

Date: **June 1, 2026**
Project: **MKEC 2026 DERA Upgrade**
Solicitation No.: **ITB 26074**
Addendum No.: **02**

TO ALL PLAN HOLDERS:

The following changes, additions, clarifications, and/or deletions are hereby made part of the ITB Documents for the above noted project, as if fully contained therein. All other terms, conditions, and specifications of the original Invitation to Bid remain unchanged.

Bidders must acknowledge receipt of this Addendum by email prior to the bid due date and time.

The ITB Package is hereby clarified, changed or modified by the following:

CONTRACT PROVISIONS AND SPECIFICATIONS

The ITB Due date and time of **June 5, 2026, at 2:00 PM AKST** remains unchanged.

QUESTIONS AND ANSWERS:

- 1. Question:** Regarding the owner-furnished materials. Are the engine specs included in the project manual?
Answer: The specifications for the owner-furnished engine-generators are not included in the project manual. The specifications that were used under ITB 26037 for purchase of the engine-generators is attached to this Addendum.

END OF ADDENDUM #02

SECTION 26 32 13 ENGINE GENERATORS

PART 1 - GENERAL

1.1 SCOPE

- A. The Work included herein shall consist of providing, fabricating, and shop testing complete skid mounted engine generators as specified herein.
- B. The engine generators shall be delivered complete and ready for installation.
- C. Provide all accessories as specified for all engine generators plus any additional components listed.

1.2 RELATED REQUIREMENTS – not used

1.3 SUBMITTALS

- A. Provide the submittal in a single electronic file in Adobe Acrobat PDF format.
- B. Provide complete and accurate drawings of the equipment, including outline drawings and dimensional data which fully describe the height, width, and depth of the equipment; skid construction; schematics; wiring diagrams; and other relevant details.
- C. Provide mechanical and electrical performance data for the engine and generator.
- D. Provide manufacturer's catalog literature for all accessories and equipment.
- E. A torsional vibration analysis (TVA) has been prepared and accepted for the following engine generator combinations:
 - 1. John Deere 4045TFM85 with Newage/Stamford UCI274C.
 - 2. John Deere 4045AFM85 with Newage/Stamford UCI274E.

For any engine generator combinations not specifically listed above, a TVA shall be provided for the proposed engine generator combination within 14-days of contract award.

1.4 REGULATORY COMPLIANCE

The Environmental Protection Agency (EPA) has issued New Source Performance Standards (NSPS) regulations governing use of stationary diesel engines in remote areas of Alaska. These regulations were revised effective June 29, 2021. The following provision of 40 CFR applies to this solicitation:

- A. 40 CFR 60.4216(c) stipulates: Manufacturers, owners, and operators of stationary CI ICE that are located in remote areas of Alaska may choose to meet the applicable emission standards for emergency engines in §§ 60.4202 and 60.4205, and not those for non-emergency engines in §§ 60.4201 and 60.4204, except that for 2014 model year and later nonemergency CI ICE, the owner or operator of any such engine must have that engine certified as meeting at least the Tier 3 PM standards identified in appendix I of 40 CFR part 1039 or 40 CFR 1042.101.

In order to comply with EPA emissions requirements and also be compatible with the intended service applications, the diesel engine furnished under this solicitation shall be a new Tier 3 Marine certified engine.

1.5 QUALITY ASSURANCE

- A. Equipment shall not have been in service at any time prior to delivery, except as required by tests.
- B. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practices. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable.
- C. Equipment and components furnished under these specifications shall be in accordance with the requirements of applicable UL, NEC, IEEE, NEMA, and ANSI standards.

1.6 FABRICATOR QUALIFICATIONS

The engine generators shall be furnished, assembled, and tested by a qualified fabricator (Fabricator) who is regularly engaged in the business of providing diesel engine driven generator equipment.

- A. The Fabricator must have staff with extensive experience in packaging diesel engine driven electrical generators. A list of five successful installations that key staff have worked on may be requested by the Owner after the bid opening and prior to award in order to verify Fabricator qualifications. The list must include installation date, description of installation, and a reference contact for each installation.
- B. The Fabricator must maintain a competent service organization that is available for field service calls. A description of the organization including resumes of key personnel may be requested by the Owner after the bid opening and prior to award in order to verify Fabricator qualifications.
- C. The Fabricator must have a fabrication facility with adequate space and appropriate equipment as required to perform the work. The Owner may inspect the Fabricator's shop after the bid opening and prior to award in order to verify Fabricator qualifications.

1.7 FABRICATOR WARRANTIES

- A. The Fabricator shall warrant the work for a period of not less than one-year. The warranty period shall commence upon acceptance by the Owner of field testing and final commissioning of the equipment.
- B. In the event of equipment or component failure during the warranty period, the Fabricator shall repair or replace such defective equipment or components and bear all associated costs. Costs shall include material, parts, and labor. The Fabricator will be allowed to charge for travel and per diem expenses within Alaska related to warranty service at actual cost plus 10%. The Fabricator shall assist the Owner as directed to determine the cause of failure and pursue manufacturer's warranties to

the extent necessary to obtain replacement equipment and provide proof of action taken upon request.

- C. Provide a nametag on each piece of equipment that clearly identifies the party responsible for the warranty. Nametag shall include the name, address, and phone number, and shop order or Fabricator's serial number.

1.8 OPERATION AND MAINTENANCE MANUALS.

- A. Provide one (1) complete bound set of operation and maintenance (O&M) manuals for each unique engine generator unit. Identification symbols for all replaceable parts and assemblies shall be included. Provide manuals for the following equipment:
 - 1. Engine.
 - 2. Generator.
 - 3. Voltage Regulator.
 - 4. All accessories.
- B. For each engine provide all available factory service publications including parts manuals, service manuals, component technical manuals, etc.
- C. For all other components of each engine generator unit provide:
 - 1. Equipment function, normal operating characteristics, and limiting conditions.
 - 2. Assembly, installation, alignment, adjustment, and checking instructions.
 - 3. Operating instructions for start-up, routine and normal operation, regulation and control, shutdown, and emergency conditions.
 - 4. Lubrication and maintenance instructions.
 - 5. Guide to "troubleshooting."
 - 6. Parts list.
 - 7. Outline, cross section, elevation, and assembly drawings
 - 8. Engineering data including all mechanical and electrical performance characteristics.
 - 9. Complete AC connection and three-line diagrams.
 - 10. Complete DC schematics including voltage regulator, fuel injector pump, sensors, switches, fuses, and all other devices.
- D. The operation and maintenance manuals shall be in addition to any instructions or parts list packed with or attached to the equipment when delivered, or any information submitted for review.
- E. Bind materials in locking three ring "D" style binders. Binder capacities shall not exceed 3 inches, nor shall material included exceed the designed binder capacity. If material to be bound exceeds capacity rating, multiple volumes shall be furnished. Binder capacity shall not be less than approximately 1/2 inch greater than the thickness of the material within the binder. Permanently label with project information on the front cover and edge.
- F. Where reduction is not practical, larger drawings shall be folded separately and placed in envelopes, which are bound into the manuals. Each envelope shall bear suitable identification on the outside.

- G. All information in the O&M manuals shall be new and original publications.

PART 2 - PRODUCTS

2.1 GENERAL CONFIGURATION AND MANUFACTURERS

- A. All units shall be complete skid mounted engine generators utilizing all new components.
- B. All units shall be configured as specified herein and shall include all accessories as indicated.
- C. Engines shall be rated for prime power duty at the horsepower (shaft) and electrical kilowatt (generator) ratings indicated for each unit. All engines shall be 1800 RPM unless specifically indicated otherwise. All starting and control systems shall be 12 VDC.
- D. Prime Power Rating Nameplate: The Fabricator shall provide a permanently affixed nameplate listing the prime power rating as specified herein for each engine generator.
- E. Provide engines of the manufacturer and model as indicated in Paragraph 2.2 - Specific Configuration, no other substitutes except as specifically noted below.
- F. Approved equal substitutions of engines will be allowed only by Engineer's approval. To obtain approval, submittals must clearly demonstrate the following:
1. The substitute engine must meet all of the requirements of Paragraph 2.3
 2. The substitute engine manufacturer must have at least one factory authorized service representative with a permanent shop in Southcentral Alaska.
 3. The size and weight of the substitute engine must not exceed that of the specified engine by more than 10%.
 4. The physical layout, piping connections, and service access areas of the substitute engine must be sufficiently similar to that of the specified engine so that no major changes will be required to the power plant design.
 5. The substitute engine must meet or exceed the fuel efficiency rate of the specified engine. Provide fuel curve showing fuel consumption (kWh/gallon) at 25%, 50%, 75% and 100% of prime rated capacity.
 6. The substitute engine must be provided with a single jacket water cooling circuit without a separate aftercooler circuit.
 7. The substitute engine must meet or exceed the heat rejection to the jacket water circuit of the specified engine.
 8. The engine must not be equipped, or require to be equipped, with any exhaust emissions equipment including Exhaust Gas Recirculation, Diesel Oxidation Catalyst, Diesel Particulate Filter, or Selective Catalytic Reduction.
- G. Provide Newage/Stamford generators as indicated in the Specific Configuration requirements that follow or Kato equal, no other substitutes except as specifically noted below. The generator shall be rated for continuous output at the value and

temperature rise indicated at 0.8 power factor. The generator shall be 2/3 pitch winding, 3 phase, 277/480 volt, 12 lead reconnectable, with PMG excitation.

