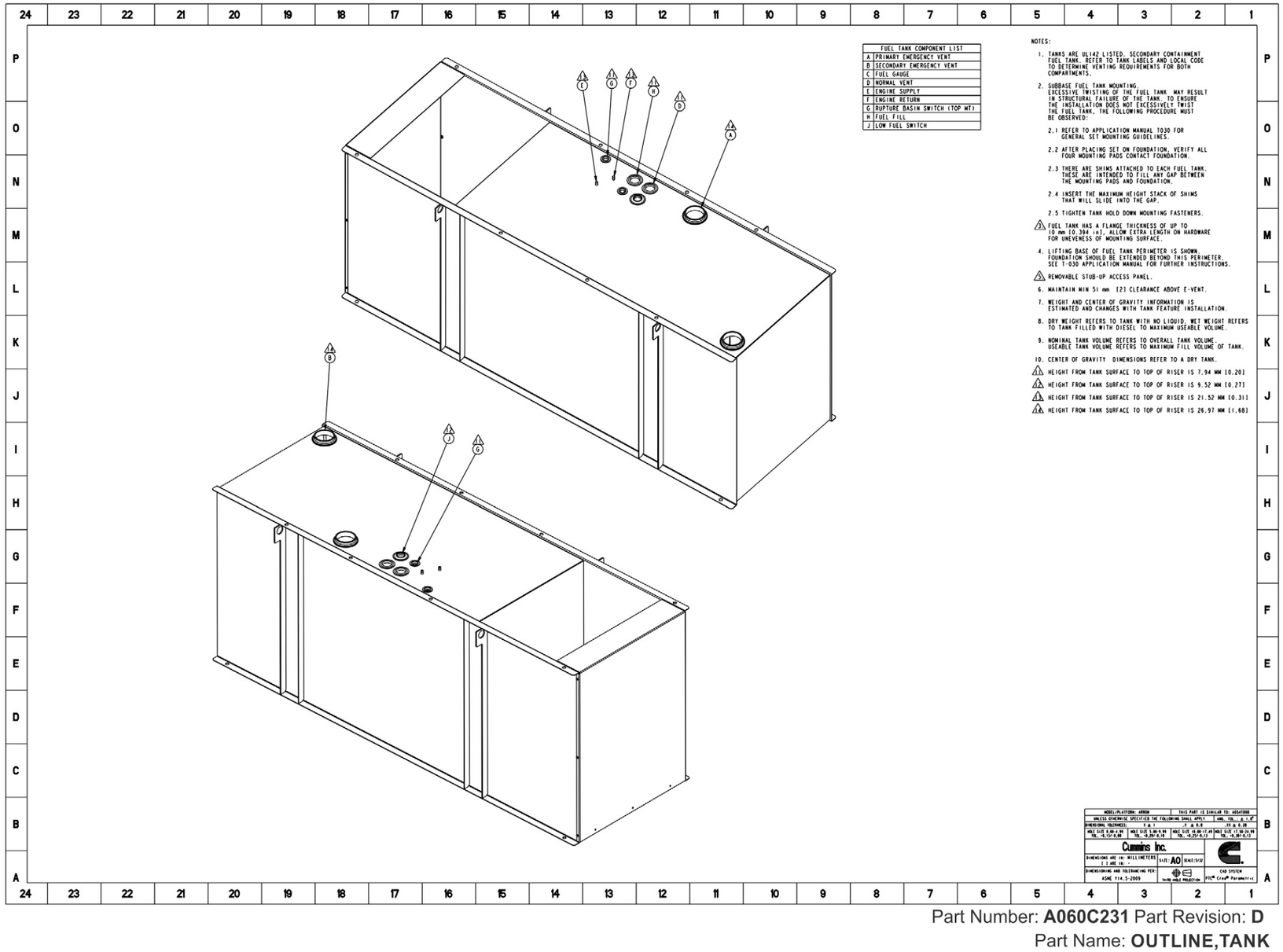


FIGURE 30. TANK OUTLINE DRAWING (SHEET 1 OF 5)

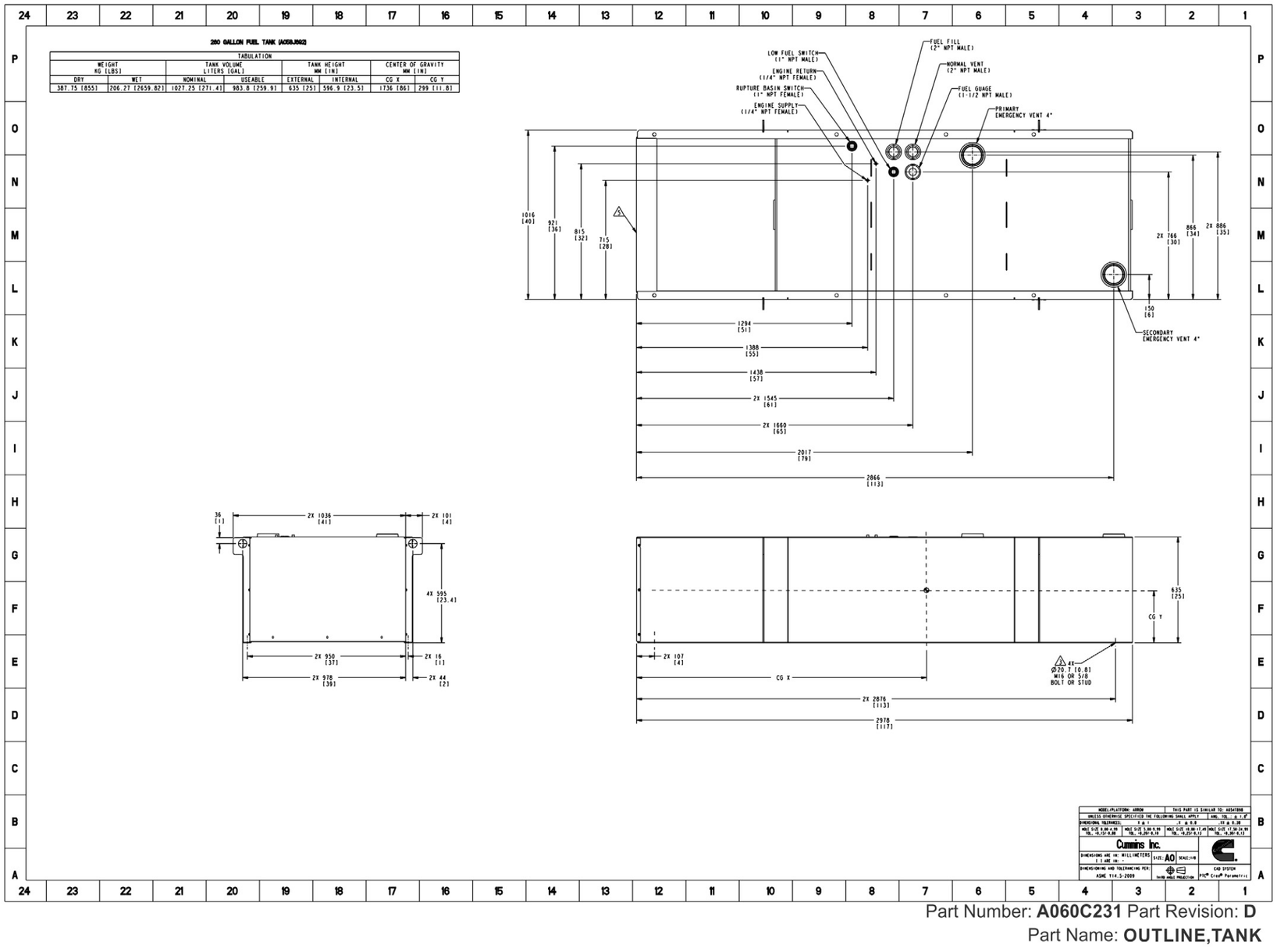


FIGURE 31. TANK OUTLINE DRAWING (SHEET 2 OF 5)

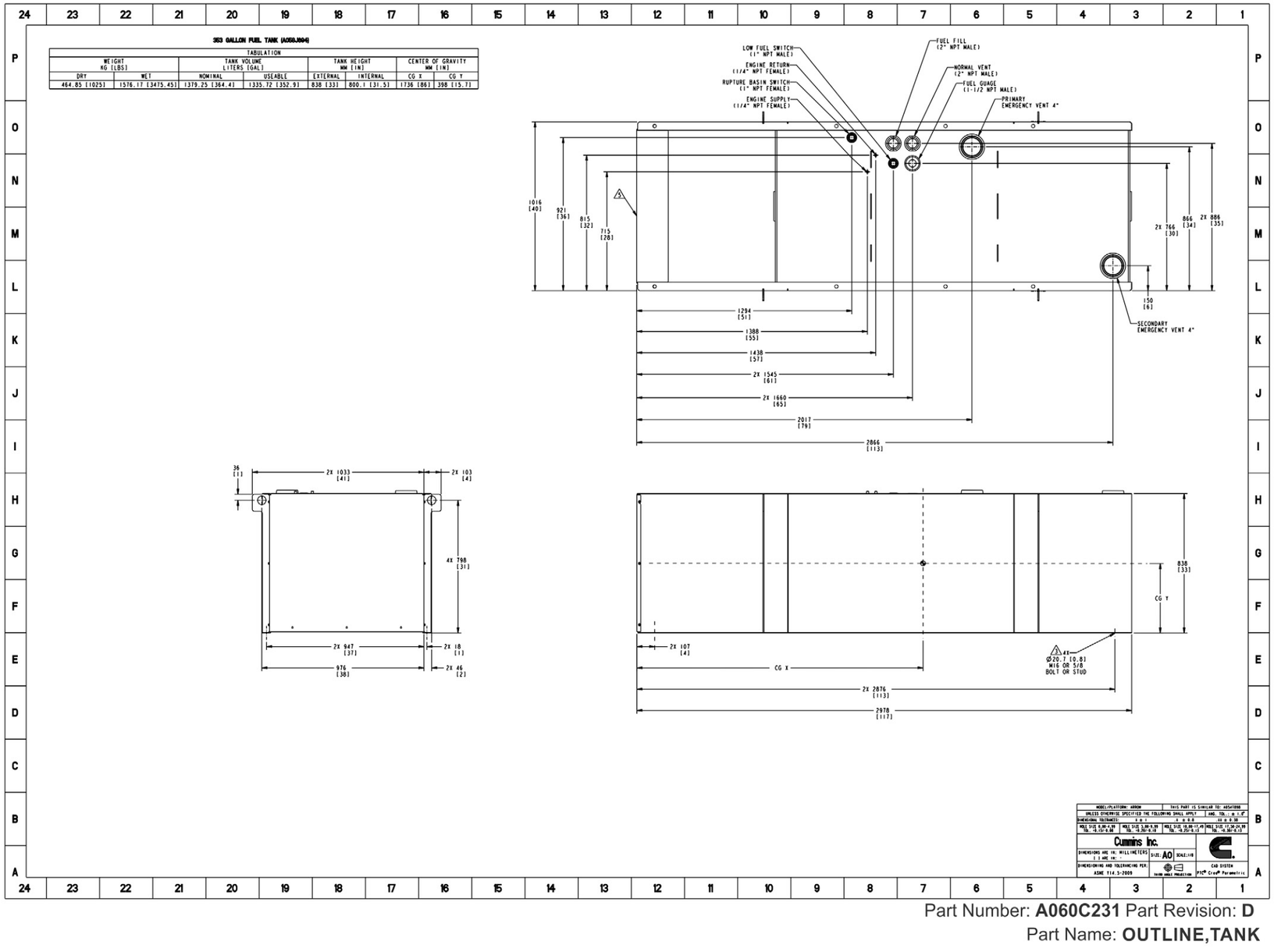


FIGURE 32. TANK OUTLINE DRAWING (SHEET 3 OF 5)

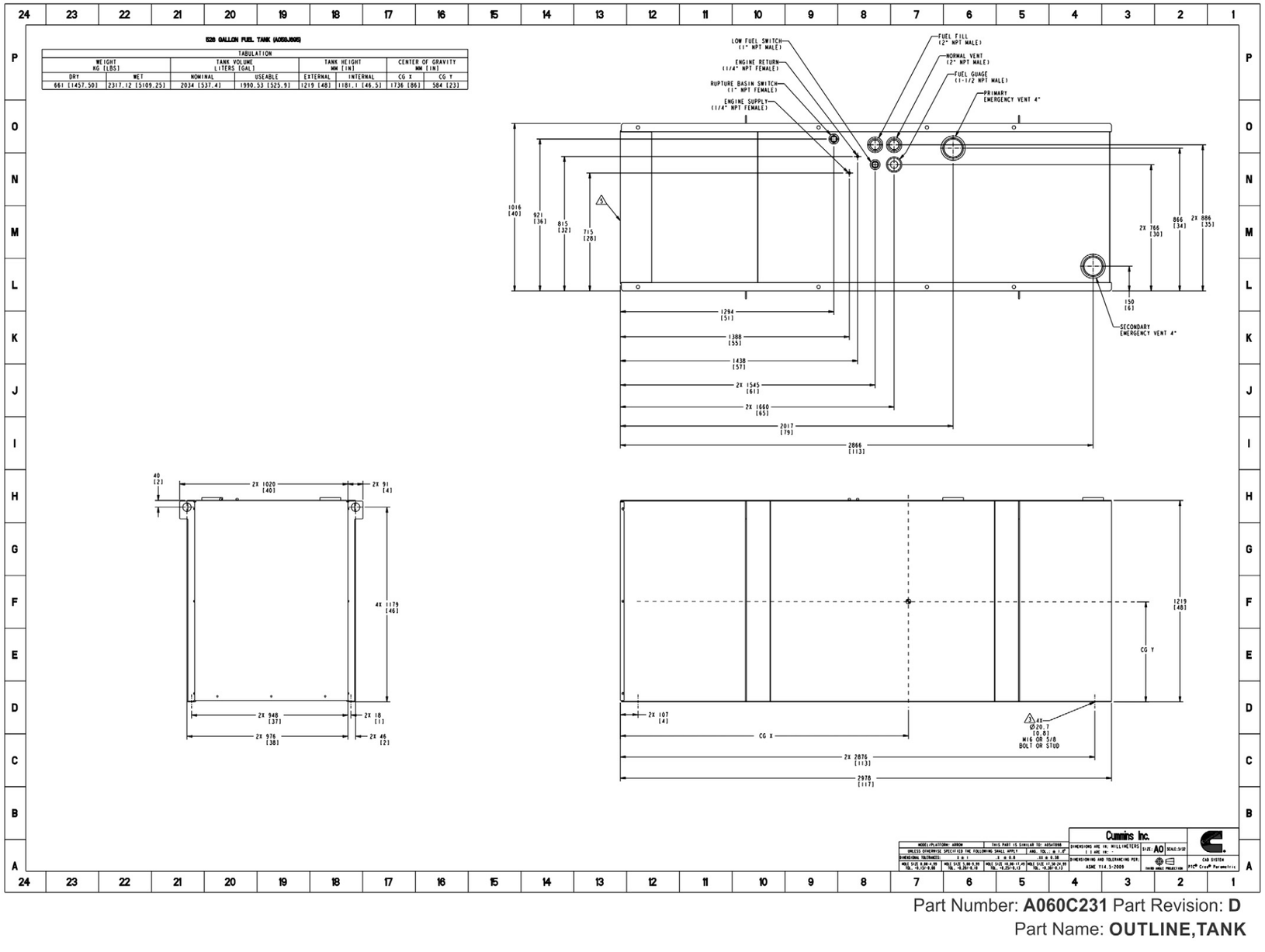
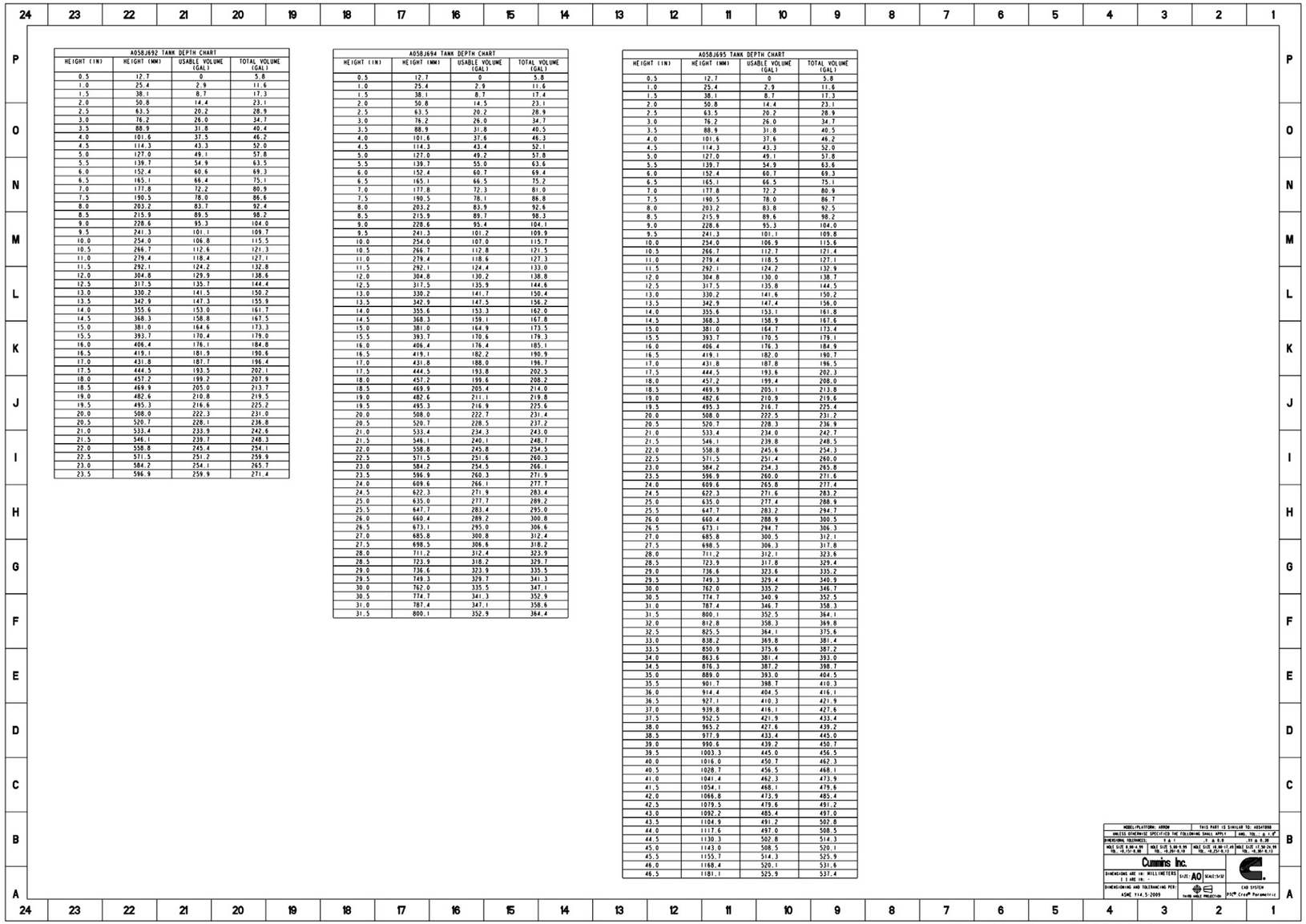


FIGURE 33. TANK OUTLINE DRAWING (SHEET 4 OF 5)



A058J692 TANK DEPTH CHART

HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL)	TOTAL VOLUME (GAL)
0.5	12.7	0	5.8
1.0	25.4	2.9	11.6
1.5	38.1	8.7	17.3
2.0	50.8	14.4	23.1
2.5	63.5	20.2	28.9
3.0	76.2	26.0	34.7
3.5	88.9	31.8	40.4
4.0	101.6	37.5	46.2
4.5	114.3	43.3	52.0
5.0	127.0	49.1	57.8
5.5	139.7	54.9	63.5
6.0	152.4	60.6	69.3
6.5	165.1	66.4	75.1
7.0	177.8	72.2	80.9
7.5	190.5	78.0	86.6
8.0	203.2	83.7	92.4
8.5	215.9	89.5	98.2
9.0	228.6	95.3	104.0
9.5	241.3	101.1	109.7
10.0	254.0	106.8	115.5
10.5	266.7	112.6	121.3
11.0	279.4	118.4	127.1
11.5	292.1	124.2	132.8
12.0	304.8	129.9	138.6
12.5	317.5	135.7	144.4
13.0	330.2	141.5	150.2
13.5	342.9	147.3	155.9
14.0	355.6	153.0	161.7
14.5	368.3	158.8	167.5
15.0	381.0	164.6	173.3
15.5	393.7	170.4	179.0
16.0	406.4	176.1	184.8
16.5	419.1	181.9	190.6
17.0	431.8	187.7	196.4
17.5	444.5	193.5	202.1
18.0	457.2	199.2	207.9
18.5	469.9	205.0	213.7
19.0	482.6	210.8	219.5
19.5	495.3	216.6	225.2
20.0	508.0	222.3	231.0
20.5	520.7	228.1	236.8
21.0	533.4	233.9	242.6
21.5	546.1	239.7	248.3
22.0	558.8	245.4	254.1
22.5	571.5	251.2	259.9
23.0	584.2	254.1	265.7
23.5	596.9	259.9	271.4

A058J694 TANK DEPTH CHART

HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL)	TOTAL VOLUME (GAL)
0.5	12.7	0	5.8
1.0	25.4	2.9	11.6
1.5	38.1	8.7	17.4
2.0	50.8	14.5	23.1
2.5	63.5	20.2	28.9
3.0	76.2	26.0	34.7
3.5	88.9	31.8	40.5
4.0	101.6	37.6	46.3
4.5	114.3	43.4	52.1
5.0	127.0	49.2	57.8
5.5	139.7	55.0	63.6
6.0	152.4	60.7	69.4
6.5	165.1	66.5	75.2
7.0	177.8	72.3	81.0
7.5	190.5	78.1	86.8
8.0	203.2	83.9	92.6
8.5	215.9	89.7	98.3
9.0	228.6	95.4	104.1
9.5	241.3	101.2	109.9
10.0	254.0	107.0	115.7
10.5	266.7	112.8	121.5
11.0	279.4	118.6	127.3
11.5	292.1	124.4	133.0
12.0	304.8	130.2	138.8
12.5	317.5	135.9	144.6
13.0	330.2	141.7	150.4
13.5	342.9	147.5	156.2
14.0	355.6	153.3	162.0
14.5	368.3	159.1	167.8
15.0	381.0	164.9	173.5
15.5	393.7	170.6	179.3
16.0	406.4	176.4	185.1
16.5	419.1	182.2	190.9
17.0	431.8	188.0	196.7
17.5	444.5	193.8	202.5
18.0	457.2	199.6	208.2
18.5	469.9	205.4	214.0
19.0	482.6	211.1	219.8
19.5	495.3	216.9	225.6
20.0	508.0	222.7	231.4
20.5	520.7	228.5	237.2
21.0	533.4	234.3	243.0
21.5	546.1	240.1	248.7
22.0	558.8	245.8	254.5
22.5	571.5	251.6	260.3
23.0	584.2	254.5	266.1
23.5	596.9	260.3	271.9
24.0	609.6	266.1	277.7
24.5	622.3	271.9	283.4
25.0	635.0	277.7	289.2
25.5	647.7	283.4	295.0
26.0	660.4	289.2	300.8
26.5	673.1	295.0	306.6
27.0	685.8	300.8	312.4
27.5	698.5	306.6	318.2
28.0	711.2	312.4	323.9
28.5	723.9	318.2	329.7
29.0	736.6	323.9	335.5
29.5	749.3	329.7	341.3
30.0	762.0	335.5	347.1
30.5	774.7	341.3	352.9
31.0	787.4	347.1	358.6
31.5	800.1	352.9	364.4

