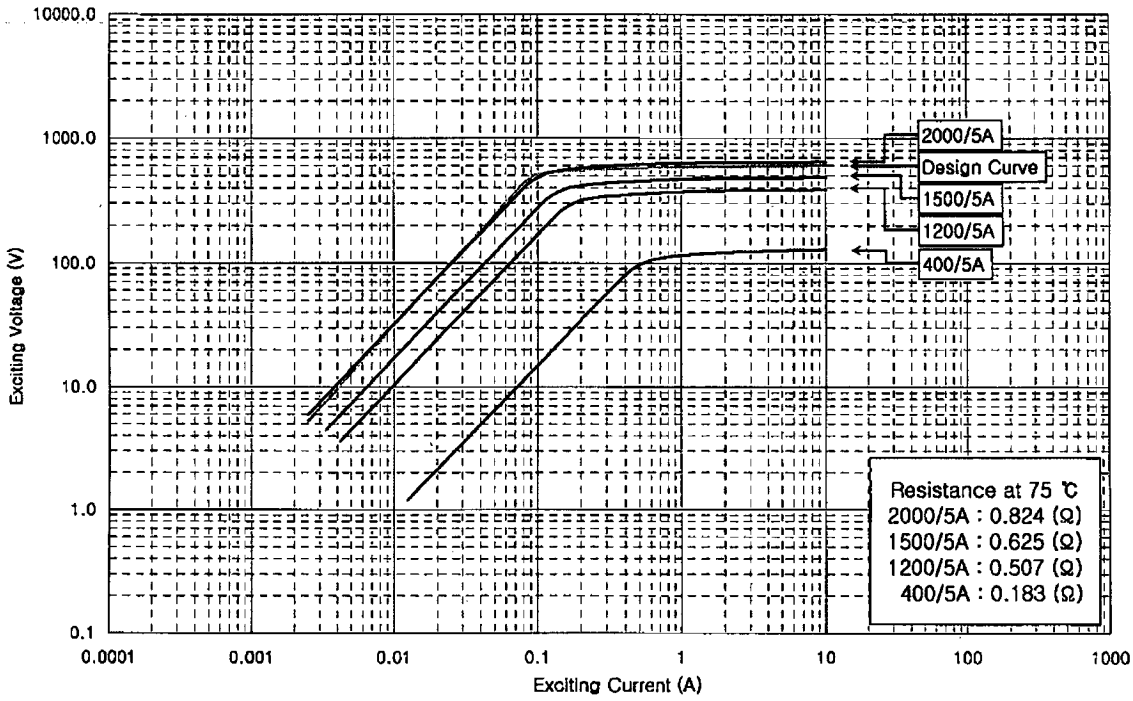
HYUNDAI HEAVY INDUSTRIES CO.,LTD.

EXCITING CURRENT CHARACTERISTIC TEST

Customer : LG Bepco Project	Serial No. : HJB0112	Date of Test : 2008. 11. 28
C.T Ratio : 2000-1500-1200-400/5A	Class/Burden : C400 / 100 VA	Frequency : 60 Hz

Exciting Current-Voltage Curve



2000/5	DSN. Exciting Voltage(V)	5.3	288.6	361.1	376.8	402.0	439.6	459.7	480.1	506.8	538.2	585.0	612.3
	DSN. Exciting Current(A)	0.0025	0.0574	0.0687	0.0708	0.0745	0.0808	0.0849	0.0903	0.0945	0.1261	0.6119	10.000
	Measuring Voltage(V)	**6.0**	**398.7**	**460.9**	**522.1**	**552.4**	**571.9**	**579.4**	**611.2**	**618.5**	**629.8**	**635.2**	**649.8**
	Measuring Current(A)	0.0025	0.0800	0.0926	0.1160	0.1426	0.1776	0.2000	0.4000	0.5000	0.8000	1.0000	10.000
1500/5	Measuring Voltage(V)	4.5	299.0	345.7	391.6	414.3	428.9	434.6	458.4	463.9	472.4	476.4	487.4
	Measuring Current(A)	0.0033	0.1067	0.1235	0.1547	0.1901	0.2368	0.2667	0.5333	0.6667	1.0667	1.3333	10.000
1200/5	Measuring Voltage(V)	3.6	239.2	276.6	313.3	331.5	343.2	347.6	366.7	371.1	377.9	381.1	389.9
	Measuring Current(A)	0.0042	0.1333	0.1543	0.1933	0.2377	0.2960	0.3333	0.6667	0.8333	1.3333	1.6667	10.000
400/5	Measuring Voltage(V)	1.2	79.7	92.2	104.4	110.5	114.4	115.9	122.2	123.7	126.0	127.0	130.0
	Measuring Current(A)	0.0125	0.4000	0.4630	0.5800	0.7130	0.8880	1.0000	2.0000	2.5000	4.0000	5.0000	10.000

AICO

Tested by : D. O. SHIN

☐ Reviewed by
☐ Witnessed by
Date

HHI

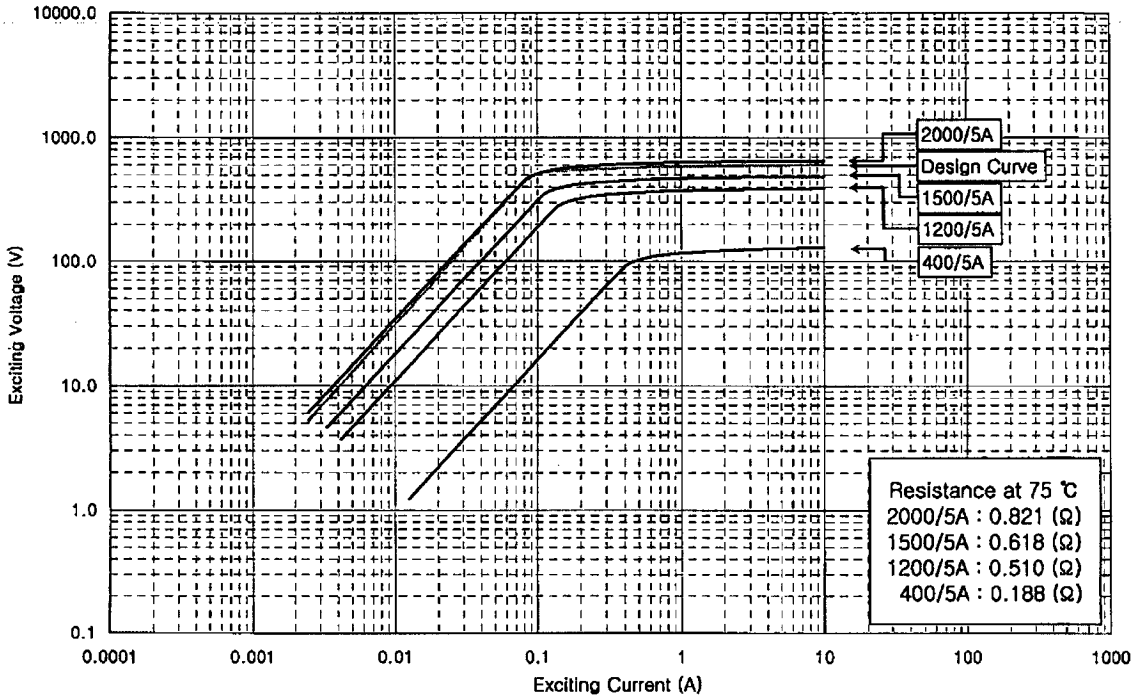
A4(210mm × 297mm)

