GENERATOR DATA

APRIL 24, 2024

For Help Desk Phone Numbers Click here

Selected Model

Engine: 3516	**Generator Frame:** 2530	**Genset Rating (kW):** 2000.0	**Line Voltage:** 12470
Fuel: Diesel	**Generator Arrangement:** 1390312	**Genset Rating (kVA):** 2500.0	**Phase Voltage:** 7200
Frequency: 60	**Excitation Type:** Permanent Magnet	**Pwr. Factor:** 0.8	**Rated Current:** 115.7
Duty: STANDBY	**Connection:** SERIES STAR	**Application:** EPG	**Status:** Current

Version: 39094 /38443 /39125 /8305

Spec Information

Generator Specification

Frame: 2530	**Type:** SR4BHV	**No. of Bearings:** 2
Winding Type: FORM WOUND		**Flywheel:** 21.0
Connection: SERIES STAR		**Housing:** 00
Phases: 3		**No. of Leads:** 6
Poles: 4		**Wires per Lead:** 1
Sync Speed: 1800		**Generator Pitch:** 0.762

Generator Efficiency

Per Unit Load	kW	Efficiency %
0.25	500.0	93.4
0.5	1000.0	95.8
0.75	1500.0	96.4
1.0	2000.0	96.4

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X''_d	0.2282	14.1916
SUBTRANSIENT - QUADRATURE AXIS X''_q	0.2537	15.7777
TRANSIENT - SATURATED X'_d	0.2644	16.4456
SYNCHRONOUS - DIRECT AXIS X_d	2.1434	133.3180
SYNCHRONOUS - QUADRATURE AXIS X_q	1.2388	77.0520
NEGATIVE SEQUENCE X_2	0.2416	15.0264
ZERO SEQUENCE X_0	0.1047	6.5114

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T'_{d0}	3.5430
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T'_d	0.5160
OPEN CIRCUIT SUBSTRANSIENT - DIRECT AXIS T''_{d0}	0.0350
SHORT CIRCUIT SUBSTRANSIENT - DIRECT AXIS T''_d	0.0310
OPEN CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T''_{q0}	0.0180
SHORT CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T''_q	0.0040
EXCITER TIME CONSTANT T_e	0.1480
ARMATURE SHORT CIRCUIT T_a	0.0530

Short Circuit Ratio: 0.58	Stator Resistance = 0.8434 Ohms	Field Resistance = 1.194 Ohms

Voltage Regulation

Voltage level adjustment: +/-	5.0%
Voltage regulation, steady state: +/-	0.5%
Voltage regulation with 3% speed change: +/-	0.5%
Waveform deviation line - line, no load: less than	2.0%
Telephone influence factor: less than	50

Generator Excitation

	No Load	Full Load, (rated) pf	
		Series	Parallel
Excitation voltage:	25.03 Volts	86.45 Volts	Volts
Excitation current	1.11 Amps	3.15 Amps	Amps

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Generator Mechanical Information

Center of Gravity

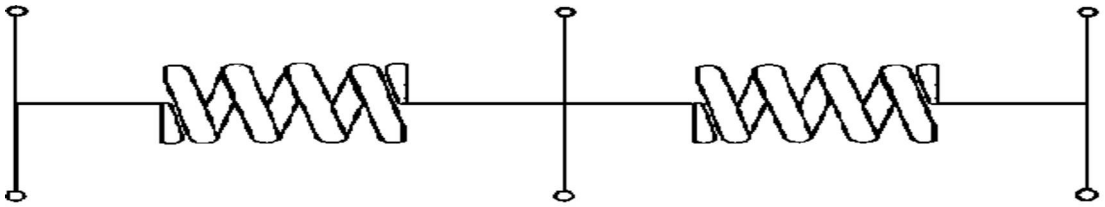
Dimension X	-1167.0 mm	-45.9 IN.
Dimension Y	0.0 mm	0.0 IN.
Dimension Z	0.0 mm	0.0 IN.

- "X" is measured from driven end of generator and parallel to rotor. Towards engine fan is positive. See General Information for details
- "Y" is measured vertically from rotor center line. Up is positive.
- "Z" is measured to left and right of rotor center line. To the right is positive.