- H. If a Marathon or other generator of equivalent or greater capacity is provided it shall be modified and upgraded prior to installation. Prior to assembling to the engine the following tasks shall be performed:
1. Inspect generator internally for defects. If any defects are encountered immediately file a warranty claim with the manufacturer.
 2. Electrically test all windings.
 3. Check fasteners for proper torque.
 4. Replace diode plate mounting bolts with grade 8 bolts with nylok nuts.
 5. Insulate main rotor leads with phase paper or fabric wire loom. Secure leads with heat shrinkable polyester tape using epoxy on all knots.

2.2 SPECIFIC CONFIGURATION

Furnish Engine Generators of the capacity and configuration listed below:

- 65 kW: **Engine** - 99 hp, 65 ekW prime, John Deere 4045TFM85, Tier 3 Marine. Configured for generator drive application with 11.5" diameter flywheel and SAE 3 adapter. Starting and Control Voltage = 12 VDC.
Generator - Minimum 90kW continuous at 105°C rise, Newage/Stamford UCI274C or Kato equal.
- 100 kW: **Engine** - 148 hp, 100 ekW prime, John Deere 4045AFM85, Tier 3 Marine. Configured for generator drive application with 11.5" diameter flywheel and SAE 3 adapter. Starting and Control Voltage = 12 VDC.
Generator - Minimum 125kW continuous at 105°C rise, Newage/Stamford UCI274E or Kato equal.

2.3 ENGINE STANDARD FEATURES

- A. The engines shall be a four-cycle, water-cooled, direct injection, 1800 RPM diesel engine of 4 or 6 cylinder in-line configuration as indicated by model. The engines shall be of newest design and of recent manufacture.
- B. Cylinder Liners: The engines shall be provided with removable cylinder liners to facilitate field rebuilding.
- C. Water Pump: The engines shall be provided with a gear driven water pump where offered by manufacturer.
- D. Horsepower: Certified engine power curves and fuel consumption at 25%, 50%, 75%, and 100% loading, shall be submitted showing the manufacturer's approval of the engine rating for engine generator prime power application. Special ratings or "continuous standby" ratings will not be acceptable.
- E. Fuel: The engine shall be capable of satisfactory performance on No. 1 or No. 2 Ultra Low Sulphur Diesel (ULSD) Fuel.
- F. Fuel System: The engine shall have manufacturer's engine mounted fuel filters with replaceable elements.

- G. Lubrication: The engine shall have a gear type lubricating oil pump for supplying oil under pressure to the main bearings, crankshaft bearings, pistons, piston pins, timing gears, camshaft bearings and valve rocker mechanism. Threaded spin-on type, full flow lubricating oil filters shall be provided.
- H. Starting: The engine shall be equipped with a 12 VDC electric starting system The starting system shall be of sufficient capacity to crank the engine at a speed which will allow full diesel starting.

2.4 ENGINE CONTROL AND MONITORING

- A. Engine Control: All engine control functions will be performed by remote switchgear which will perform all start/stop, speed, paralleling, and load sharing control functions in addition to all engine function monitoring and safety shut downs. Engine manufacturer's electronic control panels shall not be provided.
- B. Engine Monitoring: Provide a J1939 multi-function diagnostic gauge programmed to receive unique John Deere fault codes, John Deere DG14 or approved equal. Note that the diagnostic gauge must be programmed for operation with a Marine Tier 3 engine, no exceptions. Provide with wiring harness as required for connection to ECU and battery power.
- C. ECU and Isochronous Governor: Provide an Engine Control Unit (ECU) for interface with the switchgear. Program the ECU as shown in the typical payload file in Attachment A.
- D. On all AFM engines with Generation II Marine Electronics provide the following accessories:
 - 1. ECU mounting panel with 10' long engine to ECU interconnect harness, DZ110508.
 - 2. Generator drive legacy adapter harness ECU to 21 pin connection, DZ107498.
 - 3. Min 3' long extension harness with 21 pin connections, John Deere or Murcal.
 - 4. Fuel pump relay, 12VDC RE52665. Install on ECU mounting panel.
 - 5. Transient voltage protection diode (TVP), 12VDC AT157679. Install on ECU mounting panel.
- E. On all TFM engines provide a transient voltage protection diode (TVP), 12VDC AT157679.

2.5 ENGINE MOUNTED ACCESSORIES, WIRING, AND PIPING

- A. Fuel and Oil Hoses: All hoses for fuel, lube oil, vents, mechanical gauges, etc., shall be Aeroquip type FC300, Eaton Weatherhead H569 or approved equal. Minimum hose size shall be 5/16" (#6). Provide with re-useable JIC swivel type fittings. Push-on or barb type hose connections will not be allowed. Route hoses to avoid wear points and to ensure access to normal service points on the engine. Securely support hoses from engine and skid.

- B. Glycol Hoses: All hoses for glycol shall be Teflon hose with stainless steel outer braid, Eaton Weatherhead H243 or approved equal. Provide with re-useable plated steel straight JIC swivel ends with NPT adapters. Route hoses to avoid wear points and to ensure access to normal service points on the engine. Securely support hoses from engine and skid.
- C. Wire Loom: All wiring for control and instrumentation shall be routed in plastic loom. Provide tee fittings for all branch connections. Route loom to avoid wear points and to ensure access to normal service points on the engine. Securely support loom from engine and skid.
- D. Protective Guards: All moving parts and hot surfaces shall be provided with protective guards in accordance with U.L Standard 2200.
- E. Air Cleaners: The engine shall be provided with a metal canister air cleaner with a reusable oiled cotton stock element. John Deere, K&N, Parker, or approved equal. Open disposable type air filters or plastic canisters will not be accepted.
- F. Fuel Piping Termination: Fuel supply and return lines shall be routed to the front of generator skid for field connection to the plant piping. See Drawings for detailed configuration.
- G. Lube Oil Piping Termination: The oil drain line shall be routed to the front of generator skid for field connection to the plant piping. See Drawings for detailed configuration.
- H. Oil Level: The engine shall have a combination visual oil level site gauge with adjustable high and low level switches, Murphy L129CK1 or approved equal. Mount on rubber isolators and connect to engine with minimum #8 hoses. Carefully route upper vent hose to create a high point and connect directly into crankcase. Route lower hose to a connection directly on the oil pan. Do not tee lower hose into oil drain line. See Drawings for installation detail.
- I. Starting: A starter auxiliary relay shall be furnished and remote mounted in control wiring junction box:
 - 1. 12 VDC Relay: John Deere AT141011, Caterpillar 9X-8112, or Denso equal.
- J. Control Power: To provide 12 VDC power to the control wiring junction box, a 30A circuit breaker with switch shall be mounted on the engine in the vicinity of the starter, Cooper 187-030-F-00 or approved equal.
- K. Sensors and Safety Controls: The engine shall be equipped with the following:
 - 1. Air Restriction Indicator/Switch, Combination visual indication and alarm switch. 1/8" MPT, 22.46" water column limit, manual reset, normally open switch with adjustable setpoint. Donaldson 135578-08420 or approved equal. Wire into engine harness and program ECU to recognize input. Shop adjust switch to close at 20" water column and verify function.
 - 2. Exhaust Gas Temperature. High temperature, 2 wire, 100 ohm RTD with 36" high temperature lead wire, Deutsch DT06-2S-E008 male connector, Deutsch DT04-2P-E008 female connector, and compression fitting with

1/4" MPT adapter. Watlow 4031-7248 RTD, no substitutes, with Eustis NS34 adapter or equal. See note 2 below for installation.

Note 1. The above listed sensors shall be independent from engine gauges and all other devices and sensors. Where standard factory furnished sensors for the above listed functions are required for operation of the ECU, provide additional duplicate sensors as specified. All sensors shall be installed on the engine and wired to terminal blocks as indicated in the Drawings.

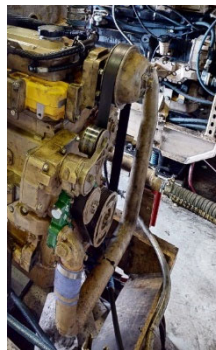
Note 2. Upon completion of shop testing, if exhaust gas temperature sensor is installed in flex, remove sensor and tywrap to engine in a secure location for shipping.

2.6 ENGINE MODIFICATIONS

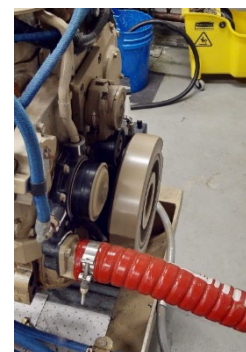
- A. The crankcase ventilation filter and accessories shall be removed and a single point hose connection shall be left for field connection by others to a crankcase ventilation system.
- B. All engines shall be furnished without a charging alternator. Factory installed components shall be removed as required. Idler pulleys shall be added and belt guards shall be modified as required.
 - 1. Remove charging alternator.
 - 2. Install transient voltage protection diode, see paragraph 2.4.
 - 3. Install an alternator delete kit. Alternately, install an industrial engine fan drive bearing and hub assembly, replace belt as required, and install custom fabricated belt guard.
- C. All engines shall be furnished without a heat exchanger, coolant expansion tank, or accessory reduction gear drive. Factory installed components shall be removed as required. See Paragraph 2.7, Cooling System.
- D. Additional Belt Guards: In addition to the above specified items furnished with each new engine, furnish the following additional belt guards for field installation on existing engines:
 - 1. Provide 2 each belt guard for 4045TFM, see photo below.
 - 2. Provide 1 each belt guard for 4045AFM, see photo below.
 - 3. Provide 1 each belt guard for 6068TF250, see photo below.