HYUNDAI HEAVY INDUSTRIES CO, LTD.

EXCITING CURRENT CHARACTERISTIC TEST

Customer : LG Bepco Project	Serial No. : HJB0113	Date of Test : 2008. 11. 28
C.T Ratio : 2000-1500-1200-400/5A	Class/Burden : C400 / 100 VA	Frequency : 60 Hz

Exciting Current-Voltage Curve



2000/5	DSN. Exciting Voltage(V)	5.3	288.6	361.1	376.8	402.0	439.6	459.7	480.1	506.8	538.2	585.0	612.3
	DSN. Exciting Current(A)	0.0025	0.0574	0.0687	0.0708	0.0745	0.0808	0.0849	0.0903	0.0945	0.1261	0.6119	10.000
	Measuring Voltage(V)	**6.2**	**450.6**	**501.5**	**538.4**	**562.7**	**579.0**	**587.6**	**617.5**	**623.8**	**634.6**	**639.6**	**654.0**
	Measuring Current(A)	0.0025	0.0800	0.0936	0.1148	0.1418	0.1724	0.2000	0.4000	0.5000	0.8000	1.0000	10.000
1500/5	Measuring Voltage(V)	4.7	338.0	376.1	403.8	422.0	434.2	440.7	463.1	467.9	476.0	479.7	490.5
	Measuring Current(A)	0.0033	0.1067	0.1248	0.1531	0.1891	0.2299	0.2667	0.5333	0.6667	1.0667	1.3333	10.000
1200/5	Measuring Voltage(V)	3.7	270.4	300.9	323.0	337.6	347.4	352.6	370.5	374.3	380.8	383.8	392.4
	Measuring Current(A)	0.0042	0.1333	0.1560	0.1913	0.2363	0.2873	0.3333	0.6667	0.8333	1.3333	1.6667	10.000
400/5	Measuring Voltage(V)	1.2	90.1	100.3	107.7	112.5	115.8	117.5	123.5	124.8	126.9	127.9	130.8
	Measuring Current(A)	0.0125	0.4000	0.4680	0.5740	0.7090	0.8620	1.0000	2.0000	2.5000	4.0000	5.0000	10.000

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Tested by : D. O. SHIN

☐ Reviewed by
☐ Witnessed by
Date

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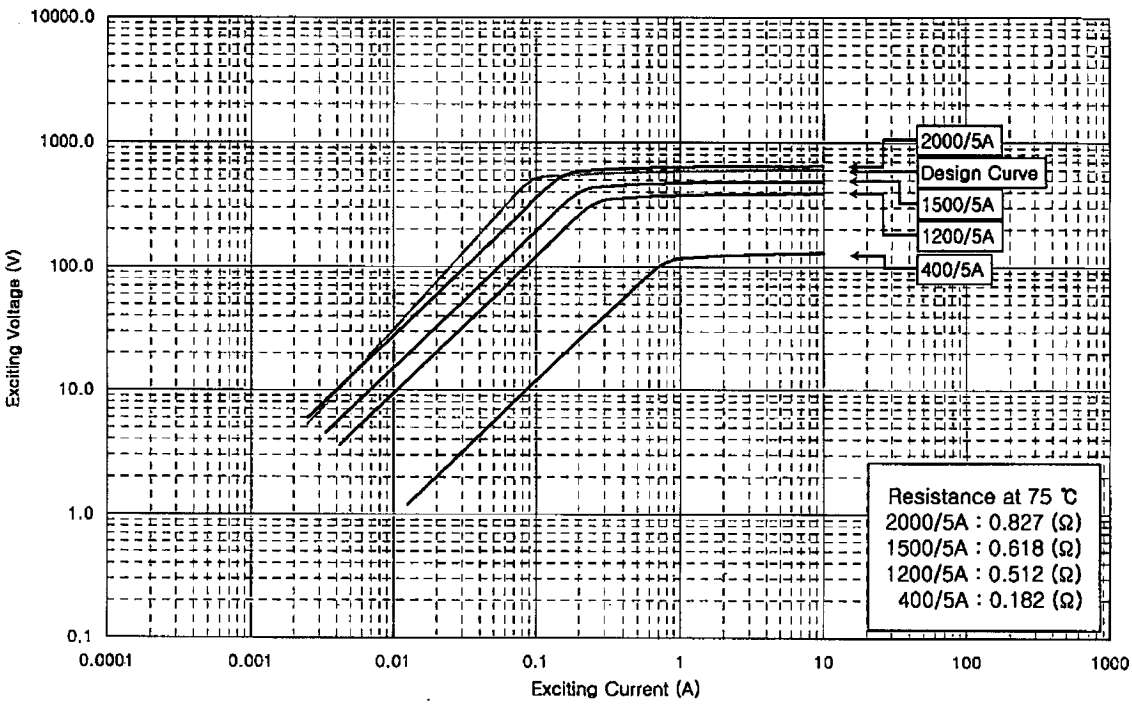
A4(210mm × 297mm)

HYUNDAI HEAVY INDUSTRIES CO.,LTD.