A058J695 TANK DEPTH CHART

HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL)	TOTAL VOLUME (GAL)
0.5	12.7	0	5.8
1.0	25.4	2.9	11.6
1.5	38.1	8.7	17.3
2.0	50.8	14.4	23.1
2.5	63.5	20.2	28.9
3.0	76.2	26.0	34.7
3.5	88.9	31.8	40.5
4.0	101.6	37.6	46.2
4.5	114.3	43.3	52.0
5.0	127.0	49.1	57.8
5.5	139.7	54.9	63.6
6.0	152.4	60.7	69.3
6.5	165.1	66.5	75.1
7.0	177.8	72.2	80.9
7.5	190.5	78.0	86.7
8.0	203.2	83.8	92.5
8.5	215.9	89.6	98.2
9.0	228.6	95.3	104.0
9.5	241.3	101.1	109.8
10.0	254.0	106.9	115.6
10.5	266.7	112.7	121.4
11.0	279.4	118.5	127.1
11.5	292.1	124.2	132.9
12.0	304.8	130.0	138.7
12.5	317.5	135.8	144.5
13.0	330.2	141.6	150.2
13.5	342.9	147.4	156.0
14.0	355.6	153.1	161.8
14.5	368.3	158.9	167.6
15.0	381.0	164.7	173.4
15.5	393.7	170.5	179.1
16.0	406.4	176.3	184.9
16.5	419.1	182.0	190.7
17.0	431.8	187.8	196.5
17.5	444.5	193.6	202.3
18.0	457.2	199.4	208.0
18.5	469.9	205.1	213.8
19.0	482.6	210.9	219.6
19.5	495.3	216.7	225.4
20.0	508.0	222.5	231.2
20.5	520.7	228.3	236.9
21.0	533.4	234.0	242.7
21.5	546.1	239.8	248.5
22.0	558.8	245.6	254.3
22.5	571.5	251.4	260.0
23.0	584.2	254.3	265.8
23.5	596.9	260.0	271.6
24.0	609.6	265.8	277.4
24.5	622.3	271.6	283.2
25.0	635.0	277.4	288.9
25.5	647.7	283.2	294.7
26.0	660.4	288.9	300.5
26.5	673.1	294.7	306.3
27.0	685.8	300.5	312.1
27.5	698.5	306.3	317.8
28.0	711.2	312.1	323.6
28.5	723.9	317.8	329.4
29.0	736.6	323.6	335.2
29.5	749.3	329.4	340.9
30.0	762.0	335.2	346.7
30.5	774.7	340.9	352.5
31.0	787.4	346.7	358.3
31.5	800.1	352.5	364.1
32.0	812.8	358.3	369.8
32.5	825.5	364.1	375.6
33.0	838.2	369.8	381.4
33.5	850.9	375.6	387.2
34.0	863.6	381.4	393.0
34.5	876.3	387.2	398.7
35.0	889.0	393.0	404.5
35.5	901.7	398.7	410.3
36.0	914.4	404.5	416.1
36.5	927.1	410.3	421.9
37.0	939.8	416.1	427.6
37.5	952.5	421.9	433.4
38.0	965.2	427.6	439.2
38.5	977.9	433.4	445.0
39.0	990.6	439.2	450.7
39.5	1003.3	445.0	456.5
40.0	1016.0	450.7	462.3
40.5	1028.7	456.5	468.1
41.0	1041.4	462.3	473.9
41.5	1054.1	468.1	479.6
42.0	1066.8	473.9	485.4
42.5	1079.5	479.6	491.2
43.0	1092.2	485.4	497.0
43.5	1104.9	491.2	502.8
44.0	1117.6	497.0	508.5
44.5	1130.3	502.8	514.3
45.0	1143.0	508.5	520.1
45.5	1155.7	514.3	525.9
46.0	1168.4	520.1	531.6
46.5	1181.1	525.9	537.4

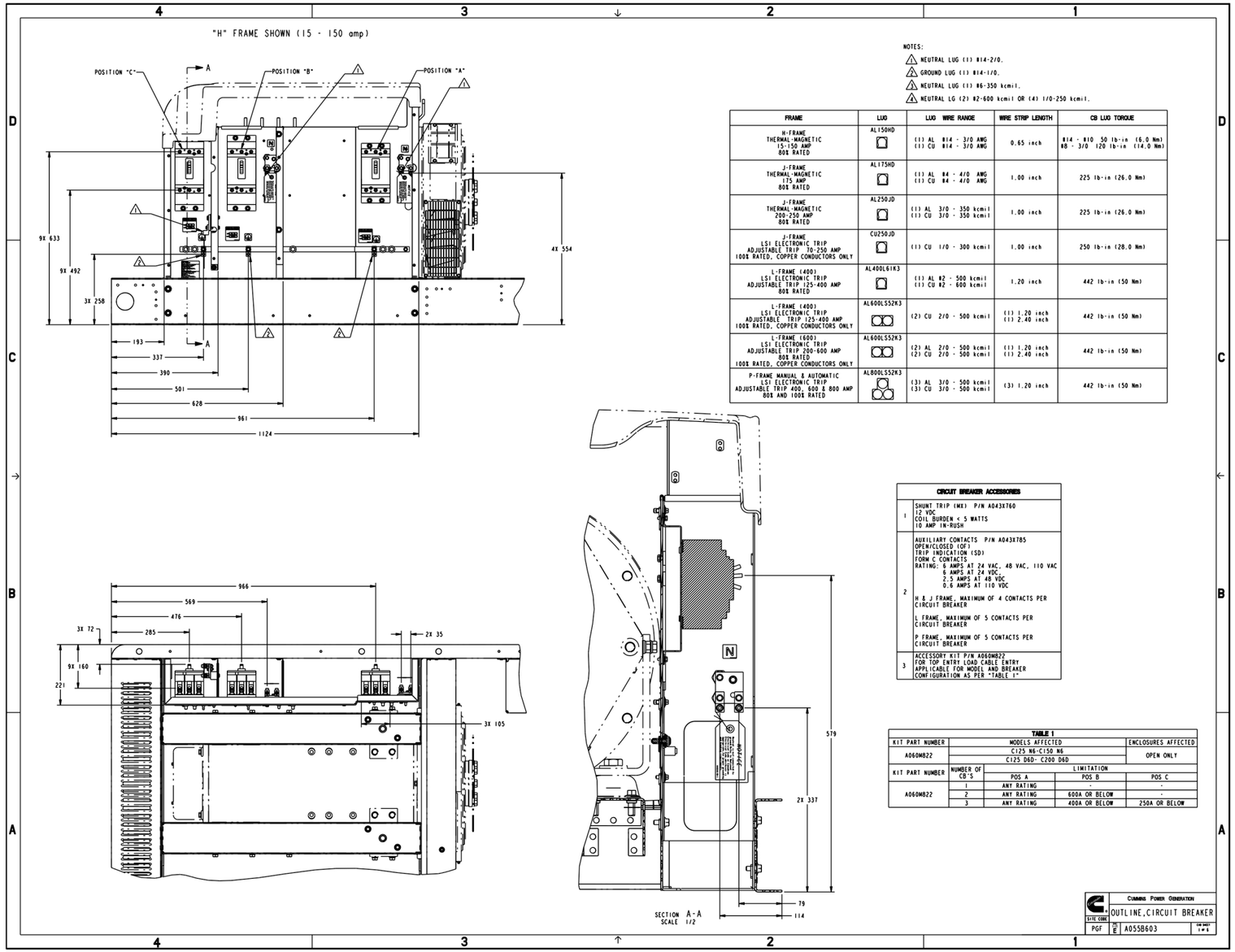
Cummins Inc.

Part Number: **A060C231** Part Revision: **D**

Part Name: **OUTLINE,TANK**

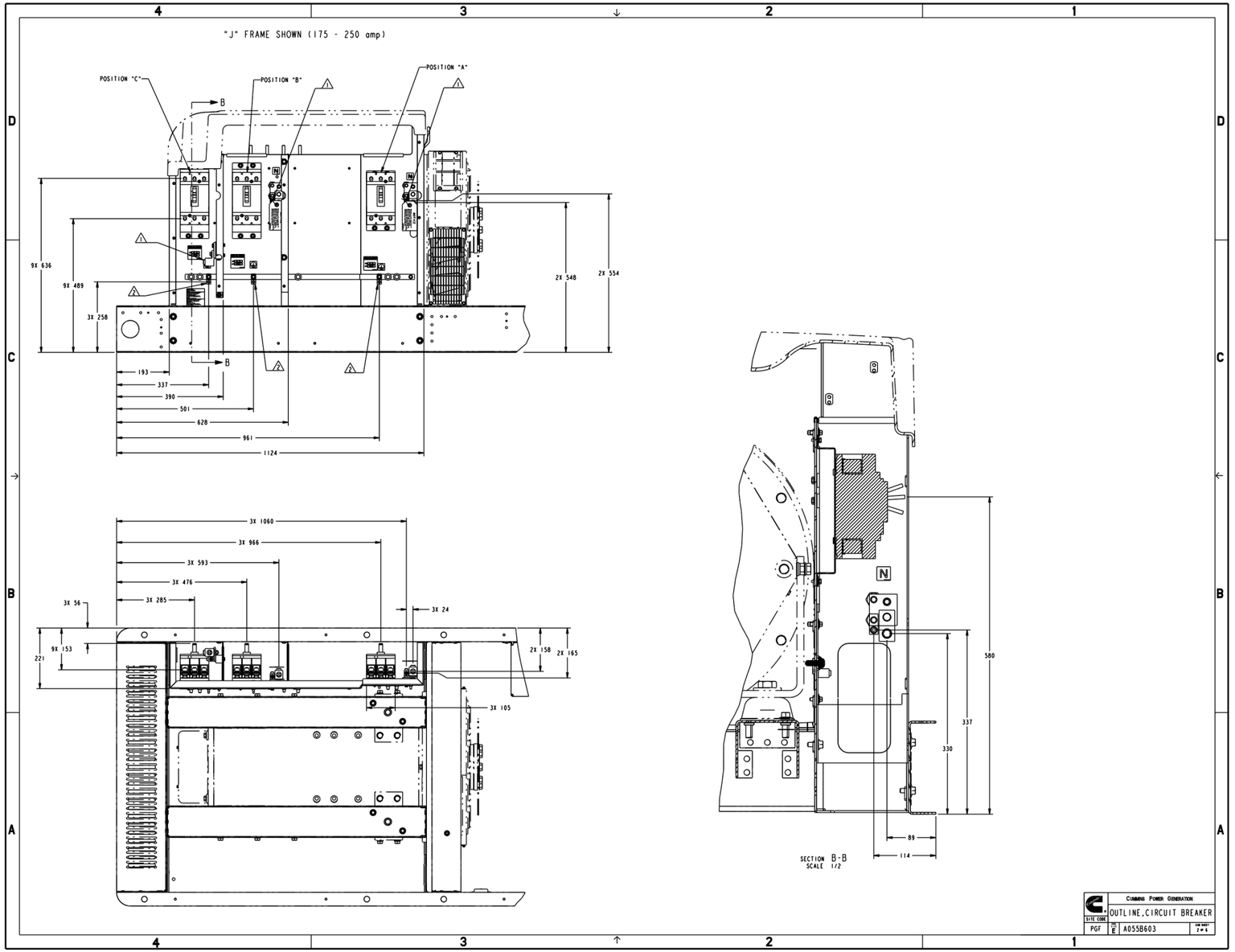
FIGURE 34. TANK OUTLINE DRAWING (SHEET 5 OF 5)

A.7 A055B603 Circuit Breaker Outline Drawing



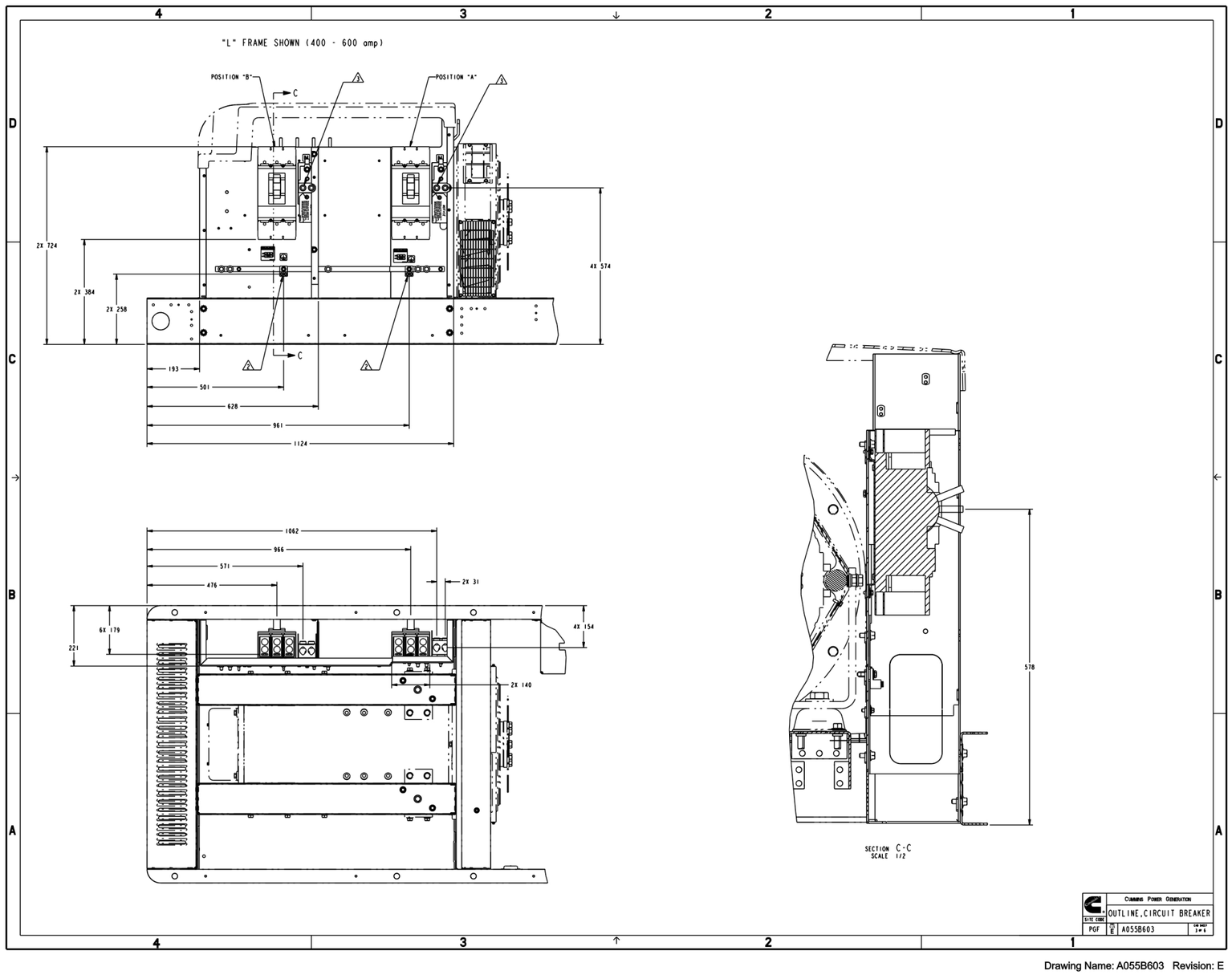
Drawing Name: A055B603 Revision: E

FIGURE 35. CIRCUIT BREAKER OUTLINE DRAWING (SHEET 1 OF 6)



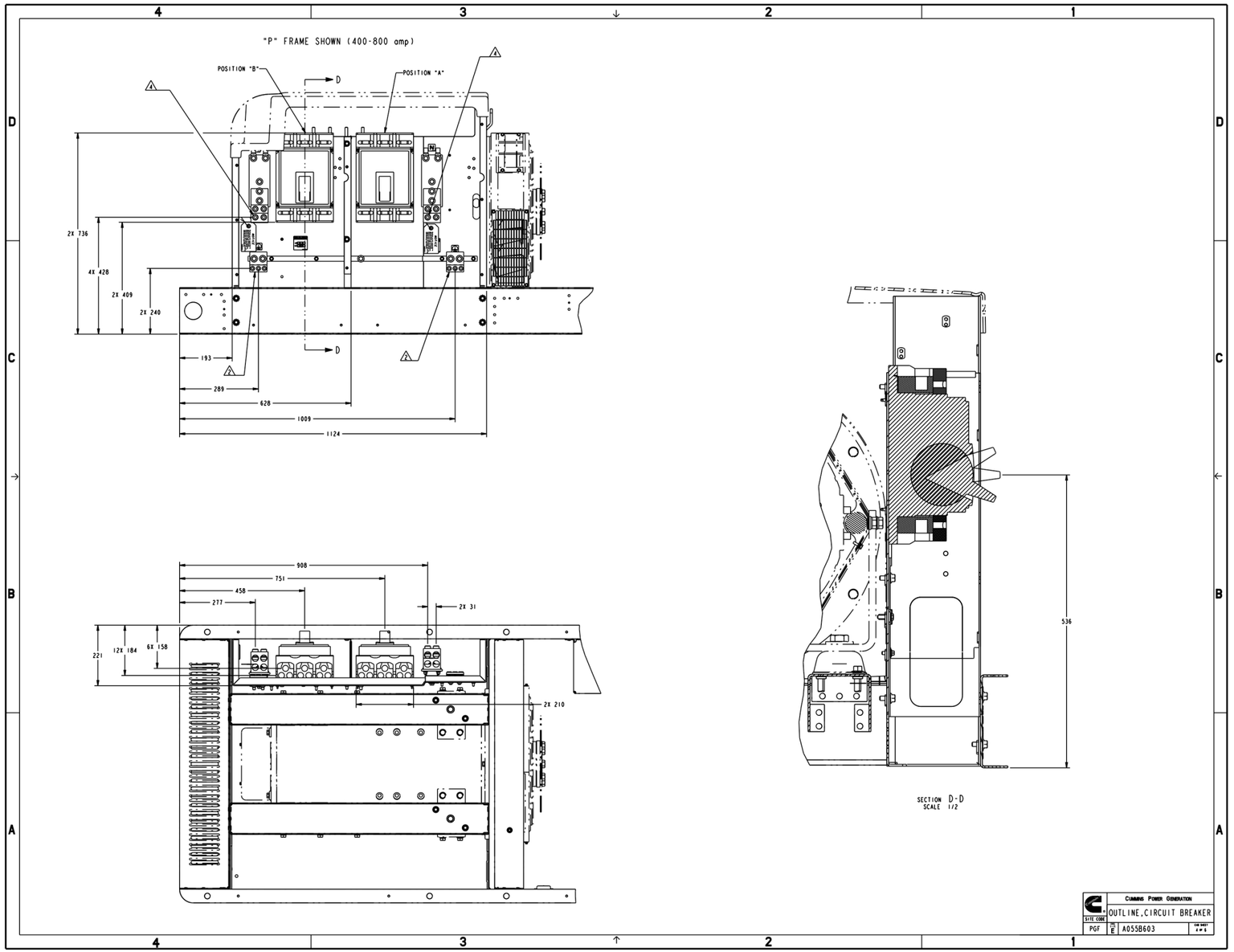
Drawing Name: A055B603 Revision: E

FIGURE 36. CIRCUIT BREAKER OUTLINE DRAWING (SHEET 2 OF 6)



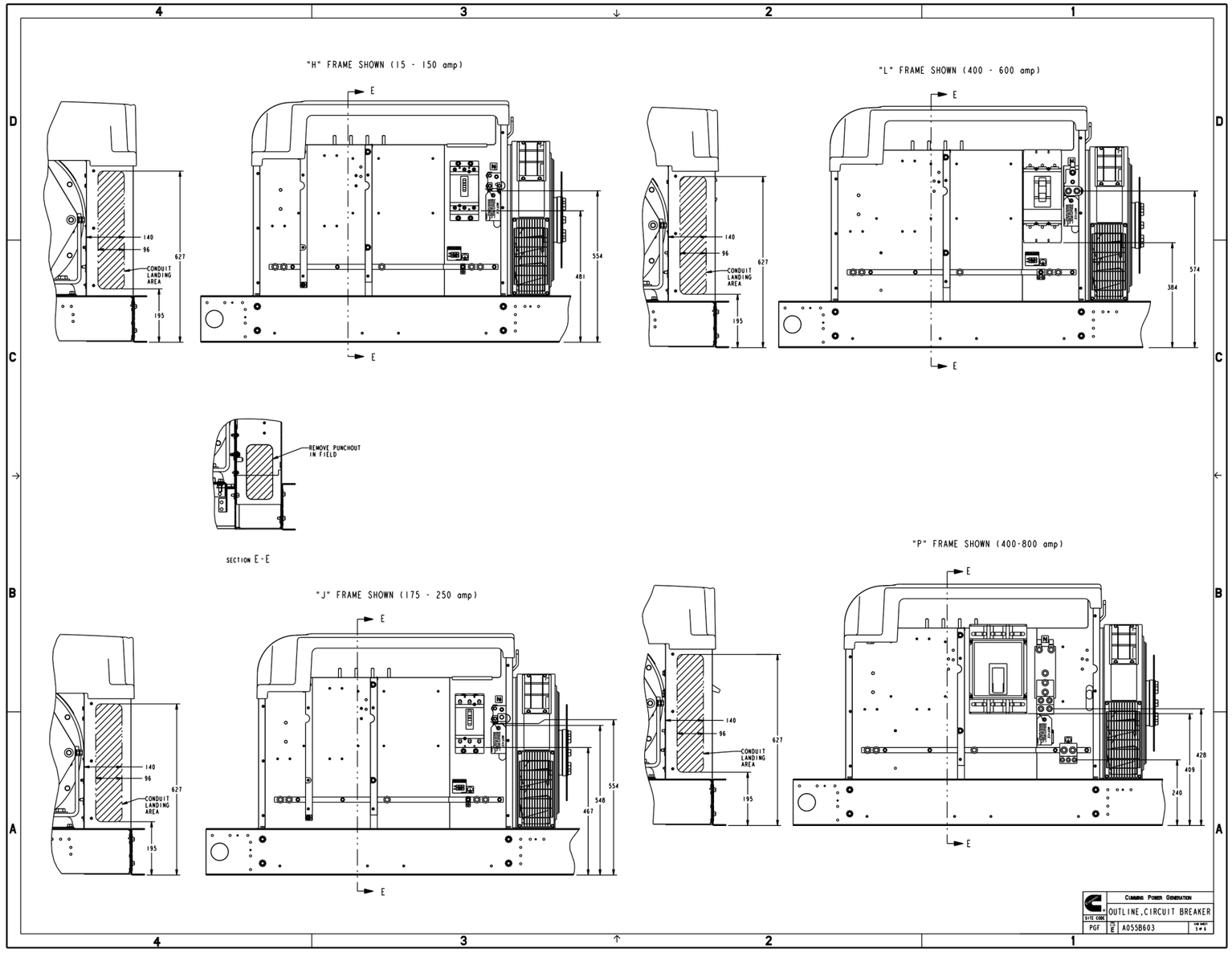
Drawing Name: A055B603 Revision: E

FIGURE 37. CIRCUIT BREAKER OUTLINE DRAWING (SHEET 3 OF 6)



Drawing Name: A055B603 Revision: E

FIGURE 38. CIRCUIT BREAKER OUTLINE DRAWING (SHEET 4 OF 6)



Drawing Name: A055B603 Revision: E

FIGURE 39. CIRCUIT BREAKER OUTLINE DRAWING (SHEET 5 OF 6)

