

FILE

THE PUBLIC UTILITIES COMMISSION OF OHIO

RENEWABLE ENERGY SERVICES  
OF OHIO, LLC,  
1 Continental Way  
Norwalk, Ohio 44857

vs.

FIRSTENERGY CORP.,  
76 South Main Street  
Akron, Ohio 44308

Docket No. 09-429-EL-CSS

COMPLAINT

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2009 MAY 21 AM 9:13  
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NOW COMES Renewable Energy Services of Ohio, LLC ("Renewable"), by and through its counsel, Meyers, Roman, Friedberg & Lewis, by Mario J. Fazio, and for its Complaint states the following:

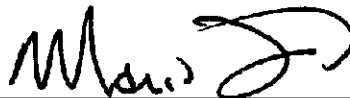
1. Renewable intends to develop a renewable energy project using landfill methane gas and converting it to electricity at a project located in Erie County, Ohio (the "Project").
2. In this regard, Renewable has entered into a Landfill Gas Purchase Agreement with Erie County, Ohio, dated December 20, 2007, and a Landfill Power Purchase Agreement with American Municipal Power Ohio, dated September 1, 2008.
3. Pursuant to Ohio Administrative Code §4901:1-22-04, Renewable submitted to FirstEnergy an application for interconnection services on May 12, 2008 for the Project, a copy of which is attached hereto as "Exhibit A."
4. Renewable has, in good faith, on numerous occasions endeavored to contact FirstEnergy to discuss its application for interconnection services.
5. FirstEnergy has delayed discussing the matter and has failed to provide any substantive written response to Renewable regarding its application.
6. FirstEnergy's inaction has caused serious delays in development of the Project and has resulted in monetary damages to Renewable and its owners.
7. FirstEnergy failed to comply with Ohio Administrative Code §4601:1-22-04(B)(1), because it did not process Renewable's application in a nondiscriminatory manner and in the order in which it was received. Despite having received Renewable's application over one (1) year ago, FirstEnergy has failed to process the application, nor has it

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informed Renewable of any defects in the application. Renewable has made numerous inquiries of the status of the application and FirstEnergy has been non-responsive.

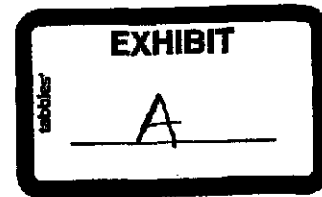
8. In this connection, FirstEnergy failed to comply with Ohio Administrative Code §4601:1-22-04(B)(3), which states that the public utility company "shall automatically provide each applicant with a written notice of [its] receipt of an application within three business days after the application has been received. The notice of receipt shall include the following: (a) a copy of the applicable review process; and (b) a target date for processing the application." FirstEnergy failed to provide the requisite notice of receipt, and has failed to provide Renewable with a target completion date.
9. FirstEnergy further failed to comply with Ohio Administrative Code §4601:1-22-04(B)(4) because, if it has determined that Renewable's application is incomplete, it has not provided to Renewable: (a) written notice of such incompleteness within ten (10) business days; (b) a checklist of information required to complete the application; and (c) a statement that processing cannot begin until the needed information is received.
10. Finally, FirstEnergy is in violation of Ohio Administrative Code §4601:1-22-04(B)(5) because, if it has determined that it cannot connect Renewable's facility within the required timeframes, it has failed to notify Renewable of this fact within ten (10) business days after receipt of its application.

WHEREFORE, Renewable respectfully requests that the Commission: (a) direct FirstEnergy to promptly process Renewable's application for interconnection services and enter into a fair and reasonable Interconnection Service Agreement with Renewable for the Project; and (b) grant Renewable any and all further relief that the Commission deems just and proper.



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Mario J. Fazio (Bar Reg. No. 0042284)  
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Cleveland, Ohio 44122  
Phone: (216) 831-0042  
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[mfazio@meyersroman.com](mailto:mfazio@meyersroman.com)  
*Counsel for Renewable Energy Services of Ohio, LLC*



## **Bio-Gas Technologies, Ltd.**

**Developers of Landfill Gas-to-Energy and Co-Generation Power Systems**

May 12, 2008

Memo To: Bruce Rimmel

Re: Ohio Renewable Energy Services, LLC, Interconnection

Dear Bruce,

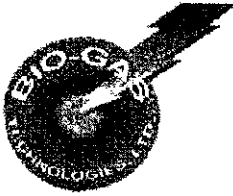
The attached represents our application for interconnection to O-E's distribution system. The facility will sell all of its output to AMP-Ohio under a long term sales agreement. The facility will be built on Hoover Road per the attached site drawings. This DG unit is located next to FE's transmission line easement. The O-E, 12.4kV lines end at the intersection of Hoover Road and Mason Road. Rich Adelman estimated that four to five poles would be needed to reach the property line.

We normally use a Schweitzer Engineering Laboratories, Model SEL-351A Relay, for Distribution Protection. This relay is capable of protection per the attached single line drawing. This relay will be controlling a Square D, Model VR, rated for 4.76 kV, 3-Phase, Class 6055, Vacuum Circuit Breaker. We have attached the normal settings we used for this type of service. Please advise what settings your firm requires for this device.

The generator protection uses a Schweitzer Engineering Laboratories, Model-551 protection relay. This relay is controlling another Square D Vacuum Circuit Breaker. The generator also contains a complete set of protection devices built into the generator's unit mounted EMCP-II+, control panel.

If the utility causes a tripp of any type on the distribution line the main feeder will open and be locked out. The design prevents automatic reclosure of the feeder breaker without manual, human operation. The unit will continue to operate supplying house-parasitic load until the engine has timed out for its cool-down period.

I have attached several aerial maps showing the site from different vantage points. One of the aerials shows the site and its relation to Hoover Road, Mason Road, and Huron Avery Road and the closest O-E substation, which is located just across Milan Road [ SR-250].



## **Bio-Gas Technologies, Ltd.**

**Developers of Landfill Gas-to-Energy and Co-Generation Power Systems**

We are planning to use a pad mounted, outdoor, oil filled, fan cooled, 3750 kVa, 12.4 kV to 4.16 kV step-down, transformer with bottom entry exit connections and fused disconnect switch on the 12.4 kV side. I have attached photos and specification cut sheet on this transformer. We would like to use a Wye connection on the 4.16 kV side with a delta connection on the 12.4 kV side as this gives a good bonding point with the grounding grid, building, generator and transformers. We bond at one point and one point only, multiple bonding points creates multiple problems with digital equipment.

We will also have a 4.16 kV/480 volt, 300 kVa, 3-phase transformer for parasitic load and a 480 volt to 120/240 volt, single phase, 50 kVa transformer for the building low voltage requirements.

We will be using use a Power Measurement, ION-7650 power quality meter with data collection for utility compliance monitoring. Programmed into this meter is additional, third tier, system fault protection isolation. This meter will be integrated into the system's main microprocessor control.

We utilize a Caterpillar digital, solid state, voltage regulator with cross current compensation, volts-per-hertz control, series boost, VAR-power factor controller built into this device.

We have tried to make this application as complete as possible so that it moves along as promptly as possible. If you need any additional information please feel free to contact me.

Best regards



James R. Hiendlmayr  
Managing Partner

Cc: Gary Mortus, Rich Adelman, Ohio Edison  
Enclosures

APPLICATION FOR INTERCONNECTION AND PARALLEL OPERATION WITH THE  
OHIO EDISON COMPANY'S DISTRIBUTION SYSTEM

Return Completed Application to: FirstEnergy Corporation  
c/o Metropolitan Edison Co  
P.O. Box 16001  
Reading, PA 19640  
Attn: PA Rates - Net Metering & Interconnection  
Fax: 330 - 777 - 6188

Customer's Name: Ohio Renewables Energy Services, LLC

Address: 1 Continental Way

City: Norwalk State: Ohio Zip: 44857

Account Number: N/A

Contact Person: James Hiendlmayr

Telephone Number: 419-663-8000

Service Point Address: Hoover Road, [See attached site maps]

City: Milan Township State: Ohio Zip: 44846

Information Prepared and Submitted By: James Hiendlmayr

Company Name Bio-Gas Technologies, LLC

City: Norwalk State: Ohio Zip: 44857

Address: 1 Continental Way

Telephone Number: 419-663-8000 Email: BGTJIMH@AOL.COM

**GENERATOR**

The following information shall be supplied by the Customer or Customer's designated representative. All applicable items must be accurately completed in order that the Customer's generating facilities may be effectively evaluated for interconnection with the Company's Distribution System.

Type: Synchronous, Fuel Source: Biogas

Number of Units: 1 Manufacturer: Caterpillar, Model 3520

Model Number of Inverter (If Applicable): \_\_\_\_\_

Inverter Rating (If Applicable): \_\_\_\_\_ kW, Number of Phases: 3, Frequency: 60 Hz

DC Source Rating (If Applicable): \_\_\_\_\_ kW DC Voltage Rating (If Applicable): \_\_\_\_\_ V

kW Rating (@ 95°F at location): 1600 kW kVA Rating (@ 95°F at location): 2000kVA

Power Factor: 80 %, Voltage Rating: 4160 VAC, Ampere Rating: 277.6 Amps

Do you plan to export power? Yes - Significant annual Export - No net metering

If Yes, Estimated Maximum: 1600 kW, Estimated Energy: 35000 kWh per Day

(Attach additional sheets as necessary in the event of multiple units of various types/sizes)

APPLICATION FOR INTERCONNECTION AND PARALLEL OPERATION – Continued

Normal Operation of Interconnection: Other

If "Other", please describe: Sale of all exported power exported to AMP-Ohio,

Application Fee<sup>2</sup> \$250 [Checks may be made payable to FirstEnergy Corporation.]

One-line diagram attached? Yes [Note: Requires a "Yes" for a complete Application.]

Have testing results<sup>3</sup> been supplied to the Company documenting conformance with the Company's technical requirements: Yes [Note: Requires a "Yes" for a complete Application.]

Have all necessary government permits and approvals been obtained for the project prior to this application? Yes [Note: Requires a "Yes" for an Application to be considered complete.]

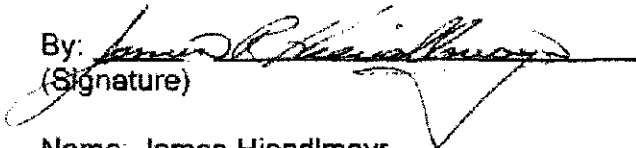
Have the generator manufacturer machine characteristics been supplied to the Company? Yes [Note: Requires a "Yes" for a complete Application.]

Is there a layout sketch showing lockable, "visible" disconnect device? Yes ["Yes" Required for a complete Application.]

Application fee<sup>4</sup>: \$ 8000 [Checks may be made payable to FirstEnergy Corporation.]

DATE: May 12, 2008

Ohio Renewable Energy Services, LLC

By:   
(Signature)

Name: James Hiendlmayr  
(Type or Print)

Title: Managing Partner  
(Type or Print)

When finished completing form, save with a new name. Place cursor on a location other than a dropdown list to print

<sup>2</sup> The Company shall charge each Interconnection Service Customer that applies for Interconnection Service a nonrefundable Application fee of \$250 payable at the time the Application is submitted.