EXCITING CURRENT CHARACTERISTIC TEST

Customer : LG Bepco Project	Serial No. : HJB0114	Date of Test : 2008. 11. 28
C.T Ratio : 2000-1500-1200-400/5A	Class/Burden : C400 / 100 VA	Frequency : 60 Hz

Exciting Current-Voltage Curve



2000/5	DSN. Exciting Voltage(V)	5.3	288.6	361.1	376.8	402.0	439.6	459.7	480.1	506.8	538.2	585.0	612.3
	DSN. Exciting Current(A)	0.0025	0.0574	0.0687	0.0708	0.0745	0.0808	0.0849	0.0903	0.0945	0.1261	0.6119	10.000
	Measuring Voltage(V)	**6.0**	**278.0**	**329.8**	**414.3**	**506.9**	**568.7**	**586.2**	**621.2**	**626.5**	**635.9**	**640.4**	**653.0**
	Measuring Current(A)	0.0025	0.0800	0.0926	0.1142	0.1414	0.1736	0.2000	0.4000	0.5000	0.8000	1.0000	10.000
1500/5	Measuring Voltage(V)	4.5	208.5	247.4	310.7	380.2	426.5	439.7	465.9	469.9	476.9	480.3	489.8
	Measuring Current(A)	0.0033	0.1067	0.1235	0.1523	0.1885	0.2315	0.2667	0.5333	0.6667	1.0667	1.3333	10.000
1200/5	Measuring Voltage(V)	3.6	166.8	197.9	248.6	304.2	341.2	351.7	372.7	375.9	381.5	384.2	391.8
	Measuring Current(A)	0.0042	0.1333	0.1543	0.1903	0.2357	0.2893	0.3333	0.6667	0.8333	1.3333	1.6667	10.000
400/5	Measuring Voltage(V)	1.2	55.6	66.0	82.9	101.4	113.7	117.2	124.2	125.3	127.2	128.1	130.6
	Measuring Current(A)	0.0125	0.4000	0.4630	0.5710	0.7070	0.8680	1.0000	2.0000	2.5000	4.0000	5.0000	10.000

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Tested by : D. O. SHIN

☑ Reviewed by
☐ Witnessed by
Date:

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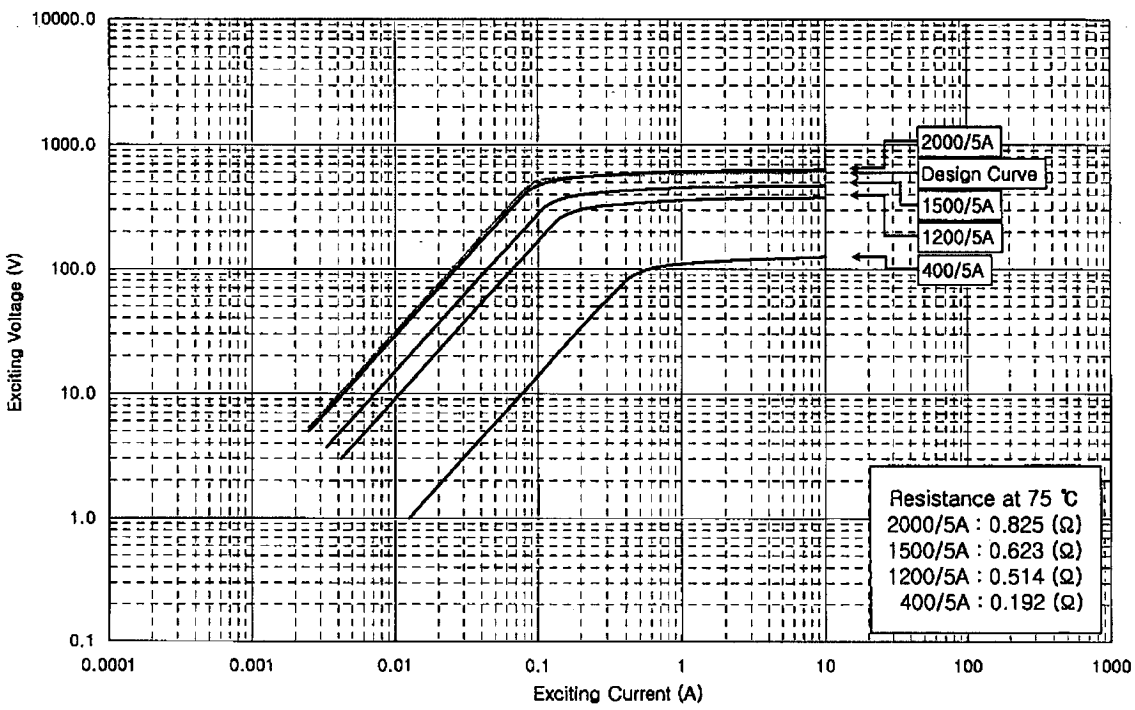
A4(210mm × 297mm)

HYUNDAI HEAVY INDUSTRIES CO, LTD.

EXCITING CURRENT CHARACTERISTIC TEST

Customer : LG Bepco Project	Serial No. : HJB0115	Date of Test : 2008. 11. 28
C.T Ratio : 2000-1500-1200-400/5A	Class/Burden : C400 / 100 VA	Frequency : 60 Hz

Exciting Current-Voltage Curve



2000/5	DSN. Exciting Voltage(V)	5.3	288.6	361.1	376.8	402.0	439.6	459.7	480.1	506.8	538.2	585.0	612.3
	DSN. Exciting Current(A)	0.0025	0.0574	0.0687	0.0708	0.0745	0.0808	0.0849	0.0903	0.0945	0.1261	0.6119	10.000
	Measuring Voltage(V)	**5.0**	**402.4**	**455.5**	**498.8**	**527.0**	**545.9**	**555.5**	**590.0**	**597.7**	**611.0**	**617.2**	**634.6**
	Measuring Current(A)	0.0025	0.0800	0.0932	0.1140	0.1404	0.1730	0.2000	0.4000	0.5000	0.8000	1.0000	10.000
1500/5	Measuring Voltage(V)	3.8	301.8	341.6	374.1	395.2	409.4	416.6	442.5	448.3	458.3	462.9	476.0
	Measuring Current(A)	0.0033	0.1067	0.1243	0.1520	0.1872	0.2307	0.2667	0.5333	0.6667	1.0667	1.3333	10.000
1200/5	Measuring Voltage(V)	3.0	241.4	273.3	299.3	316.2	327.6	333.3	354.0	358.6	366.6	370.3	380.8
	Measuring Current(A)	0.0042	0.1333	0.1553	0.1900	0.2340	0.2883	0.3333	0.6667	0.8333	1.3333	1.6667	10.000
400/5	Measuring Voltage(V)	1.0	80.5	91.1	99.8	105.4	109.2	111.1	118.0	119.5	122.2	123.4	126.9
	Measuring Current(A)	0.0125	0.4000	0.4660	0.5700	0.7020	0.8650	1.0000	2.0000	2.5000	4.0000	5.0000	10.000