4045TFM



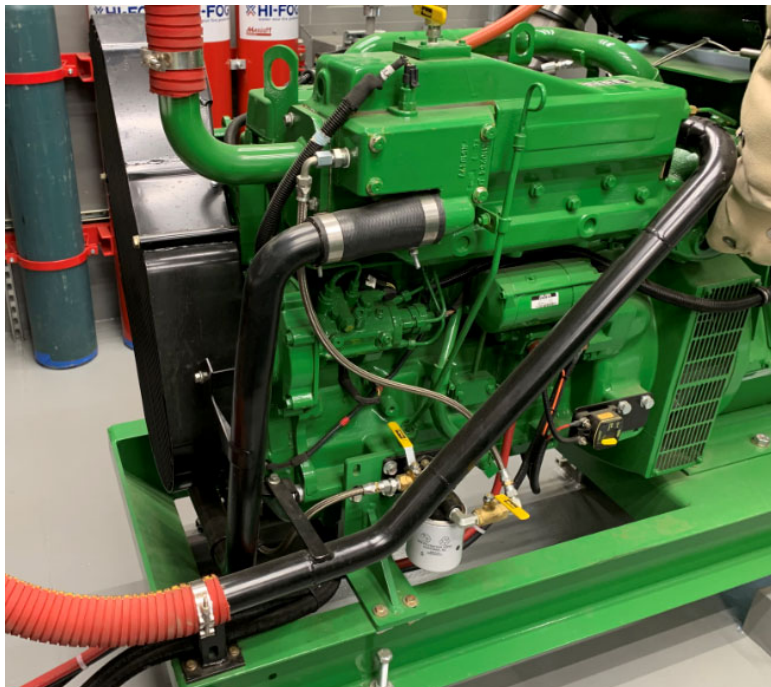
4045AFM



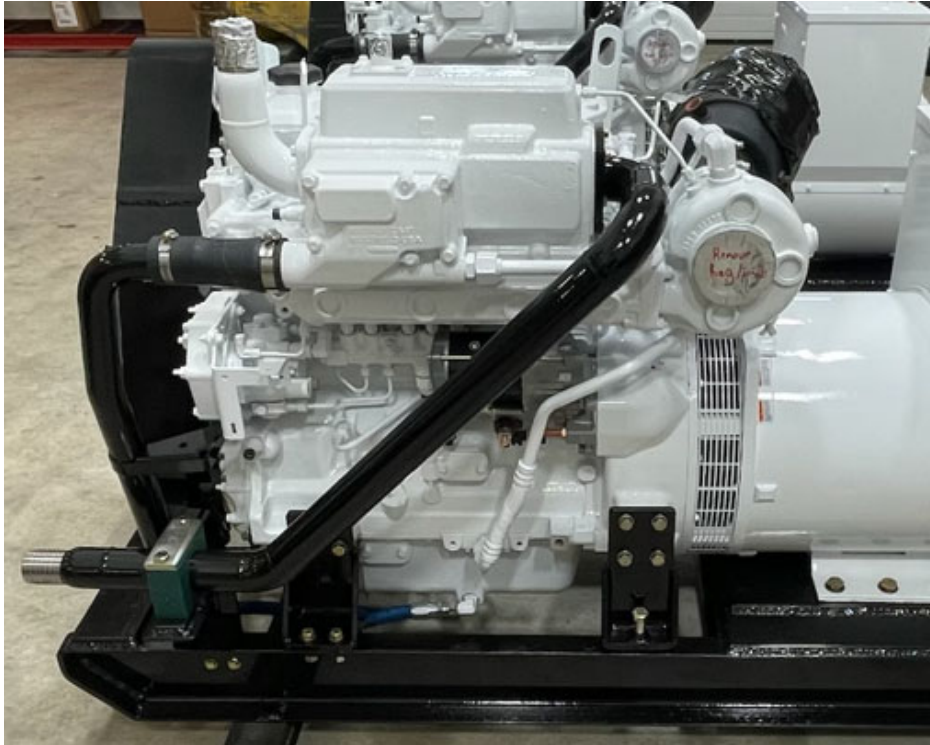
6068TF250

2.7 COOLING SYSTEM

- A. Engine cooling will be by remote radiators with coolant circulation driven by the engine coolant pump.
- B. Glycol Filter: Provide screw-on canister style filter element with 3/8" NPT connections on head, Wix #24019 head with #24069 element or approved equal. Mount head on steel bracket fixed to front or side of engine. Connect to engine with glycol hoses with 3/8" NPT quarter turn gauge cock isolation valves. Connect inlet to thermostat housing and connect outlet to water pump inlet. On thermostat housing connection provide 3/8" NPT tee fitting with plug for field connection of pre-heat line by others. When filters are provided as part of engine manufacturer's assembly the standard factory filters may be substituted for the above specified parts; however, equivalent mounting, connections, and isolation valves shall be included.
- C. Provide an air vent/pre-heat connection at the high point on the engine coolant system. Provide a threaded ball valve with a 1/2" male hose barb fitting.
- D. Modify engines as follows:
 - 1. John Deere 4045TFM - Remove coolant tank and other accessories that are not required. Install a bent or welded section of 2 inch steel tube routed to the front of the left skid and supported from the skid. See photograph below for representative installation.



2. John Deere 4045AFM Remove coolant tank and other accessories that are not required. Note that the 4045AFM85 engines have small ports in the coolant hose connection fittings that are overly restrictive. To provide adequate flow for prime power application remove the coolant discharge and suction connection fittings. On the discharge install a custom fabricated fitting with an elbow and a 2” king nipple oriented vertically. On the suction install a custom fabricated fitting with a bent and/or welded section of 2” inch steel tube routed to the front of the left skid and supported from the skid. See photographs below for representative conversion.



2.8 EXHAUST SYSTEM

- A. The turbocharger discharge shall be equipped with a 4-hole square “Cat” flange when available.
- B. Flex: A flexible, continuous, 18 inch long stainless steel exhaust flex connector with welded connections shall be furnished for each engine, Alaska Rubber, DME, Harco, or approved equal. Provide a mating connection to match the turbocharger at one end and a 4” ANSI 125/150# pattern flange at the opposite end. Provide gasket, bolts, v-clamp, or any other components required for connection to the turbocharger. Provide a 90° elbow where required for the flex to be installed vertically. Note that if the exhaust temperature sensor cannot be installed directly in the turbocharger outlet connection, a 1/4” FPT stainless steel thread-o-let shall be welded into the flex between the engine connection and the corrugated hose.

2.9 LOOSE SHIP ACCESSORIES

Provide the following accessories for each engine generator (unless otherwise indicated):

- A. Spring vibration isolators complete with mounting hardware, four (4) per each unit, sized for the complete engine generator unit weight. Caldyn Type RJ or approved equal.
- B. Drip pan, 16-gauge galvanized sheet metal, liquid tight joints, 20” wide by 50” long by 1” high.
- C. Minimum 800 cold crank amp 12-volt starting batteries, two for each engine. Batteries shall be sealed maintenance free, Optima Red Top NAPA Part Number BAT N993478RED or approved equal. Furnish and install battery racks sized to hold the batteries with hardware to secure the battery for shipping.
- D. Each engine shall be provided with two each #2/0 AWG arctic flex battery cables, 15 ft. long, plus two each #2/0 AWG by 12-inch long jumper. All cables shall include compression type terminal ends shipped loose. One battery cable and one jumper shall be red for the positive lead and the other cable and jumper shall be black for the negative lead. Provide plastic terminal covers. The battery cables shall be routed and supported as indicated on the Drawings.
- E. Additional Components: In addition to the above specified items furnished with each new engine, furnish the following:
 - 1. Batteries: Furnish eight (8) each batteries as specified above.
 - 2. Rain Caps: Furnish three (3) each 4” iron pipe size rain cap, all stainless steel construction, G.T. Exhaust Systems or approved equal.

2.10 GENERATOR/ALTERNATOR

- A. Generator shall be a single bearing, four pole, synchronous type. Generator shall be directly connected to the engine flywheel housing and driven through a flexible coupling to ensure permanent alignment. Windings shall 2/3 pitch, random wound, and lashed at the end turns to provide superior mechanical strength. The generator shall be brushless, 12 lead reconnectable, three phase, 60 Hz, 1800 RPM, and connected for 277/480V service.
- B. The rotating assembly shall be dynamically balanced to less than 2 mils peak to peak displacement and shall be designed to have an over speed withstand of 125% of rated speed for 2 minutes in accordance with NEMA MG1-32.
- C. Cast iron end brackets with bearing bores machined for an O-Ring to retard bearing outer race rotation and fabricated steel frames shall be used. Bearings shall be pre-lubricated, double shielded, ball type, single row Conrad, C3 fit. Minimum B-10 bearing life shall be 30,000 hours for single bearing units.
- D. Generator wiring diagram shall be permanently installed on the inside of the terminal enclosure cover.
- E. The insulation system of both the rotor and stator shall be of NEMA Class H materials or better and shall be synthetic and non-hygroscopic. The stator winding

and rotor shall be coated with resin plus an epoxy sealant for extra moisture and abrasion resistance.