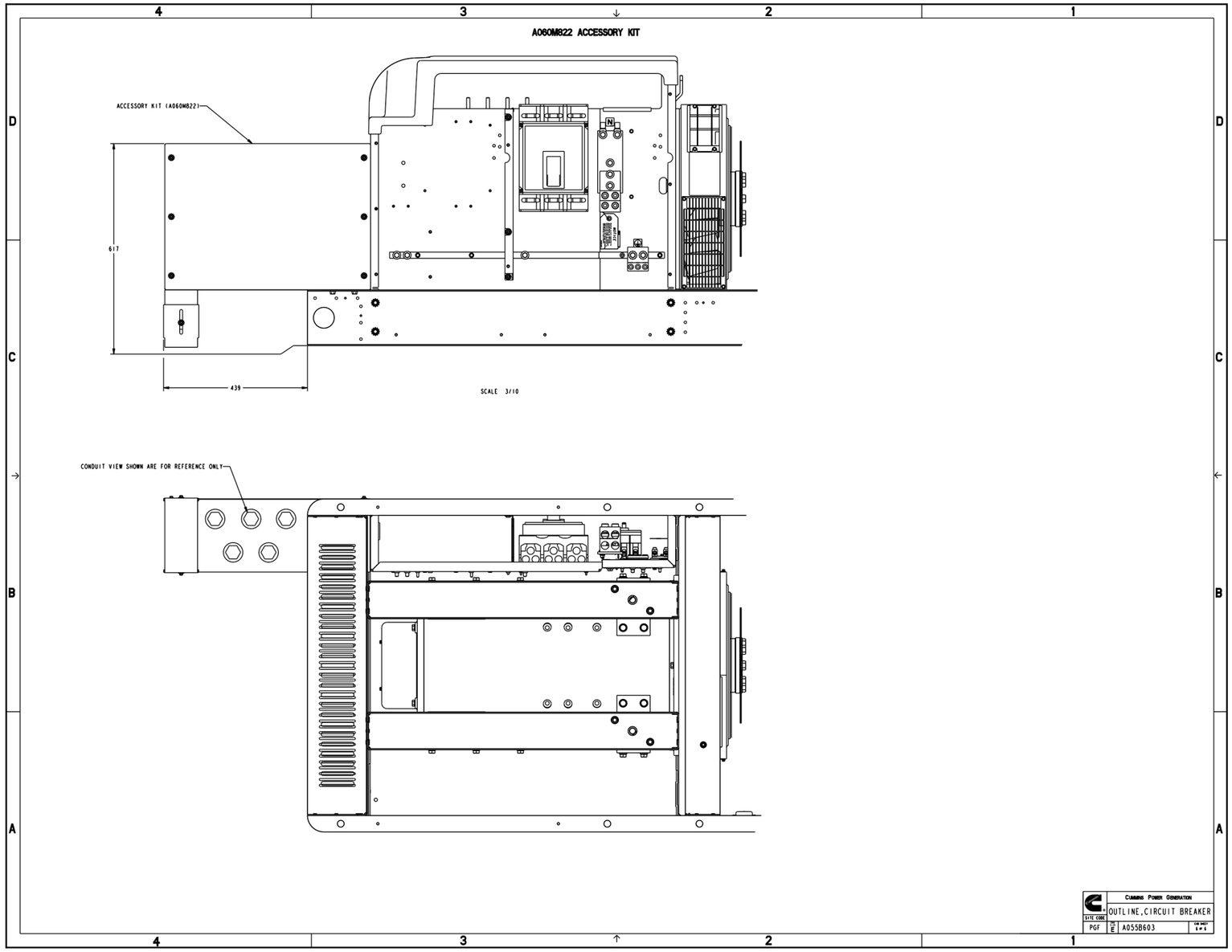


FIGURE 40. CIRCUIT BREAKER OUTLINE DRAWING (SHEET 6 OF 6)

Appendix B. Wiring Diagrams

Table of Contents

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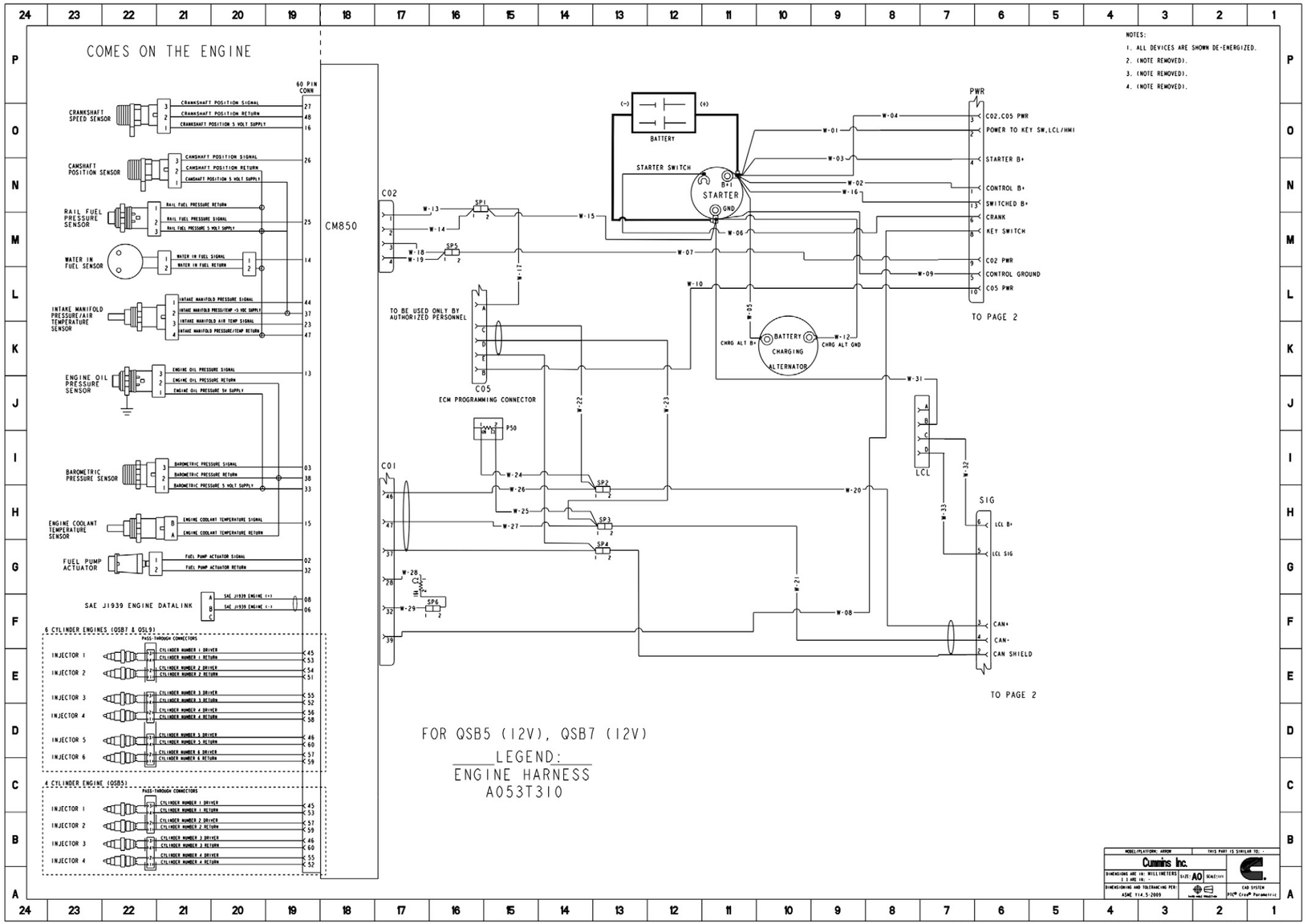
B.0 A057P963 Generator Set Schematic Diagram.



Part Number: **A057P963** Part Revision: **G**

Part Name: **DIAGRAM,GENSET SCHEMATIC**

FIGURE 41. SHEET 1 OF 5

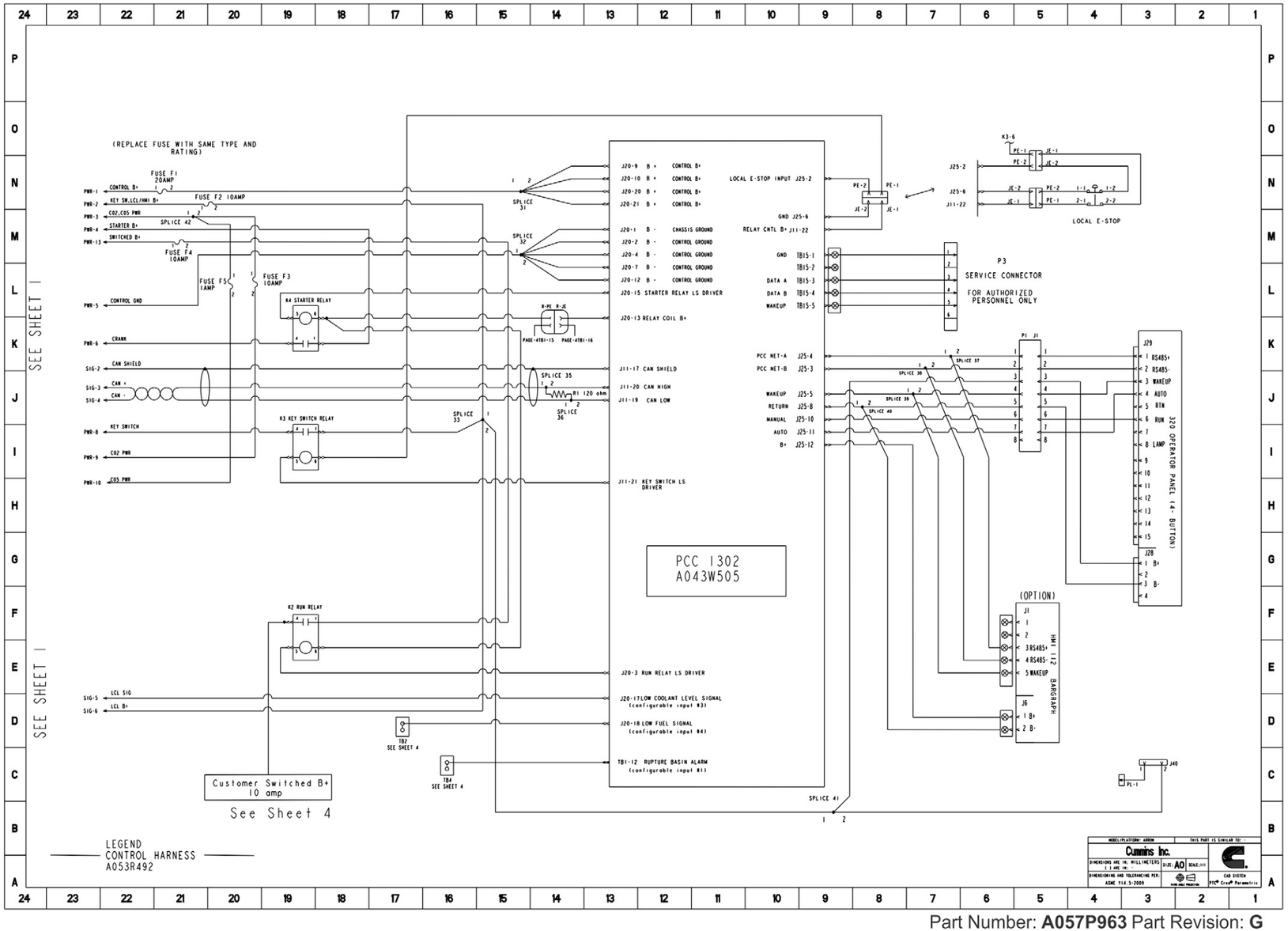
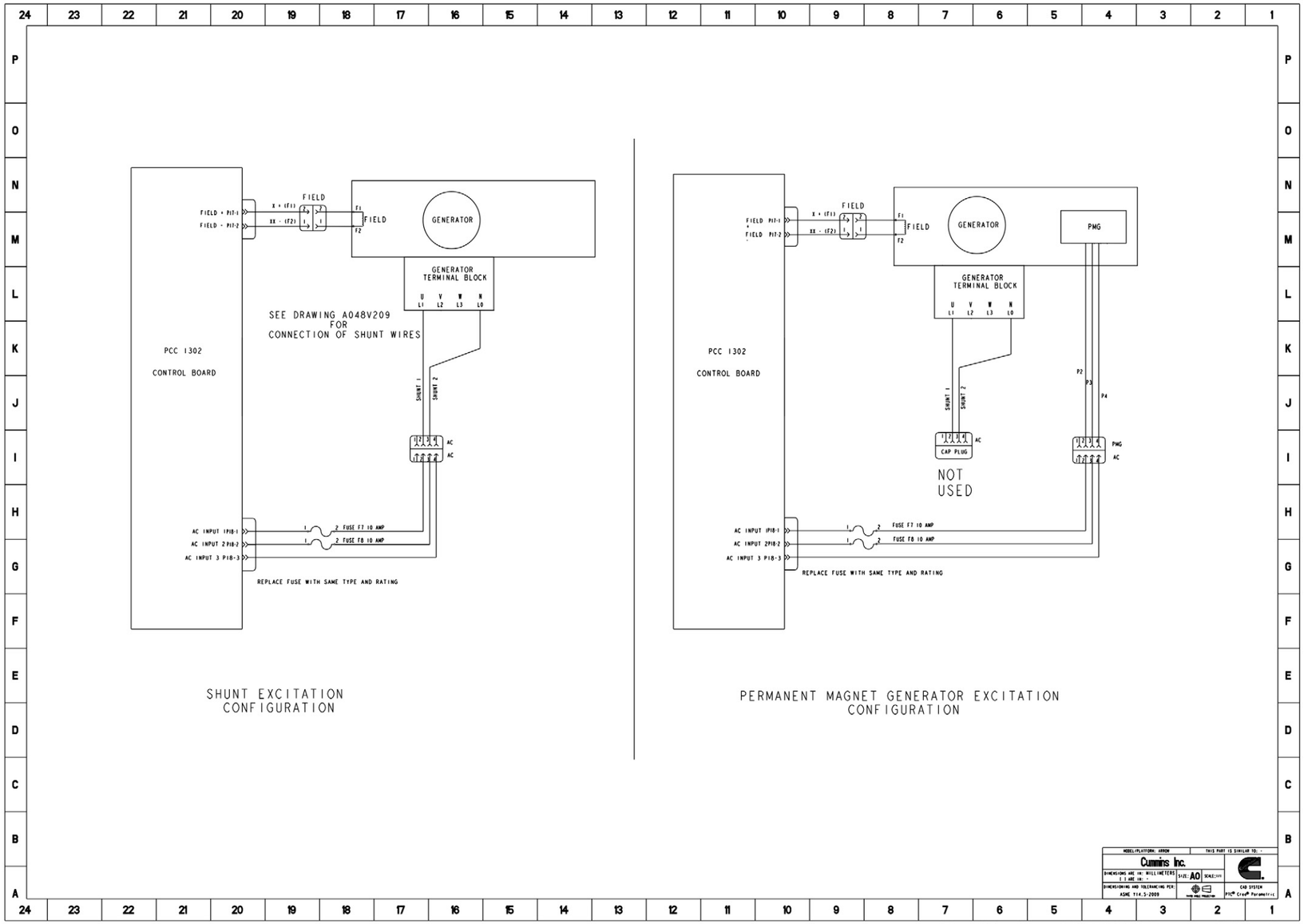
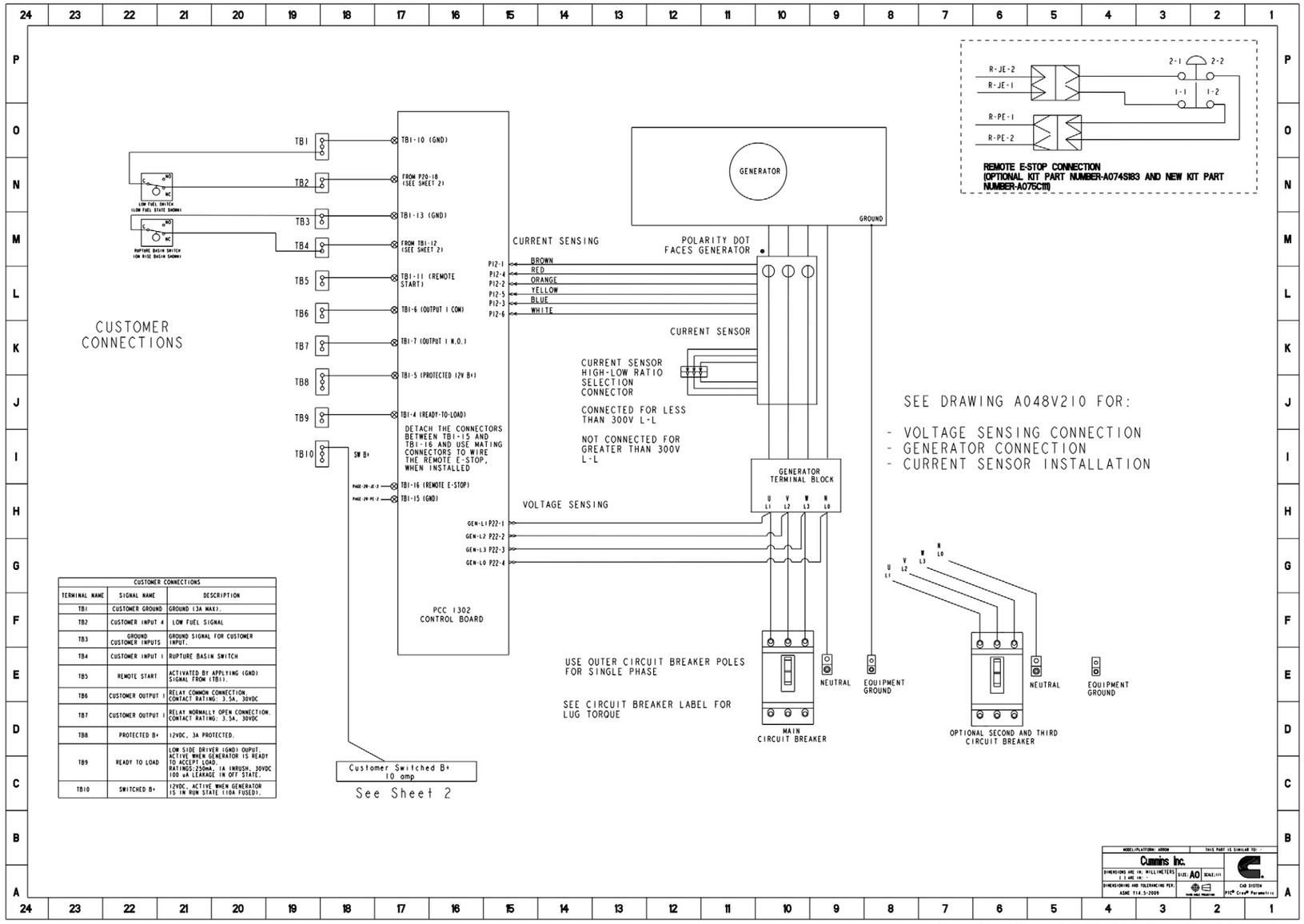


FIGURE 42. SHEET 2 OF 5



Part Number: **A057P963** Part Revision: **G**
Part Name: **DIAGRAM,GENSET SCHEMATIC**

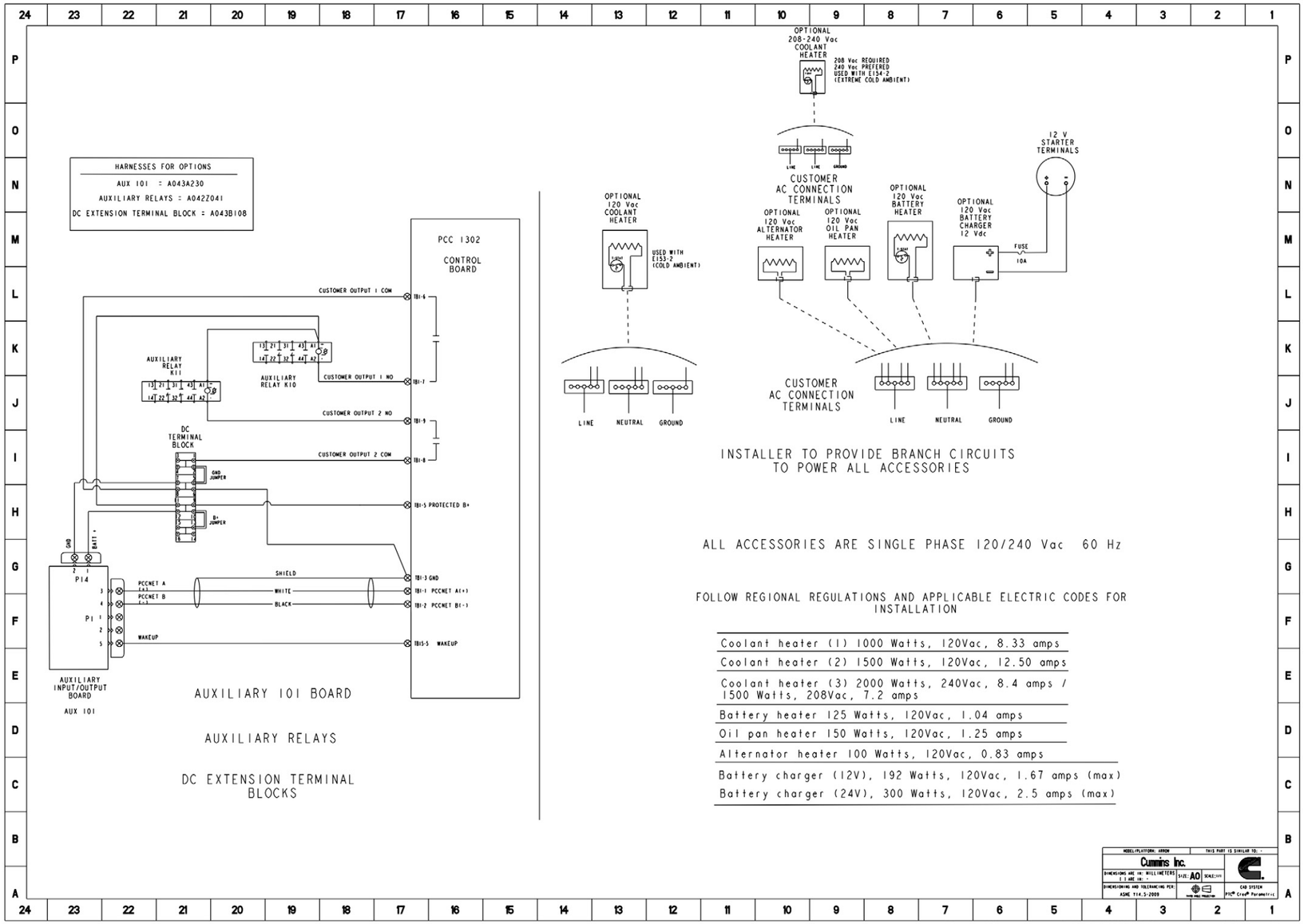
FIGURE 43. SHEET 3 OF 5



CUSTOMER CONNECTIONS		
TERMINAL NAME	SIGNAL NAME	DESCRIPTION
TB1	CUSTOMER GROUND	GROUND (3A MAX).
TB2	CUSTOMER INPUT 4	LOW FUEL SIGNAL
TB3	GROUND CUSTOMER INPUTS	GROUND SIGNAL FOR CUSTOMER INPUT.
TB4	CUSTOMER INPUT 1	RUPTURE BASIN SWITCH
TB5	REMOTE START	ACTIVATED BY APPLYING (GND) SIGNAL FROM (TB1).
TB6	CUSTOMER OUTPUT 1	RELAY COMMON CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB7	CUSTOMER OUTPUT 1	RELAY NORMALLY OPEN CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB8	PROTECTED B+	12VDC, 3A PROTECTED.
TB9	READY TO LOAD	LOW SIDE DRIVER (GND) OUPUT. ACTIVE WHEN GENERATOR IS READY TO ACCEPT LOAD. RATINGS:250mA, 1A INRUSH, 30VDC 100 uA LEAKAGE IN OFF STATE.
TB10	SWITCHED B+	12VDC, ACTIVE WHEN GENERATOR IS IN RUN STATE (10A FUSED).