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Tested by : D. O. SHIN

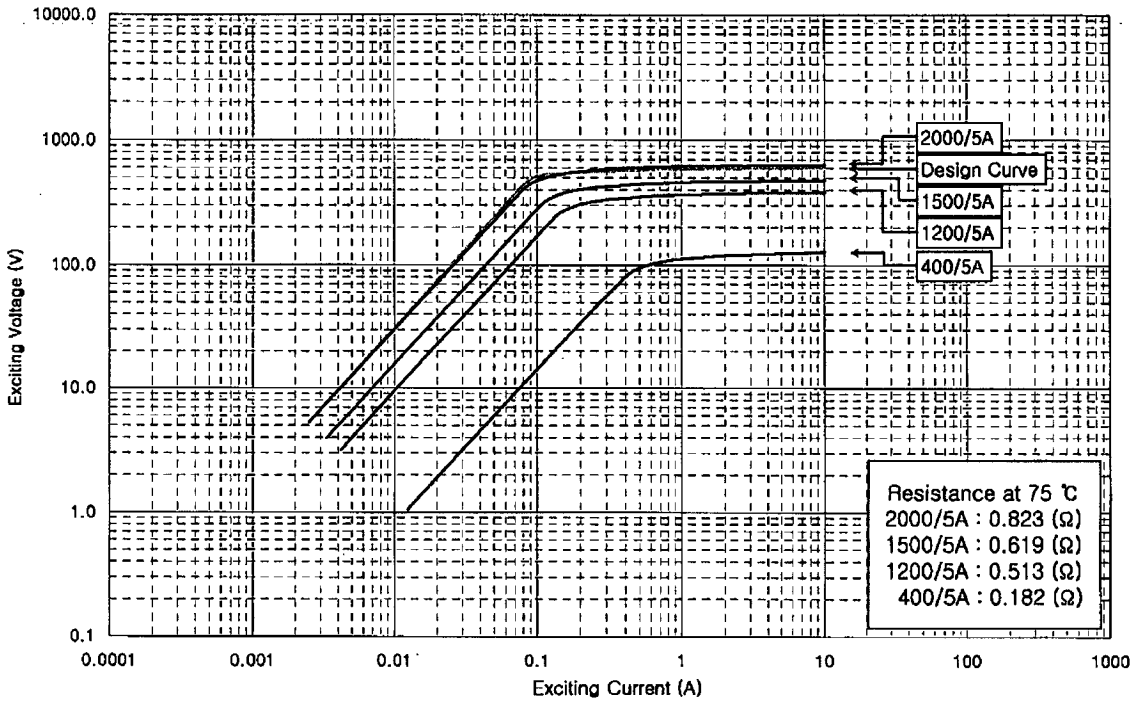
☐ Reviewed by
☐ Witnessed by
Date:

HYUNDAI HEAVY INDUSTRIES CO.,LTD.

EXCITING CURRENT CHARACTERISTIC TEST

Customer : LG Bepco Project	Serial No. : HJB0116	Date of Test : 2008. 11. 28
C.T Ratio : 2000-1500-1200-400/5A	Class/Burden : C400 / 100 VA	Frequency : 60 Hz

Exciting Current-Voltage Curve



2000/5	DSN. Exciting Voltage(V)	5.3	288.6	361.1	376.8	402.0	439.6	459.7	480.1	506.8	538.2	585.0	612.3
	DSN. Exciting Current(A)	0.0025	0.0574	0.0687	0.0708	0.0745	0.0808	0.0849	0.0903	0.0945	0.1261	0.6119	10.000
	Measuring Voltage(V)	**5.3**	**403.6**	**456.0**	**504.2**	**531.8**	**551.9**	**563.2**	**600.0**	**606.5**	**618.4**	**624.2**	**640.5**
	Measuring Current(A)	0.0025	0.0800	0.0926	0.1158	0.1418	0.1726	0.2000	0.4000	0.5000	0.8000	1.0000	10.000
1500/5	Measuring Voltage(V)	4.0	302.7	342.0	378.2	398.9	413.9	422.4	450.0	454.9	463.8	468.2	480.4
	Measuring Current(A)	0.0033	0.1067	0.1235	0.1544	0.1891	0.2301	0.2667	0.5333	0.6667	1.0667	1.3333	10.000
1200/5	Measuring Voltage(V)	3.2	242.2	273.6	302.5	319.1	331.1	337.9	360.0	363.9	371.0	374.5	384.3
	Measuring Current(A)	0.0042	0.1333	0.1543	0.1930	0.2363	0.2877	0.3333	0.6667	0.8333	1.3333	1.6667	10.000
400/5	Measuring Voltage(V)	1.1	80.7	91.2	100.8	106.4	110.4	112.6	120.0	121.3	123.7	124.8	128.1
	Measuring Current(A)	0.0125	0.4000	0.4630	0.5790	0.7090	0.8630	1.0000	2.0000	2.5000	4.0000	5.0000	10.000

AICD

Tested by : D. O. SHIN

☐ Reviewed by
☐ Witnessed by
Date:

HHI

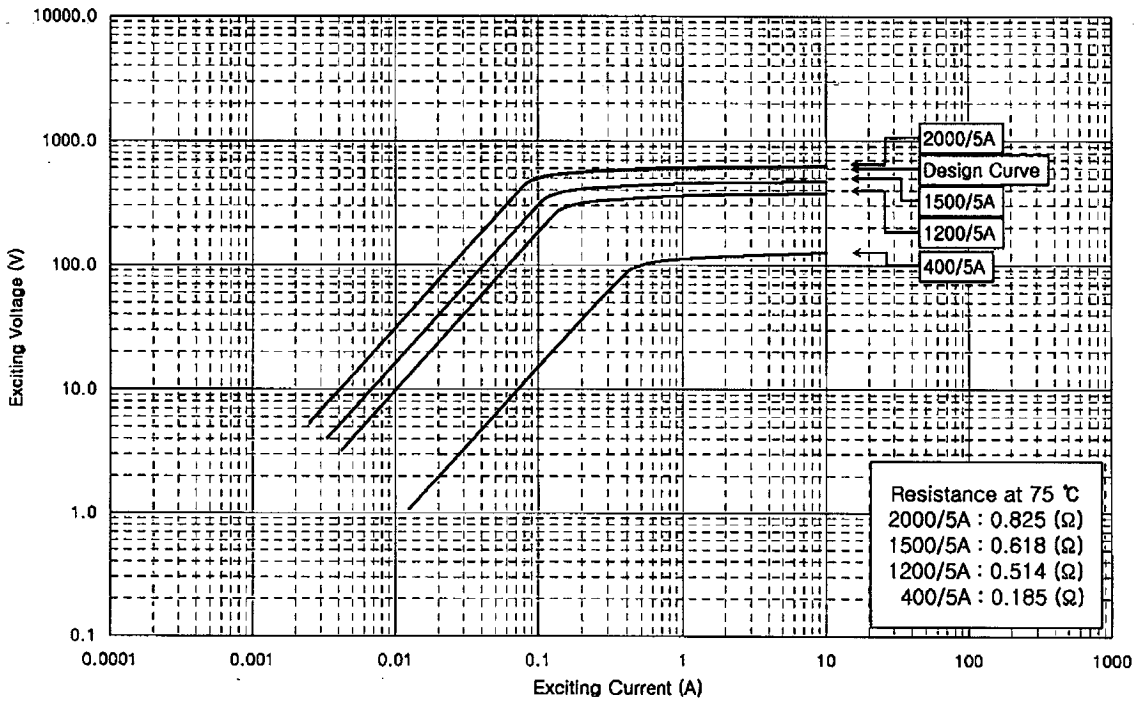
A4(210mm × 297mm)

HYUNDAI HEAVY INDUSTRIES CO.,LTD.

EXCITING CURRENT CHARACTERISTIC TEST

Customer : LG Bepco Project	Serial No. : HJB0117	Date of Test : 2008. 11. 28
C.T Ratio : 2000-1500-1200-400/5A	Class/Burden : C400 / 100 VA	Frequency : 60 Hz

Exciting Current-Voltage Curve



2000/5	DSN. Exciting Voltage(V)	5.3	288.6	361.1	376.8	402.0	439.6	459.7	480.1	506.8	538.2	585.0	612.3
	DSN. Exciting Current(A)	0.0025	0.0574	0.0687	0.0708	0.0745	0.0808	0.0849	0.0903	0.0945	0.1261	0.6119	10.000
	Measuring Voltage(V)	**5.4**	**440.1**	**489.1**	**520.5**	**541.0**	**555.2**	**562.4**	**591.5**	**597.9**	**610.3**	**616.1**	**631.8**
	Measuring Current(A)	0.0025	0.0800	0.0944	0.1142	0.1424	0.1750	0.2000	0.4000	0.5000	0.8000	1.0000	10.000
1500/5	Measuring Voltage(V)	4.1	330.1	366.8	390.4	405.8	416.4	421.8	443.6	448.4	457.7	462.1	473.9
	Measuring Current(A)	0.0033	0.1067	0.1259	0.1523	0.1899	0.2333	0.2667	0.5333	0.6667	1.0667	1.3333	10.000
1200/5	Measuring Voltage(V)	3.2	264.1	293.4	312.3	324.6	333.1	337.4	354.9	358.7	366.2	369.7	379.1
	Measuring Current(A)	0.0042	0.1333	0.1573	0.1903	0.2373	0.2917	0.3333	0.6667	0.8333	1.3333	1.6667	10.000
400/5	Measuring Voltage(V)	1.1	88.0	97.8	104.1	108.2	111.0	112.5	118.3	119.6	122.1	123.2	126.4
	Measuring Current(A)	0.0125	0.4000	0.4720	0.5710	0.7120	0.8750	1.0000	2.0000	2.5000	4.0000	5.0000	10.000

AICO

Tested by : D. O. SHIN

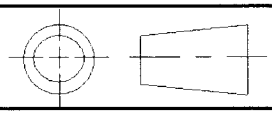
☑ Reviewed by
☐ Witnessed by
Date:

HHI

A4(210mm × 297mm)

SIZE	DWG NO	SH	REV
A	401A4699	1	A

THIRD ANGLE PROJECTION



THIS DOCUMENT SHALL BE REVISED IN ITS ENTIRETY. ALL SHEETS OF THIS DOCUMENT ARE THE SAME REVISION LEVEL AS INDICATED IN THE REVISION BLOCK.

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	Revised per DCI 08000095. See notes at end.	17APR08	ADC

11-CT-CTG-001
12-CT-CTG-001

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ±	DRAWN Manish Das	04DEC07
	CHECKED Ken Bina	04DEC07
3 PL DECIMALS ±	ENGRG Manish Das	04DEC07
ANGLES ±	ISSUED Alan Conkling	07DEC07
FRACTIONS ± ✓		
APPLIED PRACTICES		
	SIM TO:	

GENERAL ELECTRIC COMPANY

GE Energy

SCHENECTADY, NY

Recommended Relay Settings

FIRST MADE FOR: 337X446,337X447

MLI: C185

SIZE	CAGE CODE	DWG NO
A		401A4699

SCALE		SHEET
		1

DT -1N

CE1E

One line drawing# 215D1108 Rev D
C902 drawing# 237A6528 Rev -

Generator Gen-Info

Description	Settings	Units
Apparent Power	223000	KVA
Terminal Voltage	18	KV
Frequency	60	Hz
Power Factor	0.85	PF
CT Line Side Primary	9000	A
CT Line Side Secondary	5	A
VT Line Side Primary	18000	Volts
VT Line Side Secondary	120	Volts
VT Generator Neutral Primary	12000	Volts
VT Generator Neutral Secondary	240	Volts
CT Generator Neutral Primary	9000	A
CT Generator Neutral Secondary	5	A
Unsaturated Synchronous Reactance (Xd)	2.01	PU
Unsaturated Transient Reactance (X'd)	0.25	PU
Phase Rotation	ABC	
VT Connection	Delta	
LCI Present	Yes	
Guaranteed I2 Squared T	10	Sec
Guaranteed Cont I2	8	%