- F. The generator shall be equipped with a permanent magnet generator (PMG) excitation system. The system shall supply a minimum short circuit support current of 300% of the rating for 10 seconds. The rotating exciter shall use a three-phase full wave rectifier assembly with hermetically sealed silicon diodes protected against abnormal transient conditions by a multi-plate selenium surge protector. The diodes shall be designed for safety factors of 5 times voltage and 1.5 times current.
- G. Voltage Regulator: The voltage regulator shall be compatible with the PMG excitation and shall control the output of the brushless AC generator by regulating the current into the exciter field. The voltage regulation shall be minimum 0.25% accuracy. Basler DECS-100-A05 or approved equal.
 - 1. The voltage regulator shall be configured for rear mounting and shall be mounted inside of the control wiring junction box as indicated in the Drawings.
 - 2. The voltage regulator shall be connected to the 3 phase voltage sensing, field, and PMG on terminal blocks in the control wiring junction box as indicated in the Drawings.
- H. Factory Nameplate: The generator manufacturer shall provide a permanently affixed nameplate that provides the following information:
 - 1. Rated voltage, phase, and power factor.
 - 2. Insulation class, winding type, and connection.
 - 3. Rated kW and amperage at specific temperature rise.
 - 4. Exciter voltage and current.
- I. Each generator shall be provided with a standard sized terminal compartment. The terminal compartment shall be provided with a load connection block to allow easy field termination of the load, neutral, and ground conductors. The generator neutral connection shall not be connected to the mounting skid or the generator frame. The neutral shall be isolated for field grounding by others at the switchgear or transformer.
- J. The generator shall be self-ventilated with a direct drive one-piece, cast aluminum alloy, unidirectional internal fan for high volume, low noise air delivery. Airflow shall be from opposite drive end through generator to drive end. The exciter shall be in the airflow.
- K. Loose Ship Voltage Regulators: In addition to the voltage regulators furnished with each generator, furnish two (2) each voltage regulators as specified above.

2.11 MOUNTING SKID

- A. The engine generator shall be equipped with a suitable full length base frame (skid) for mounting the engine and generator. The skid shall be constructed from structural steel channel with ends beveled and plated for short term skidding and rolling of unit. **No formed or stamped steel base frame designs will be accepted.** Provisions shall be made so that the generator can slide back a minimum of 12” to access the rear main seal on the engine without removing the generator end off of

the skid or requiring the use of blocking to support it. See the Drawings for skid design and layout.

- B. Provisions shall be made in the skid for the mounting of vibration isolators at locations as indicated on the Drawings. Wedge washers shall be welded in place on the skid to provide a flat surface for the vibration isolator lock nuts.
- C. Each engine generator shall be placed on the skid at the location indicated on the Drawings.

2.12 WIRING JUNCTION BOX FOR INTERFACE WITH REMOTE SWITCHGEAR

- A. A control wiring junction box shall be furnished with the generator. It will be field installed on a strut rack above the right hand side of the generator enclosure. On the 4045AFM engines the engine ECU mounting panel will be installed directly behind the junction box.
- B. Furnish the junction box with the following features:
 - 1. NEMA 12 steel enclosure with hinged door and screw down latches. B-Line, Hoffman or approved equal. See Drawings for size.
 - 2. The junction box orientation, device layout, terminal block layout, and labeling shall be as indicated on the Drawings.
 - 3. All wiring for control, monitoring, and safety shall be terminated on terminal blocks within the control wiring junction. The terminals shall be IDEC or approved equal, BNH15LW except where indicated 50A provide BNH50W. Terminals shall be mounted on DIN rail with heavy duty end anchors. Each terminal block and all wire terminations shall be individually numbered as indicated.
 - 4. Install the voltage regulator and the diagnostic gauge as previously specified in the junction box as shown on the Drawings.
 - 5. Install an engine manufacturer's standard 21 pin customer connection for field connection to the engine ECU in the junction box as shown on the Drawings.
- C. The DC power supply for the switchgear shall be provided from the engine starting batteries through the engine-mounted circuit breaker. Terminals shall be provided as indicated on the Drawings for supplying 12 VDC to the switchgear. All remote indication will be 24VDC, 4-20mA, or as otherwise indicated. All switches used for remote indication shall be rated for operation at 24 VDC.
- D. Label each control wiring junction box with the serial number of the associated engine. Connect to the engine and generator prior to performing the load test.

2.13 PAINTING

Each unit shall be painted John Deere green industrial tan including engine, skid, and generator.

2.14 SPARE FILTERS

In addition to the filters installed on the engines, provide the following quantities of replacement filters for each engine plus break in oil. Package spare filters and oil in boxes and label each box with the engine model number.

- A. Twelve (12) oil filters.
- B. Four (4) primary fuel filters.
- C. Four (4) secondary fuel filters.
- D. Two (2) air filters plus one air filter service kit.
- E. Four (4) glycol filters.
- F. Break in oil identical to oil installed in engine. One (1) gallon for each engine.

PART 3 - EXECUTION

3.1 SHOP ASSEMBLY

- A. Prior to beginning assembly, thoroughly inspect engine and generator for manufacturing defects or for damage that may have occurred in shipping. Verify that the shipping arms on the front of the generator are intact and that rotor is properly centered. Check inside of generator for dirt or moisture and clean thoroughly.
- B. Replace the standard factory hardware used for attachment of the generator coupling disc to the engine flywheel with Grade 8 hex head bolts. Install heavy gauge washers, tighten and torque bolts in accordance with manufacturer's specifications, and paint pen mark after final torquing.
- C. Upon assembly of engine and generator on the skid, ensure proper alignment then adjust and secure supports to ensure alignment is maintained.
- D. Modify engines as specified previously. Install all accessories, devices, hoses, etc. as specified. Verify that all hose and wiring is properly routed, well supported, and secured to avoid wear points.
- E. Install exhaust temperature sensor and air restriction indicator/switch and connect to wiring junction box. Adjust air restriction switch to close at 20" water column, verify function, and reset.
- F. ECU Mounting: On engines models supplied with an ECU mounting panel, configure wiring harness so that ECU panel can be installed approximately 2' above the top of the generator enclosure.

3.2 SHOP TESTS

- A. Prior to shipment, perform shop tests on each unit at the shop where the engine generator is assembled. Supply sufficient notice to the Owner prior to performing tests. The Owner reserves the right to witness all tests. Test procedures shall

- conform to ASME, IEEE, and ANSI standards, and NEMA standard practices section on testing, as appropriate and applicable.
- B. Provide all required mechanical and electrical equipment including but not limited to fuel supply, radiator, exhaust, load bank, voltage regulator, etc.
- C. Provide all required measuring and indicating devices. All devices shall be certified correct or correction data furnished for the device.
- D. Set Up For Load Test: Prior to running the engine perform the following tasks:
1. Verify that engine is filled with break in oil. The break in oil shall be approved by the engine manufacturer for 100 to 500 hour run time, John Deere Break-In Plus or approved equal. Pull a sample of the clean lube oil prior to the load test to be used for reference.
 2. Perform hydrostatic test on water jackets to ensure that water seals and water jackets are watertight. Test report shall indicate pressure at which test was made and the results.
 3. Connect engine coolant piping to radiator or heat exchanger. Note that all engine coolant circulation must be performed by the engine water pump without the benefit of any external pump or pressurized system.
 4. Install thermometer to monitor coolant return temperature entering the engine for comparison against the coolant discharge temperature.
 5. Connect engine air piping to charge air cooler.
 6. Connect engine and generator to the associated control wiring junction box.
- E. Engine Pre-Tests: Prior to the 8 hour load test perform the following tests:
1. Power up the ECU and program as shown in the typical payload file in Attachment A. Connect the ECU to an analog throttle input and verify that it is correctly responding including idle operation at input less than or equal to 0.5 VDC, 1800 RPM at 2.5 VDC, and variable RPM above and below 2.5 VDC. Note confirmation on the load test. Take screen shots to document the ECU programming and include with the load test reports for each engine.
 2. Run the engine with adequate load to get up to normal operating temperature. Check Service Advisor and verify that the engine is functioning properly and that all parameters are within normal ranges.
 3. Perform a Cylinder Cutout Test in accordance with the manufacturer's procedures. If any cylinders test abnormally, perform a Cylinder Misfire Test and a Cylinder Electronic Compression Test. If any injectors appear to be defective replace and then repeat tests.
 4. Record the results of the tests, including any corrections made, in the load test report.
- F. Load Test: Perform a standard commercial shop 8 hour load test on each engine generator including, but not limited to, the following:
1. Place engine in continuous operation without stoppage for a period of not less than eight hours. Operate not less than one hour at each load point (1/2,

- 3/4, and full load) and 1 hour at 110 percent of rated load. If stoppage becomes necessary during this period, repeat the 8-hour run.
2. Record the following data at the start, at 15-minute intervals, and at the end of each load run: Hz, kW load, fuel consumption, exhaust temperature, intake air temperature, jacket water temperature, coolant return temperature, lube oil temperature, lube oil pressure, manifold (boost) pressure, and crankcase vacuum.
 3. Tests shall indicate satisfactory operation and attainment of guarantees and specified performance.
- G. Provide completed test reports to the Owner. Reports shall include but not limited to the following:
1. Complete 8-hour load test data.
 2. Results of Cylinder Cutout Test and any subsequent tests performed.
 3. Screen shots of throttle programming and confirmation of response.
 4. Photos of split oil filters as described below.
 5. Laboratory analysis of the clean lube oil sample and the sample pulled after the test as described below.