Part Number: **A057P963** Part Revision: **G**
Part Name: **DIAGRAM,GENSET SCHEMATIC**

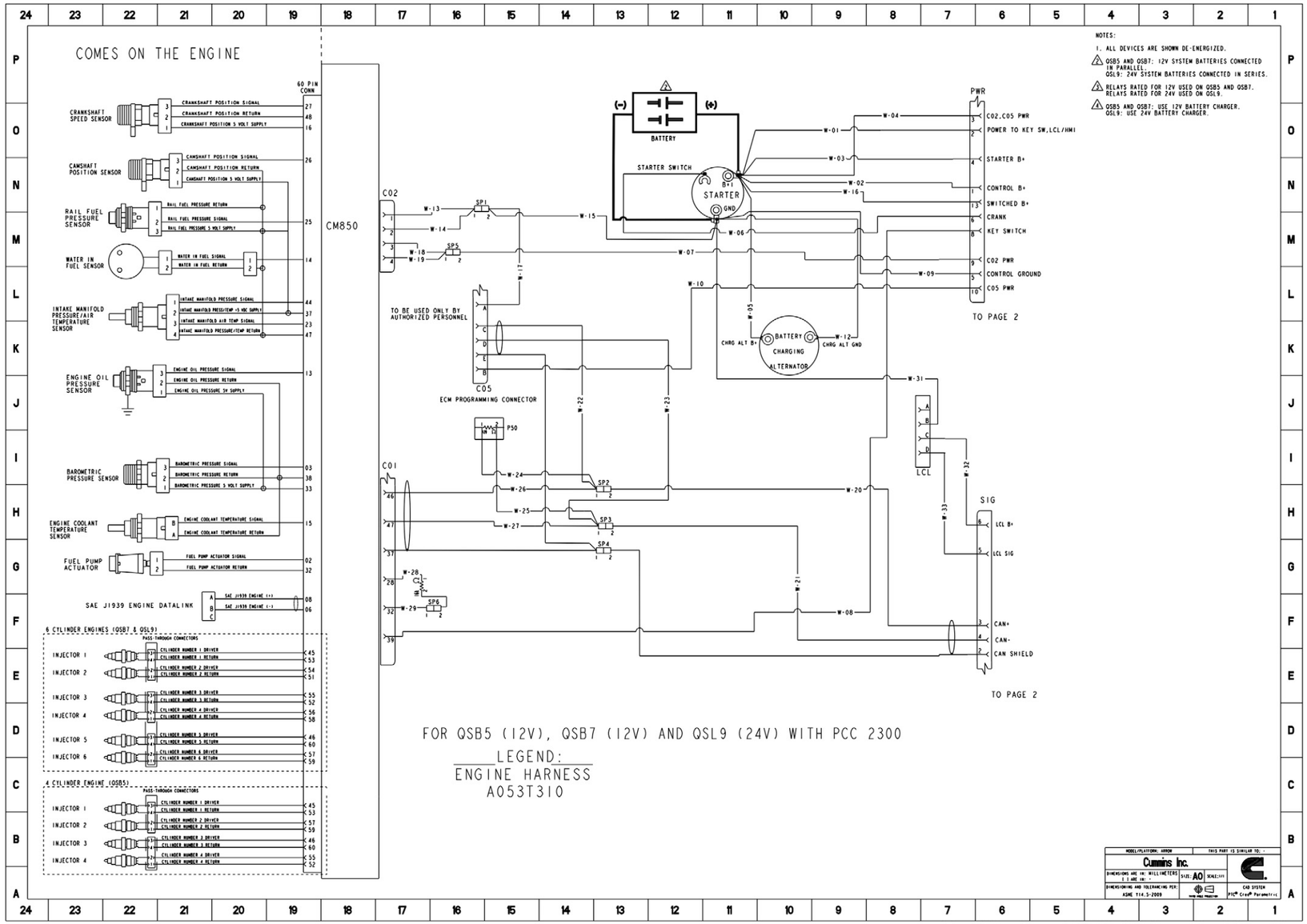
FIGURE 44. SHEET 4 OF 5



Part Number: **A057P963** Part Revision: **G**
Part Name: **DIAGRAM,GENSET SCHEMATIC**

FIGURE 45. SHEET 5 OF 5

B.1 Generator Set Schematic Diagram



Part Number: **A054B421** Part Revision: **H**

Part Name: **DIAGRAM,GENSET SCHEMATIC**

FIGURE 46. GENERATOR SET SCHEMATIC DIAGRAM (SHEET 1 OF 5)

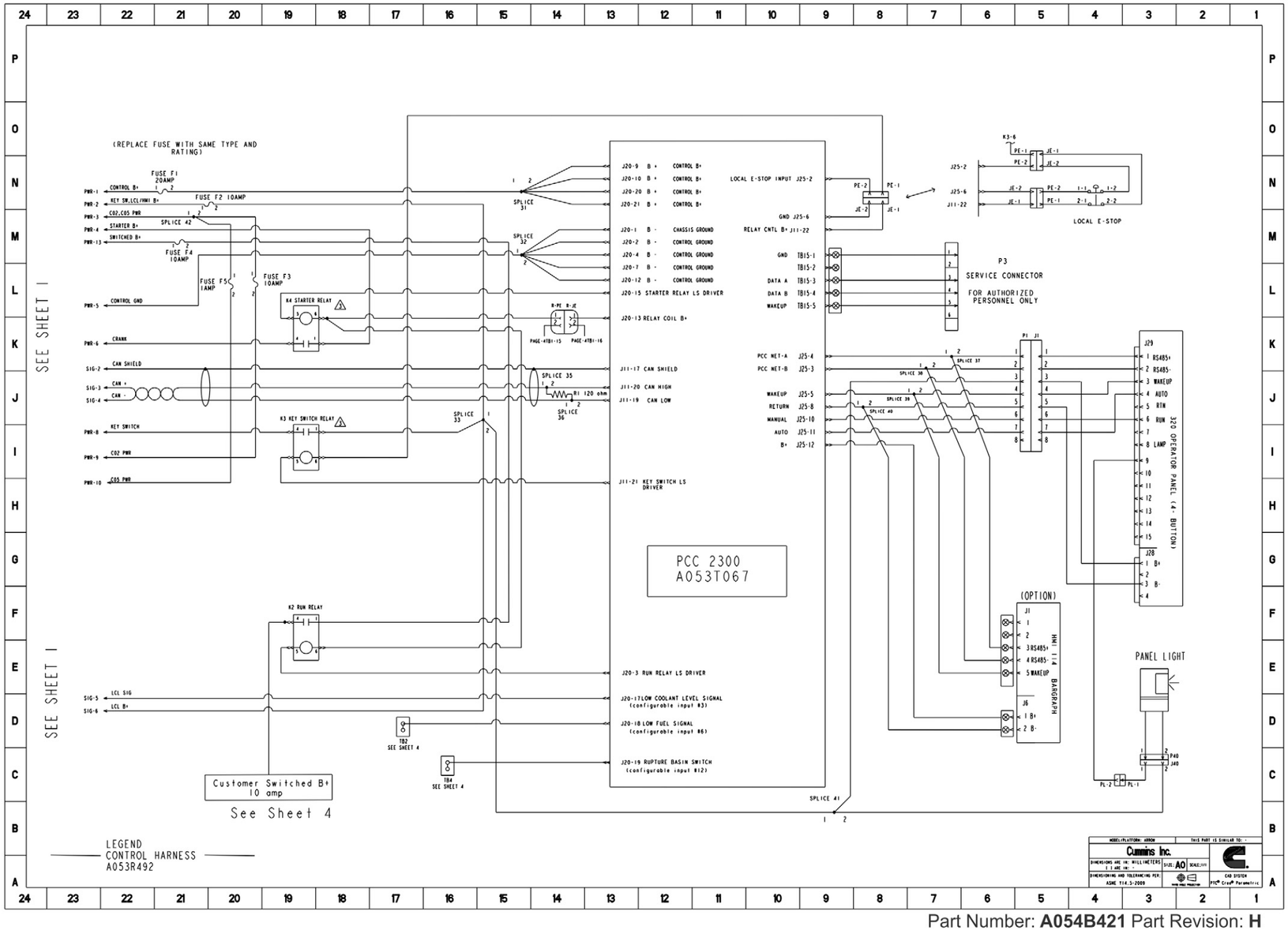
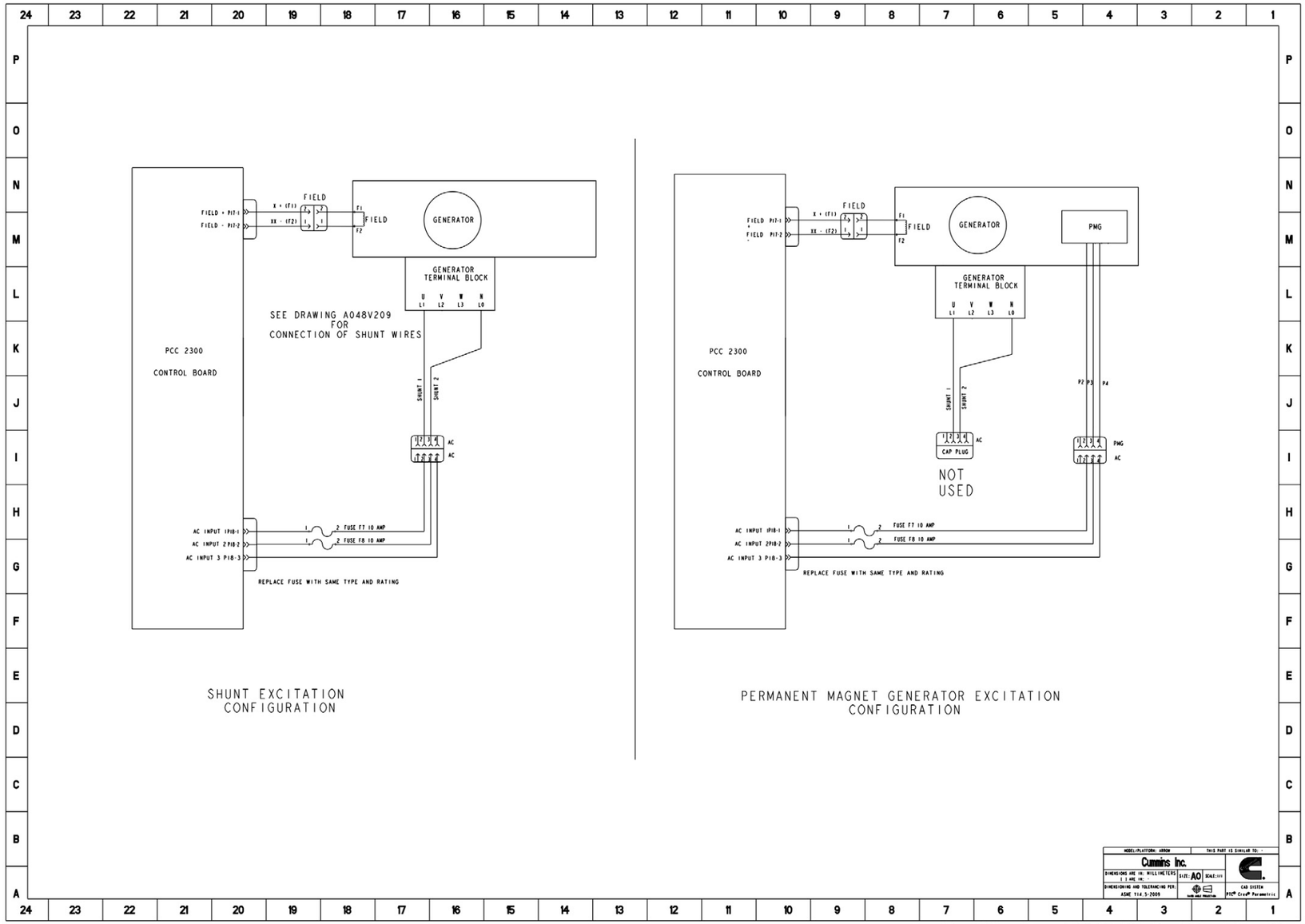


FIGURE 47. GENERATOR SET SCHEMATIC DIAGRAM (SHEET 2 OF 5)

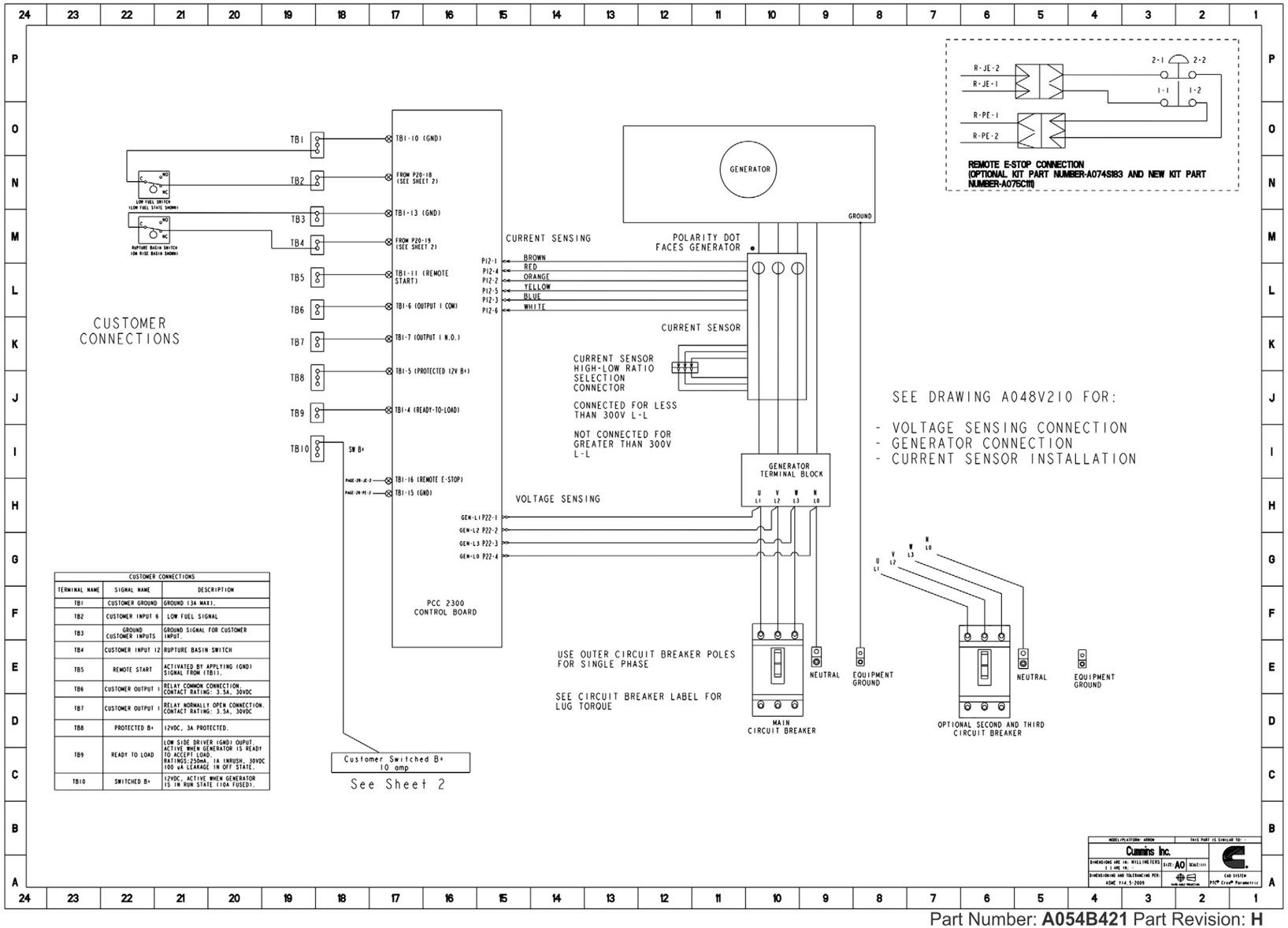
Part Number: **A054B421** Part Revision: **H**

Part Name: **DIAGRAM,GENSET SCHEMATIC**



Part Number: **A054B421** Part Revision: **H**
Part Name: **DIAGRAM,GENSET SCHEMATIC**

FIGURE 48. GENERATOR SET SCHEMATIC DIAGRAM (SHEET 3 OF 5)

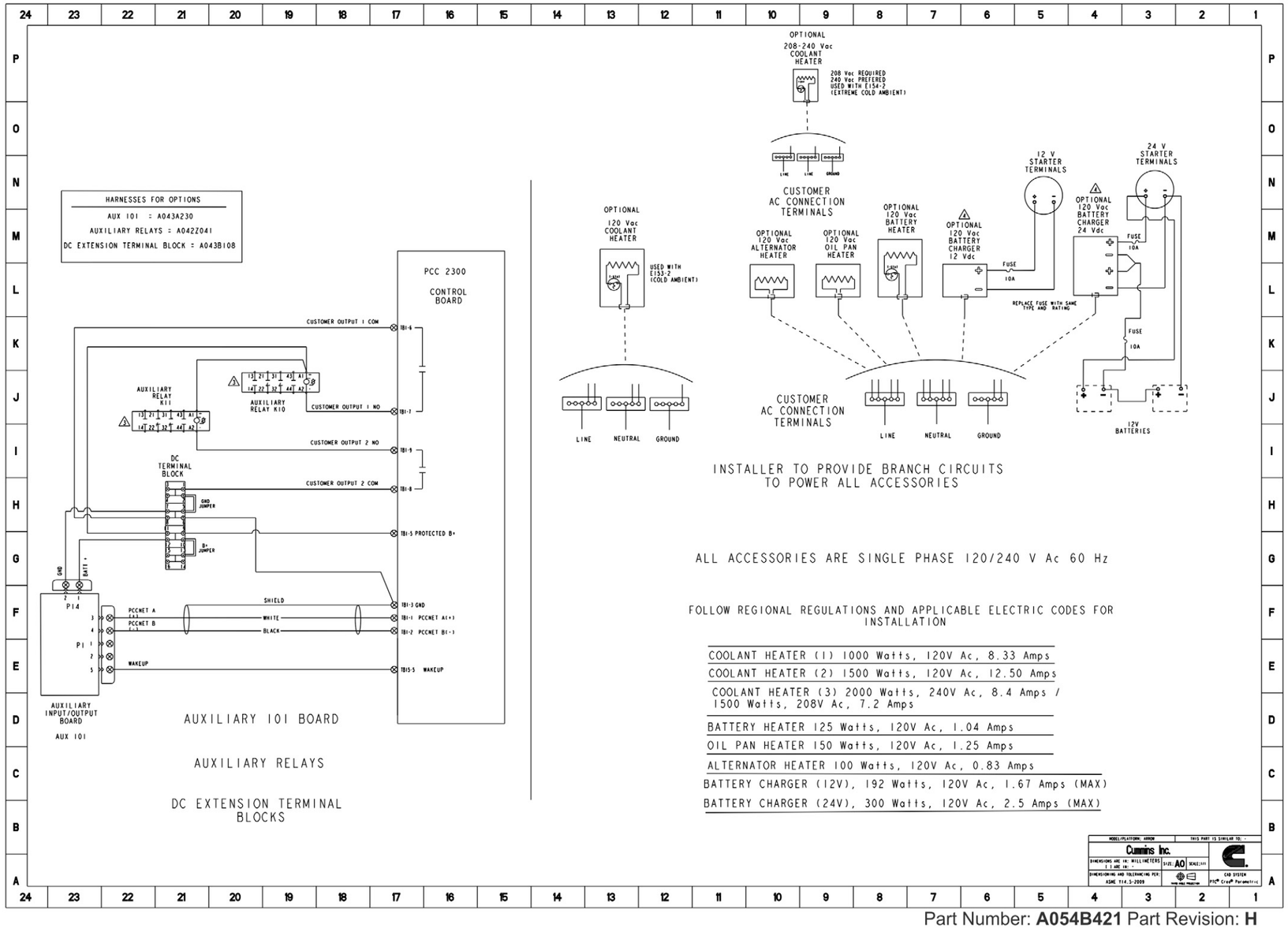


CUSTOMER CONNECTIONS		
TERMINAL NAME	SIGNAL NAME	DESCRIPTION
TB1	CUSTOMER GROUND	GROUND (3A MAX).
TB2	CUSTOMER INPUT 6	LOW FUEL SIGNAL
TB3	GROUND CUSTOMER INPUTS	GROUND SIGNAL FOR CUSTOMER INPUT.
TB4	CUSTOMER INPUT 12	RUPTURE BASIN SWITCH
TB5	REMOTE START	ACTIVATED BY APPLYING (GND) SIGNAL FROM (TB1).
TB6	CUSTOMER OUTPUT 1	RELAY COMMON CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB7	CUSTOMER OUTPUT 1	RELAY, NORMALLY OPEN CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB8	PROTECTED B+	12VDC, 3A PROTECTED.
TB9	READY TO LOAD	LOW SIDE DRIVER (GND) OUPUT. ACTIVE WHEN GENERATOR IS READY TO ACCEPT LOAD. RATINGS:250mA, 1A INRUSH, 30VDC 100 uA LEAKAGE IN OFF STATE.
TB10	SWITCHED B+	12VDC, ACTIVE WHEN GENERATOR IS IN RUN STATE (10A FUSED).