G60A/B - Generator Protection Relay Settings
Product Order Code: G60-G01-HCH-F8F-H6P-M8H-P6P-U6P-WXX
Version: 5.0

PRODUCT SETUP: DISPLAY PROPERTIES		
	Flash Message Time	1.0 s
	Default Message Timeout	300 s
	Default Message Intensity (VFD Only)	25%
	Screen Saver Feature (LCD Only)	Disabled
	Screen Saver Wait Time (LCD Only)	30 min
	Current Cutoff Level	0.020 pu
	Voltage Cutoff Level	1.0 V
COMMUNICATIONS: SERIAL PORTS		
	RS485 Com2 Baud Rate	9600
	RS485 Com2 Parity	None
	RS485 Com2 Response Min Time	0 ms
Network		
	IP Address	CUSTOMER
	IP Subnet Mask	CUSTOMER
	Gateway IP Address	CUSTOMER
	OSI Network Address (NSAP)	CUSTOMER
MODBUS PROTOCOL		
	Modbus Slave Address	CUSTOMER
	Modbus TCP Port Number	CUSTOMER
UCA MMS		
	Default GOOSE Update Time	60 s
	UCA Logical Device Name	UCADevice
	UCA/MMS TCP Port Number	102
	GOOSE Function	Disabled
	UCA GLOBE.ST.LocRemDS	OFF
HTTP		
	HTTP TCP Port Number	80
TFTP		
	TFTP Main UDP Port Number	69
	TFTP Data UDP Port Number	10
	TFTP Data UDP Port Number	20
REAL TIME CLOCK		
	IRIG-B Signal Type	None
OSCILLOGRAPHY		
	Number Of Records	6
	Trigger Mode	Automatic Overwrite

	Trigger Position	25%
	Trigger Source	TRIG OSC On (VO6)
	AC Input Waveforms	64 samples/cycle
	Digital Channel 1	52G/b On(H7a)
	Digital Channel 2	86G-1A On (VO1)
	Digital Channel 3	STATOR DIFF OP A
	Digital Channel 4	STATOR DIFF OP B
	Digital Channel 5	STATOR DIFF OP C
	Digital Channel 6	3RD HARM NTRL UV PKP
	Digital Channel 7	3RD HARM NTRL UV OP
	Digital Channel 8	3RD HARM NTRL UV DPO
	Digital Channel 9	59GN (DE1) PKP
	Digital Channel 10	59GN (DE1) OP
	Digital Channel 11	EXT TRIG On (U7a)
	Digital Channel 12	86G-2A On (VO2)
	Digital Channel 13	LOSS EXCIT STG1 PKP
	Digital Channel 14	LOSS EXCIT STG1 OP
	Digital Channel 15	LOSS EXCIT STG2 PKP
	Digital Channel 16	LOSS EXCIT STG2 OP
	Digital Channel 17	VOLTS PER HERTZ 1 PKP
	Digital Channel 18	VOLTS PER HERTZ 1 OP
	Digital Channel 19	VOLTS PER HERTZ 2 PKP
	Digital Channel 20	VOLTS PER HERTZ 2 OP
	Digital Channel 21	GEN UNBAL STG1 PKP
	Digital Channel 22	GEN UNBAL STG1 OP
	Digital Channel 23	GEN UNBAL STG2 PKP
	Digital Channel 24	GEN UNBAL STG2 OP
	Digital Channel 25	BRKR TRP On (VO3)
	Digital Channel 26	PH DIST Z1 PKP
	Digital Channel 27	PH DIST Z2 PKP
	Digital Channel 28	PH DIST Z3 PKP
	Digital Channel 30	PH DIST Z1 OP AB
	Digital Channel 31	PH DIST Z2 OP AB
	Digital Channel 32	PH DIST Z3 OP AB
	Digital Channel 33	PH DIST Z1 OP BC
	Digital Channel 34	PH DIST Z2 OP BC
	Digital Channel 35	PH DIST Z3 OP BC
	Digital Channel 36	PH DIST Z1 OP CA
	Digital Channel 37	PH DIST Z2 OP CA
	Digital Channel 38	PH DIST Z3 OP CA
	Digital Channel 39	DIR POWER 1 STG1 PKP
	Digital Channel 40	DIR POWER 1 STG1 OP

	Digital Channel 41	DIR POWER 1 STG2 PKP
	Digital Channel 42	DIR POWER 1 STG2 OP
	Digital Channel 43	ACCDNT ENRG ARMED
	Digital Channel 44	ACCDNT ENRG OP
	Digital Channel 45	POWER SWING TRIP
	Digital Channel 46	UNDERFREQ 1 OP
	Digital Channel 47	ANY TRIP On (VO4)
	Digital Channel 48	SRC2 VT FUSE FAIL OP
	Digital Channel 49	PHASE OV1 OP A
	Digital Channel 50	PHASE OV1 OP B
	Digital Channel 51	PHASE OV1 OP C
	Digital Channel 52	PHASE UV1 OP A
	Digital Channel 53	PHASE UV1 OP B
	Digital Channel 54	PHASE UV1 OP C
	Digital Channel 55	PHASE TOC1 PKP
	Digital Channel 56	PHASE TOC1 OP
	Digital Channel 57	24A (FE 1) OP
	Digital Channel 58	OVERFREQ1 OP
	Digital Channel 59	TRIG OSC On (VO6)
	Digital Channel 60	PHASE IOC1 OP
	Digital Channel 61	PHASE IOC1 PKP
	Analog Channel 1	Stator Diff Iad
	Analog Channel 2	SRC2 I_2 MAG
	Analog Channel 3	SRC2 I_0 MAG
	Analog Channel 4	Stator Rest Ibr
	Analog Channel 5	Stator Diff Icd
	Analog Channel 6	Stator Rest Icr
	Analog Channel 7	Stator Gnd Vn 3rd
	Analog Channel 8	Sns Dir Power 1
	Analog Channel 9	SRC1 Ia MAG
	Analog Channel 10	SRC1 Ib MAG
	Analog Channel 11	SRC1 Ic MAG
	Analog Channel 12	SRC2 Frequency
	Analog Channel 13	SRC2 P
	Analog Channel 14	SRC2 Q
	Analog Channel 15	Sns Dir Power 2
	Analog Channel 16	none
DATA LOGGER		
	Rate	5 min
	Channel 1	Stator Gnd Vn 3rd
	Channel 2	Stator Gnd Vn+V0 3rd
	Channel 3	SRC2 P