For Inverter-based systems, evidence of UL 1741 test certification satisfies this requirement. Testing may be performed by UL or another Nationally Recognized Testing Laboratory

<sup>4</sup> Each Interconnection Service Customer shall deposit with the Company an amount equal to \$5 per kW of generation referenced in the Application for all generation units greater than 50kW. All units 50kW or less shall be assessed the nonrefundable Application Fee only as its deposit. The Company shall apply the deposit to the Company's actual costs associated with the Interconnection. If such costs are greater than the amount of the deposit, the customer shall pay such additional costs to the Company. If such costs are less than the amount of the deposit the Company shall refund the balance of the deposit to the customer.

GENERATOR DATA  
FOR STABILITY CALCULATIONS  
 (Not Intended for Inverter Based Systems)

Machine MVA base for each machine: 4.0 MVA  
See Attached Data  
Sheet for Values

Step-up transformer percent impedance and MVA base

\_\_\_\_\_ % R + \_\_\_\_\_ % X \_\_\_\_\_ MVA  
 \_\_\_\_\_ % R + J \_\_\_\_\_ % X \_\_\_\_\_ MVA

| Value* | Description (for each machine) <u>Caterpillar 3520, Frame 868 see attached</u>      |
|--------|-------------------------------------------------------------------------------------|
| _____  | T'do (sec. 0) _____                                                                 |
| _____  | T'do (sec. 0) _____                                                                 |
| _____  | T'qo (sec. 0) _____                                                                 |
| _____  | T'qo (sec. 0) _____                                                                 |
| _____  | Inertia H Total Shaft Inertia (Turbine, exciter, generator)                         |
| _____  | Speed Damping D If unavailable, program defaults to 0.0                             |
| _____  | Xd                                                                                  |
| _____  | Xq                                                                                  |
| _____  | X'd                                                                                 |
| _____  | X'q                                                                                 |
| _____  | X''d = X''q                                                                         |
| _____  | X1 If unavailable, program defaults to 0.05Xd                                       |
| _____  | S(1.0) Saturation values 1.0 p.u. voltage; if unavailable, program defaults to 0.11 |
| _____  | S(1.2) Saturation values 1.2 p.u. voltage; if unavailable, program defaults to 0.48 |

|                                                                               |
|-------------------------------------------------------------------------------|
| <u>Excitation System</u><br>Brand Name: <u>Caterpillar</u><br>Type: <u>DC</u> |
|-------------------------------------------------------------------------------|

\* Xd, Xq, X'd, X'q, X''d, X''q, X1, H, and D are in p.u. machine base.  
 X''q must be equal to X''d.



**SUNBELT**  
transformers

**E-Quote**

**# 179526**

To:

Jim Hordman  
BioGas Technologies  
1300 Central Way  
Norwalk, CT 06851  
Tel: 203-437-6671 x120

From:

Don Sweney  
Phone: 1-248-442-6410  
dsweney@sunbeltusa.com  
Prepared on 05-12-2008

Reconditioned 3750 / 4687 KVA DSE B Transformer HV: 12470 D LV: 4160 Y 2400

**Specifications:**

HV CONDUCTOR: Aluminum  
LV CONDUCTOR: Aluminum  
TAPS: 1:094 12782 12470 12158 11846  
PHASE: 3  
FREQUENCY: 60  
DECR. RISE: 65  
CLASS: OAFB  
IMPEDANCE: 5.88  
LIQUID: oil  
MANUFACTURER: Balleau Standard  
OEM SERIAL: ST0603A12486  
STOCK NO: T48151-1 S  
HV BUSHINGS: Qty: 3 Location: Side Termination: ATC  
LV BUSHINGS: Qty: 4 Location: Side Termination: ATC

**Accessories:**

Pressure relief device  
Dial type thermometer  
Liquid level gauge  
Pressure vacuum gauge  
Drain and sample valve  
Upper filter press connection

**Notes:**

includes Fans Controls

**Commercial Terms:**

SHIPMENT: Stock, 1-2 weeks ARO  
PAY TERMS: Net 30 with approved credit upon completion  
SHIPPING TERMS: FOB Factory Prepaid- Allowed  
SHIP SITE: Bakersfield, CA  
WARRANTY: 2 year

**Dimensions:**

H: 78 in W: 109 in D: 103 in

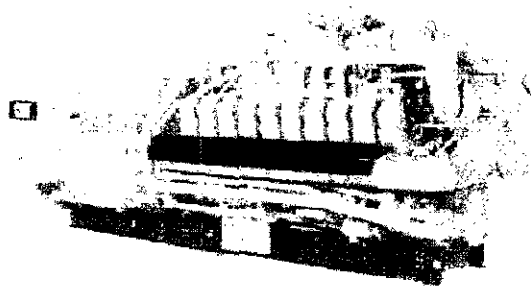
**Weight:**

17100 lbs. (See sales engineer for gallons of fluid)

**More info:**

Contact your sales engineer to modify or add other accessories to this quote.

Visit the [Stock Substation page](http://www.sunbeltusa.com/content/stock_substationtrans) for drawings, warranty and general information  
[http://www.sunbeltusa.com/content/stock\\_substationtrans](http://www.sunbeltusa.com/content/stock_substationtrans)



**CONTINUOUS  
1600 kW @  
1200 RPM  
60 Hz (Low Energy Fuel)**

Caterpillar is leading the power generation marketplace with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

**BENEFITS**

**LOW EMISSIONS**

- Meets most worldwide emissions requirements down to 0.5 g/bhp-hr NOx level without aftertreatment

**FULL RANGE OF ATTACHMENTS**

- Wide range of bolt-on system expansion attachments, factory designed and tested

**SINGLE-SOURCE SUPPLIER**

- **Fully Prototype Tested** with certified torsional vibration analysis available

**WORLDWIDE PRODUCT SUPPORT**

- With over 1,800 dealer branch stores operating in 166 countries, you're never far from the Caterpillar part you need.  
99.5% of parts orders filled within 48 hours.  
The best product support record in the industry.
- Caterpillar dealer service technicians are trained to service every aspect of your electric power generation system
- Customer Support Agreements offer back-to-back services from scheduled inspections and preventive maintenance to before-failure overhauls and Total Cost Per Hour Guarantees.



**CAT® G3520C GAS ENGINE**

- Robust high speed diesel block design provides prolonged life and lower owning and operating costs.
- Designed for maximum performance on low pressure pipeline natural gas.
- Simple open chamber combustion system for reliability and fuel flexibility
- Leading edge technology in ignition system and air/fuel ratio control for lower emissions and higher engine efficiency.
- One electronic control module handles all engine functions: ignition, governing, air/fuel ratio control, and engine protection.
- Factory designed systems built at Caterpillar ISO9001:2000 certified facilities.



**CAT SR4B GENERATOR**

- Designed to match performance and output characteristics of Caterpillar engines.
- Optimum winding pitch for minimum total harmonic distortion and maximum efficiency.
- Segregated low voltage (AC/DC) accessory box provides single point access to accessory connections.



**CAT CONTROL MODULE**

- Designed to meet individual customer needs:  
Gas Engine Control Module provides full featured engine management and control functions: engine cycle, staged shutdown, high oil pressure and low oil pressure protective relaying functions.
- Remote control and monitor capability options

# GAS GENERATOR SET CONTINUOUS POWER 1600 kW @ 1200 RPM - 60 Hz (LOW ENERGY FUEL)

# CATERPILLAR

## FACTORY INSTALLED STANDARD & OPTIONAL EQUIPMENT

| System                                  | Standard                                                                                                                                                                                                                                                                                                                                                                     | Optional                                                                                                                                                                                    |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air Inlet                               | 2 element, single stage air cleaner with enclosure, service indicator, horizontal mount (shipped loose)                                                                                                                                                                                                                                                                      | 2 elements with enclosure vertical mount (shipped loose). Stand to mount horizontal or optional vertical air cleaner. Heavy duty air cleaner w/precleaner, horizontal mount (shipped loose) |
| Cooling                                 | Engine driven water pumps for jacket water and aftercooler, stand, jacket water and SCAC pumps start. 480/208V customer ratings conform with the 480V and require ANSI C 130A 100-1500 systems has Cat fan legs.                                                                                                                                                             | Permitts radiator for 24V and SCAC controls. Water level switch mounted for full water level. 480V electric driven fans with quantity motor control and disconnect switch.                  |
| Engine Control Module                   | Fuel/air ratio control transient richening and turbo bypass control. Start/stop logic, gas purge cycle, staged shutdown. Engine Protection Systems: detonation sensitive timing, high jacket water temperature, low oil pressure, failure to start, overspeed, high oil temperature, emergency stop.                                                                         |                                                                                                                                                                                             |
| Exhaust                                 | Dry exhaust manifold, full flanged outlet. Individual exhaust stop and bypass gate under control of Integrated Performance Monitoring Module (IPMM) for providing alarms and shutdowns.                                                                                                                                                                                      | 15, 18, 24, 25, 35A alternator modules with ANSI style flanges, weld flanges, exhausts, and flexible fitting.                                                                               |
| Fuel                                    | Electronic air fuel ratio control (Engine Control Module). ADEM™ III based, electronic fuel control valve, throttle plate throttle, electronically actuated and electronically controlled by ECM, low pressure pipeline natural gas fuel supply (100-350 mscf). Sized for 10.8 to 25.8 MMBtu/hr (275 to 650 Btu/hr) for dry pipeline natural gas.                            | Fuel filter (non-coalescent)                                                                                                                                                                |
| Ignition                                | ECM provides electronic ignition, individual cylinder timing and inductive high deposition control through the ECM. One detonation sensor per cylinder.                                                                                                                                                                                                                      |                                                                                                                                                                                             |
| Integrated Thermo Sensing Module (ITSM) | 24 thermocouples to input individual exhaust port temperatures and inlet and outlet temperatures of both turbochargers.                                                                                                                                                                                                                                                      | ECM transfers Cat® DataLink information through RS232 to customer terminal.                                                                                                                 |
| Generator                               | Temperature limit in excitation, two bearing oil coolers, separate sensing, platinum state RVD. Class F insulation, 100% surge. Caterpillar® Integral Voltage Regulator with adjustable 110V to 240V output and PF control. Back out temperature extension. Low, segregated low voltage warning panel, overvoltage, temperature detectors, with condenser oil drain heaters. | Overvoltage and premium generation. Bearing temperature detector. Low voltage alarm extension, trip.                                                                                        |
| Governor                                | Electronic (ADEM™ III, ProAct) actuator.                                                                                                                                                                                                                                                                                                                                     | Electronic load sharing.                                                                                                                                                                    |
| Control Panels                          | ADEM™ III.                                                                                                                                                                                                                                                                                                                                                                   | Local start and stop, interconnect, load shedding, load sharing module.                                                                                                                     |
| Lube                                    | Lubricating oil and filter, oil drain valve, crankcase breathers, gas type (tube or pump), integral tube oil cooler, lifted/dropped.                                                                                                                                                                                                                                         | Closed crankcase ventilation system, prelub pump.                                                                                                                                           |
| Mounting                                | 550 mm structural steel rails for base and ductwork, container, and vibration mounts (shipped loose).                                                                                                                                                                                                                                                                        |                                                                                                                                                                                             |
| Starting/Charging                       | 24 volt starting motor, batteries with rack and cables, batteries disconnect switch.                                                                                                                                                                                                                                                                                         | Battery charger, 24V charging alternator, air starting system, jacket water coolant heaters, 9 kW (450V/3 phase) with 240V/1 phase pump, include isolation valves, overvoltage batteries.   |
| General                                 | Generator                                                                                                                                                                                                                                                                                                                                                                    | Manual latching device, detentions, crank case expansion relief valve.                                                                                                                      |