3.3 PREPARATION AND SHIPPING

- A. Upon completion of testing perform the following steps to prepare for shipping:
1. Flush the cooling system with extended life 50/50 ethylene glycol mix, Shell Rotella ELC or approved equal. Install covers over the connections. Note that if testing was performed with extended life ethylene glycol solution the engine does not need to be flushed.
 2. Pull a sample of the lube oil. Send to a laboratory for analysis. Include the sample of clean lube oil pulled prior to the load test for reference comparison.
 3. Remove oil filter, split case, inspect contents and take photo to document. Note that if excessive or unusual metal fragments are found, contact the Owner immediately. Install new oil filter.
 4. Turn the engine at cranking speed with throttle control in full off position and use a sprayer to add a mixture of 50% VCI (volatile corrosion inhibitor) oil and 50% 30-weight engine oil into the engine long enough to ensure the cylinders and exhaust ports are coated.
 - a. For marine engines with a jacket water aftercooler, spray the VCI-oil mixture directly into the air intake manifold and then separately spray a small amount into the turbocharger inlet.
 - b. For engines without a jacket water aftercooler, spray the VCI-oil mixture into the turbocharger inlet.
 5. Clean the outside of the engine and inspect and ensure that the engine and generator are covered by good quality paint. Correct any deficiencies.

6. Spray a thin amount of VCI-oil mixture on the flywheel, ring gear teeth, and starter pinion. Install the covers to keep the vapors in.
 7. Install a positive mechanical seal consisting of a fitting plate and gasket on exhaust opening. Then install all covers and/or tape on any other openings. Ensure all covers are air tight and weatherproof. Use waterproof, weather resistant type tape. Do not install tape in such a manner as will damage paint when the tape is removed. Install a mechanical protective device over any protruding items, which may be vulnerable to damage during transportation.
- B. After preparing the equipment for shipping, package each engine generator separately as follows:
1. Coil wiring harnesses and secure control wiring junction box and ECU mounting panel to generator.
 2. Put a waterproof cover over the entire engine generator unit. Make the cover tight, but loose enough to let air circulate around the unit to prevent damage to exposed metal parts from condensation.
 3. All other included components (spare parts, loose items, etc.) shall be packaged individually in waterproof wrapping. Each individual component package shall then be packed in a box or crate, and each box/crate wrapped in waterproof wrapping to prevent corrosion to the components during extended periods of outside storage. All boxes or crates shall be palletized onto the minimum number of pallets, as required for the quantity and size of the boxes/crates.
 4. Each component package shall be sequentially numbered and marked for ease of identification. Each box/crate shall also be marked with a unique identifying number. Each pallet shall be provided with a packing slip identifying the number of each box/crate on the pallet, in addition to a listing of each component package within each box/crate. Each pallet shall be marked (with two inch high letters/numbers), on all four sides and the top, with the project or community name.
 5. Two copies of the packing slip identifying the quantity of pallets, the crates/boxes on each pallet, and the listing of component packages within each box/crate shall be provided to the Owner.
- C. Final payment will not be made until completion of the following:
1. All engine-generators and all loose ship parts have been accepted by the Authority at the F.O.B. Point.
 2. All required manuals have been accepted by the Authority at the F.O.B. Point.
 3. All test reports have been received and approved by the Authority.

3.4 INSTALLATION AND COMMISSIONING – not used

END OF WRITTEN SPECIFICATION

See The Following Attachments:

Attachment A - Typical ECU Payload

Drawing M5 – Generator Fabrication Details

Drawing E3 - 12VDC Engine Control Wiring Junction Box

JOHN DEERE Custom Performance™

PowerTech™ 4.5L AFM - Marine Genset

Glossary

[Sensor Configuration](#)
[CAN Configuration](#)
[Output Configuration](#)
[Speed Control](#)
[Governors](#)
[Engine Protection Report](#)

Pinout Report

PIN J2-A1 : CAN 1-High (Yellow)	PIN J2-D1 :	PIN J2-G1 :	PIN J2-K1 :
PIN J2-A2 :	PIN J2-D2 : Stop Lamp (-)	PIN J2-G2 : Excitation 4+	PIN J2-K2 : CAN Shield
PIN J2-A3 : Excitation #3+	PIN J2-D3 :	PIN J2-G3 : Excitation 4-	PIN J2-K3 :
PIN J2-A4 : Primary Analog Throttle	PIN J2-D4 :	PIN J2-G4 :	PIN J2-K4 :
PIN J2-B1 : CAN 1-Low (Green)	PIN J2-E1 :	PIN J2-H1 :	PIN J2-L1 : ECU Power
PIN J2-B2 : Keyswitch	PIN J2-E2 :	PIN J2-H2 :	PIN J2-L2 : ECU Ground
PIN J2-B3 :	PIN J2-E3 : Engine Protection Shutdown Override	PIN J2-H3 : CAN 2-Low	PIN J2-L3 : ECU Ground
PIN J2-B4 :	PIN J2-E4 :	PIN J2-H4 :	PIN J2-L4 : ECU Power
PIN J2-C1 :	PIN J2-F1 :	PIN J2-J1 :	PIN J2-M1 : ECU Power
PIN J2-C2 :	PIN J2-F2 :	PIN J2-J2 :	PIN J2-M2 : ECU Ground
PIN J2-C3 : Excitation #3-	PIN J2-F3 :	PIN J2-J3 : CAN 2-High	PIN J2-M3 :
PIN J2-C4 :	PIN J2-F4 :	PIN J2-J4 :	PIN J2-M4 : ECU Power

Fault Code Report

Note: the following list of Fault Codes are those that are configured in the Trim Page, this list does not include all of the fault codes configured.

Fault 91.03: Primary Analog Throttle Out-of-Range High

Fault 91.04: Primary Analog Throttle Out-of-Range Low

Standard Sensor Configuration

[Help](#)

Coolant Loss Switch Enable

Coolant Loss Switch Type

Air Filter Restriction Switch Enable - shared with Auxiliary Temperature Sensor

Air Filter Restriction Switch Type

Fuel Leak Switch Enable - shared with Configurable Switch 1

Fuel Leak Switch Type

Water-in-Fuel Sensor Disable

Auxiliary Sensor Configuration

[Help](#)

Enable Auxiliary Temperature Sensor (Pin J2-D3) - shared with Air Filter Restriction Switch

Default (deg. C)

- Configurable Switch 1 Enable (Pin J2-F2 Switch to Power)
Shared with Fuel Leak Switch

Switch Name

Switch Type

- Configurable Switch 2 Enable (Pin J2-E1 Switch to Power)

Switch Name

Switch Type

- Configurable Switch 3 Enable (Pin J2-J1 Switch to Ground)
Shared with Auxiliary Derate Switch

Switch Name

Switch Type

- Configurable Switch 4 Enable (Pin J2-F1 Switch to Power)
Shared with Bump Down Switch

Switch Name

Switch Type

- Configurable Switch 5 Enable (Pin J2-D4 Switch to Power)
Shared with Bump Up Switch

Switch Name

Switch Type

Configurable Switch 6 Enable (Pin J2-J2 Switch to Power)

Switch Name

Switch Type

Configurable Switch 7 Enable (Pin J2-K1 Switch to Ground)
Shared with Auxiliary Shutdown Switch

Switch Name

Switch Type

Configurable Switch 8 Enable (Pin J2-B3 Switch to Power)

Switch Name

Switch Type

Configurable Switch 9 Enable (Pin J2-E4 Switch to Power)
Shared with Bump Enable Switch

Switch Name

Switch Type

Configurable Switch 10 Enable (Pin J2-H4 Switch to Excitation+)
Shared with Isochronous Droop Switch

Switch Name

Switch Type

Configurable Logic

[Help](#) Enable Configurable Logic 1Logic Name

Active when the following conditions have been met for

 seconds is is

Inactive when the following conditions have been met for

 secondsUnused is Unused is Enable Configurable Logic 2Logic Name

Active when the following conditions have been met for

 seconds is is

Inactive when the following conditions have been met for

 seconds

Unused is

Unused is

Enable Configurable Logic 3

Logic Name

Active when the following conditions have been met for seconds

is

is

Inactive when the following conditions have been met for seconds

Unused is

Unused is

Shared CAN Bus Settings

ECU Source Address

John Deere OEM Panel Function Instance

Tachometer Output

[Help](#) Enable Tachometer Output30 Pulses per Revolution

Fuel Transfer Pump

[Help](#)Select Fuel Transfer Pump Stanadyne Transfer Pump

Start Aid Control

[Help](#) Enable Glow Plugs

Hardware Fault Lamps

[Help](#) Enable Warning Fault Lamp (J2-C1) - Shared with Starter Overspeed Relay / Configurable Output 3 Enable Stop Fault Lamp (J2-D2)