	Channel 4	SRC2 Q
	Channel 5	SRC2 PF
USER-PROGRAMMABLE LEDS		
TRIP AND ALARMS LEDS		
	Trip LED Input	ANY TRIP On (VO4)
	Alarm LED Input	ANY SELF TESTS
USER PROGRAMMABLE LEDS		
	LED 1: OPERAND	3RD HARM NTRL UV OP
	LED 1: TYPE	Latched
	LED 2: OPERAND	59GN(DE1) OP
	LED 2: TYPE	Latched
	LED 3: OPERAND	STATOR DIFF OP A
	LED 3: TYPE	Latched
	LED 4: OPERAND	STATOR DIFF OP B
	LED 4: TYPE	Latched
	LED 5: OPERAND	STATOR DIFF OP C
	LED 5: TYPE	Latched
	LED 9: OPERAND	VOLTS PER HERTZ 1 OP
	LED 9: TYPE	Latched
	LED 10: OPERAND	VOLTS PER HERTZ 2 OP
	LED 10: TYPE	Latched
	LED 11: OPERAND	LOSS EXCIT STG1 OP
	LED 11: TYPE	Latched
	LED 12: OPERAND	LOSS EXCIT STG2 OP
	LED 12: TYPE	Latched
	LED 13: OPERAND	LOSS EXCIT STG1 PKP
	LED 13: TYPE	Self-Reset
	LED 14: OPERAND	LOSS EXCIT STG2 PKP
	LED 14: TYPE	Self-Reset
	LED 17: OPERAND	PH DIST Z1 OP
	LED 17: TYPE	Latched
	LED 18: OPERAND	PH DIST Z2 OP
	LED 18: TYPE	Latched
	LED 19: OPERAND	PH DIST Z3 OP
	LED 19: TYPE	Latched
	LED 20: OPERAND	DIR POWER 1 STG1 OP
	LED 20: TYPE	Latched
	LED 21: OPERAND	DIR POWER 1 STG2 OP
	LED 21: TYPE	Latched
	LED 22: OPERAND	POWER SWING TRIP
	LED 22: TYPE	Latched
	LED 23: OPERAND	UNDERFREQ 1 OP

	LED 23: TYPE	Latched
	LED 25: OPERAND	EXT TRIG On (U7a)
	LED 25: TYPE	Latched
	LED 26: OPERAND	PHASE OV1 OP
	LED 26: TYPE	Self-Reset
	LED 27: OPERAND	PHASE UV1 OP
	LED 27: TYPE	Self-Reset
	LED 28: OPERAND	OVERFREQ 1 OP
	LED 28: TYPE	Self-Reset
	LED 29: OPERAND	SRC2 VT FUSE FAIL OP
	LED 29: TYPE	Self-Reset
	LED 33: OPERAND	GEN UNBAL STG1 PKP
	LED 33: TYPE	Self-Reset
	LED 34: OPERAND	GEN UNBAL STG1 OP
	LED 34: TYPE	Latched
	LED 35: OPERAND	GEN UNBAL STG2 PKP
	LED 35: TYPE	Self-Reset
	LED 36: OPERAND	GEN UNBAL STG2 OP
	LED 36: TYPE	Latched
	LED 41: OPERAND	ACCDNT ENRG ARMED
	LED 41: TYPE	Self-Reset
	LED 42: OPERAND	ACCDNT ENRG OP
	LED 42: TYPE	Latched
	LED 43: OPERAND	PHASE TOC1 PKP
	LED 43: TYPE	Self-Reset
	LED 44: OPERAND	PHASE TOC1 OP
	LED 44: TYPE	Self-Reset
	LED 45: OPERAND	24A (FE1) OP
	LED 45: TYPE	Latched
	LED 44: OPERAND	TRIG OSC On (VO6)
	LED 44: TYPE	Latched
	LED 45: OPERAND	PHASE IOC1 OP
	LED 45: TYPE	Latched
USER-PROGRAMMABLE SELF TESTS		
	Detect Ring Break Function	Enabled
	Direct Device Off Function	Enabled
	Remote Device Off Function	Enabled
	Battery Fail Function	Enabled
	SNTP Fail Function	Disabled
	IRIG B Fail Function	Disabled
INSTALLATION		
	Relay Settings	Not Programmed

	Relay Name	CUSTOMER
SYSTEM SETUP: AC INPUTS: CURRENT		
	CT F1: Phase CT Primary	9000 A
	CT F1: Phase CT Secondary	5 A
	CT F1: Ground CT Primary	1 A
	CT F1: Ground CT Secondary	1 A
	CT M1: Phase CT Primary	9000 A
	CT M1: Phase CT Secondary	5 A
	CT M1: Ground CT Primary	1 A
	CT M1: Ground CT Secondary	1 A
VOLTAGE		
	VT F5: Phase VT Connection	Delta
	VT F5: Phase VT Secondary	120 V
	VT F5: Phase VT Ratio	150.0 :1
	VT F5: Auxiliary VT Connection	Vn
	VT F5: Auxiliary VT Secondary	240 V
	VT F5: Auxiliary VT Ratio	50.0 :1
POWER SYSTEM		
	Nominal Frequency	60 Hz
	Phase Rotation	ABC
	Frequency And Phase Reference	SRC 2
	Frequency Tracking Function	Enabled
SIGNAL SOURCES		
	SOURCE 1: Name	NEUTRAL
	SOURCE 1: Phase CT	F1
	SOURCE 1: Ground CT	None
	SOURCE 1: Phase VT	None
	SOURCE 1: Auxiliary VT	F5
	SOURCE 2: Name	LINE
	SOURCE 2: Phase CT	M1
	SOURCE 2: Ground CT	None
	SOURCE 2: Phase VT	F5
	SOURCE 2: Auxiliary VT	F5
FLEXLOGIC: FLEXLOGIC EQUATION EDITOR		
	Flexlogic Entry 1 (Protection Element)	3RD HARM NTRL UV OP
	Flexlogic Entry 2 (Protection Element)	59GN (DE1) OP
	Flexlogic Entry 3 (Protection Element)	STATOR DIFF OP
	Flexlogic Entry 4 (OR)	OR(3)
	Flexlogic Entry 5 (Assign Virtual Output)	=86G-1A (VO1)
	Flexlogic Entry 6 (Protection Element)	VOLT PER HERTZ 1 OP
	Flexlogic Entry 7 (Protection Element)	VOLT PER HERTZ 2 OP
	Flexlogic Entry 8 (Protection Element)	LOSS EXCIT STG1 OP