## SPECIFICATIONS

### CAT SR48B GENERATOR

|                        |                                                                 |
|------------------------|-----------------------------------------------------------------|
| Excitation             | 80%                                                             |
| Excitation             | Excitation (independent)                                        |
| Fuel                   | 100%                                                            |
| Number of poles        | 6                                                               |
| Number of bearings     | 2                                                               |
| Number of fans         | 6                                                               |
| Insulation             | UL 1446 Reinforced Class H insulation                           |
| IP class               | Disinfect IP22                                                  |
| Alignment              | Pure shaft                                                      |
| Overload capability    | 125%                                                            |
| Wave form              | Less than 5% distortion                                         |
| Paralleling capability | Standard                                                        |
| Voltage regulation     | On load sensing with adjustable 110V to 240V output, 100% surge |
| PF                     | Less than 0.9                                                   |
| THD                    | Less than 3%                                                    |

Consult your Caterpillar dealer for available voltages

### CAT ENGINE

|                   |                                          |
|-------------------|------------------------------------------|
| Displacement      | 120 (6.7)                                |
| Stroke            | 190 (7.5)                                |
| Displacement      | 100 (5.2)                                |
| Compression ratio | 11.1:1                                   |
| Aspiration        | Turbocharged Separate Charge Aftercooled |
| Fuel system       | Low Pressure                             |
| Injection type    | Electronic (ADEM™ III)                   |

### CAT CONTROL PANEL

|                                                        |  |
|--------------------------------------------------------|--|
| 24 Volt DC Control                                     |  |
| NEMA 1 IP22 enclosure                                  |  |
| Electrically dead front                                |  |
| Lockable hinged door                                   |  |
| Generator instruments meet ANSI C39.1                  |  |
| Terminal box (shipped)                                 |  |
| Single isolation circuit, terminal point               |  |
| EL component - segregated AC/DC connections and wiring |  |

# GAS GENERATOR SET CONTINUOUS POWER 1600 kW @ 1200 RPM - 60 Hz (LOW ENERGY FUEL)

# CATERPILLAR

## TECHNICAL DATA

| Generator Set - 1200 rpm/60 Hz/480 Volts           |  |  |  | DM5740  |  | DM5739  |  |
|----------------------------------------------------|--|--|--|---------|--|---------|--|
| <b>G3520C Gas Generator Set (Low Energy Fuel)</b>  |  |  |  |         |  |         |  |
| Emission level (NOx)                               |  |  |  | 0.5     |  | 1       |  |
| Aftercooler (CAC)                                  |  |  |  | 54      |  | 54      |  |
| Package Performance (1)                            |  |  |  | 130     |  | 130     |  |
| Electrical efficiency @ 1.0 ul (5)                 |  |  |  | 40.1%   |  | 41.2%   |  |
| Power rating @ 1.0 ul                              |  |  |  | 1617    |  | 1617    |  |
| Power rating @ 0.5 ul                              |  |  |  | 1600    |  | 1500    |  |
| Mechanical Power                                   |  |  |  | 2000    |  | 2000    |  |
| Fuel Consumption (2)                               |  |  |  | 1665    |  | 1665    |  |
| Low Heat Value (LHV) fuel input (ISO3046/1)        |  |  |  | 2233    |  | 2233    |  |
| 100% load without fan                              |  |  |  | 4032    |  | 3929    |  |
| 75% load without fan                               |  |  |  | 235,181 |  | 229,195 |  |
| 50% load without fan                               |  |  |  | 408     |  | 358     |  |
| Altitude Capability (3)                            |  |  |  | 14,774  |  | 15,224  |  |
| At 25 °C (77 °F) Ambient                           |  |  |  | 318     |  | 310     |  |
| Cooling System                                     |  |  |  | 11,510  |  | 11,866  |  |
| Ambient air temperature                            |  |  |  | 226     |  | 221     |  |
| Jacket Water temperature (maximum outlet)          |  |  |  | 8364    |  | 8438    |  |
| Exhaust System                                     |  |  |  | 221     |  | 221     |  |
| Exhaust gas inlet flow rate                        |  |  |  | 113     |  | 108     |  |
| Exhaust gas outlet flow rate                       |  |  |  | 486     |  | 490     |  |
| Exhaust gas inlet temperature                      |  |  |  | 122     |  | 117     |  |
| Exhaust gas outlet temperature                     |  |  |  | 12,645  |  | 11,557  |  |
| Exhaust gas inlet diameter                         |  |  |  | 360     |  | 360     |  |
| Exhaust gas outlet diameter                        |  |  |  | 14.17   |  | 14.17   |  |
| Heat Rejection (4)                                 |  |  |  | 676     |  | 657     |  |
| Heat rejection to Jacket Water and AC - Stage 1    |  |  |  | 35,427  |  | 37,363  |  |
| Heat rejection to oil cooler and AC - Stage 2      |  |  |  | 339     |  | 332     |  |
| Heat rejection to exhaust (LHV to 350 °F)          |  |  |  | 19,298  |  | 18,866  |  |
| Heat rejection to atmosphere from engine           |  |  |  | 1158    |  | 1141    |  |
| Heat rejection to atmosphere from generator        |  |  |  | 55,468  |  | 54,952  |  |
| Generator                                          |  |  |  | 127     |  | 127     |  |
| Motor starting capability @ 30% voltage dip*       |  |  |  | 47.7    |  | 47.7    |  |
| Frame                                              |  |  |  | kW      |  | kW      |  |
| Temperature rise                                   |  |  |  | 3663    |  | 3663    |  |
| Lube System                                        |  |  |  | 762     |  | 762     |  |
| Refill volume with filter change for standard sump |  |  |  | 165     |  | 165     |  |
| Emissions (5)                                      |  |  |  | 541     |  | 541     |  |
| NOx                                                |  |  |  | 141     |  | 141     |  |
| CO (maximum) (6)                                   |  |  |  | L       |  | L       |  |
| CO (total)                                         |  |  |  | Gal     |  | Gal     |  |
| CO (low methane)                                   |  |  |  | 541     |  | 541     |  |
| Exhaust (2, dry)                                   |  |  |  | 141     |  | 141     |  |

\*Variable synchronous driver

Emission data measurements are consistent with those described in EPA CFR 40 Part 89 Subpart D & E and ISO8178-1 for measuring NO, CO, PM, NOx. Data shown is based on steady state engine operating conditions of 25 °C (77 °F), 96.28 kPa (25.43 in Hg) and fuel having a LHV of 17.7 MJ/N-m<sup>3</sup> (456 Btu/cu ft) at 101.60 kPa (30.00 in Hg) absolute and 0 °C (32 °F). Emission data shown is subject to instrumentation, measurement, facility, and engine fuel system adjustments.

## RATING DEFINITIONS AND CONDITIONS

(1) Ratings are based on low energy methane-based gas having a LHV of 17.7 MJ/N-m<sup>3</sup> (456 Btu/cu ft) and 120 MN without fan (no variation in excess of the altitude, temperature, inlet/exhaust restriction, or difference from the conditions listed; contact your local Caterpillar dealer).

(2) Ratings and fuel consumption are based on ISO3046/1 standard reference conditions of 25 °C (77 °F) and 100 kPa (29.92 in Hg) with 0.15% fuel tolerance.

(3) Altitude capability is based on 2.5 kPa inlet and 5.0 kPa exhaust restriction.

(4) Heat Rejection - values based on ISO3046/1 with fuel tolerance of ±3% and 2.5 kPa inlet and 5.0 kPa exhaust restriction.

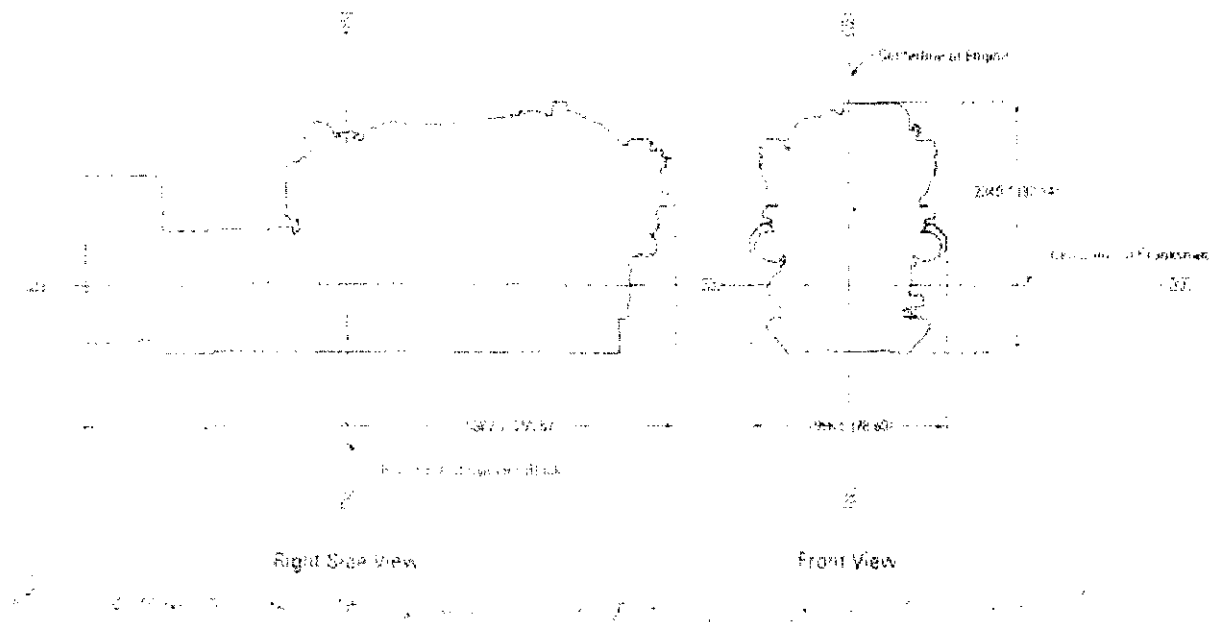
(5) Efficiency of standard generator is used. For higher efficiency generators, contact your local Caterpillar dealer.