Engine Mode Indication

[Help](#) Enable Engine Run Lamp / Alarm (J2-J4) - Shared with Configurable Output 1 Enable Engine Stop Lamp / Alarm (J2-E2)

Configurable Outputs

[Help](#)

Enable Configurable Output 1 (J2-J4) - Shared with Run Mode Lamp/Alarm

Output Name

Output Type

Enable Output when is

Default Output to when is

Lamp Test

Enable Configurable Output 2 (J2-K4)

Output Name

Output Type

Enable Output when is

Default Output to when is

Lamp Test

Enable Configurable Output 3 (J2-C1) - Shared with Warning Fault Lamp

Output Name

Output Type

Enable Output when is

Default Output to when is

Lamp Test



Throttle Help

Disable All Throttles

Digital Throttle	Primary Analog Throttle	Secondary Analog Throttle	PWM Throttle
<input type="checkbox"/> Enable Digital Throttle <input type="radio"/> 2-State Throttle <input checked="" type="radio"/> 3-State Throttle	<input checked="" type="checkbox"/> Enable Primary Analog Throttle <input type="checkbox"/> Self-Calibration Enable	<input type="checkbox"/> Enable Secondary Analog Throttle <input type="checkbox"/> Self-Calibration Enable	<input type="checkbox"/> Enable PWM Throttle PWM Frequency (Hz) <input type="text" value="200"/> Minimum PWM Duty Cycle % <input type="text" value="10"/> Maximum PWM Duty Cycle % <input type="text" value="90"/>

Throttle Adjustments

Multiple Throttle Failure Condition Default:
 ▼

Throttle Out-of-Range Recovery:
 ▼

Minimum Throttle Offset:

<p>Offset: <input type="text" value="0"/> rpm increase</p> <p>Maximum Throttle Offset: <input type="text" value="0"/> rpm <input type="button" value="Decrease"/> ▾</p> <p><input type="button" value="Envelope Calculation"/></p>		
--	--	--

<h2>Torque Speed Control <input type="button" value="Help"/></h2>		
<input type="checkbox"/> Enable TSC Source 1 Enable	<input type="checkbox"/> TSC1 Timeout Fault	<input type="text" value="3"/> Source Address 1
<input type="checkbox"/> Enable TSC Source 2 Enable	<input type="checkbox"/> TSC2 Timeout Fault	<input type="text" value="4"/> Source Address 2

<h2>Governor Droop <input type="button" value="Help"/></h2>	
<p>RPM of Droop <input type="text" value="0 Hz (Isochronous)"/> ▾</p> <p><input type="button" value="Envelope Calculation"/></p>	

<h2>Startup Acceleration Rate <input type="button" value="Help"/></h2>	
<p>Acceleration Rate: <input type="text" value="Standard (Maximum)"/> ▾</p>	

Governor Gains

[Help](#)

Information: The factory settings for the engine speed control (governor) parameters have been optimized for the majority of applications to provide the best combination of stability and response characteristics.

DO NOT change these settings from the defaults unless there is a significant problem with engine speed stability or response to load changes. Changing the governor gains from the defaults can aggravate instabilities in the system or lead to unacceptable response. Any changes must be evaluated to determine if the final performance is acceptable.

Low Speed Governor Gain	<input type="text" value="Use Selected Alternate Gain"/> ▼
All Speed Governor Gain	<input type="text" value="Use Selected Alternate Gain"/> ▼
Maximum Speed Governor Gain	<input type="text" value="Use Selected Alternate Gain"/> ▼
Selected Alternate Gain	<input type="text" value="Alternate Gainset #1"/> ▼
Gain Adjustment Percentage	<input type="text" value="100"/> % (Valid range is 25% to 200%)

Derates & Shutdowns

[Help](#)

Standard (Level 1) Derates

Enable Standard (Level 1) Derates

Standard Shutdowns

Refer to the Sensor Configuration section to enable optional sensors

Coolant Temperature Shutdown
 ▼

Engine Overspeed Shutdown
 ▼

J1939 Enable/Disable Shutdowns

Allow Enable/Disable of Shutdowns by J1939 CAN Message

Controller Source Address

Engine will shutdown immediately after Engine Overspeed condition

Fuel Temperature Shutdown ▼

Intake Manifold Air Temperature Shutdown ▼

Oil Pressure Shutdown ▼

Water-in-Fuel Shutdown ▼

Coolant Loss Shutdown ▼

Shutdown Timer ▼

Fault Indication

Enable Auxiliary Temperature Indication - Auxiliary Temperature Sensor is Disabled

Lamp Type ▼ Aux Temperature Threshold 1 (deg. C)

Lamp Type ▼ Aux Temperature Threshold 2 (deg. C)

Temperature Shutdown ▼

Auxiliary Derate

Auxiliary Derate Enable - shared with Configurable Switch 3

Auxiliary Derate Switch Input Type ▼

Auxiliary Derate Amount

20% over 4 minutes ▾

 Override Auxiliary Derate at Engine Start

Override Auxiliary Derate Time

5 seconds ▾

Auxiliary Shutdown

[Help](#)

Warning: This is intended as a system protection shutdown. This is not intended to be used as an emergency stop.

 Auxiliary Shutdown Enable - shared with Configurable Switch 7

Auxiliary Shutdown Switch Input Type

Normally Open ▾

NOTE: Care should be taken to choose a switch type that matches desired behavior with common failure modes

Auxiliary Shutdown Timer

Immediate ▾

 Override Auxiliary Shutdown at Engine Start

Override Auxiliary Shutdown Time

5 seconds ▾

Shutdown Verify for Certification Testing

[Help](#)

Enable Engine Overspeed Verify - Engine Overspeed Shutdown has been enabled above in Standard Shutdowns

Engine Overspeed Threshold (rpm)

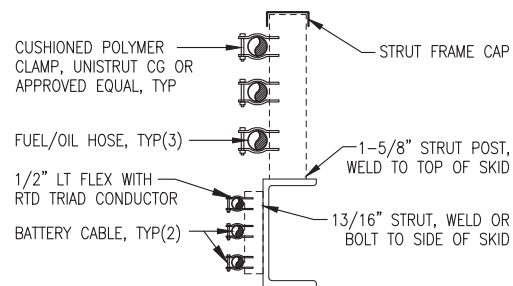
1700

 Enable Adjustable Coolant Temperature Shutdown

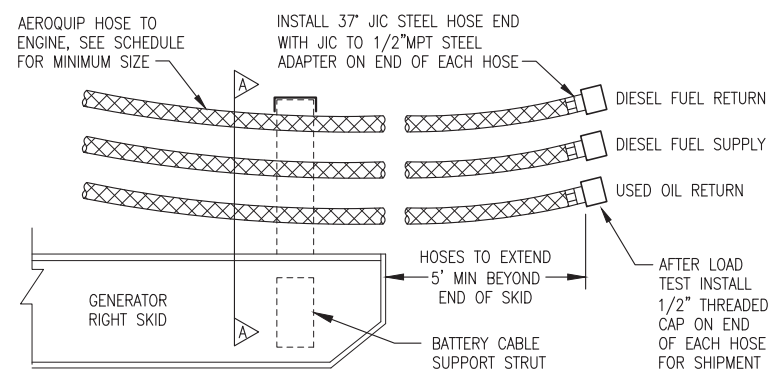
Coolant Temperature Shutdown Threshold (deg. C)

75

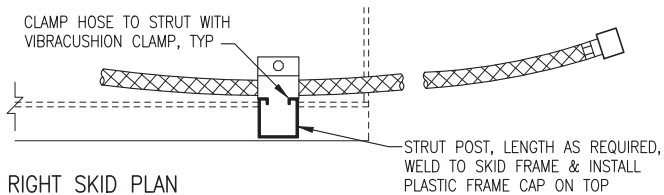
Enable Oil Pressure Shutdown for Certification Testing



RIGHT SKID SECTION A-A

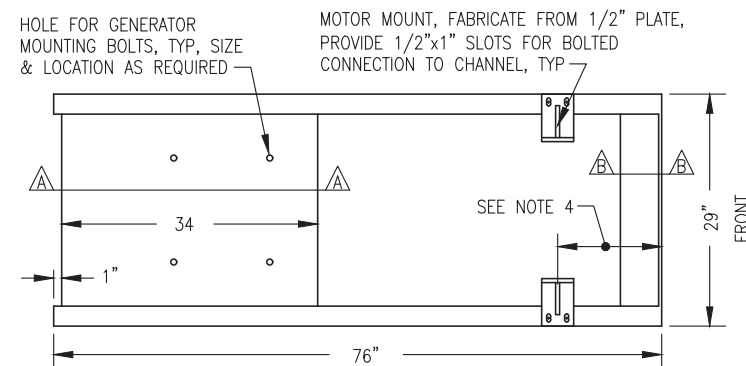


RIGHT SKID ELEVATION

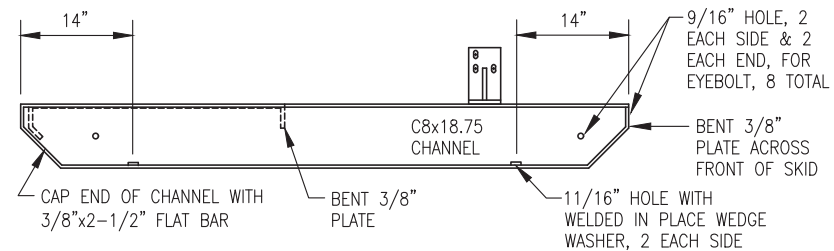


RIGHT SKID PLAN

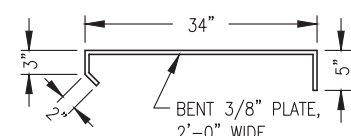
1 FUEL & OIL HOSE TERMINATIONS
M5 NO SCALE