Part Number: **A054B421** Part Revision: **H**

Part Name: **DIAGRAM,GENSET SCHEMATIC**

FIGURE 49. GENERATOR SET SCHEMATIC DIAGRAM (SHEET 4 OF 5)



Part Number: **A054B421** Part Revision: **H**

Part Name: **DIAGRAM,GENSET SCHEMATIC**

FIGURE 50. GENERATOR SET SCHEMATIC DIAGRAM (SHEET 5 OF 5)

B.2 Wiring Diagram

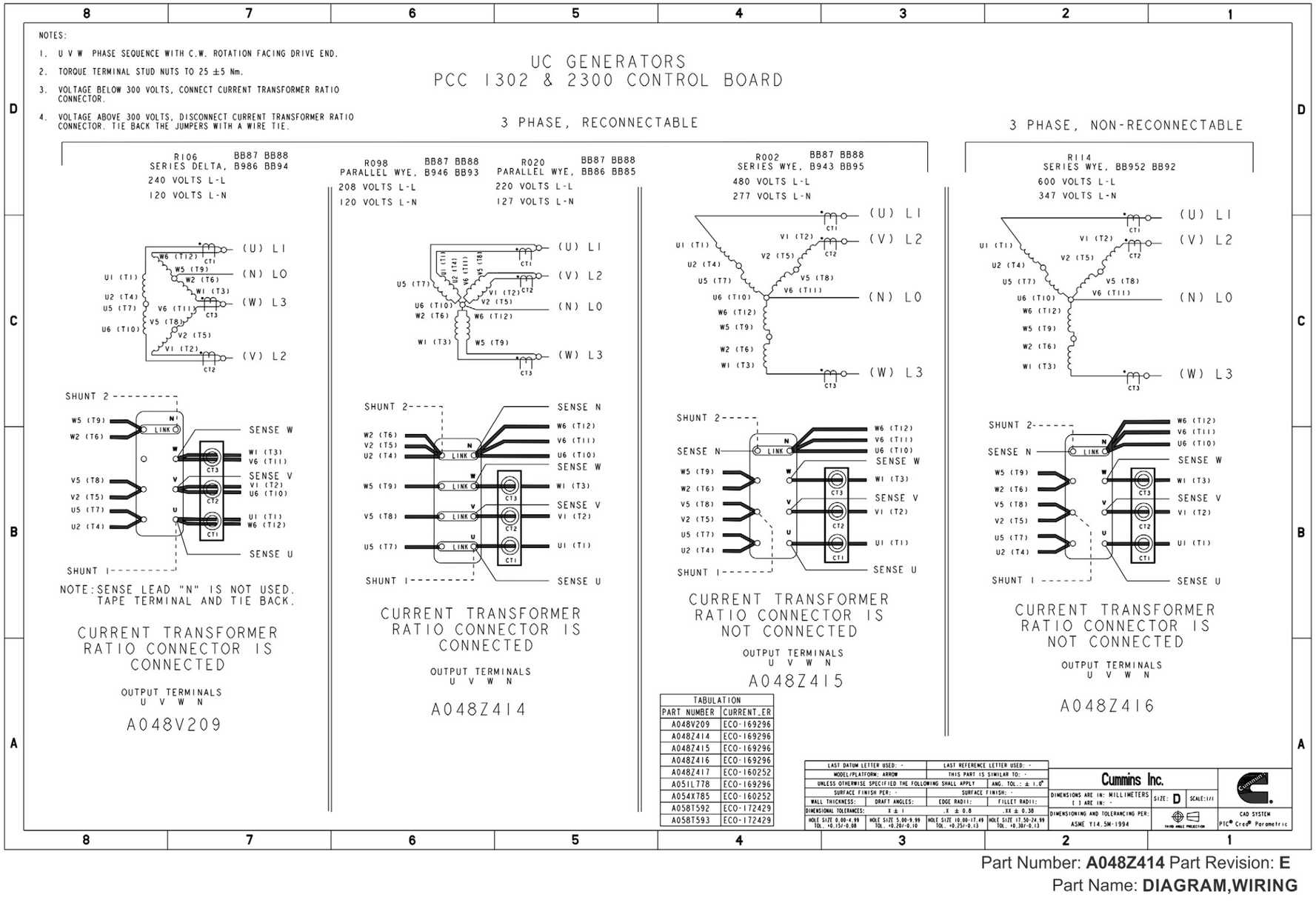


FIGURE 51. UC GENERATORS PCC 1302 & 2300 CONTROL BOARD WIRING DIAGRAM (SHEET 1 OF 4)

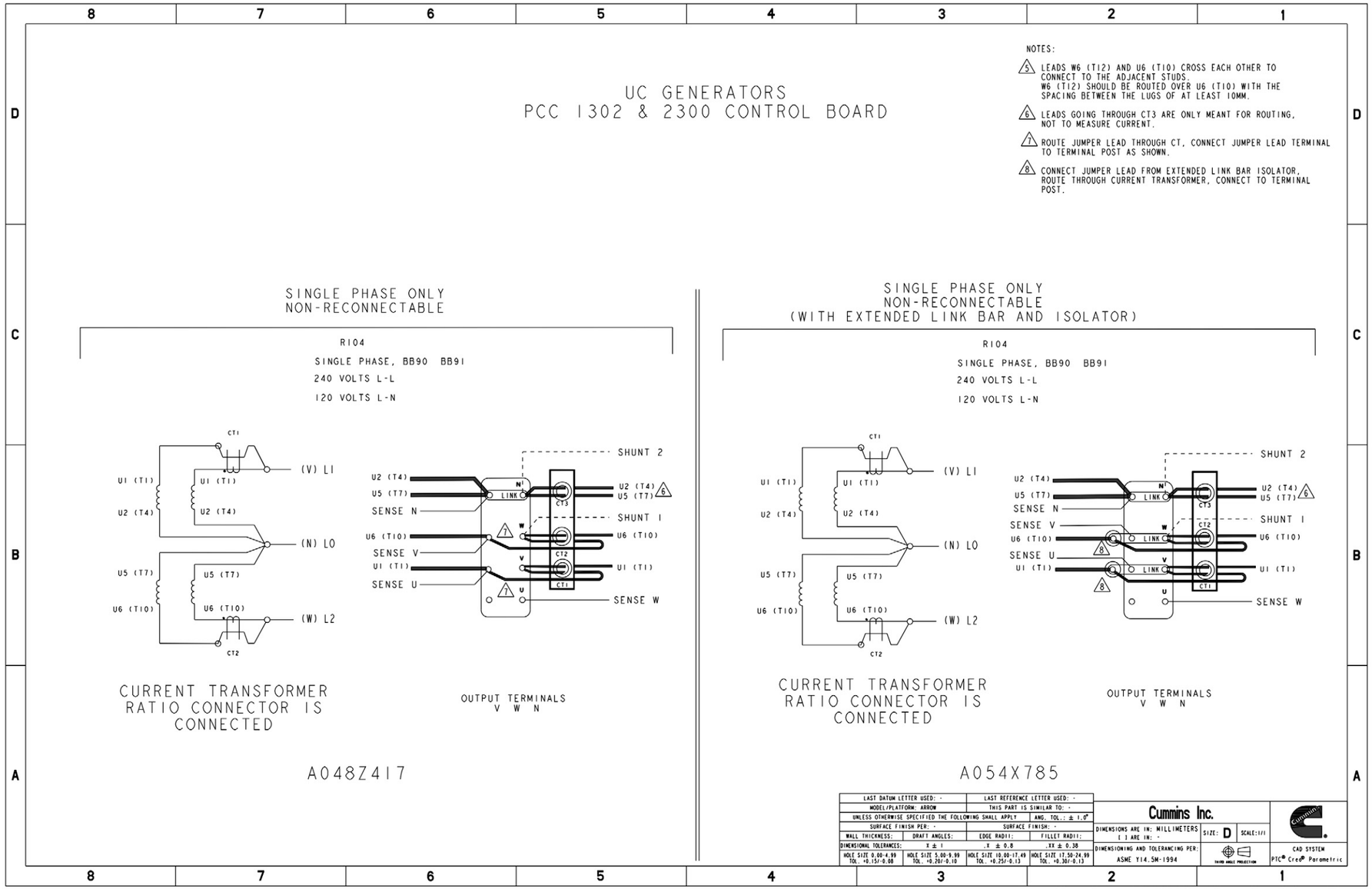


FIGURE 52. UC GENERATORS PCC 1302 & 2300 CONTROL BOARD WIRING DIAGRAM (SHEET 2 OF 4)

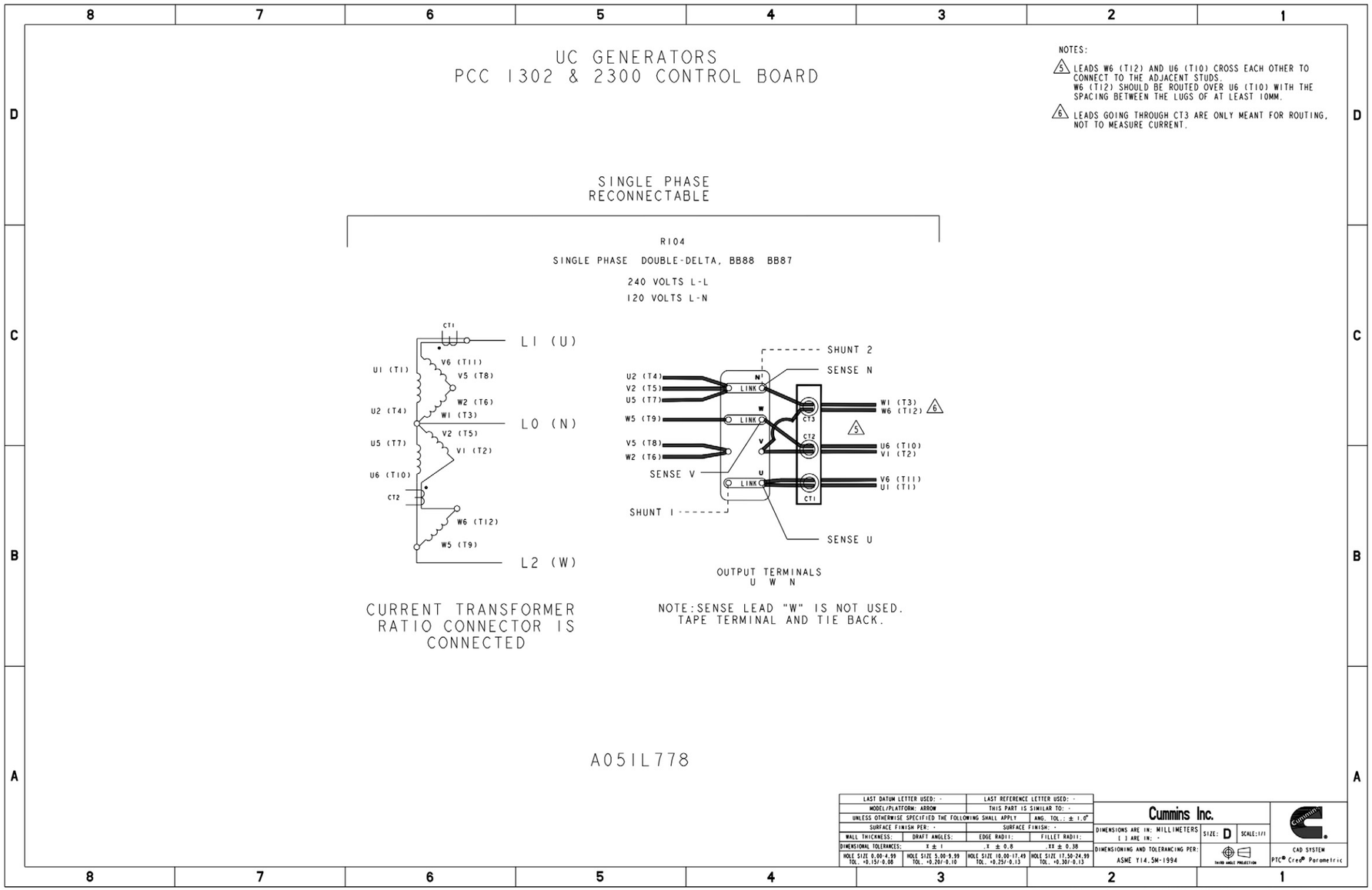


FIGURE 53. UC GENERATORS PCC 1302 & 2300 CONTROL BOARD WIRING DIAGRAM (SHEET 3 OF 4)

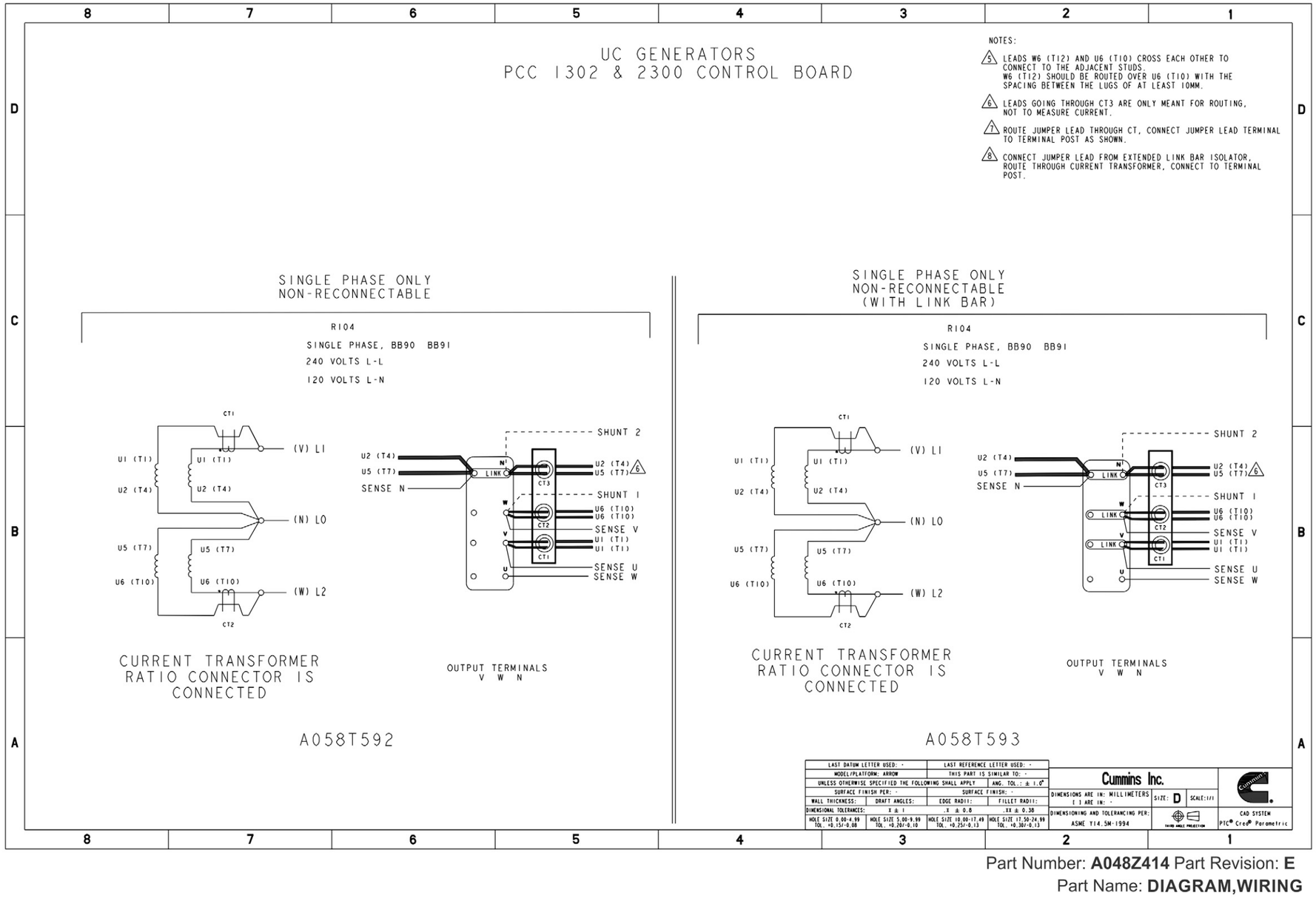
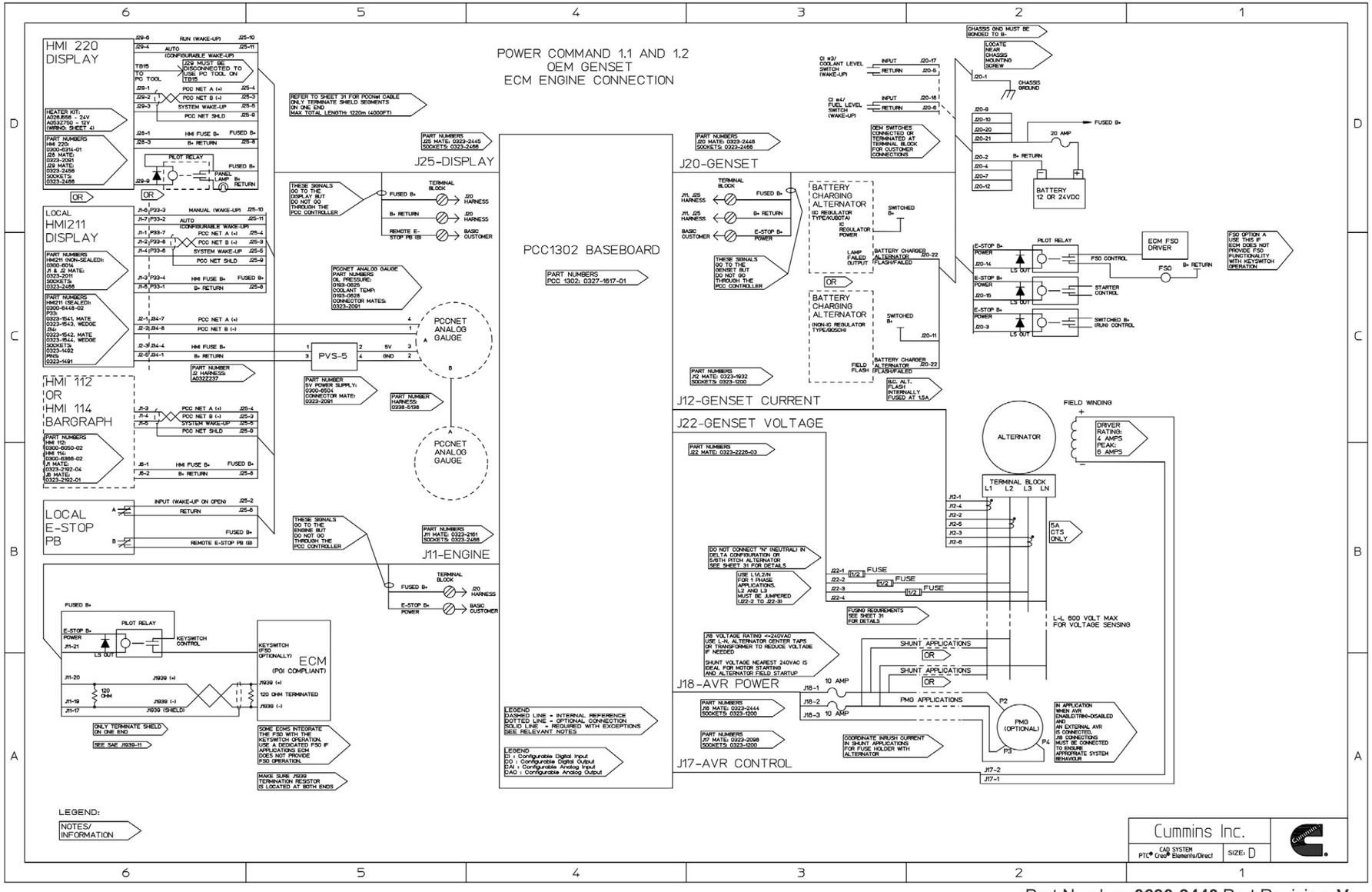


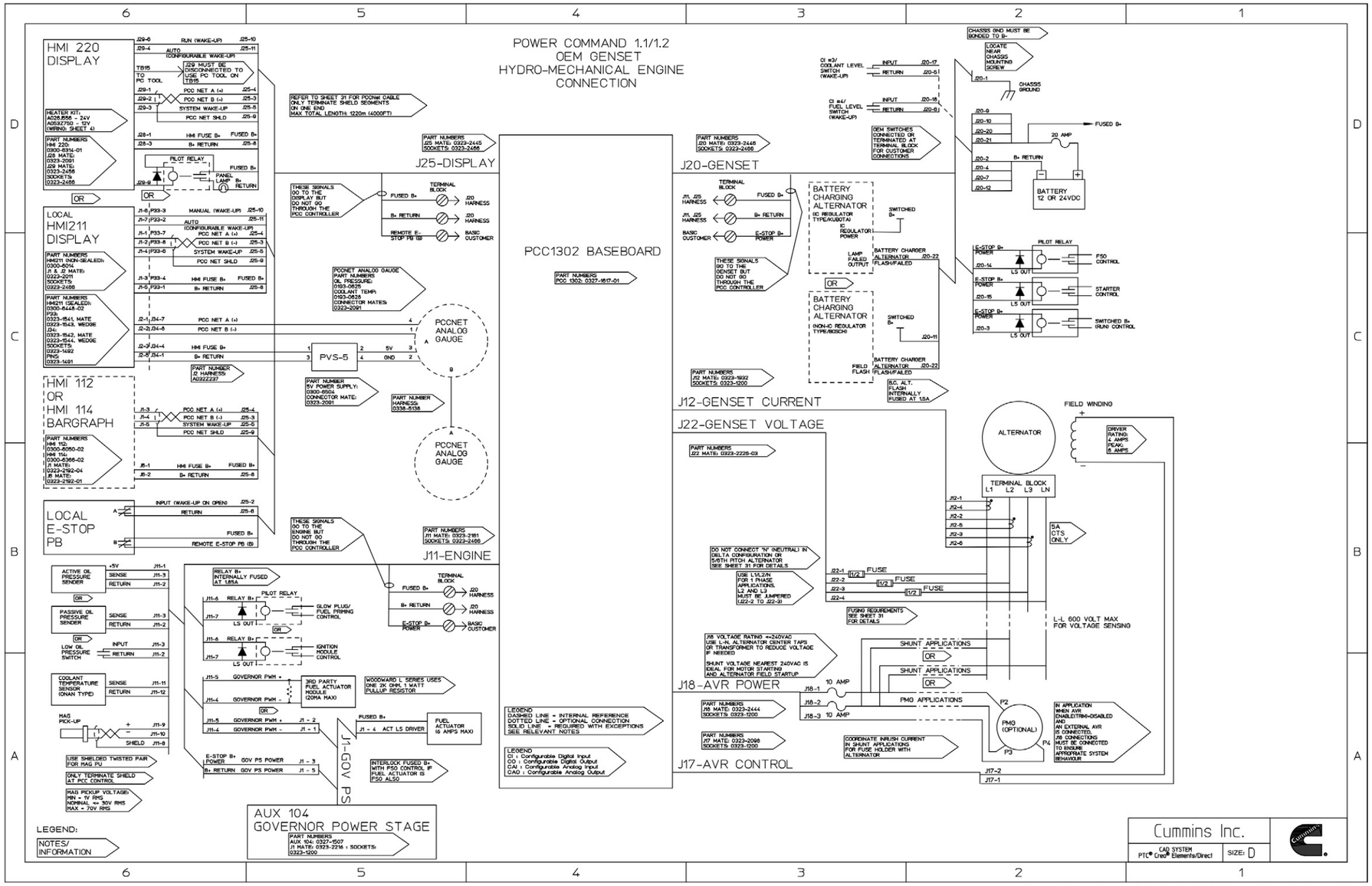
FIGURE 54. UC GENERATORS PCC 1302 & 2300 CONTROL BOARD WIRING DIAGRAM (SHEET 4 OF 4)

B.3 Wiring Diagram with PowerCommand 1.1/1.2 Control



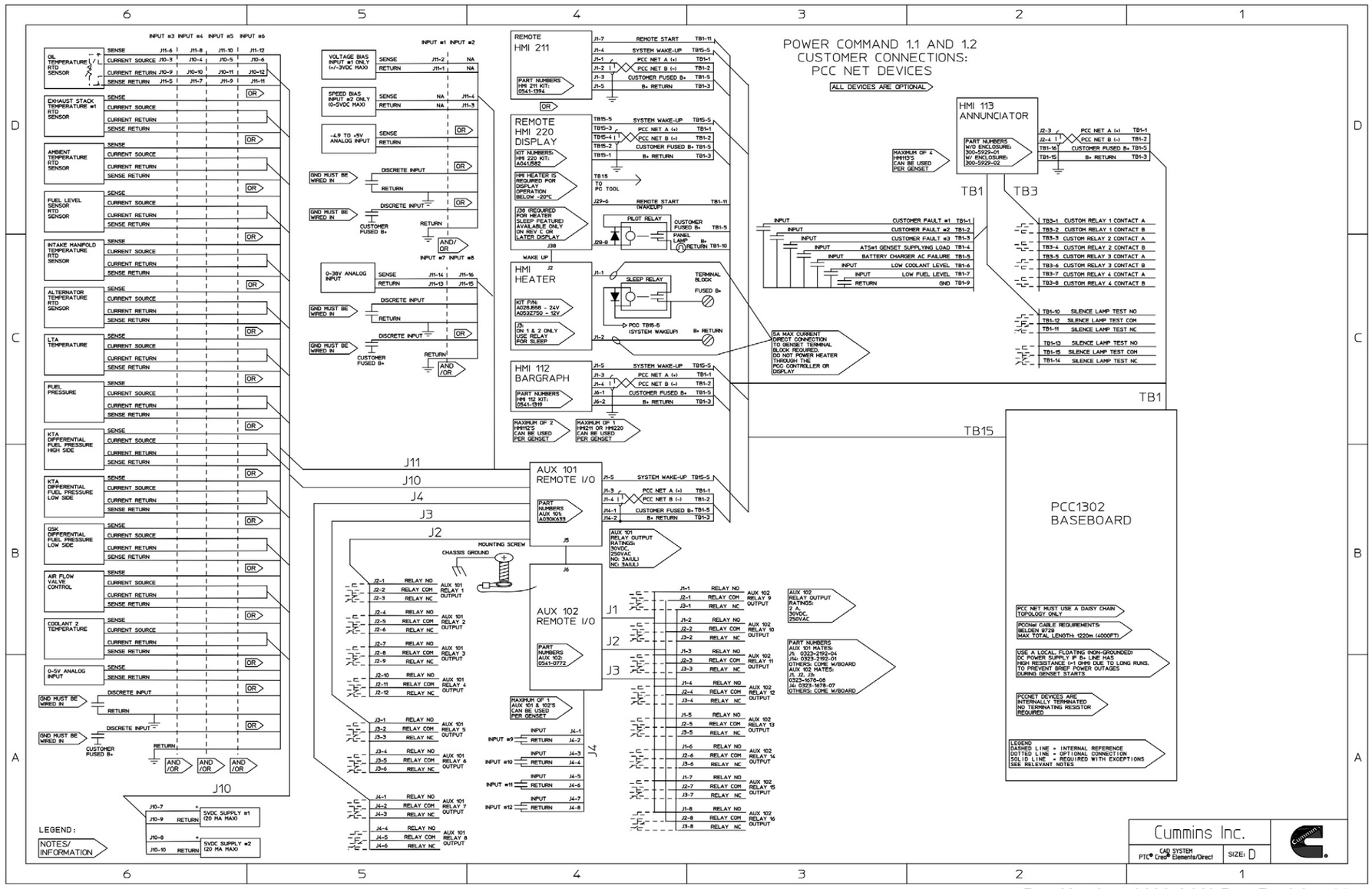
Part Number: **0630-3440** Part Revision: **V**
Part Name: **DIAGRAM,CONTROL SCHEMATIC**