(6) Nominal Value - emissions from a new engine during first 100 hrs of operation. Contact local dealer for more information.

**GAS GENERATOR SET  
CONTINUOUS POWER  
1600 ekW @ 1200 RPM - 60 Hz  
(LOW ENERGY FUEL)**

**CATERPILLAR**

**OPEN GENERATOR SET PACKAGE**



| Package Dimensions |           |           |
|--------------------|-----------|-----------|
| Length             | 6367.1 mm | 250.67 in |
| Width              | 1995.5 mm | 78.60 in  |
| Height             | 2465.1 mm | 97.05 in  |
| Shipping Weight    | 19 350 kg | 40 437 lb |

Note: Do not use for installation design.  
See general dimension drawings  
for detail (Drawing # 2d7-7367).

1300 Reference No. 1300-740-DM5/32

U.S. version

1300-740-DM5/32

Materials and specifications are subject to change without notice.  
The International System of Units (SI) is used in this publication.

[www.caterpillar.com](http://www.caterpillar.com)

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## GENERATOR DATA

SEPTEMBER 06, 2005

Can't find what you're looking for? [Click here](#)

## Selected Model

Engine: 3520 Generator Frame: 868 Genset Rating (kW): 1600.0 Line Voltage: 4160  
 Fuel: Gas Generator Arrangement: 1386432 Genset Rating (kVA): 2000.0 Phase Voltage: 2402  
 Frequency: 60 Excitation Type: Permanent Magnet Pwr. Factor: 0.8 Rated Current: 277.6  
 Duty: CONTINUOUS Connection: SERIES STAR Application: EPG Status: Current  
 Version: 28317, 28423, 28180, 9625

## Spec Information

| Generator Specification  |            | Generator Efficiency    |               |        |              |
|--------------------------|------------|-------------------------|---------------|--------|--------------|
| Frame: 868               | Type: SR4B | No. of Bearings: 2      | Per Unit Load | kW     | Efficiency % |
| Winding Type: FORM WOUND |            | Flywheel: 21.0          | 0.25          | 400.0  | 92.0         |
| Connection: SERIES STAR  |            | Housing: 00             | 0.5           | 800.0  | 94.8         |
| Phases: 3                |            | No. of Leads: 6         | 0.75          | 1200.0 | 95.0         |
| Poles:                   |            | Wires per Lead: 1       | 1.0           | 1600.0 | 95.5         |
| Sync Speed: 1200         |            | Generator Pitch: 0.6667 | 1.1           | 1760.0 | 95.4         |

| Reactances                            | Per Unit | Ohms    |
|---------------------------------------|----------|---------|
| SUBTRANSIENT - DIRECT AXIS $X_d'$     | 0.1500   | 1.2950  |
| SUBTRANSIENT - QUADRATURE AXIS $X_q'$ | 0.1510   | 1.3040  |
| TRANSIENT - SATURATED $X_d''$         | 0.2380   | 2.0620  |
| SYNCHRONOUS - DIRECT AXIS $X_d$       | 1.8160   | 15.7140 |
| SYNCHRONOUS - QUADRATURE AXIS $X_q$   | 0.9950   | 8.6090  |
| NEGATIVE SEQUENCE $X_2$               | 0.1500   | 1.2990  |
| ZERO SEQUENCE $X_0$                   | 0.0090   | 0.0800  |

| Time Constants                                         | Seconds |
|--------------------------------------------------------|---------|
| OPEN CIRCUIT TRANSIENT - DIRECT AXIS $T_{d0}'$         | 3.6290  |
| SHORT CIRCUIT TRANSIENT - DIRECT AXIS $T_d'$           | 0.4762  |
| OPEN CIRCUIT SUBTRANSIENT - DIRECT AXIS $T_{d0}''$     | 0.0169  |
| SHORT CIRCUIT SUBTRANSIENT - DIRECT AXIS $T_d''$       | 0.0112  |
| OPEN CIRCUIT SUBTRANSIENT - QUADRATURE AXIS $T_{q0}''$ | 0.0114  |
| SHORT CIRCUIT SUBTRANSIENT - QUADRATURE AXIS $T_q''$   | 0.0085  |
| EXCITER TIME CONSTANT $T_f$                            | 0.1889  |
| ARMATURE SHORT CIRCUIT $T_a$                           | 0.0331  |

|                           |                                 |                               |
|---------------------------|---------------------------------|-------------------------------|
| Short Circuit Ratio: 0.68 | Stator Resistance = 0.1725 Ohms | Field Resistance = 1.522 Ohms |
|---------------------------|---------------------------------|-------------------------------|

| Voltage Regulation                                 |      | Generator Excitation |                      |             |
|----------------------------------------------------|------|----------------------|----------------------|-------------|
| Voltage level adjustment: +/-                      | 5.0% | No Load              | Full Load, (rated) p |             |
| Voltage regulation, steady state: +/-              | 0.5% |                      | Series               | Parallel    |
| Voltage regulation with 3% speed change: +/-       | 0.5% | Excitation voltage:  | 10.88 Volts          | 33.79 Volts |
| Waveform deviation line - line, no load: less than | 3.0% | Excitation current   | 3.4 Amps             | 10.56 Amps  |
| Telephone influence factor: less than              | 50   |                      |                      |             |



**Selected Model**

Engine: 3520      Generator Frame: 868      Genset Rating (kW): 1600.0      Line Voltage: 4160  
 Fuel: Gas      Generator Arrangement: 1586432      Genset Rating (kVA): 2000.0      Phase Voltage: 2402  
 Frequency: 60      Excitation Type: Permanent Magnet      Pwr. Factor: 0.8      Rated Current: 277.6  
 Duty: CONTINUOUS      Connection: SERIES STAR      Application: EPG      Status: Current

Version: 38517/08433/08180/0625

**Generator Cooling Requirements -  
Temperature - Insulation Data**

|                                                       |                                          |          |
|-------------------------------------------------------|------------------------------------------|----------|
| <b>Cooling Requirements:</b>                          | <b>Temperature Data: (Ambient 40 °C)</b> |          |
| Heat Dissipated: 75.4 kW                              | Stator Rise:                             | 105.0 °C |
| Air Flow: 0.0 m <sup>3</sup> /min                     | Rotor Rise:                              | 105.0 °C |
| Insulation Class: H                                   |                                          |          |
| Insulation Reg. as shipped: 100.0 MΩ minimum at 40 °C |                                          |          |

**Thermal Limits of Generator**

|                       |            |
|-----------------------|------------|
| Frequency:            | 60 Hz      |
| Line to Line Voltage: | 4160 Volts |
| B BR 80/40            | 1660.0 kVA |
| F BR -105/40          | 2000.0 kVA |
| H BR - 125/40         | 2200.0 kVA |
| F PR 130/40           | 2200.0 kVA |

### Selected Model

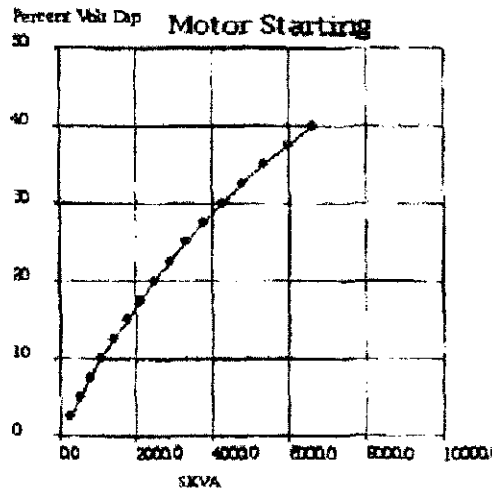
Engine: 3520      Generator Frame: 868      Genset Rating (kW): 1600.0      Line Voltage: 4160  
 Fuel: Gas      Generator Arrangement: 1586432      Genset Rating (kVA): 2000.0      Phase Voltage: 2402  
 Frequency: 60      Excitation Type: Permanent Magnet      Pwr. Factor: 0.8      Rated Current: 277.6  
 Duty: CONTINUOUS      Connection: SERIES STAR      Application: EPG      Status: Current

Version: 38517 38453 /36180 9621

### Starting Capability & Current Decrement

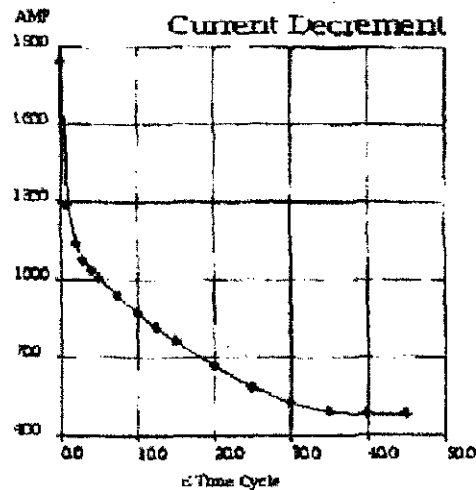
#### Motor Starting Capability (0.4 pf)

| SKVA  | Percent Volt Dip |
|-------|------------------|
| 236   | 2.5              |
| 526   | 5.0              |
| 810   | 7.5              |
| 1,110 | 10.0             |
| 1,427 | 12.5             |
| 1,762 | 15.0             |
| 2,118 | 17.5             |
| 2,497 | 20.0             |
| 2,899 | 22.5             |
| 3,329 | 25.0             |
| 3,788 | 27.5             |
| 4,280 | 30.0             |
| 4,809 | 32.5             |
| 5,378 | 35.0             |
| 5,992 | 37.5             |
| 6,658 | 40.0             |



#### Current Decrement Data

| E Time Cycle | AMP   |
|--------------|-------|
| 0.0          | 1,845 |
| 1.0          | 1,286 |
| 2.0          | 1,133 |
| 3.0          | 1,074 |
| 4.0          | 1,037 |
| 5.0          | 1,006 |
| 7.5          | 956   |
| 10.0         | 872   |
| 12.5         | 813   |
| 15.0         | 759   |
| 20.0         | 661   |
| 25.0         | 586   |
| 30.0         | 522   |
| 35.0         | 481   |
| 40.0         | 479   |
| 45.0         | 482   |



Instantaneous 3 Phase Fault Current: 1845 Amps

Instantaneous Line - Line Fault Current: 1595 Amps

Instantaneous Line - Neutral Fault Current: 2680 Amps

### Selected Model

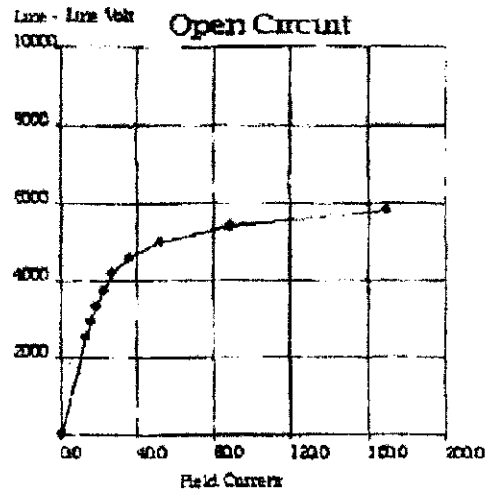
Engine: 3520      Generator Frame: 868      Genset Rating (kW): 1600.0      Line Voltage: 4160  
 Fuel: Gas      Generator Arrangement: 1586432      Genset Rating (kVA): 2000.0      Phase Voltage: 2402  
 Frequency: 60      Excitation Type: Permanent Magnet Pwr. Factor: 0.8      Rated Current: 277.6  
 Duty: CONTINUOUS      Connection: SERIES STAR      Application: EPG      Status: Current