Generator WT = 6124 kg * Rotor WT = 1692 kg * Stator WT = 4431 kg
13,501 LB 3,730 LB 9,769 LB

Rotor Balance = 0.0508 mm deflection PTP
Overspeed Capacity = 125% of synchronous speed

Generator Torsional Data



J1 = Coupling and Fan **J2 = Rotor** **J3 = Exciter End**

TOTAL J = J1 + J2 + J3

K1 = Shaft Stiffness between J1 + J2 (Diameter 1)

K2 = Shaft Stiffness between J2 + J3 (Diameter 2)

J1	K1	Min Shaft Dia 1	J2	K2	Min Shaft Dia 2	J3
348.5 LB IN. s^2	120.0 MLB IN./rad	6.5 IN.	68.1 LB IN. s^2	57.6 MLB IN./rad	5.0 IN.	2.2 LB IN. s^2
39.377 N m s^2	13.56 MN m/rad	165.0 mm	7.691 N m s^2	6.5088 MN m/rad	127.0 mm	0.246 N m s^2

Total J

418.8 LB IN. s^2

47.314 N m s^2

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Generator Cooling Requirements - Temperature - Insulation Data

Cooling Requirements:		**Temperature Data: (Ambient 40 ^{0}C)**	
Heat Dissipated:	74.7 kW	**Stator Rise:**	130.0 ^{0}C
Air Flow:	312.0 m^3/min	**Rotor Rise:**	130.0 ^{0}C

Insulation Class: F

Insulation Reg. as shipped: 100.0 MΩ minimum at 40 ^{0}C

Thermal Limits of Generator

Frequency:	60 Hz
Line to Line Voltage:	12470 Volts
B BR 80/40	1946.0 kVA
F BR -105/40	2281.0 kVA
H BR - 125/40	2500.0 kVA
F PR - 130/40	2500.0 kVA

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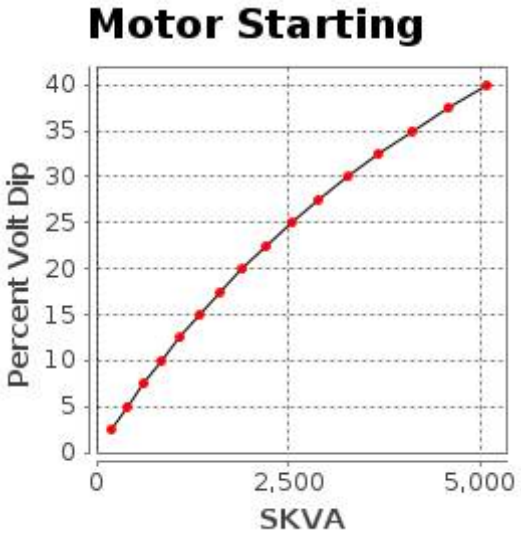
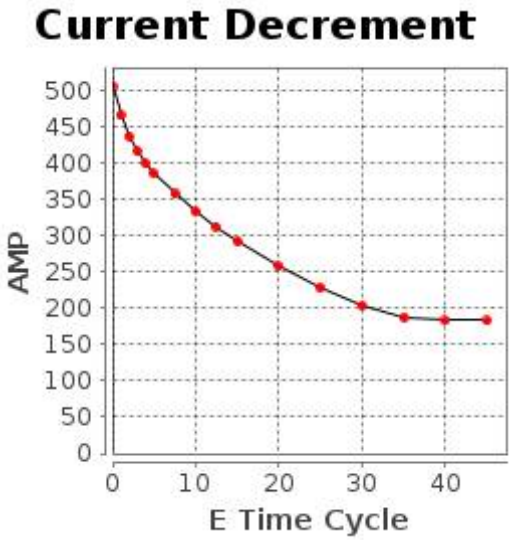
Starting Capability & Current Decrement
Motor Starting Capability (0.4 pf)

SKVA	Percent Volt Dip
196	2.5
402	5.0
619	7.5
849	10.0
1,091	12.5
1,348	15.0
1,621	17.5
1,910	20.0
2,218	22.5
2,547	25.0
2,898	27.5
3,274	30.0
3,678	32.5
4,114	35.0
4,584	37.5
5,093	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	507
1.0	466
2.0	438
3.0	417
4.0	400
5.0	386
7.5	358
10.0	334
12.5	313
15.0	293
20.0	258
25.0	229
30.0	204
35.0	188
40.0	183
45.0	183



Instantaneous 3 Phase Fault Current: 507 Amps **Instantaneous Line - Line Fault Current:** 427 Amps