FIGURE 55. WIRING DIAGRAM (SHEET 1)



Part Number: **0630-3440** Part Revision: **V**
Part Name: **DIAGRAM,CONTROL SCHEMATIC**

FIGURE 56. WIRING DIAGRAM (SHEET 2)



Part Number: **0630-3440** Part Revision: **V**
Part Name: **DIAGRAM,CONTROL SCHEMATIC**

FIGURE 57. WIRING DIAGRAM (SHEET 3)

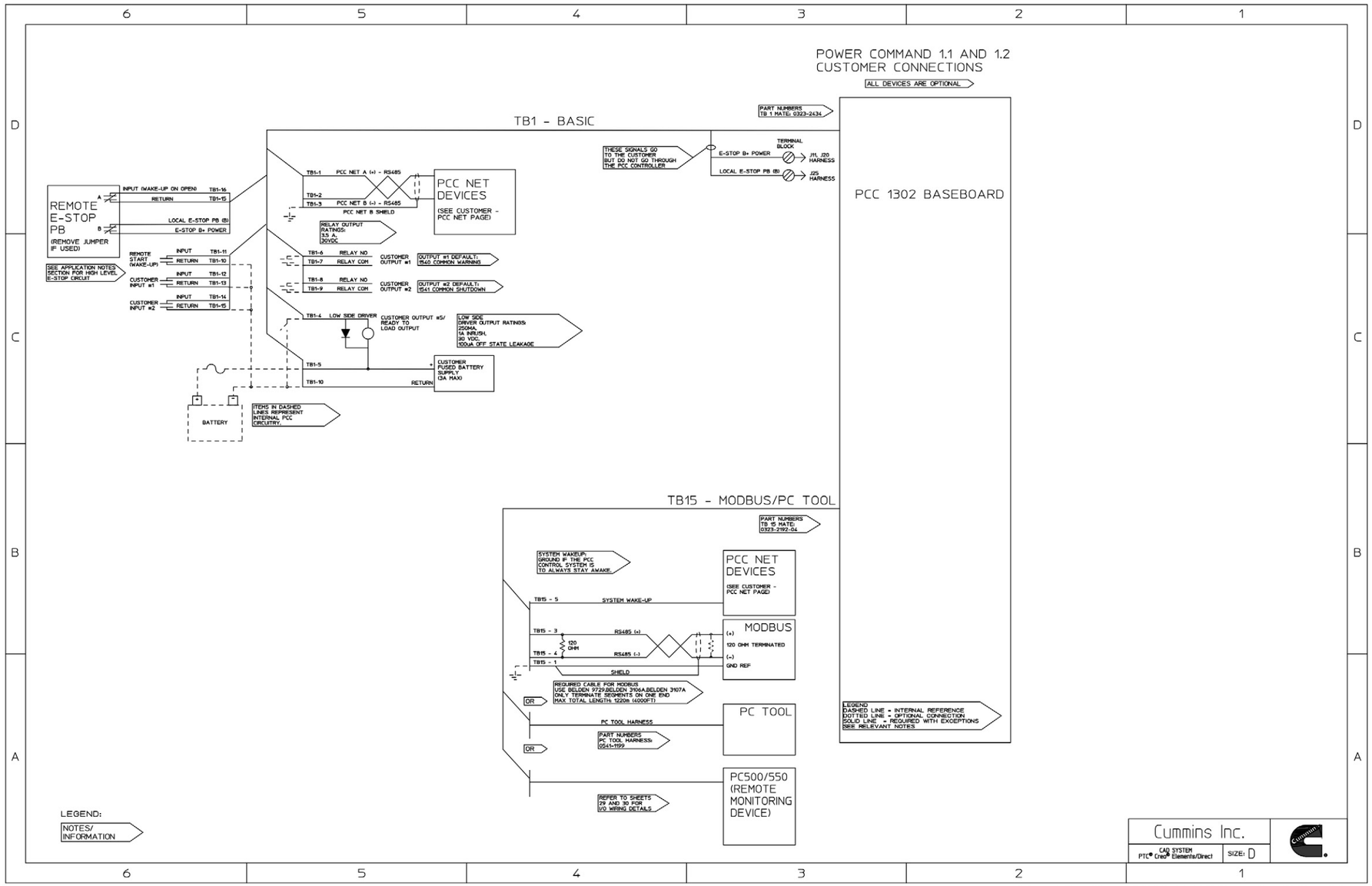
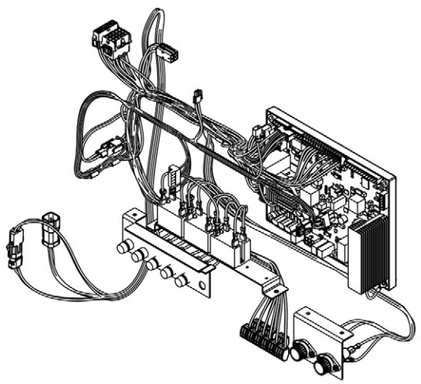


FIGURE 58. WIRING DIAGRAM (SHEET 4)

B.4 Harness, Generator Electrical

WIRE FROM / TO TABLE

LEAD NO	FROM STATION	FROM CPG P/N	TO STATION	TO CPG P/N	WIRE WIRE SIZE	WIRE COLOR	WIRE CPG P/N
101	PWR 1	A050S773	FUSE F1-1	0332-1995	12	WHITE	0334-0760
102	SPLICE 31-1	0332-3638	FUSE F1-2	0332-1995	12	WHITE	0334-0760
103	SPLICE 31-2	0332-3638	P20-9	0323-2466	18	WHITE	0334-0757
104			P20-10	0323-2466	18	WHITE	0334-0757
105			P20-20	0323-2466	18	WHITE	0334-0757
106			P20-21	0323-2466	18	WHITE	0334-0757
107	PWR 2	A043U187	FUSE F2-1	0332-1993	16	WHITE	0334-0758
108	SPLICE 33-1	0332-3638	FUSE F2-2	0332-1993	16	WHITE	0334-0758
109	SPLICE 33-2	0332-3638	K3-1	0332-1993	16	WHITE	0334-0758
110			SIG 6	A043H311	18	WHITE	0334-0757
111			SPLICE 41-1	0332-4304	18	WHITE	0334-0757
112	PWR 3	A050S773	SPLICE 42-1	0332-3638	12	WHITE	0334-0760
113	PWR 5	A043U187	SPLICE 32-1	0332-3638	16	WHITE	0334-0758
114	P20-1	0323-2466	SPLICE 32-2	0332-3638	18	WHITE	0334-0757
115	P20-2	0323-2466			18	WHITE	0334-0757
116	P20-4	0323-2466			18	WHITE	0334-0757
117	P20-7	0323-2466			18	WHITE	0334-0757
118	P20-12	0323-2466			18	WHITE	0334-0757
119	PWR 6	A050S773	K4-4	0332-1995	12	WHITE	0334-0760
120	PWR 8	A043U187	K3-4	0332-1993	16	WHITE	0334-0758
121	SIG 5	A043H311	P20-17	0323-2466	18	WHITE	0334-0757
122	K2-5	0332-1992	P20-3	0323-2466	18	WHITE	0334-0757
123	K4-5	0332-1992	P20-15	0323-2466	18	WHITE	0334-0757
124	PWR 4	A050S773	K4-1	0332-1995	12	WHITE	0334-0760
125	K3-5	0332-1992	P11-21	0323-2466	18	WHITE	0334-0757
126	K4-6	A006Z641	R-PE-A	0323-1718	18	WHITE	0334-0757
127	SIG 2	A043H311	CAN SHIELD	0332-4304	18	-	0334-1354
128	CAN SHIELD	0332-4304	P11-17	0323-2466	18	-	0334-1354
129	SIG 3	A043H311	SPLICE 35-1	0332-4304	18	WHITE	0334-1354
130	R1-1	0351-1596-59			--	--	-
131	SIG 4	A043H311	SPLICE 36-1	0332-4304	18	BLACK	0334-1354
132	R1-2	0351-1596-59			--	-	-
133	SPLICE 35-2	0332-3638	P11-20	0323-2466	18	WHITE	0334-1354
134	SPLICE 36-2	0332-3638	P11-19	0323-2466	18	BLACK	0334-1354
135	K3-6	0332-1992	PE-1	0323-2332	18	WHITE	0334-0757
136	P11-22	0323-2466	JE-1	A040M659	18	WHITE	0334-0757
137	P25-2	0323-2466	PE-2	0323-2332	18	WHITE	0334-0757
138	P25-6	0323-2466	JE-2	A040M659	18	WHITE	0334-0757
139	TB15-1	0332-4079-03	P3-1	A040B973	18	WHITE	0334-0757
140	TB15-3	0332-4079-03	P3-3	A040B973	18	WHITE	0334-0757
141	TB15-4	0332-4079-03	P3-4	A040B973	18	WHITE	0334-0757
142	TB15-5	0332-4079-03	P3-5	A040B973	18	WHITE	0334-0757
143	P25-4	0323-2466	SPLICE 37-1	0332-4304	20	WHITE	0334-0756
144	OP P1-1	0323-2466	SPLICE 37-2	0332-4304	20	WHITE	0334-0756
145	BG P1-3	A034V373			20	WHITE	0334-0756
146	P25-3	0323-2466	SPLICE 38-1	0332-4304	20	WHITE	0334-0756
147	OP P1-2	0323-2466	SPLICE 38-2	0332-4304	20	WHITE	0334-0756
148	BG P1-4	A034V373			20	WHITE	0334-0756
149	P25-5	0323-2466	SPLICE 39-1	0332-4304	20	WHITE	0334-0756
150	OP P1-4	0323-2466	SPLICE 39-2	0332-4304	20	WHITE	0334-0756
151	BG P1-5	A034V373			20	WHITE	0334-0756
152	P25-8	0323-2466	SPLICE 40-1	0332-4304	20	WHITE	0334-0756
153	OP P1-5	0323-2466	SPLICE 40-2	0332-4304	20	WHITE	0334-0756
154	BG P6-2	A034V373			20	WHITE	0334-0756
155	P25-10	0323-2466	OP P1-6	0323-2466	20	WHITE	0334-0756
156	P25-11	0323-2466	OP P1-7	0323-2466	20	WHITE	0334-0756
157	P25-12	0323-2466	BG P6-1	A034V373	20	WHITE	0334-0756
158	P18-1	0323-2332	F7-1	0332-1993	16	WHITE	0334-0758
159	F7-2	0332-1993	AC-P-2	A043L492	16	WHITE	0334-0758
160	P18-2	0323-2332	F8-1	0332-1993	16	WHITE	0334-0758
161	F8-2	0332-1993	AC-P-3	A043L492	16	WHITE	0334-0758
162	TB1-1	0332-3491-01	PCC-TB1-10	0332-4079-03	18	WHITE	0334-0757
163	TB5-1	0332-3491-01	PCC-TB1-11	0332-4079-03	18	WHITE	0334-0757
164	TB2-1	0332-3491-01	P20-19	0323-2466	18	WHITE	0334-0757
165	TB7-1	0332-3491-01	PCC-TB1-7	0332-4079-03	18	WHITE	0334-0757
166	PCC-TB1-15	0332-4079-03	R-PE-B	0323-1718	18	WHITE	0334-0757
167	TB6-1	0332-3491-01	PCC-TB1-6	0332-4079-03	18	WHITE	0334-0757
168	TB8-1	0332-3491-01	PCC-TB1-5	0332-4079-03	18	WHITE	0334-0757
169	TB4-1	0332-3491-01	P20-18	0323-2466	18	WHITE	0334-0757
170	TB3-1	0332-3491-01	PCC-TB1-13	0332-4079-03	18	WHITE	0334-0757
171	TB9-1	0332-3491-01	PCC-TB1-4	0332-4079-03	18	WHITE	0334-0757
172	PWR-13	A043U187	FUSE F4-1	0332-1993	16	WHITE	0334-0758
173	FUSE F4-2	0332-1993	K2-1	0332-1993	16	WHITE	0334-0758
174	TB10-1	0332-3491-01	K2-4	0332-1993	16	WHITE	0334-0758
175	SPLICE 41-2	0332- 4304	OP P1-3	0323-2466	20	WHITE	0334-0756
176			J40-2	0323-1859	18	WHITE	0334-0757
177	PL-1	0332-2430	J40-1	0323-1859	18	WHITE	0334-0757
178	P18-3	0323-2332	AC-P-4	A043L492	16	WHITE	0334-0758
179	FUSE F3-2	0332-1995	PWR-9	A050S773	12	WHITE	0334-0760
180	K2-6	0332-1992	K4-6	0332-4041	18	WHITE	0334-0757
181	SPLICE 42-2	0332-3638	FUSE F3-1	0332-1995	12	WHITE	0334-0760
182	SPLICE 42-2	0332-3638	FUSE F5-1	0332-1993	16	WHITE	0334-0758
183	FUSE F5-2	0332-1993	PWR-10	A043U187	16	WHITE	0334-0758
184	R-JE-A	0323-1444	P20-13	A001N345	18	WHITE	0334-0757
185	R-JE-B	0323-1444	PCC-TB1-16	0332-4079-03	18	WHITE	0334-0757



NOTES:

1. TOLERANCES: UP TO 500 ±15
   500 TO 1000 ±30
   1000 TO LONGER ±40
2. ALL LEADS/WIRES SHALL BE MARKED AT MAXIMUM OF 76 MM BEHIND THE CONNECTOR AND AT EVERY 305 MM INTERVAL WITH BOTH STATION NUMBERS LISTED IN THE "FROM-TO" TABULATION. MARKING SHALL BE PERMANENT AND LEGIBLE. WIRE MARKINGS NEED TO HAVE FULL VISUAL ACCESS.END MARKINGS ARE NOT TO BE VISUALLY OBSCURED AND MUST BE FULLY DISPLAYED. TO/FROM DESIGNATIONS ARE NOT TO BE FRAGMENTED. DESIGNATOR SHALL APPEAR IN FULL TEXT AND NOT IN BROKEN SEGMENTS.
3. USE CABLE TIES (0332-3388) AT EVERY 200 MM AS NECESSARY TO SECURE WIRES.EXCEPT IN THOSE CABLE TIES EXPLICITLY DIMENSIONED IN THE DRAWING.
4. (NOTE REMOVED).
5. HARNESS MUST BE PROCURED FROM A SUPPLIER QUALIFIED AS A UL RECOGNIZED HARNESS MANUFACTURER CATEGORY (ZPFW2). PACKAGING OF PARTS TO BE MARKED IN ACCORDANCE WITH REQUIREMENTS SPECIFIED BY SUPPLIERS UL PROGRAM.
6. STAGGER THE SPLICES, RESISTORS & DIODE, COVER WITH HEAT SHRINK (0898-1337-03). PLACE THE SPLICES INLINE WITH BUNDLE.
7. LABEL MUST BE MADE FROM UL RECOGNIZED SELF LAMINATION LABEL SYSTEM. MARK FUSES ABOVE THE HOLDER ON THE BRACKET F1:20A, F2:10A, F3:10A ,F4:10A,F5:1A, F7:10A, F8:10A MARK RELAYS TOP-CENTER K2,K3 & K4 (DO NOT COVER TECHNICAL INFORMATION OF THE RELAY)
8. (NOTE REMOVED).
9. SLEEVING MATERIAL SHOULD BE UL 94-V2 RATED & WITHSTAND UP TO -40°C TO 125°C OPERATING TEMPERATURE, CONTINUOUS USE 105°C. COLOR BLACK.
10. PLUG PE CONNECTOR IN TO JE CONNECTOR .
11. (NOTE REMOVED).
12. INK FOR HARNESS MARKING,MUST RESIST ERASER ABRASION TEST,ANTIFREEZE,MOTOR OIL, TRANSMISSION FLUID,GASOLINE,DIESEL FUEL & BRAKE FLUID
13. SCREW TORQUE: 0.65 ± 0.15 Nm.
14. CABLE AND HARNESS WORKMANSHIP SHALL COMPLY WITH IPC/WHMA-A-620 CLASS II REQUIREMENTS AND ACCEPTANCE FOR CABLE AND WIRE HARNESS ASSEMBLIES MOST CURRENT REVISION.
15. POINT TO POINT CONTINUITY TEST MUST BE PERFORMED ON THIS HARNESS ASSEMBLY.
16. ATTACH A MASTER HARNESS LABEL WITH THE FOLLOWING INFORMATION; CUMMINS PART NUMBER, CUMMINS PART REVISION LEVEL, MANUFACTURER'S NAME, MANUFACTURER'S LOCATION, AND MANUFACTURER'S DATE OF MANUFACTURE IN THE FORMAT OF MONTH, DATE, LAST 2 YEAR DIGITS.
17. MARK LABEL WITH FOLLOWING TEXT
    "TB1 GROUND"
    "TB2 INPUT RUPTURE BASIN"
    "TB3 INPUTS RETURN"
    "TB4 INPUT LOW FUEL"
    "TB5 REMOTE START"
    "TB6 OUTPUT 1 COM"
    "TB7 OUTPUT 1 N.O."
    "TB8 FUSE B+ (3A)"
    "TB9 READY TO LOAD"
    "TB10 SW B+ (10A)"
18. ATTACH A LABEL WITH UL MARK (UL SYMBOL AND OTHER UL REQUIRED INFORMATION) IN ACCORDANCE WITH REQUIREMENTS SPECIFIED BY THE SUPPLIER'S UL PROGRAM.
19. TORQUE TO 2.9 ± 0.4 Nm.
20. CONVOLUTED TUBING ENDS SHALL BE WRAPPED WITH A MINIMUM OF 2 LAYERS OF BLACK ELECTRICAL TAPE, 0895-0030.
21. SPOT WRAP ALL CONVOLUTED TUBING WITH BLACK ELECTRICAL TAPE, 0895-0030 TO PREVENT WIRES FROM FALLING OUT.
22. ELECTRICAL WORKMANSHIP SHALL COMPLY WITH IPC-A-610A CLASS II ACCEPTABILITY ELECTRONIC AND ELECTRICAL ASSEMBLIES MOST CURRENT REVISION.
23. (NOTE REMOVED).
24. (NOTE REMOVED).
25. (NOTE REMOVED).
26. TORQUE (1.975 ± 0.275 Nm) TO FUSE HOLDER 0321-0175 (F1,F2,F3,F4,F5).
27. CONNECT R-PE WITH R-JE BEFORE SHIPPING.

MODEL/PLATFORM: ARROW — THIS PART IS SIMILAR TO: -

Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -

SIZE: A0 SCALE:0.3

DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

THIRD ANGLE PROJECTION

CAD SYSTEM: PTC® Creo® Parametric

Part Number: **A053R492** Part Revision: **L**

Part Name: **HARNESS,GENERATOR ELECTRICAL**

FIGURE 59. HARNESS, GENERATOR ELECTRICAL (SHEET 1 OF 4)