Version: 18517/48413/38140/9625

### Generator Output Characteristic Curves

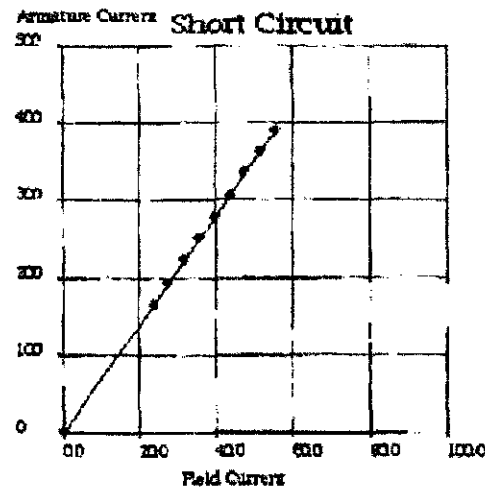
#### Open Circuit Curve

| Field Current | Line - Line Volt |
|---------------|------------------|
| 0.0           | 0                |
| 13.9          | 2,496            |
| 16.4          | 2,912            |
| 19.1          | 3,328            |
| 22.6          | 3,744            |
| 27.6          | 4,160            |
| 36.3          | 4,576            |
| 53.1          | 4,992            |
| 89.2          | 5,408            |
| 169.9         | 5,824            |



#### Short Circuit Curve

| Field Current | Armature Current |
|---------------|------------------|
| 0.0           | 0                |
| 24.0          | 167              |
| 27.9          | 194              |
| 31.9          | 222              |
| 35.9          | 250              |
| 39.9          | 277              |
| 43.9          | 305              |
| 47.9          | 333              |
| 51.9          | 361              |
| 55.9          | 389              |



## Selected Model

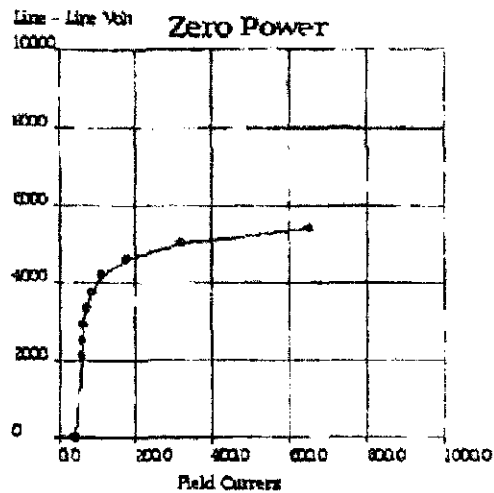
Engine: 3520      Generator Frame: 868      Genset Rating (kW): 1600.0      Line Voltage: 4160  
 Fuel: Gas      Generator Arrangement: 1586432      Genset Rating (kVA): 2000.0      Phase Voltage: 2402  
 Frequency: 60      Excitation Type: Permanent Magnet Pwr. Factor: 0.8      Rated Current: 277.6  
 Duty: CONTINUOUS Connection: SERIES STAR      Application: EPG      Status: Current

Version: 3851 / 38433 / 38186 / 25.1

## Generator Output Characteristic Curves

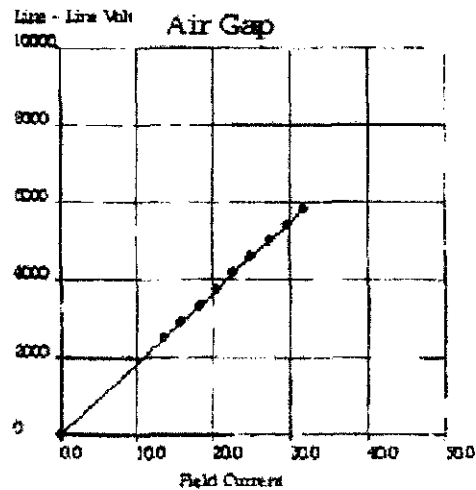
## Zero Power Factor Curve

| Field Current | Line - Line Volt |
|---------------|------------------|
| 39.9          | 0                |
| 57.5          | 2,080            |
| 60.3          | 2,496            |
| 65.3          | 2,912            |
| 72.5          | 3,328            |
| 86.2          | 3,744            |
| 115.0         | 4,160            |
| 178.6         | 4,576            |
| 323.1         | 4,992            |
| 654.7         | 5,408            |



## Air Gap Curve

| Field Current | Line - Line Volt |
|---------------|------------------|
| 0.0           | 0                |
| 13.7          | 1,496            |
| 16.0          | 2,912            |
| 18.3          | 3,328            |
| 30.5          | 3,744            |
| 22.8          | 4,160            |
| 25.1          | 4,576            |
| 27.4          | 4,992            |
| 29.7          | 5,408            |
| 31.9          | 5,824            |

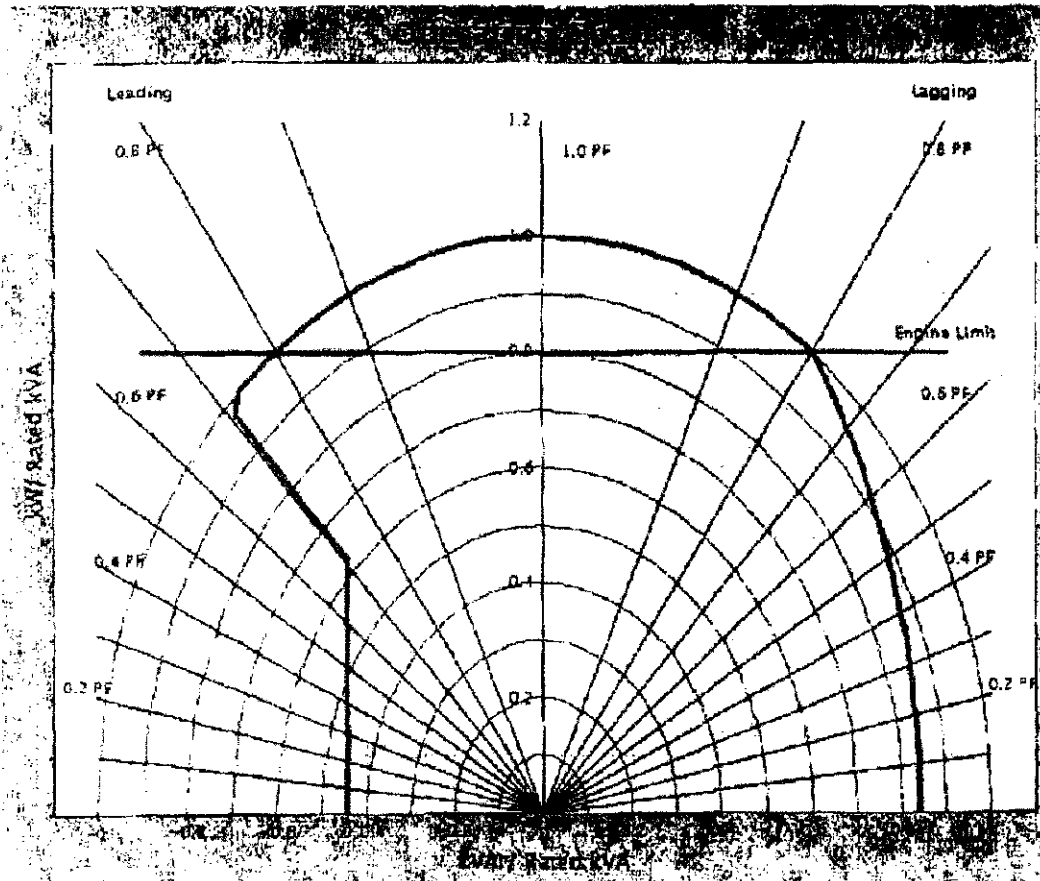


## Selected Model

Engine: 3520      Generator Frame: 868      Genset Rating (kW): 1600.0      Line Voltage: 4160  
Fuel: Gas      Generator Arrangement: 1586432      Genset Rating (kVA): 2000.0      Phase Voltage: 2402  
Frequency: 60      Excitation Type: Permanent Magnct      Pwr. Factor: 0.8      Rated Current: 277.6  
Duty: CONTINUOUS      Connection: SERIES STAR      Application: EPG      Status: Current

Version: 18517/03431/10190/0625

## Reactive Capability Curve



---

**Selected Model**

Engine: 3520      Generator Frame: 868      Genset Rating (kW): 1600.0      Line Voltage: 4160  
 Fuel: Gas      Generator Arrangement: 1586432      Genset Rating (kVA): 2000.0      Phase Voltage: 2402  
 Frequency: 60      Excitation Type: Permanent Magnet      Pwr. Factor: 0.8      Rated Current: 277.6  
 Duty: CONTINUOUS      Connection: SERIES STAR      Application: EPG      Status: Current

---

Version: 34517 38433 38180 9623

**General Information**

DM7802

**GENERATOR GENERAL INFORMATION****I. GENERATOR MOTOR STARTING CAPABILITY CURVES**

A. The MOTOR STARTING CURVES ARE REPRESENTATIVE OF THE DATA OBTAINED BY THE FOLLOWING PROCEDURE:

1. THE CATERPILLAR GENERATOR IS DRIVEN BY A SYNCHRONOUS DRIVER.
2. VARIOUS SIZE THREE PHASE INDUCTION MOTORS (NEMA CODE F) ARE STARTED ACROSS THE LINE LEADS OF THE UNLOADED GENERATOR.
3. THE RESULTING VOLTAGE DIPS ARE RECORDED WITH AN OSCILLOSCOPE.
4. MOTOR HORSEPOWER HAS BEEN CONVERTED TO STARTING KILOVOLT AMPERES (SKVA).
5. RECORDED VOLTAGE DIPS HAVE BEEN EXPRESSED AS A % OF GENERATOR RATED VOLTAGE.

**II. USE OF THE MOTOR STARTING CAPABILITY CURVES.**

A. CALCULATE THE SKVA REQUIRED BY THE MOTOR FOR FULL VOLTAGE STARTING ACROSS THE LINE IF THE VALUE IS NOT LISTED ON THE MOTOR DATA PLATE.

1. MOTORS CONFORMING TO NEMA STANDARDS  
MULTIPLY THE MOTOR HORSEPOWER BY THE NEMA SKVA/HP FIGURE. FOR NEMA CODE F, USE 5.3 SKVA/HP; FOR NEMA CODE G, USE 6.0 SKVA/HP.