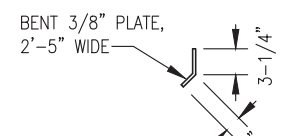
PLAN (TOP) VIEW



ELEVATION (SIDE) VIEW



SECTION A-A

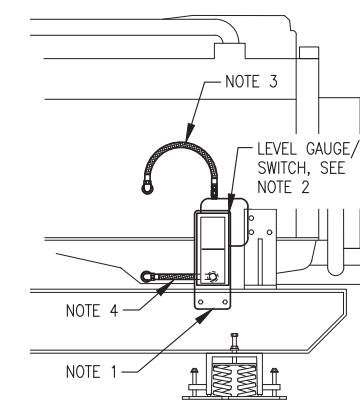


SECTION B-B

NOTES:

- 1) FABRICATE FROM ASTM A-36 STEEL. BEND PLATES & CUT ENDS OF CHANNELS AT 90° & 45° AS SHOWN.
- 2) EXCEPT WHERE INDICATED AS BOLTED MAKE ALL CONNECTIONS WITH CONTINUOUS WELDS (FILLET OR FULL-PENETRATION GROOVE AS REQUIRED) IN ACCORDANCE WITH CURRENT AWS STANDARD CODE.
- 3) ROUND ALL CORNERS & GRIND WELDS SMOOTH AFTER FABRICATION. PAINT TO MATCH ENGINE-GENERATOR.
- 4) PLACE UNIT ON SKID SO THAT THE EXHAUST RISER CENTERLINE IS 39" FROM THE FRONT OF THE SKID.

2 GEN#3 (JOHN DEERE 4045) SKID DESIGN
M5 NO SCALE





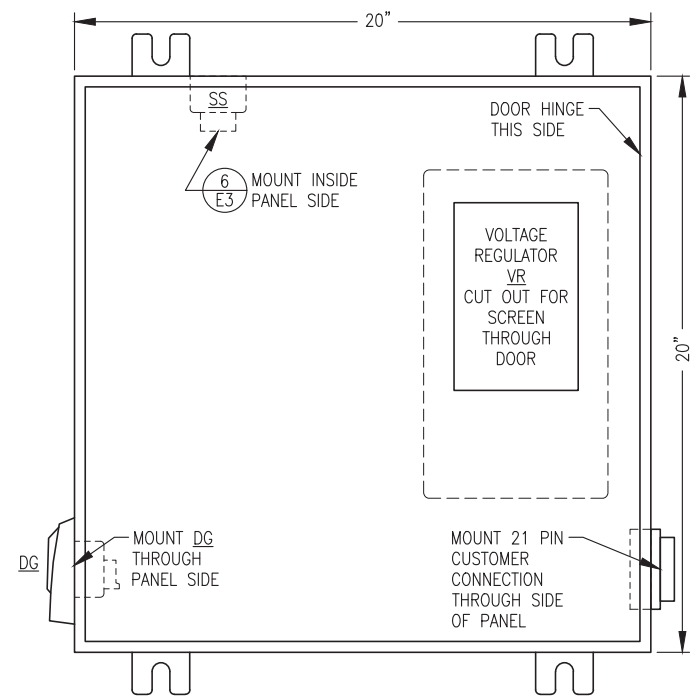
NOTES:

- 1) 1/4" STEEL SUPPORT PLATE PRE-DRILLED TO MATCH GAUGE/SWITCH MOUNTS AND BOTTOM HOSE ENTRANCE. BOLT TO INSIDE (BACK) OF CHANNEL SKID AT HEIGHT AS REQUIRED TO CENTER GAUGE AT NORMAL FULL OIL LEVEL.
- 2) MOUNT OIL LEVEL GAUGE/SWITCH TO STEEL SUPPORT PLATE WITH RUBBER SHOCK MOUNTS. ADJUST SWITCH CONTACTS TO 1/2" ABOVE AND BELOW NORMAL FULL LEVEL. PAINT MARK A RED LINE AT BOTH SWITCH LEVELS.
- 3) CONNECT TOP (VENT) PORT TO ENGINE CRANK CASE WITH #8 HOSE WITH 1/2" OR 3/8" NPT JIC SWIVEL ENDS. ROUTE UPPER HOSE WITH HIGH POINT 4" MIN ABOVE TOP OF GAUGE.
- 4) CONNECT BOTTOM PORT TO ENGINE OIL PAN WITH #8 HOSE WITH 1/2" OR 3/8" NPT JIC SWIVEL ENDS. DO NOT TEE INTO OIL DRAIN LINE. ROUTE LOWER HOSE BACK THROUGH PRE-DRILLED HOLE IN STEEL PLATE.

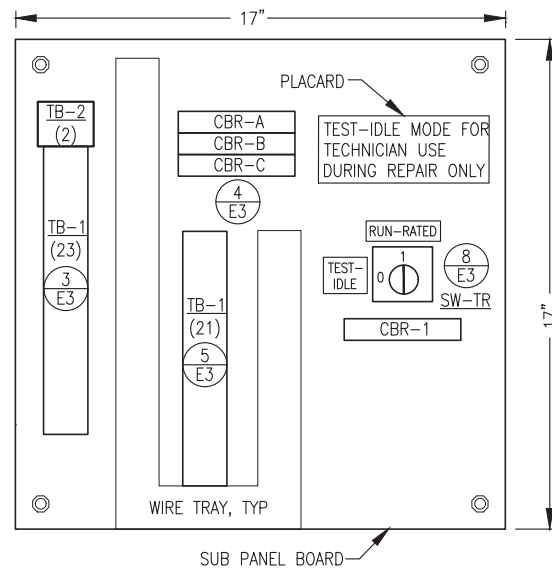
3 OIL LEVEL GAUGE/SWITCH INSTALLATION
M5 NO SCALE

ISSUED FOR
GENERATOR
PURCHASE
FEBRUARY
2026

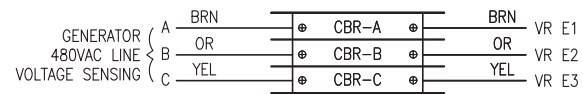
 ALASKA ENERGY AUTHORITY		
PROJECT: MKEC 2026 DERA PROJECT CHUATHBALUK POWER PLANT UPGRADES		
TITLE: GENERATOR FABRICATION DETAILS		
 P.O. 111405, Anchorage, AK 99511 (907)349-0100	DRAWN BY: JTD	SCALE: AS NOTED
	DESIGNED BY: BCG	DATE:
FILE NAME: CHBLKB DERA M	SHEET:	M5
PROJECT NUMBER:		



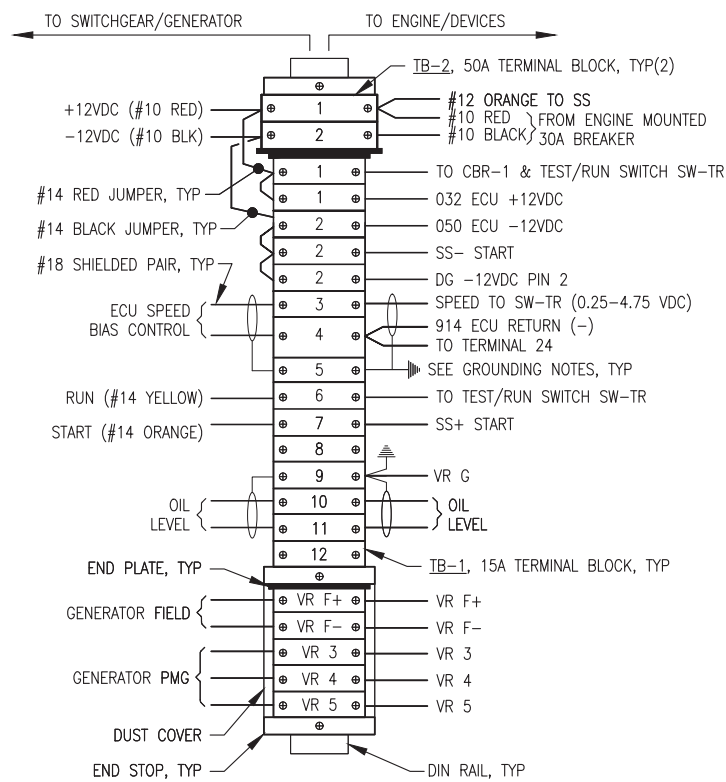
1 JUNCTION BOX FRONT PANEL LAYOUT
E3 NO SCALE