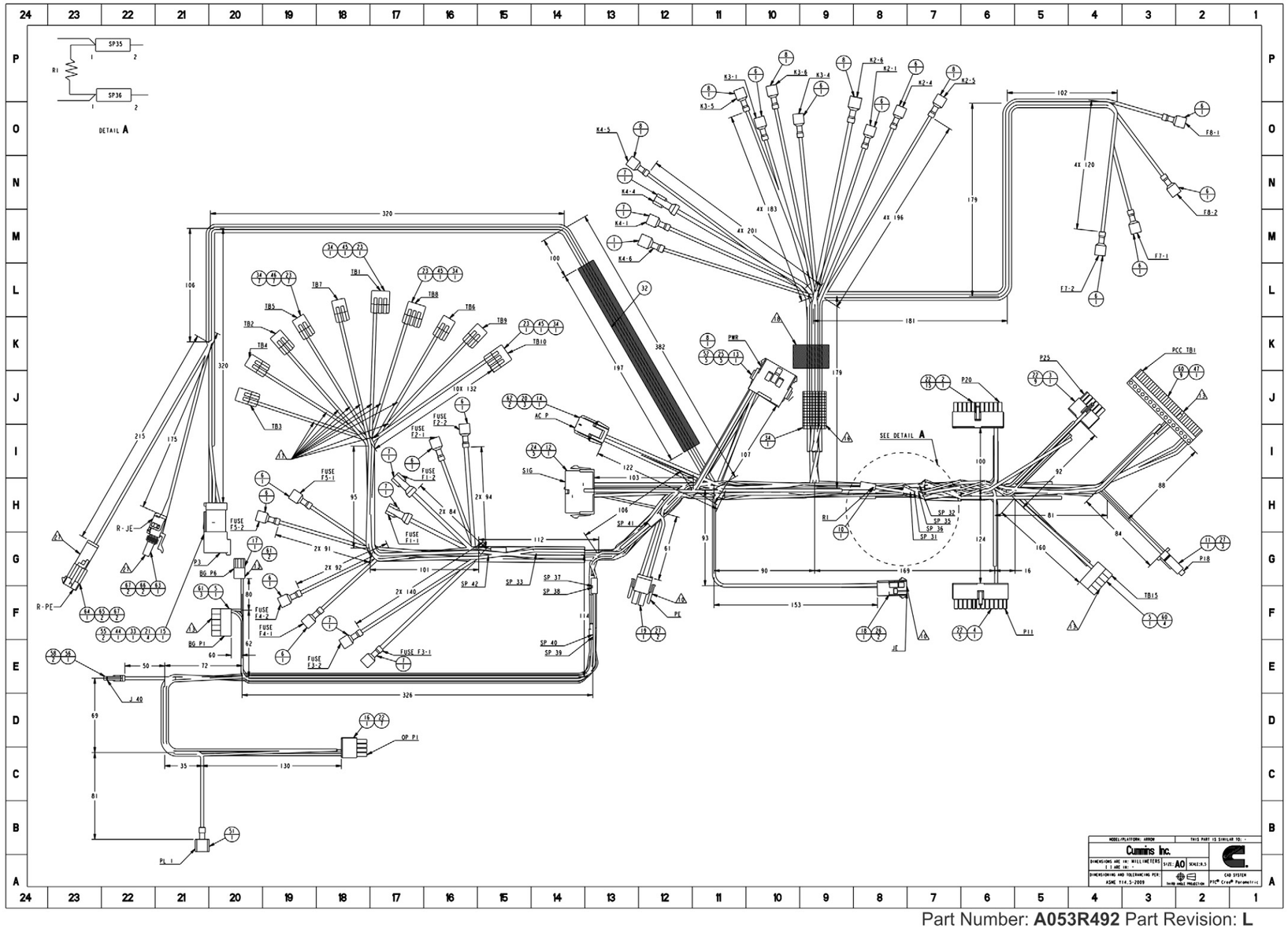
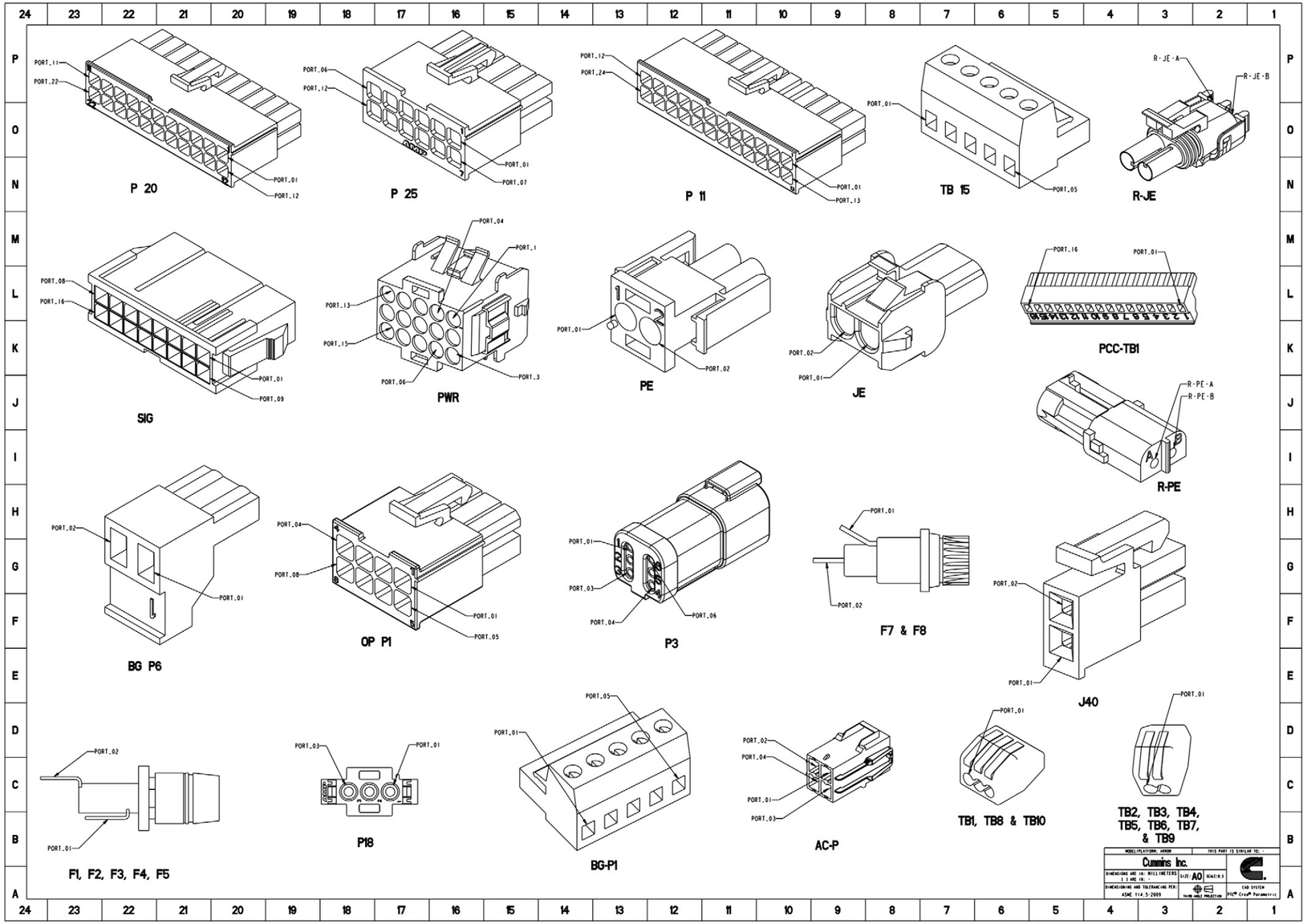


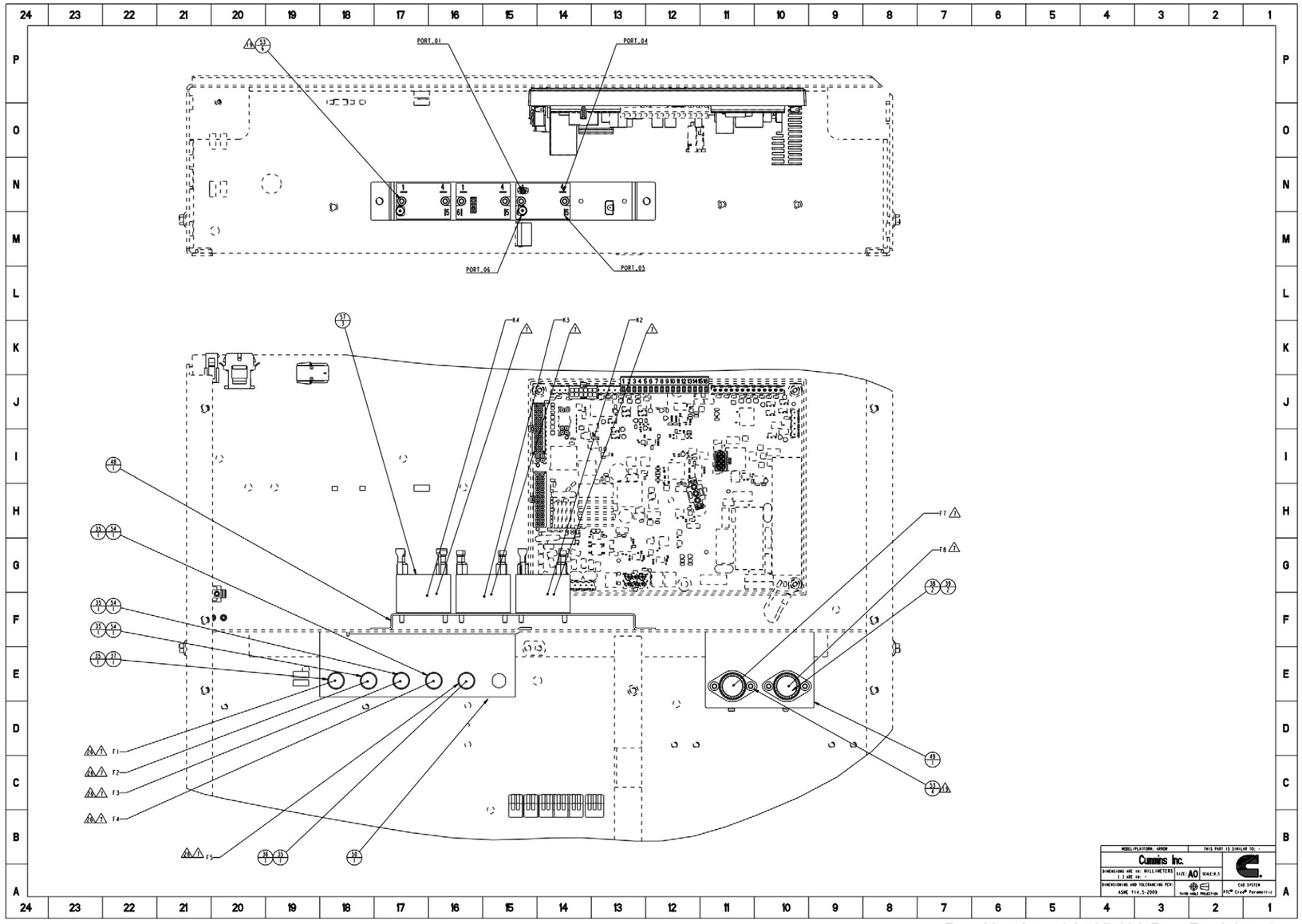
FIGURE 60. HARNESS, GENERATOR ELECTRICAL (SHEET 1 OF 4)



Part Number: **A053R492** Part Revision: **L**

Part Name: **HARNESS,GENERATOR ELECTRICAL**

FIGURE 61. HARNESS, GENERATOR ELECTRICAL (SHEET 3 OF 4)



Part Number: **A053R492** Part Revision: **L**

Part Name: **HARNESS,GENERATOR ELECTRICAL**

FIGURE 62. HARNESS, GENERATOR ELECTRICAL (SHEET 4 OF 4)

B.5 Harness, Engine

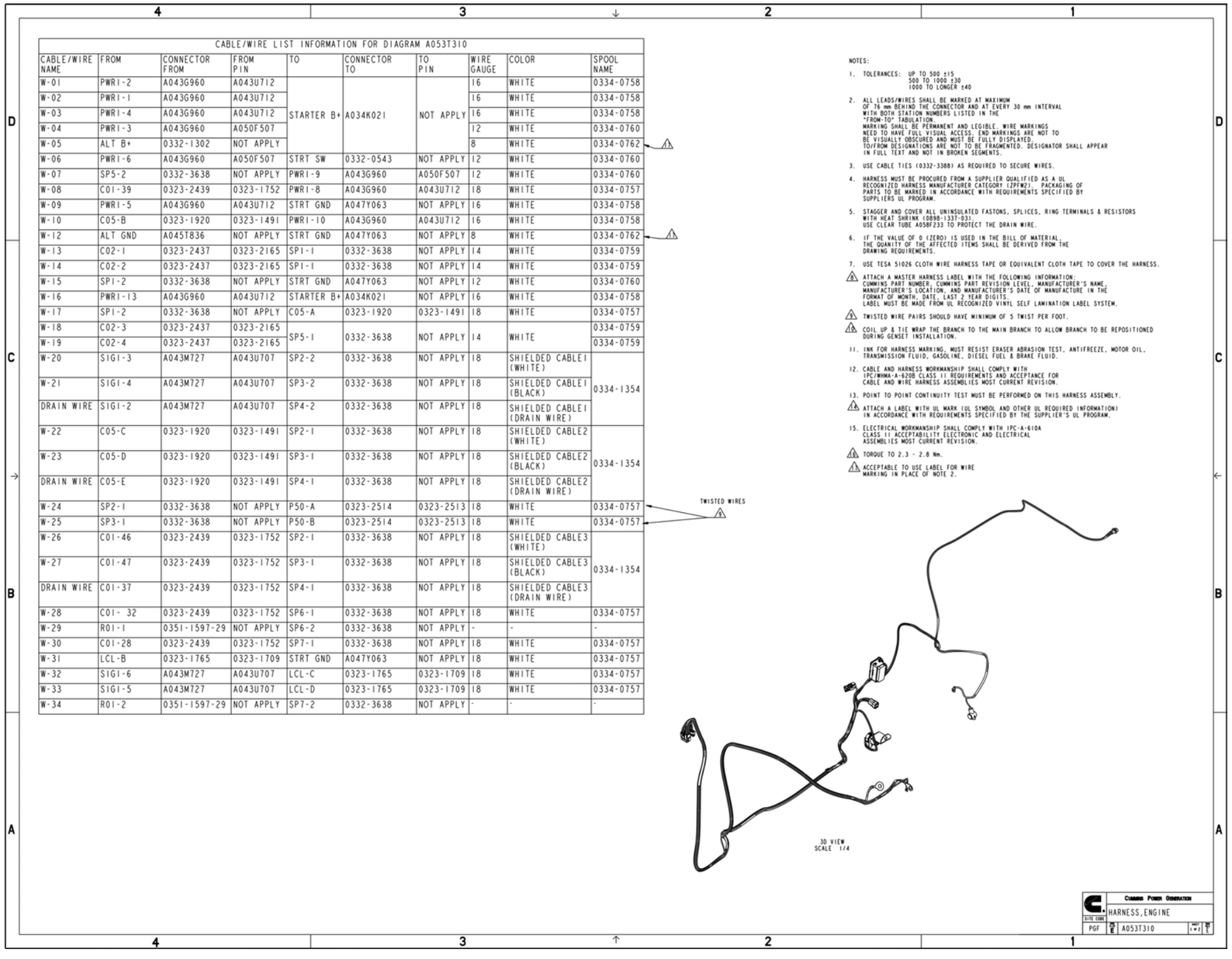


FIGURE 63. HARNESS, ENGINE (SHEET 1 OF 2)

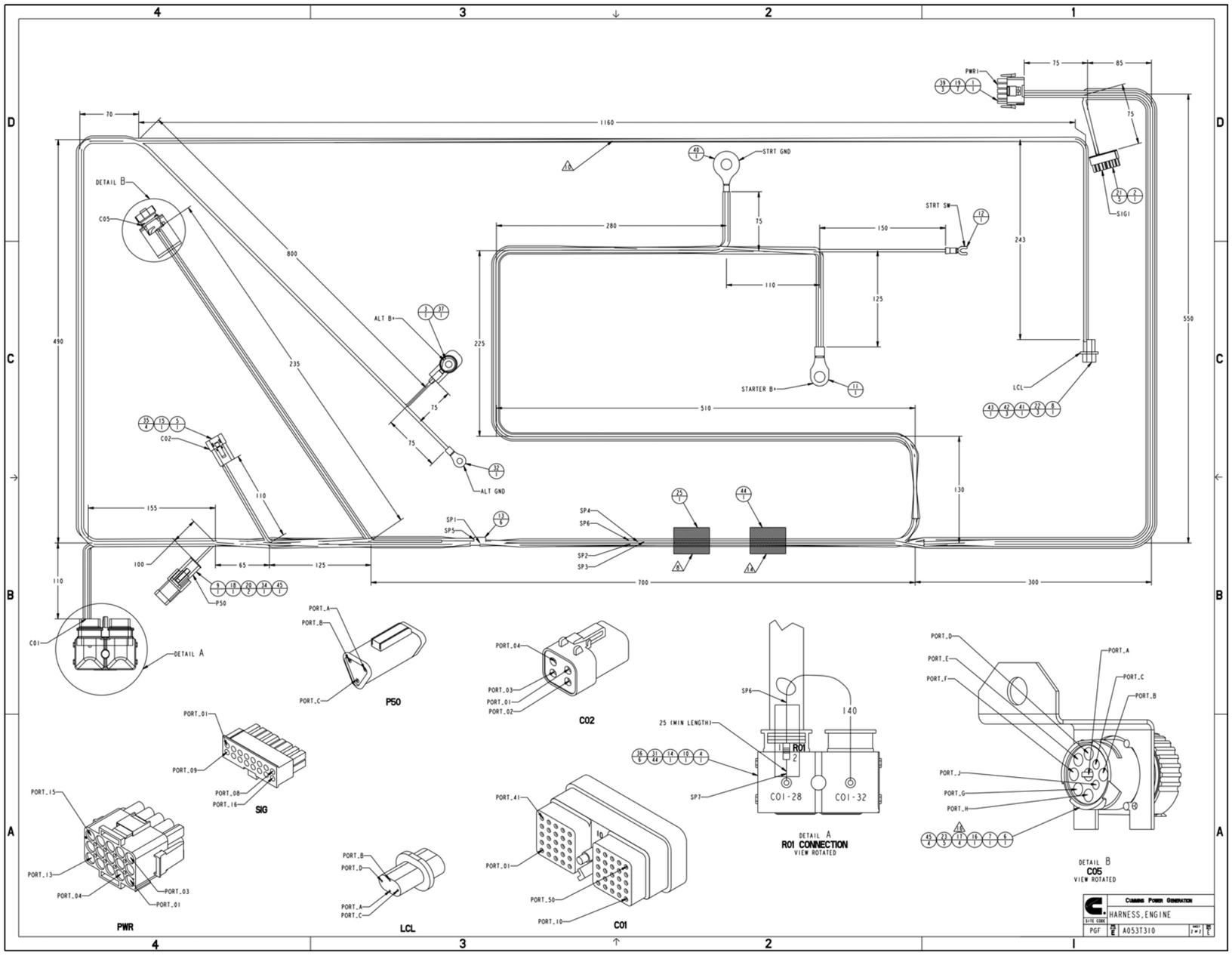
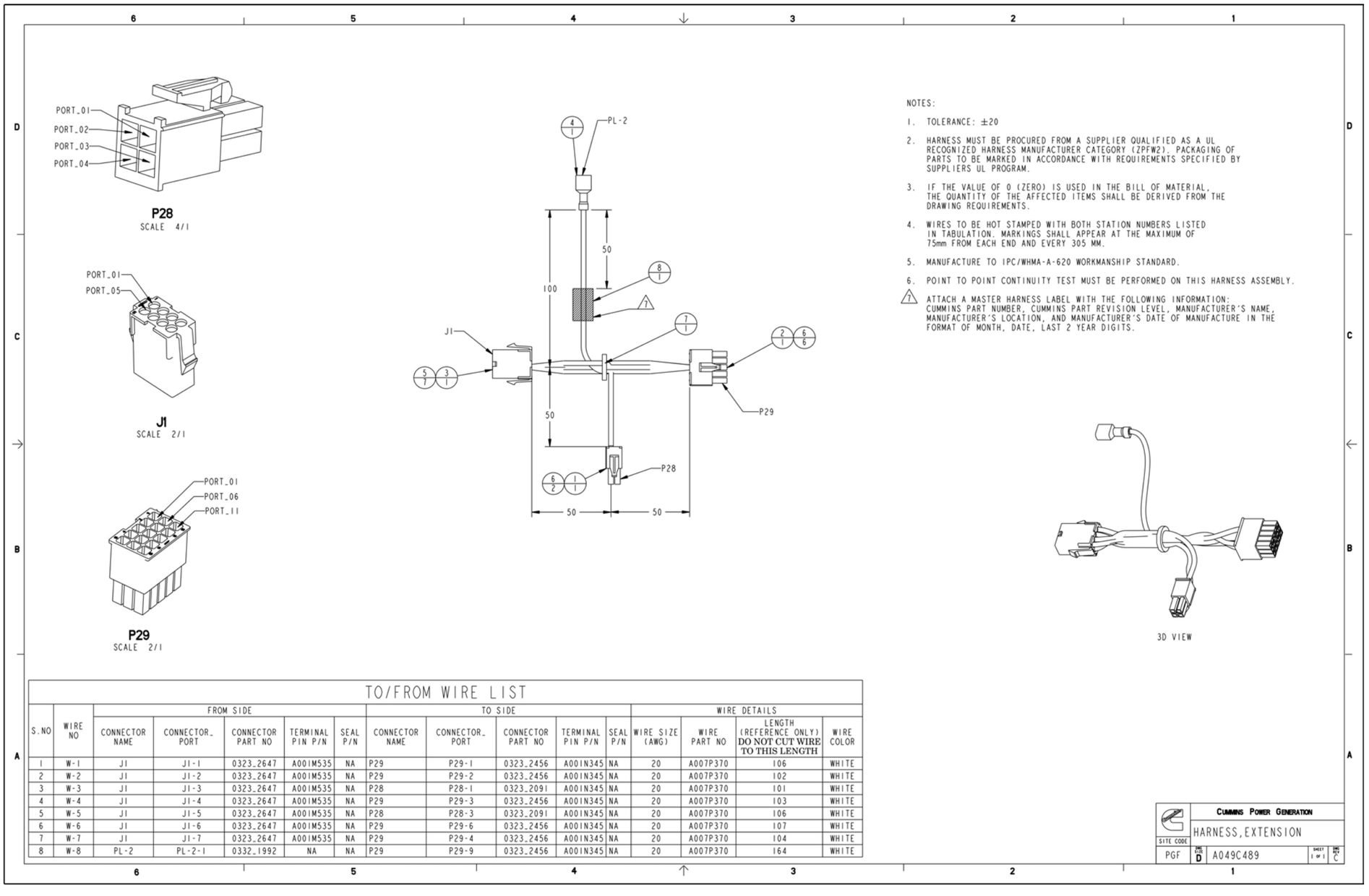


FIGURE 64. HARNESS, ENGINE (SHEET 2 OF 2)

B.6 Harness Extension



TO/FROM WIRE LIST

S.NO	WIRE NO	FROM SIDE					TO SIDE					WIRE DETAILS			
		CONNECTOR NAME	CONNECTOR_PORT	CONNECTOR PART NO	TERMINAL PIN P/N	SEAL P/N	CONNECTOR NAME	CONNECTOR_PORT	CONNECTOR PART NO	TERMINAL PIN P/N	SEAL P/N	WIRE SIZE (AWG)	WIRE PART NO	LENGTH (REFERENCE ONLY) DO NOT CUT WIRE TO THIS LENGTH	WIRE COLOR
1	W-1	J1	J1-1	0323_2647	A001M535	NA	P29	P29-1	0323_2456	A001N345	NA	20	A007P370	106	WHITE
2	W-2	J1	J1-2	0323_2647	A001M535	NA	P29	P29-2	0323_2456	A001N345	NA	20	A007P370	102	WHITE
3	W-3	J1	J1-3	0323_2647	A001M535	NA	P28	P28-1	0323_2091	A001N345	NA	20	A007P370	101	WHITE
4	W-4	J1	J1-4	0323_2647	A001M535	NA	P29	P29-3	0323_2456	A001N345	NA	20	A007P370	103	WHITE
5	W-5	J1	J1-5	0323_2647	A001M535	NA	P28	P28-3	0323_2091	A001N345	NA	20	A007P370	106	WHITE
6	W-6	J1	J1-6	0323_2647	A001M535	NA	P29	P29-6	0323_2456	A001N345	NA	20	A007P370	107	WHITE
7	W-7	J1	J1-7	0323_2647	A001M535	NA	P29	P29-4	0323_2456	A001N345	NA	20	A007P370	104	WHITE
8	W-8	PL-2	PL-2-1	0332_1992	NA	NA	P29	P29-9	0323_2456	A001N345	NA	20	A007P370	164	WHITE

FIGURE 65. HARNESS EXTENSION

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Appendix C. Seismic Requirements

Table of Contents

The drawings included in this section are representative. For current complete information, refer to the drawing package that was shipped with the unit.