2. ALL OTHER MOTORS:  
MULTIPLY THE RATED VOLTAGE BY THE LOCKED ROTOR AMPERE AND BY 0.001732. (IF THE LOCKED ROTOR AMPERES ARE NOT LISTED, MULTIPLY THE FULL LOAD (RUNNING) AMPERES BY 8.)  
B. USE THE ABOVE SKVA WITH THE MOTOR STARTING TABLE.

1. ACROSS LINE STARTING:  
READ ACROSS THE ROW OF "ACROSS THE LINE STARTING SKVA" IF THE DESIRED VALUE OF SKVA IS NOT GIVEN, CALCULATE THE DIP BY FINDING THE PROPER SKVA INTERVAL AND INTERPOLATING AS FOLLOWS:

SKVA1 IS THE SKVA TABLE ENTRY JUST SMALLER THAN THE DESIRED SKVA, DIP1 IS THE DIP FOR SKVA2, AND SKVA2 IS THE SKVA TABLE ENTRY JUST GREATER THAN THE DESIRED SKVA. THE DIP (IN PERCENT) AT THE DESIRED SKVA IS:

$$DIP = DIP1 + \frac{(SKVA - SKVA1)}{(SKVA2 - SKVA1)} \times 2.5$$

NOTE: VOLTAGE DIPS GREATER THAN 3% MAY CAUSE MAGNETIC CONTACTORS TO DROP OUT.

**3. REDUCED VOLTAGE STARTING:**

REFER TO THE FOLLOWING TABLE. MULTIPLY THE CALCULATED ACROSS LINE SKVA BY THE MULTIPLIER LISTED FOR THE SPECIFIC STARTING METHOD. APPLY THE RESULT TO THE STARTING TABLE AS IN II A, TO CALCULATE THE EXPECTED VOLTAGE DIP:

| TYPE OF REDUCED VOLTAGE STARTING | MULTIPLY LINE SKVA BY |
|----------------------------------|-----------------------|
| 40% TAP                          | .80                   |
| 65% TAP                          | .65                   |
| 50% TAP                          | .50                   |

15% TAP 45  
Wye start, delta run 33

#### AUTOTRANSFORMER

80% TAP .68  
65% TAP .46  
50% TAP .29

NOTE: REDUCE VOLTAGE STARTING LOWERS THE MAXIMUM  
REQUIRED MOTOR skVA.

#### 3. Part winding starting:

Most common is half-winding start, full-winding run.  
Multiply the full motor, across line starting skVA  
by 0.6. Apply the result to the selected curve as  
in 11. A above. Read the expected voltage dip. for  
the required skVA.

### III. DEFINITION:

#### A. GENERATOR TERMS

MODEL: Engine Sales model  
ENG TYPE: DI = Direct Injection,  
NA = Naturally Aspirated, etc  
HZ: Running frequency, hertz  
RATING TYPE: PP, SB (prime power or standby)  
KW: Base rating electrical kilowatts (ekW)  
VOLTS: Rating terminal, line to line  
GEN ARR: Cat generator arrangement part number  
GEN FRAME: Generator frame size designation  
CON: Generator output connection  
(star, wye, delta, etc)  
POLES: Number of pole pieces on rotor  
(eg. A 4 pole generator run at 1800)  
RPM will produce 60 Hz alternating current. A 6 pole  
generator run at 1200 RPM will produce 60 Hz alternating  
current...

#### B. GENERATOR TEMPERATURE RISE:

The indicated temperature rise indicated the NEMA limits  
for standby or prime power applications. These rises are  
used for calculating the losses and efficiencies and are  
not necessarily indicative of the actual temperature rise  
of a given machine

#### C. CENTER OF GRAVITY

The specified center of gravity is for the generator only.  
It is measured from the generator/engine flywheel housing  
interface and from the centerline of the rotor shaft.

#### D. GENERATOR DECREMENT CURRENT CURVES

The generator decrement current curve gives the  
symmetrical current supplied by the generator for a three  
phase bolted fault at the generator terminals. Generators  
equipped with the series boost attachment or generators  
with PM excitation system will supply 30% of rated current  
for at least 10 seconds.

#### E. GENERATOR EFFICIENCY CURVES

The efficiency curve is representative of the overall  
generator efficiency over the normal range of the  
electrical load and at the specified parameters. This is  
not the overall engine generator set efficiency curve.

**CATERPILLAR**

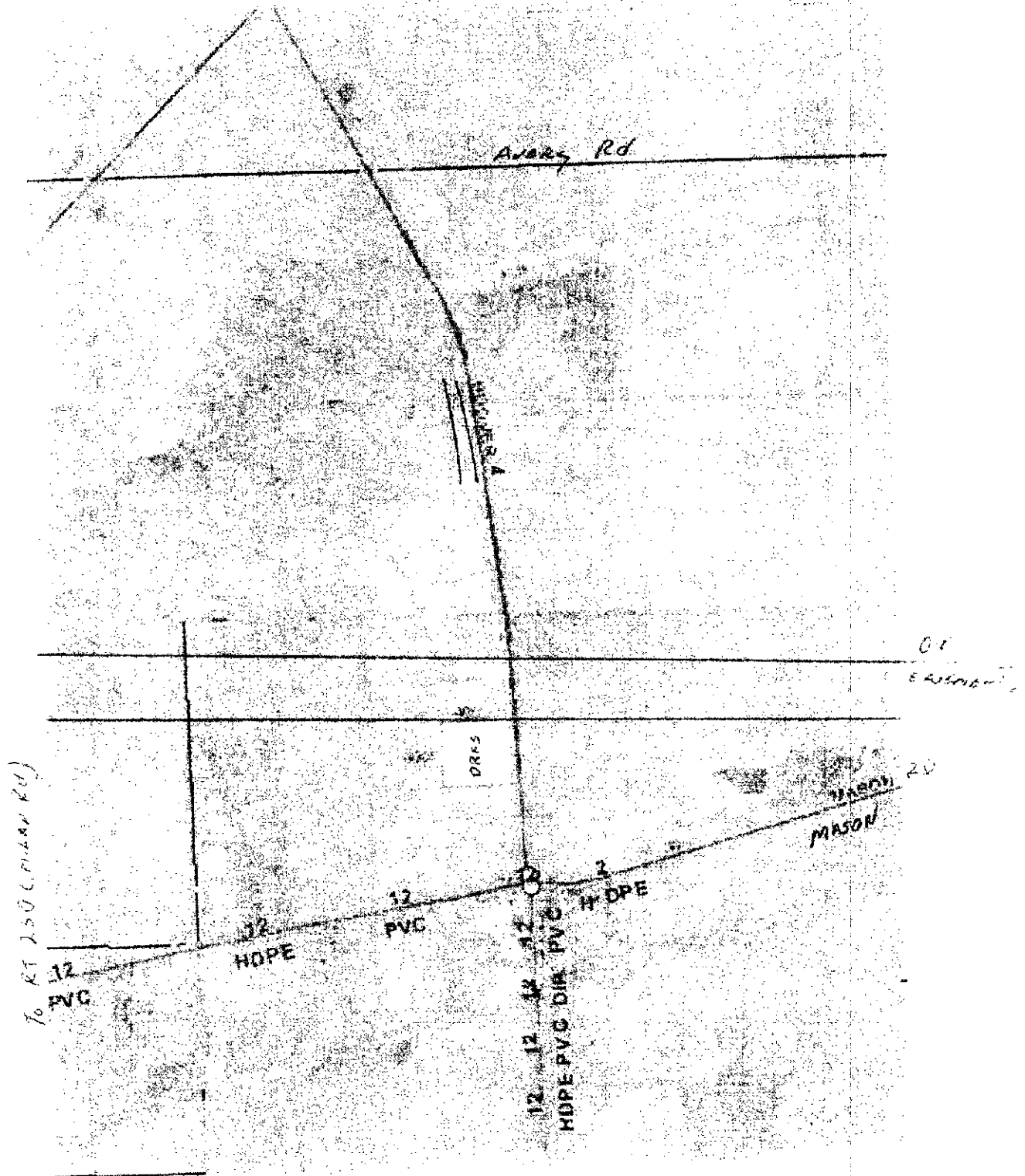
Caterpillar Confidential: Green

Content Owner: Alan Scott

Current Date: Tue Sep 06 14:28:33 2005

Web Master: e-business Solutions

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Avery Rd

DRES

RT 250 (PILAR RD)

0.1  
ELEVATION

HARRIS  
MASON

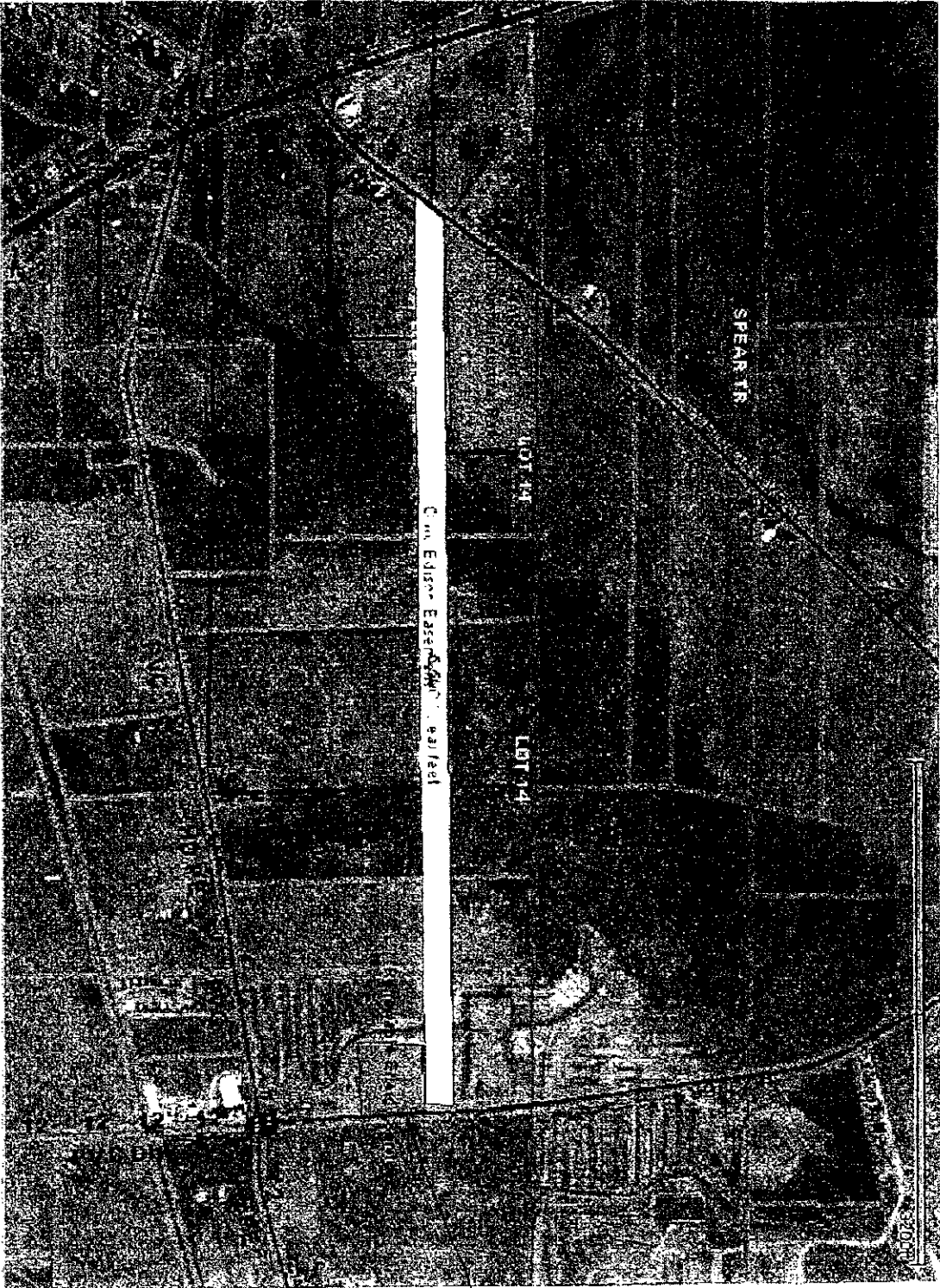
12  
HOPE

12  
PVC

12 12 12 12  
HOPE PVC DIA PVC

12  
HOPE

O-E  
Substation



Hussey Ave Rd

O-E  
SITE

Hussey Ave Rd

Parcel "A"