Instantaneous Line - Neutral Fault Current: 604 Amps

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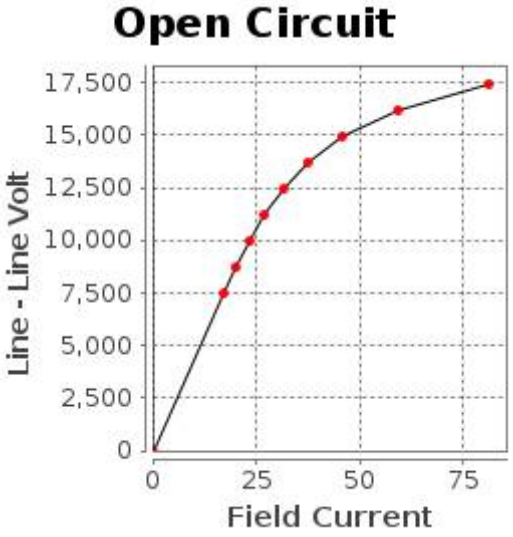
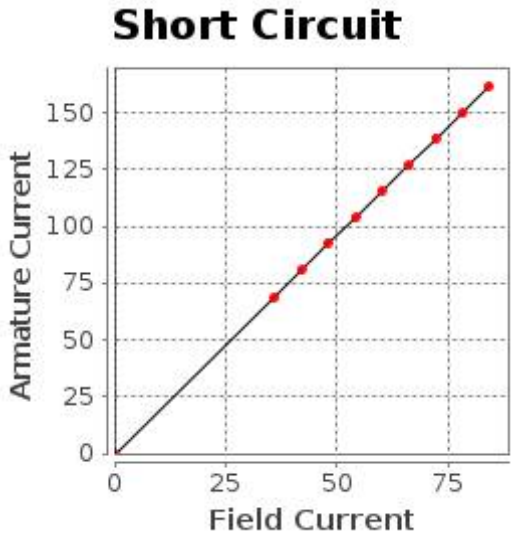
Generator Output Characteristic Curves
Open Circuit Curve

Field Current	Line - Line Volt
0.0	0
17.1	7,482
20.1	8,729
23.4	9,976
27.1	11,223
31.6	12,470
37.5	13,717
45.9	14,964
59.2	16,211
81.3	17,458



Short Circuit Curve

Field Current	Armature Current
0.0	0
36.0	69
42.0	81
48.0	93
54.1	104
60.1	116
66.1	127
72.1	139
78.1	150
84.1	162



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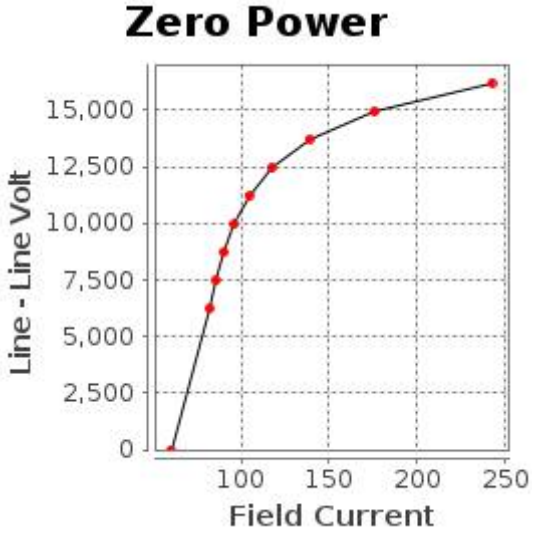
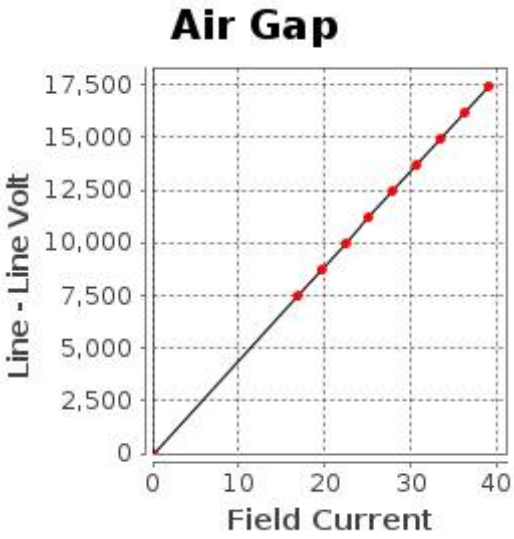
Generator Output Characteristic Curves
Zero Power Factor Curve

Field Current	Line - Line Volt
60.1	0
82.3	6,235
86.0	7,482
90.5	8,729
96.4	9,976
104.7	11,223
117.6	12,470
139.0	13,717
176.2	14,964
242.5	16,211



Air Gap Curve

Field Current	Line - Line Volt
0.0	0
16.8	7,482
19.6	8,729
22.4	9,976
25.1	11,223
27.9	12,470
30.7	13,717
33.5	14,964
36.3	16,211
39.1	17,458