C.1 Seismic Installation Instructions

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-182667	B	1	UPDATE DRAWING	RAH	DGP	D_PRIEM	03JAN19

SEISMIC INSTALLATIONS NOTES:

1. THE DESIGN OF POST-INSTALLED ANCHORS IN CONCRETE USED FOR THE COMPONENT ANCHORAGE IS PRE-QUALIFIED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 355.2-07" AND DOCUMENTED IN A REPORT BY A REPUTABLE TESTING AGENCY. (EX. THE EVALUATION SERVICE REPORT ISSUED BY THE INTERNATIONAL CODE COUNCIL)
2. ANCHORS MUST BE INSTALLED TO AN EMBEDMENT DEPTH AS RECOMMENDED IN THE PRE-QUALIFICATION TEST REPORT AS DEFINED IN NOTE 1. FOR "CBC 2013" APPLICATIONS.
3. ANCHORS MUST BE INSTALLED IN MINIMUM 3000 PSI COMPRESSIVE STRENGTH NORMAL WEIGHT STRUCTURAL CONCRETE. CONCRETE AGGREGATE MUST COMPLY WITH "ASTM C33".
4. ANCHORS MUST BE INSTALLED TO THE TORQUE SPECIFICATION AS RECOMMENDED BY THE ANCHOR MANUFACTURER.
5. ANCHORS MUST BE INSTALLED IN LOCATIONS SPECIFIED ON THIS INSTALLATION DRAWING.
6. WASHERS MUST BE INSTALLED AT EACH ANCHOR LOCATION BETWEEN THE ANCHOR HEAD AND EQUIPMENT FOR TENSION LOAD DISTRIBUTION. WASHERS MUST BE TYPE A OR B PLAIN WASHERS MEETING ASME B18.21.1-2009. WASHER SIZE TO MATCH ANCHOR DIAMETER.
7. CONCRETE FLOOR SLAB AND CONCRETE HOUSEKEEPING PADS MUST BE DESIGNED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 318-11".
8. ALL HOUSEKEEPING PAD THICKNESSES MUST BE DESIGNED IN ACCORDANCE WITH THE PRE-QUALIFICATION TEST REPORT AS DEFINED IN NOTE 1 OR A MINIMUM OF 1.5X THE ANCHOR EMBEDMENT DEPTH, WHICHEVER IS LARGEST (UNLESS NOTED OTHERWISE).
9. ALL HOUSEKEEPING PADS MUST BE DOWELLED OR CAST INTO THE BUILDING STRUCTURAL FLOOR SLAB AND DESIGNED FOR SEISMIC APPLICATION PER "ACI 318-11" AND AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.
10. FLOOR MOUNTED EQUIPMENT (WITH OR WITHOUT A HOUSEKEEPING PAD) MUST BE INSTALLED TO A STEEL REINFORCED STRUCTURAL CONCRETE FLOOR THAT IS SEISMICALLY DESIGNED AND APPROVED BY THE ENGINEER OF RECORD TO RESIST ALL LOADS FROM EQUIPMENT BEING ANCHORED TO THE FLOOR.
11. COORDINATE REINFORCEMENT OF SUPPORT STRUCTURE WITH EQUIPMENT ANCHOR LOCATIONS.
12. ATTACHING SEISMIC CERTIFIED EQUIPMENT TO FLOOR OTHER THAN THOSE DESIGNED TO ACCEPT THE SEISMIC LOADS FROM CERTIFIED EQUIPMENT BY THE STRUCTURAL ENGINEER OF RECORD IS PROHIBITED.
13. INSTALLATION ONTO A STEEL ROOF STRUCTURE OR MANUFACTURED STEEL CURB SHALL BE COORDINATED WITH THE STRUCTURAL ENGINEER OF RECORD.
14. CONNECTIONS TO THE EQUIPMENT, INCLUDING BUT NOT LIMITED TO CONDUIT, WIRING FROM CABLE TRAYS, OTHER ELECTRICAL SERVICES OR OTHER CONNECTIONS, ARE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR AND BEYOND THE SCOPE OF THIS DOCUMENT. FLEXIBLE ATTACHMENTS MUST BE USED FOR SEISMIC CONNECTIONS TO ISOLATED COMPONENTS OR ISOLATED EQUIPMENT. THE FLEXIBLE ATTACHMENT MUST PROVIDE FOR ENOUGH RELATIVE DISPLACEMENT TO REMAIN CONNECTED TO THE EQUIPMENT AND FUNCTIONAL DURING AND AFTER A SEISMIC EVENT.
15. REFER TO GENSET OUTLINE DRAWINGS FOR WEIGHT, CG AND CONFIGURATION SPECIFICS.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM		HOLE	
X ± 1		0.00- 4.99	+0.15/-0.08
.X ± 0.8		5.00- 9.99	+0.20/-0.10
.XX± 0.38		10.00-17.49	+0.25/-0.13
		17.50-24.99	+0.30/-0.13

ANG TOL: ± 1.0° SCALE: 1/1

SIM TO A05IN157
DO NOT SCALE PRINT
- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP

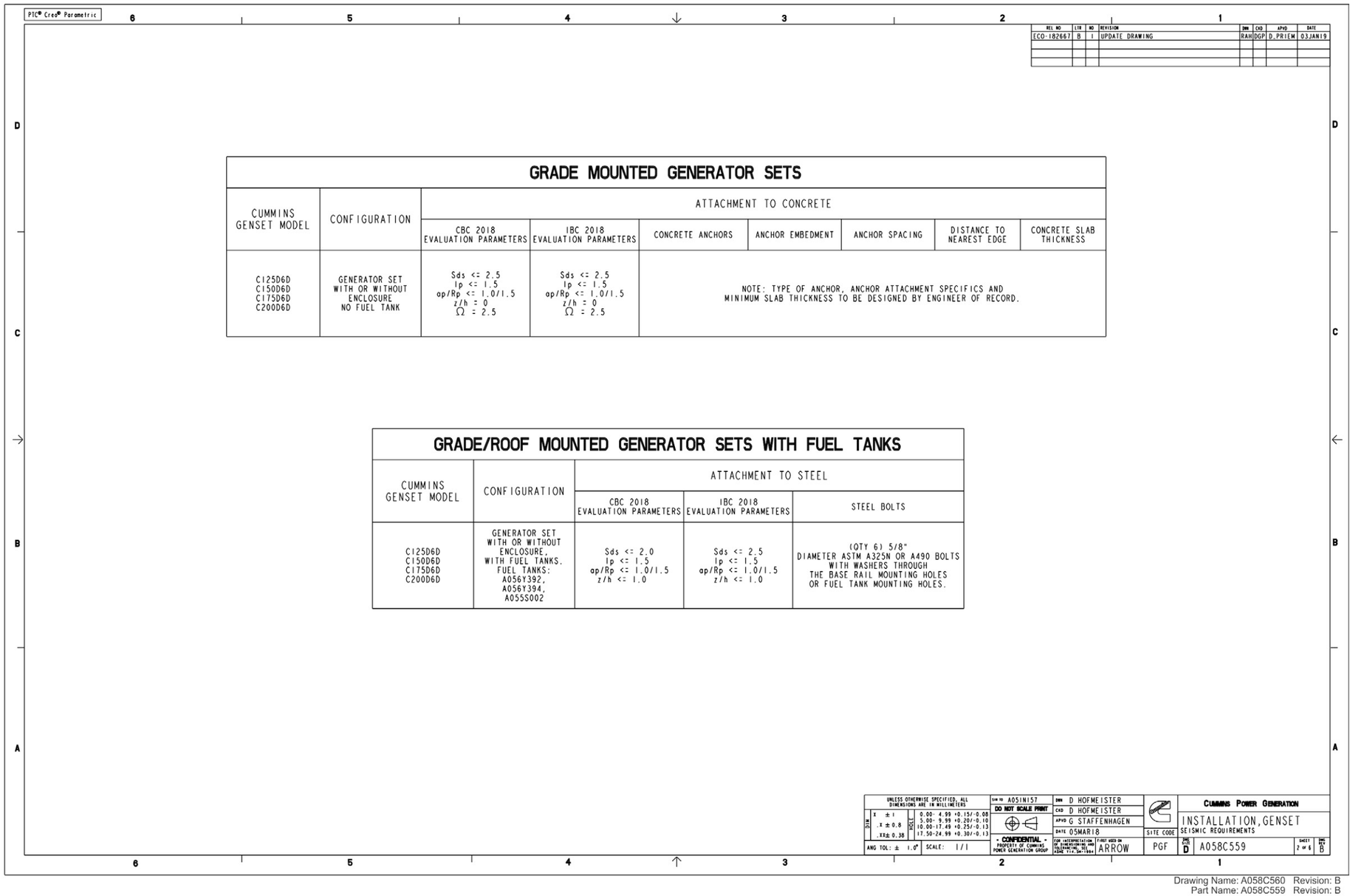
DWN D HOFMEISTER
CKD D HOFMEISTER
APVD G STAFFENHAGEN
DATE 05MAR18
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994
FIRST USED ON ARROW

SITE CODE PGF

CUMMINS POWER GENERATION
INSTALLATION, GENSET
SEISMIC REQUIREMENTS
DWG SIZE D A058C559 SHEET 1 OF 6 DWG REV B

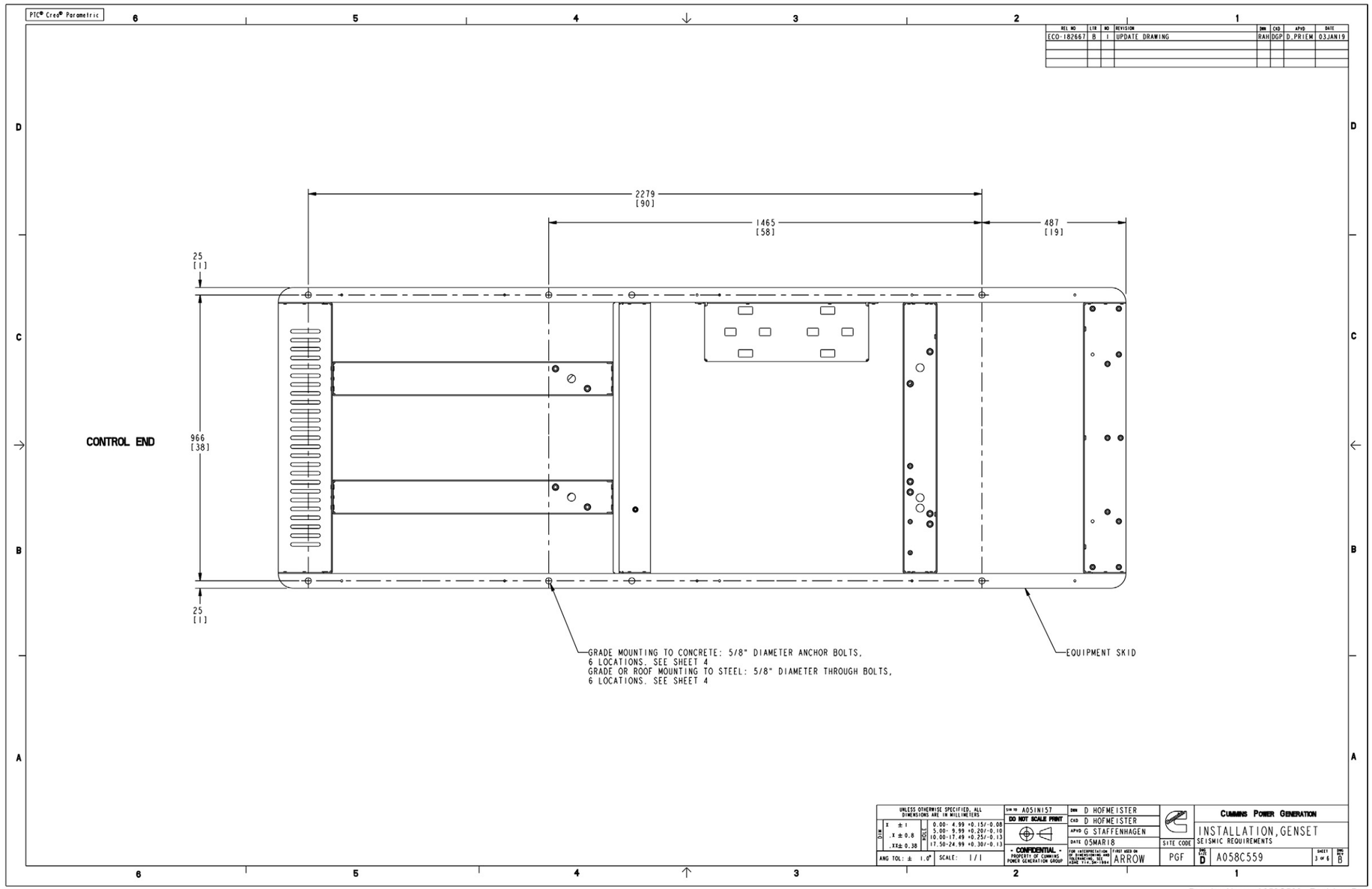
Drawing Name: A058C560 Revision: B
Part Name: A058C559 Revision: B

FIGURE 66. SEISMIC INSTALLATION REQUIREMENTS (SHEET 1 OF 6)



Drawing Name: A058C560 Revision: B
Part Name: A058C559 Revision: B

FIGURE 67. SEISMIC INSTALLATION REQUIREMENTS (SHEET 2 OF 6)



Drawing Name: A058C560 Revision: B
Part Name: A058C559 Revision: B

FIGURE 68. SEISMIC INSTALLATION REQUIREMENTS (SHEET 3 OF 6)

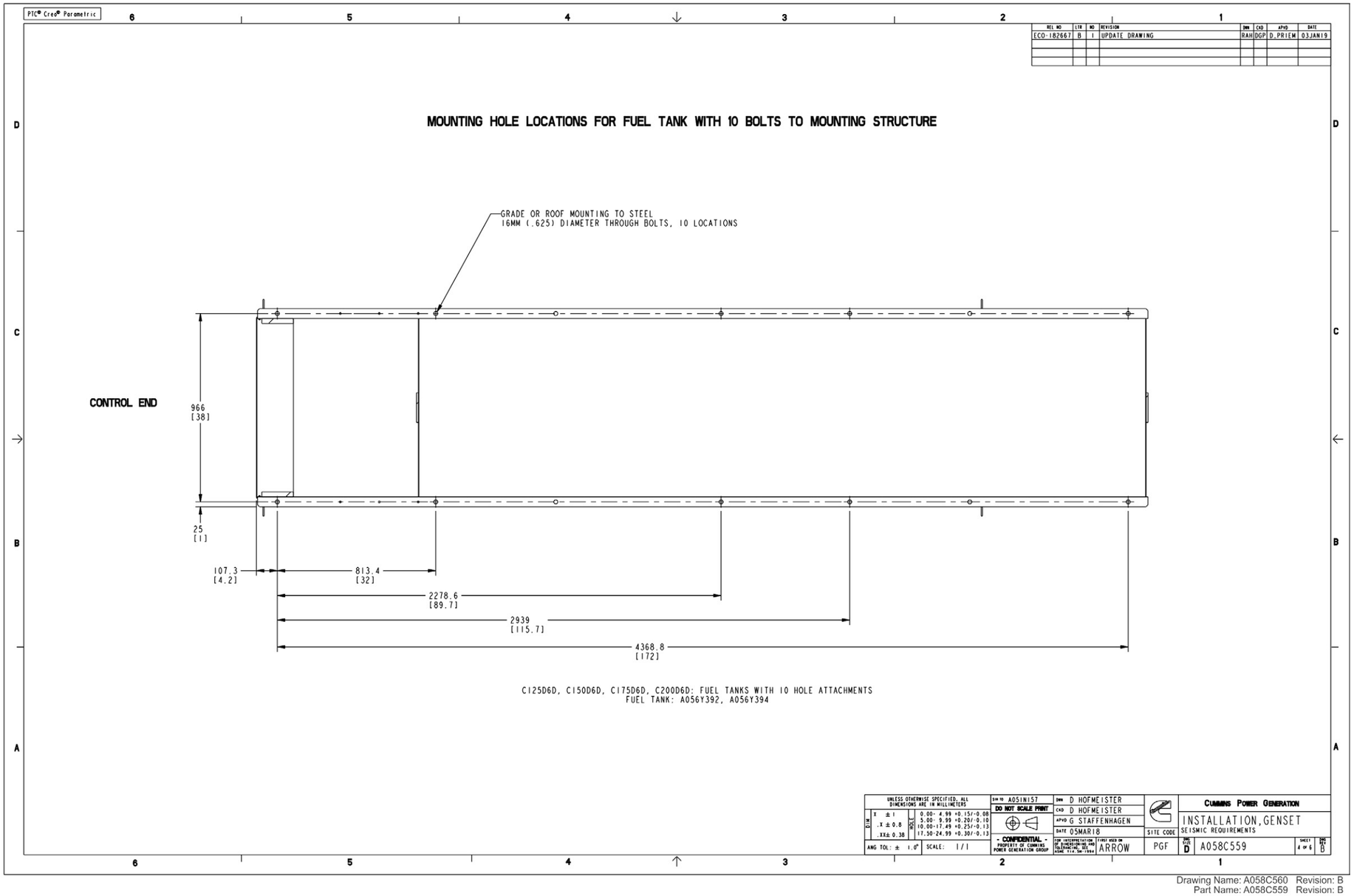
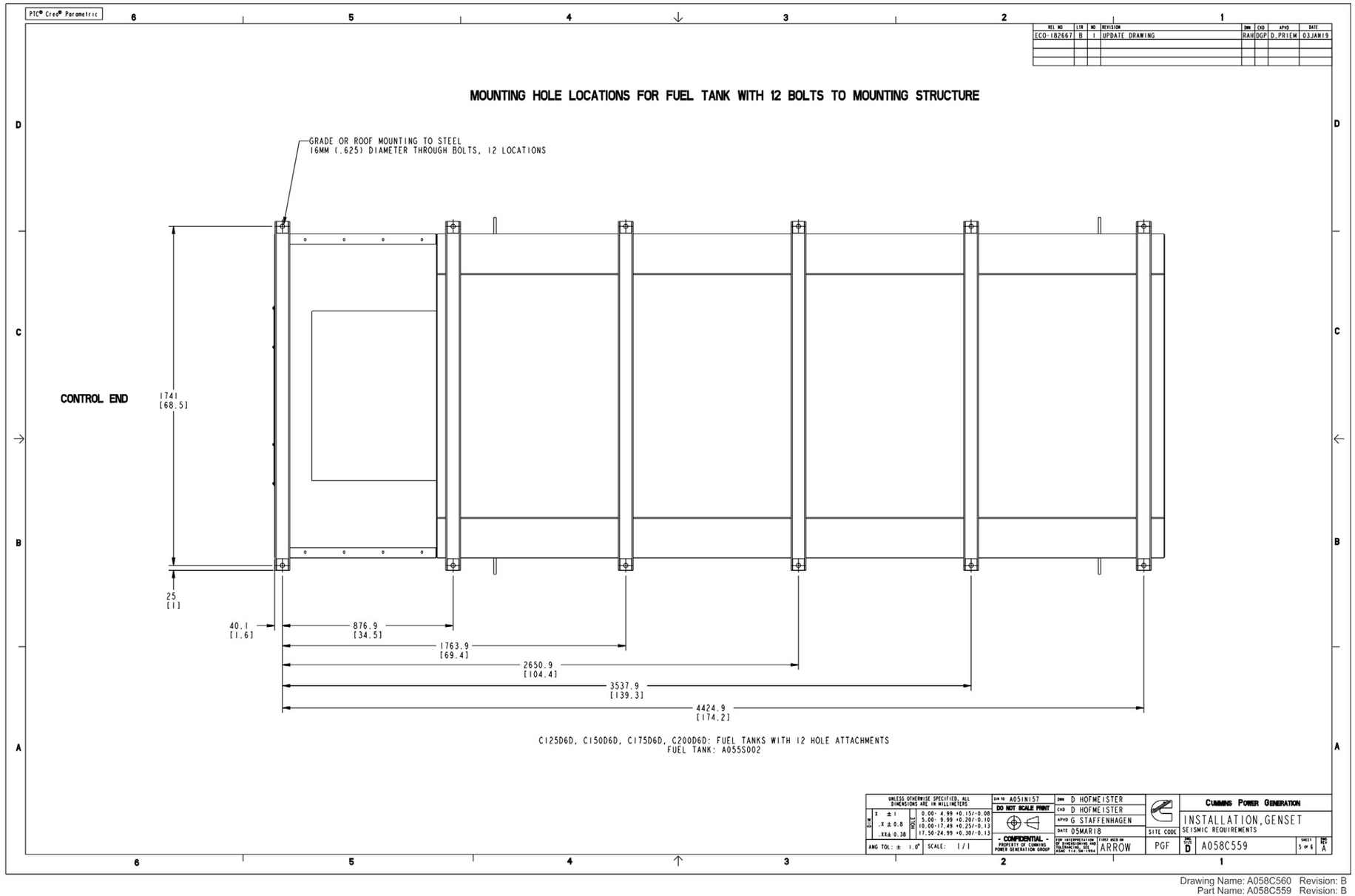
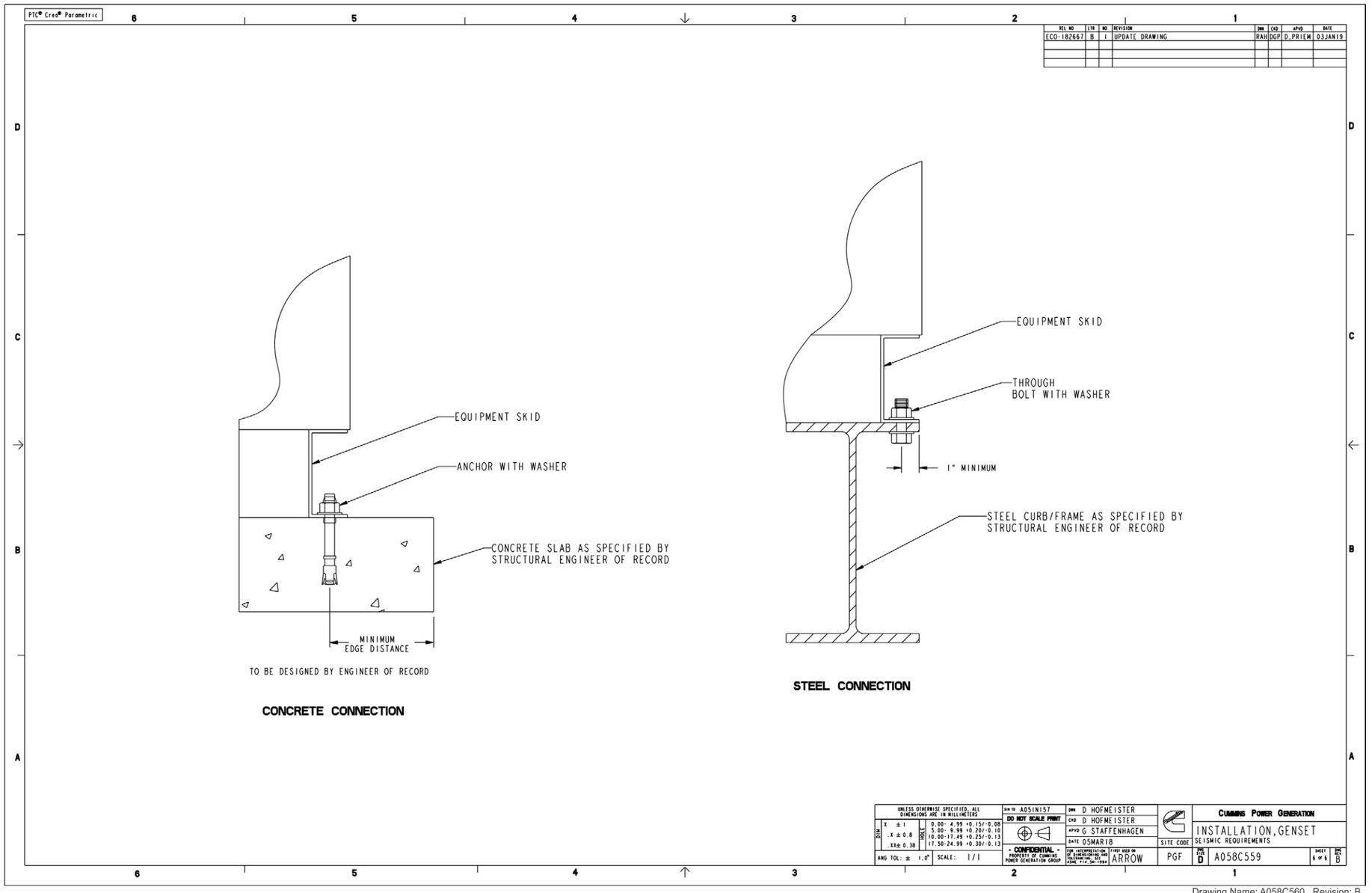


FIGURE 69. SEISMIC INSTALLATION REQUIREMENTS (SHEET 4 OF 6)



Drawing Name: A058C560 Revision: B
Part Name: A058C559 Revision: B

FIGURE 70. SEISMIC INSTALLATION REQUIREMENTS (SHEET 5 OF 6)



Drawing Name: A058C560 Revision: B
Part Name: A058C559 Revision: B

FIGURE 71. SEISMIC INSTALLATION REQUIREMENTS (SHEET 6 OF 6)

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