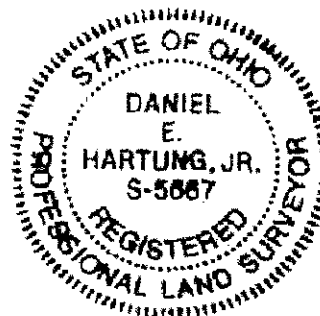
Being situated in the State of Ohio, County of Erie, Milan Township, Section No. 3, part of the Richards Tract and being more definitely described as follows

Commencing at a monument box, found, marking the intersection of the centerline of Hoover Road with the centerline of Mason Road; Thence North  $01^{\circ}05'30''$  West along the centerline of Hoover Road, a distance of 590.80 feet to a PK Nail, set; Thence South  $88^{\circ}54'30''$  West a distance of 30.00 feet to a  $\frac{1}{2}$ " iron pin, set, on the West right-of-way line of Hoover Road and the point of beginning;

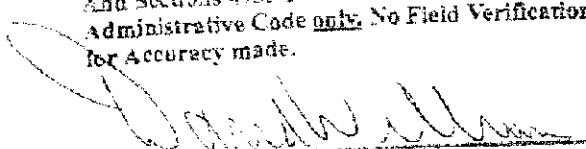
- (1) Thence South  $88^{\circ}54'30''$  West a distance of 200.00 feet to a  $\frac{1}{2}$ " iron pin, set;
- (2) Thence North  $67^{\circ}31'25''$  West a distance of 202.71 feet to a  $\frac{1}{2}$ " iron pin, set;
- (3) Thence North  $01^{\circ}20'29''$  East a distance of 380.00 feet to a  $\frac{1}{2}$ " iron pin, set, on the South line of an Ohio Edison Easement (225 FT);
- (4) Thence South  $88^{\circ}39'31''$  East along the South line of said Edison Easement, a distance of 370.00 feet to a  $\frac{1}{2}$ " iron pin, set, on the West right-of-way line of Hoover Road;
- (5) Thence South  $01^{\circ}05'30''$  East along the West right-of-way line of Hoover Road, a distance of 445.00 feet to a  $\frac{1}{2}$ " iron pin, set, and the point of beginning, containing 3.7706 acres, more or less, but being subject to all legal highways, easements and restrictions of record.

The above description was prepared from an actual survey by Daniel E. Hartung Jr., Professional Surveyor No. 5667 in February 2008. The bearings were assumed only for the purpose of indicating angles

  
Daniel E. Hartung Jr., PE, PS



Per Ordinance per Erie County Requirements  
And Sections 4733-37 thru 4733-37-07 of the Ohio  
Administrative Code only. No Field Verifications  
for Accuracy made.

  
Erie County Engineer

Date: 2/26/08

R/W

HIO EDISON EASEMENT

S 88°39'31" E



856.10' R/W

R/W

S 88°39'31" E 376.00'

HOOVER ROAD

01°05'30" E

445.00'

R/W

PARCEL "A"  
3.7706 acres

N 01°20'29" E 386.00'

202.71'

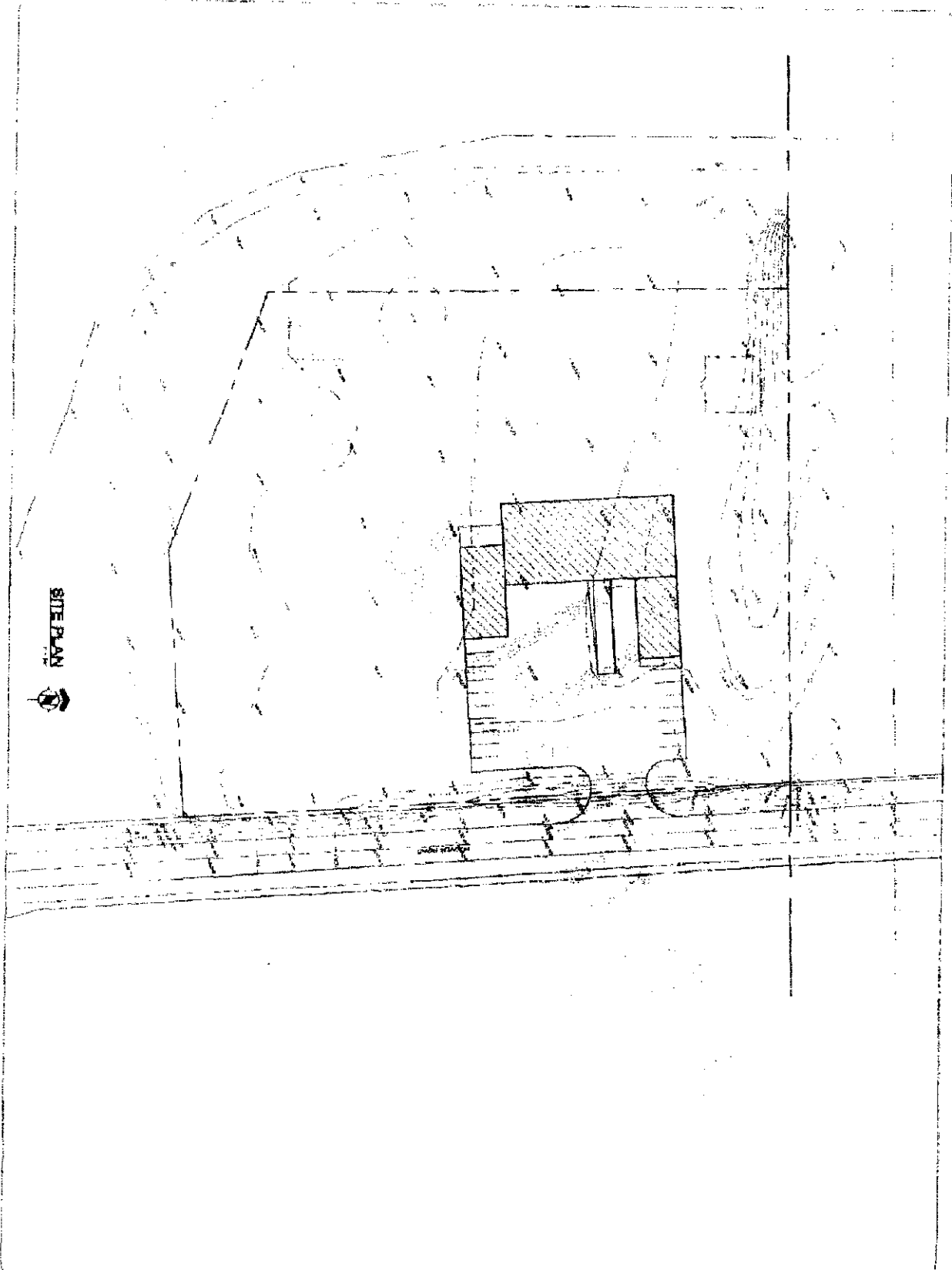
N 67°31'25" W

200.00'

S 88°54'30" W

EXISTING DITCH

COMMISSIONERS  
C, OHIO  
101



SITE PLAN



|          |       |
|----------|-------|
| DATE     | 08/14 |
| BY       | WJH   |
| CHK'D BY | WJH   |
| DATE     | 08/14 |
| BY       | WJH   |
| CHK'D BY | WJH   |
| DATE     | 08/14 |
| BY       | WJH   |

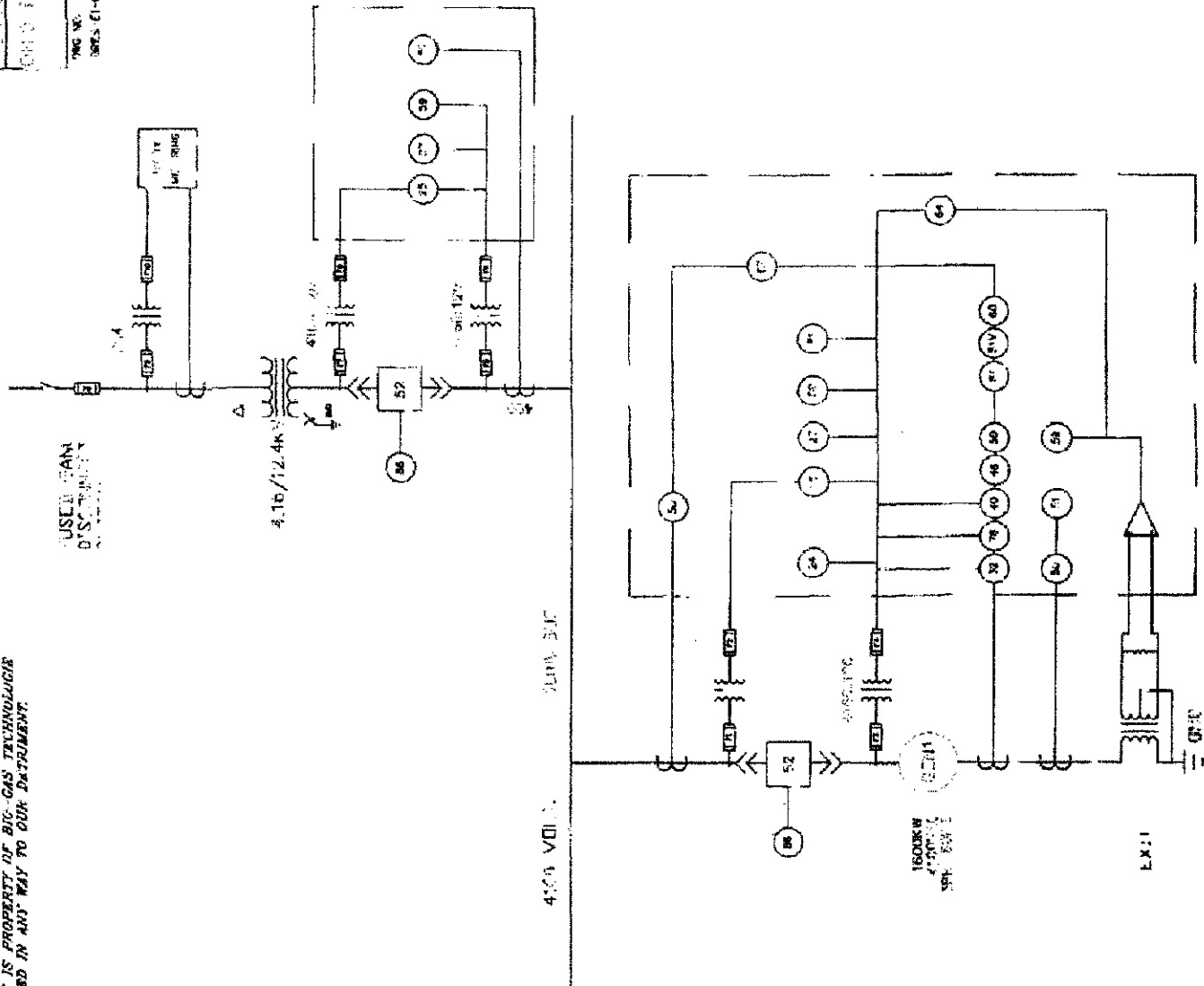
A REPRESENTATIVE FOR  
**BIO-GAS TECHNOLOGIES, LTD.**  
 10000 RIVER ROAD  
 WILSON, ONTARIO  
**SITE PLAN**