2 JUNCTION BOX SUB PANEL LAYOUT
E3 NO SCALE

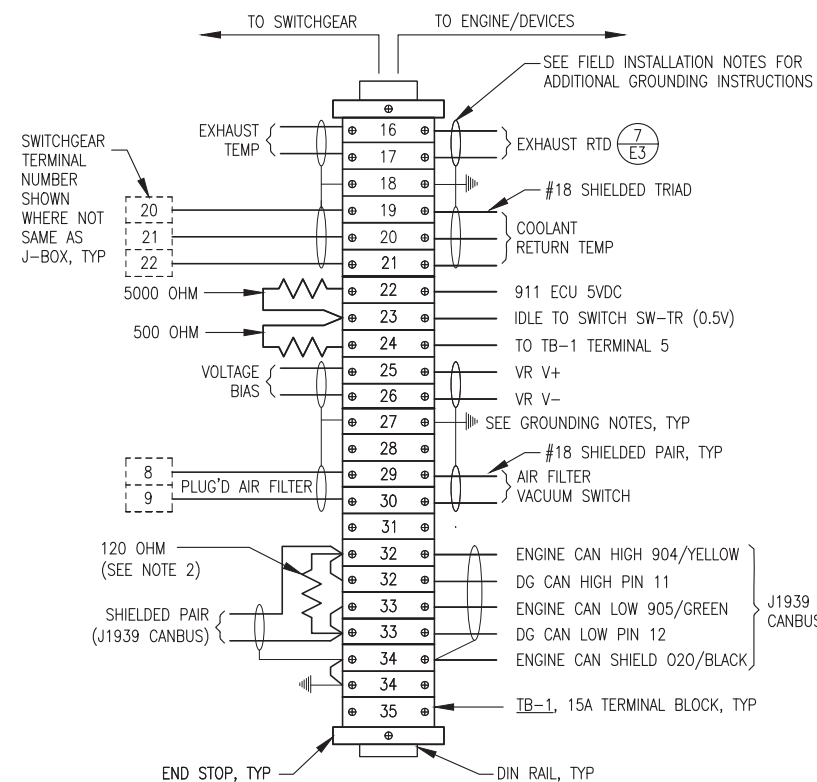


4 CIRCUIT BREAKER CONNECTIONS
E3 NO SCALE



NOTE: TYPICAL JOHN DEERE ECU CONNECTION NUMBERS SHOWN. SEE WIRING HARNESS FOR EACH ENGINE FOR ACTUAL ECU CONNECTIONS.

3 TERMINAL STRIP CONNECTIONS
E3 NO SCALE



NOTES: 1) ALL RESISTORS 0.25W.
2) REMOVE RESISTOR IF ENGINE WIRING HARNESS HAS 120 OHM END OF LINE RESISTOR.

5 TERMINAL STRIP CONNECTIONS
E3 NO SCALE

TAG	MANUFACTURER	MODEL	DESCRIPTION
21 PIN	JOHN DEERE OR	DEUTZ	21 PIN CUSTOMER CONNECTION ASSY
CBR-A/B/C	ALLEN-BRADLEY	1489-M1-C010	RAIL MOUNT CIRCUIT BREAKER, 1P, 1A
CBR-1	ALLEN-BRADLEY	1489-M1-C050	RAIL MOUNT CIRCUIT BREAKER, 1P, 5A
DG	JOHN DEERE	DG-14	DIAGNOSTIC GAUGE WITH HARNESS
			PROGRAMMED FOR MARINE TIER 3 WITH UNIQUE JOHN DEERE FAULT CODE
ENCL.	HOFFMAN	A20H20ALP	20x20x8" NEMA 12
	HOFFMAN	A20P20	BACK PANEL
SS	JOHN DEERE	AT141011	STARTER AUXILIARY SOLENOID, 12V
SW-TR	ALLEN-BRADLEY	194L-A12-225-2	CHANGEOVER SWITCH, 12A, 2P
	ALLEN-BRADLEY	194L-HE-4A-175	90 DEGREE I-O HANDLE
TB-1	IDEC	BNH15LW	15A DIN RAIL-MOUNT TERMINAL BLOCK
TB-2	IDEC	BNH50W	50A DIN RAIL-MOUNT TERMINAL BLOCK
VR	BASLER	DECS-100-A05	DIGITAL VOLTAGE REGULATOR

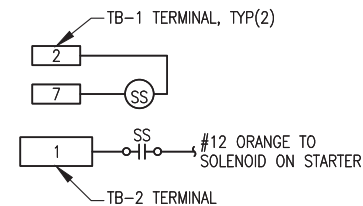
BRAND SPECIFIC NOTE: SPECIFIC PARTS MANUFACTURER AND MODEL SELECTED NOT ONLY TO MEET PERFORMANCE FUNCTION BUT ALSO TO COORDINATE AND INTERFACE WITH OTHER DEVICES AND SYSTEMS. APPROVED EQUAL SUBSTITUTIONS WILL BE ALLOWED ONLY BY ENGINEER'S APPROVAL. TO OBTAIN APPROVAL, SUBMITTALS MUST CLEARLY DEMONSTRATE HOW SUBSTITUTE ITEM MEETS OR EXCEEDS SPECIFIED ITEM QUALITY AND PERFORMANCE CHARACTERISTICS AND ALSO COMPLIES WITH MECHANICAL AND/OR ELECTRICAL CONNECTIONS AND PHYSICAL LAYOUT REQUIREMENTS.

SHOP FABRICATION NOTES:

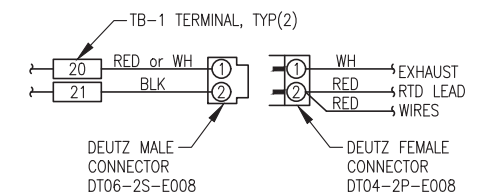
- 1) PROVIDE ASSEMBLY WITH ALL DEVICES AND WIRING INDICATED.
- 2) INSTALL IN A NEMA 12 ENCLOSURE WITH MOUNTING FLANGES AT BACK, A MIN 14 GAUGE INTERIOR BACK PANEL AND HINGED LOCKABLE DOOR. SIZE AS INDICATED.
- 3) PROVIDE DIN RAIL, TERMINAL END PLATES, TERMINAL END STOPS, TERMINAL DUST COVERS AND OTHER MISCELLANEOUS HARDWARE AS REQUIRED TO MATCH TERMINALS. LABEL ALL TERMINALS EXACTLY AS INDICATED ON THE DETAILS.
- 4) ALL WIRE #14AWG EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE. LABEL BOTH ENDS OF ALL JUMPERS WITH THE ENGINE PANEL TERMINAL NUMBER.
- 5) PROVIDE MECHANICAL GROUND LUGS FASTENED TO BACK PANEL AND GROUNDED TO ENGINE-GENERATOR. GROUND ALL SHIELD DRAIN WIRES TO LUGS AT BACK PANEL ONLY.
- 6) PROVIDE WIRING HARNESES FOR CONNECTION TO GENERATOR AND TO ENGINE. INSTALL WIRES IN LIQUID TIGHT FLEX OR FLEXIBLE PLASTIC WIRE LOOM AND PROVIDE SERVICE LOOPS IN ACCORDANCE WITH SPECIFICATIONS.
- 7) SHOP TEST EACH NEW ENGINE-GENERATOR WITH ASSOCIATED JUNCTION BOX PERMANENTLY CONNECTED. UPON COMPLETION OF TESTING, COIL WIRING HARNESES AND SECURE JUNCTION BOX TO GENERATOR FOR SHIPPING.

FIELD INSTALLATION NOTES:

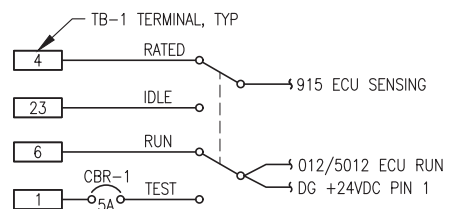
- 1) PERFORM ALL FIELD WIRING IN ACCORDANCE WITH SPECIFICATIONS. LABEL BOTH ENDS OF ALL FIELD WIRING WITH THE ENGINE PANEL TERMINAL NUMBER.
- 2) ON SHIELDED CONDUCTORS GROUND ALL SHIELD DRAIN WIRES AT ENGINE J-BOX ONLY. CLIP DRAIN WIRES AT OPPOSITE ENDS.



6 STARTER AUX SOLENOID SS WIRING
E3 NO SCALE



7 EXHAUST RTD CONNECTOR
E3 NO SCALE



8 TEST-IDLE/RUN-RATED SWITCH SW-TR WIRING
E3 NO SCALE

ISSUED FOR GENERATOR PURCHASE FEBRUARY 2026

ALASKA ENERGY AUTHORITY

PROJECT: MKEC 2026 DERA PROJECT
CHUATHBALUK POWER PLANT UPGRADE

TITLE: 12VDC ENGINE CONTROL WIRING JUNCTION BOX

	DRAWN BY: JTD	SCALE: AS NOTED
	DESIGNED BY: CWV/BCG	DATE:
	FILE NAME: CHBLKB DERA E	SHEET:
	PROJECT NUMBER:	E3

P.O. 111405, Anchorage, AK 99511 (907)349-0100