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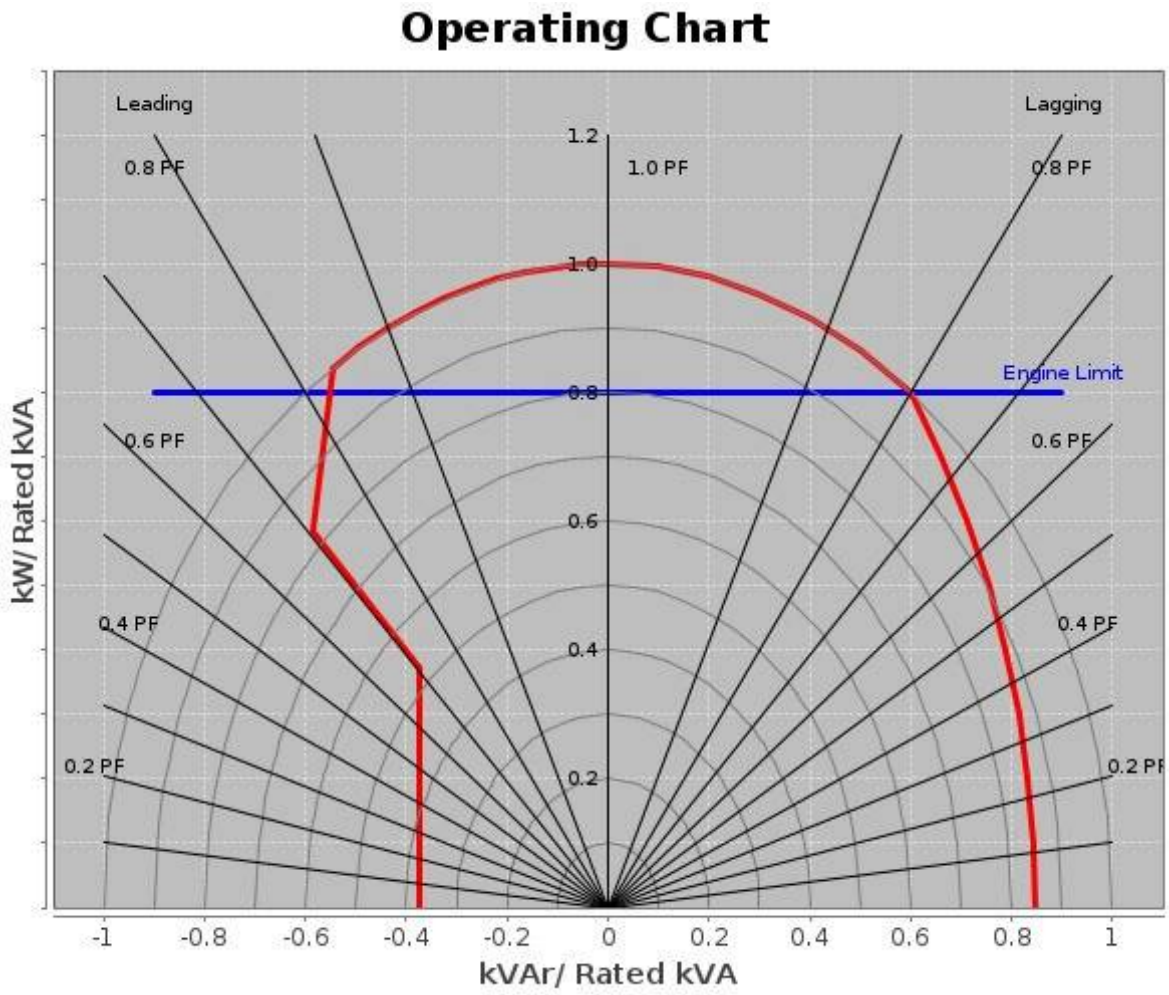
Reactive Capability Curve



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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
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 + (SKVA - SKVA1) * 2.5 / (SKVA2 - SKVA1)
NOTE:VOLTAGE DIPS GREATER THAN 35% MAY CAUSE MAGNETIC CONTACTORS TO DROP OUT.

2. REDUCED VOLTAGE STARTING:
REFER TO THE FOLLOWING TABLE. MULTIPLY THE CALCULATE 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
80% TAP	.80
65% TAP	.65
50% TAP	.50
45% 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, accross line starting skVA by 0.6. Apply the result to the selected curve as in ii. 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
CONN: Generator output connection
(star, wye, delta, ect.)
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.
For single bearing, and two bearing close coupled generators, the cent er of gravity is measured from the generator/engine flywheel housing i nterface and from the centerline of the rotor shaft.

For two bearing, standalone generators, the center of gravity is measu red from the end of the rotor shaft and from the centerline of the rot or shaft.

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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 300% 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.

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