**Janotta & Herner Inc.**  
 300 Monrovia Street, Mississauga, ON L5R 4K6  
 www.janottaandherner.com • Tel: (905) 276-4241 • Fax: (905) 276-2264



| REVISIONS |      |             |
|-----------|------|-------------|
| NO.       | DATE | DESCRIPTION |
| 1         |      |             |
| 2         |      |             |
| 3         |      |             |
| 4         |      |             |
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| 7         |      |             |
| 8         |      |             |
| 9         |      |             |
| 10        |      |             |

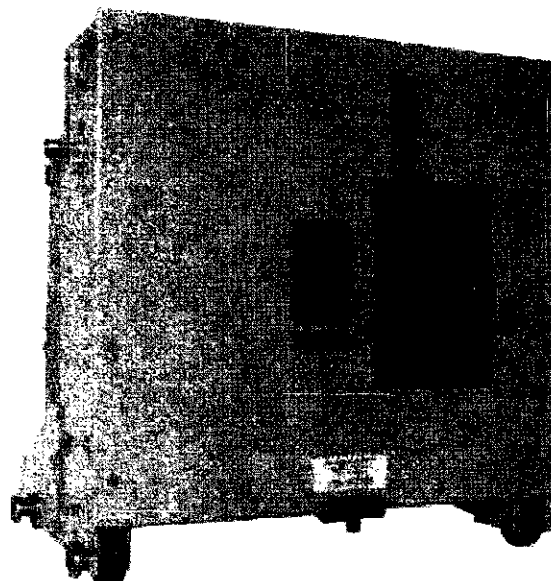
|                |          |     |            |     |     |
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| DATE: 11-13-01 | SCALE    | 5"  |            |     |     |



Instruction Bulletin

6055-31

May 1996



## **Type VR Vacuum Circuit Breaker**

**4.76 kV, 8.25 kV, and 15 kV  
1200 A and 2000 A**

**Class 6055**



**SQUARE D**

# **SEL-351A Relay**

**Distribution Protection System**

**Directional Overcurrent Relay**

**Reclosing Relay**

**Fault Locator**

**Integration Element Standard**

**Instruction Manual**

20060727

**SEL** SCHWEITZER ENGINEERING LABORATORIES, INC.



**Switchgear  
Setpoints**

**A**dvanced  
**P**ower  
**T**echnologies, Inc.

**Utility  
Paralleling Switchgear**

Project #: P06BIOGA01

Project name: OUTAGAMIE COUNTY

**Table of ratings and ratios**

|                                  |          |
|----------------------------------|----------|
| System rated frequency           | 60 Hz    |
| Utility rated voltage            | 4160 VAC |
| Utility circuit breaker rating   | 1200A    |
| Utility phase CT ratio           | 1200:5   |
|                                  |          |
| Generator rated voltage          | 4160 VAC |
| Generator rated kW               | 1600 kW  |
| Generator rated kVAR             |          |
| Generator rated P.F              | 8        |
| Generator full load amps         | 278      |
| Generator circuit breaker rating | 1200A    |
| Generator phase CT ratio         | 400:5    |
|                                  |          |
| Ground CT ratio                  | NA       |
|                                  |          |
|                                  |          |

Table of 'Setpoints menu' setpoints:

|    | Protection Setpoint                          | LOW<br>limit | HIGH<br>Limit | Units     | Recorded<br>Setpoint |
|----|----------------------------------------------|--------------|---------------|-----------|----------------------|
| 1  | Genset base load level, kW                   | 0            |               | kilowatts |                      |
| 2  | Genset kW load rate                          | 1            | 53            | -         |                      |
| 3  | Genset unload level, kW                      | 1            |               | kilowatts |                      |
| 4  | Genset kW unload rate                        | 1            | 53            | -         |                      |
| 5  | Base load over window, %                     | 1            | 5             | percent   |                      |
| 6  | Base load under window, %                    | 1            | 5             | percent   |                      |
| 7  | Stability rate                               | 1            | 53            | -         |                      |
| 8  | Genset kVAR setpoint, kVAR                   | 21           |               | kVAR      |                      |
| 9  | KVAR control gain, sec                       | 1            | 33            | seconds   |                      |
| 10 | Import level, kW                             | 0            |               | kilowatts |                      |
| 11 | Export level, kW                             | 0            |               | kilowatts |                      |
| 12 | Select 0 = Import, 1 = Export                | 0            | 1             | -         |                      |
| 13 | Import / Export over wind, %                 | 1            | 5             | percent   |                      |
| 14 | Import / Export under wind, %                | 1            | 5             | percent   |                      |
| 15 | Import / Export stability rate               | 1            | 53            | -         |                      |
| 16 | Zero power level, kW                         | 0            |               | kilowatts |                      |
| 17 | TD [Time Delay] emergency<br>start, sec      | 0            | 9999          | seconds   |                      |
| 18 | TD [Time Delay] emergency to<br>normal, min. | 0            | 1092          | minutes   |                      |
| 19 | TD [Time Delay] neutral, sec                 | 1            | 9999          | Seconds   |                      |

Table of 'Protection menu' setpoints:

|    | <u>Cod<br/>e</u> | <u>Protection Setpoint</u>       | <u>LOW<br/>limit</u> | <u>HIGH<br/>limit</u> | <u>Units</u>          | <u>Recorded<br/>Setpoint</u> |
|----|------------------|----------------------------------|----------------------|-----------------------|-----------------------|------------------------------|
| 1. | 27               | Gen. Undervolt. setp,%           | 0                    | 150                   | % of rated<br>voltage |                              |
|    |                  | Gen. Undervolt. T D.,<br>sec.    | 0                    | 9999                  | seconds               |                              |
| 2. | 59               | Gen. Overvolt. setp1,%           | 30                   | 300                   | % of rated<br>voltage |                              |
|    |                  | Gen. Overvolt. T D.1,<br>sec     | 0                    | 9999                  | seconds               |                              |
| 3  | 81U              | Gen. Underfreq setp,<br>1Hz      | 0                    | 80.0                  | hertz                 |                              |
|    |                  | Gen. Underfreq T.D.,<br>sec.     | 0                    | 9999                  | seconds               |                              |
| 4  | 81O              | Gen. Overfreq. setp,<br>1Hz      | 12                   | 100.0                 | hertz                 |                              |
|    |                  | Gen. Overfreq. T D., sec         | 0                    | 9999                  | seconds               |                              |
| 5. | 32-1             | Gen. reverse kW setp1,<br>kW     | 0                    | 9999                  | kW                    |                              |
|    |                  | Gen. reverse kW T D 1,<br>sec.   | 0                    | 9999                  | seconds               |                              |
|    | 32-2             | Gen. reverse kW setp2<br>kW      | 0                    | 9999                  | kW                    |                              |
|    |                  | Gen. reverse kW T.D.2,<br>sec.   | 0                    | 9999                  | seconds               |                              |
| 6. | 40-1             | Gen. reverse kVAR<br>setp1, kVAR | 0                    | 9999                  | kVAR                  |                              |
|    |                  | Gen. reverse kVAR<br>T.D.1, sec  | 0                    | 9999                  | seconds               |                              |
|    | 40-2             | Gen. reverse kVAR<br>setp2, kVAR | 0                    | 9999                  | kVAR                  |                              |
|    |                  | Gen. reverse kVAR<br>T D.2, sec. | 0                    | 9999                  | seconds               |                              |
| 7  | 46-1             | Gen. I unbalance setp1,<br>%     | 0                    | 9999                  | % of CT<br>primary    |                              |
|    |                  | Gen. I unbalance T D 1,<br>sec.  | 0                    | 9999                  | seconds               |                              |

Switchgear Operational Instructions

|     |      |                                 |    |      |                       |  |
|-----|------|---------------------------------|----|------|-----------------------|--|
|     | 46-2 | Gen. I unbalance setp2,<br>%    | 0  | 9999 | % of CT<br>primary    |  |
|     |      | Gen. I unbalance T.D.2,<br>sec. | 0  | 9999 | seconds               |  |
| 8.  | 27   | Util. Undervolt setp,%          | 0  | 150  | % of rated<br>voltage |  |
|     |      | Util. Undervolt T.D., sec.      | 0  | 9999 | seconds               |  |
| 9.  | 59   | Util. Overvolt. setp,%          | 10 | 300  | % of rated<br>voltage |  |
|     |      | Util. Overvolt. T.D., sec.      | 0  | 9999 | seconds               |  |
| 10. | 81U  | Util. Underfreq. setp.<br>.1Hz  | 0  | 800  | tenths of Hz          |  |
|     |      | Util. Underfreq. T.D.,<br>sec.  | 0  | 9999 | seconds               |  |
| 11. | 81O  | Util. Overfreq. setp. 1Hz       | 10 | 1000 | tenths of Hz          |  |
|     |      | Util. Overfreq T.D. sec.        | 0  | 9999 | seconds               |  |
| 12. |      | Dead bus voltage. %             | 0  | 60   | % of rated<br>voltage |  |
| 13. |      | Fail to parallel T.D., sec.     | 0  | 9999 | Seconds               |  |
| 14. |      | Breaker charg min Volt<br>%     | 60 | 150  | % of rated<br>voltage |  |