	Flexlogic Entry 9 (Protection Element)	LOSS EXCIT STG2 OP
	Flexlogic Entry 10 (Protection Element)	GEN UNBAL STG1 OP
	Flexlogic Entry 11 (OR)	OR(5)
	Flexlogic Entry 12 (Assign Virtual Output)	=86G-2A (VO2)
	Flexlogic Entry 13 (Protection Element)	PH DIST Z1 OP
	Flexlogic Entry 14 (Protection Element)	DIR POWER 1 STG1 OP
	Flexlogic Entry 15 (Protection Element)	PHASE TOC1 OP
	Flexlogic Entry 16 (Protection Element)	POWER SWING TRIP
	Flexlogic Entry 17 (Protection Element)	UNDERFREQ 1 OP
	Flexlogic Entry 18 (OR)	OR(5)
	Flexlogic Entry 19 (Assign Virtual Output)	=BRKR TRIP (VO3)
	Flexlogic Entry 20 (Virtual Output On)	86G-1A On (VO1)
	Flexlogic Entry 21 (Virtual Output On)	86G-2A On (VO2)
	Flexlogic Entry 22 (Virtual Output On)	BRKR TRIP On (VO3)
	Flexlogic Entry 23 (Protection Element)	ACCDNT ENRG OP
	Flexlogic Entry 24 (OR)	OR(4)
	Flexlogic Entry 25 (Assign Virtual Output)	= ANY TRIP (VO4)
	Flexlogic Entry 26 (Protection Element)	SRC2 VT FUSE FAIL OP
	Flexlogic Entry 27 (Contact Input On)	52G/b On(H7a)
	Flexlogic Entry 28 (OR)	OR(2)
	Flexlogic Entry 29 (Assign Virtual Output)	=BLK (VO5)
	Flexlogic Entry 30 (Virtual Output On)	ANY TRIP On (VO4)
	Flexlogic Entry 31 (Contact Input On)	EXT TRIG On (U7a)
	Flexlogic Entry 32 (OR)	OR(2)
	Flexlogic Entry 33 (TIMER)	TIMER 1
	Flexlogic Entry 34 (Assign Virtual Output)	=TRIG OSC (VO6)
	Flexlogic Entry 35	End Of List
FLEXILOGIC TIMERS		
	TIMER 1: Type	millisecond
	TIMER 1: Pickup Delay	100
	TIMER 1: Dropout Delay	0.0
FLEXELEMENTS		
	FLEXELEMENTS 1: Function	Enabled
	FLEXELEMENTS 1: Name	24A
	FLEXELEMENTS 1: InputPlus	Volts Per Hertz 1
	FLEXELEMENTS 1: InputMinus	OFF
	FLEXELEMENTS 1: InputMode	ABSOLUTE
	FLEXELEMENTS 1: Compare Mode	LEVEL
	FLEXELEMENTS 1: Direction Type	OVER
	FLEXELEMENTS 1: Pickup	1.060 pu
	FLEXELEMENTS 1: Hysteresis	3.0%
	FLEXELEMENTS 1: DeltaTUnits	Milliseconds

	FLEXELEMENTS 1: DeltaT	20
	FLEXELEMENTS 1: Pickup Delay	10.000 s
	FLEXELEMENTS 1: Reset Delay	60.000 s
	FLEXELEMENTS 1: Block	OFF
	FLEXELEMENTS 1: Target	Self-reset
	FLEXELEMENTS 1: Events	Enabled
GROUPED ELEMENTS: GROUP 1: DISTANCE: DISTANCE		
	Source	SRC 2
	Memory Duration	10 cycles
PHASE DISTANCE [GROUP 1]		
	PHASE DISTANCE 21: Function	Enabled
	PHASE DISTANCE 21: Direction	CUSTOMER
	PHASE DISTANCE 21: Shape	CUSTOMER
	PHASE DISTANCE 21: Xfmr Vol Connection	CUSTOMER
	PHASE DISTANCE 21: Xfmr Curr Connection	CUSTOMER
	PHASE DISTANCE 21: Reach	CUSTOMER
	PHASE DISTANCE 21: RCA	CUSTOMER
	PHASE DISTANCE 21: Comp Limit	CUSTOMER
	PHASE DISTANCE 21: DIR RCA	CUSTOMER
	PHASE DISTANCE 21: DIR Comp Limit	CUSTOMER
	PHASE DISTANCE 21: Quad Right Blinder	CUSTOMER
	PHASE DISTANCE 21: Quad Right Blinder RCA	CUSTOMER
	PHASE DISTANCE 21: Quad Left Blinder	CUSTOMER
	PHASE DISTANCE 21: Quad Left Blinder RCA	CUSTOMER
	PHASE DISTANCE 21: Supervision	CUSTOMER
	PHASE DISTANCE 21: Volt Level	CUSTOMER
	PHASE DISTANCE 21: Delay	CUSTOMER
	PHASE DISTANCE 21: Block	BLK On (VO5)
	PHASE DISTANCE 21: Target	Latched
	PHASE DISTANCE 21: Events	Enabled
POWER SWING DETECT [GROUP 1]		
	Function	Enabled
	Source	CUSTOMER
	Mode	CUSTOMER
	Supv	CUSTOMER
	Fwd Reach	CUSTOMER
	Fwd Rca	CUSTOMER
	Rev Reach	CUSTOMER

	Rev Rca	CUSTOMER
	Outer Limit Angle	CUSTOMER
	Middle Limit Angle	CUSTOMER
	Delay 1 Pickup	CUSTOMER
	Delay 1 Reset	CUSTOMER
	Delay 2 Pickup	CUSTOMER
	Delay 3 Pickup	CUSTOMER
	Delay 4 Pickup	CUSTOMER
	Seal-In Delay	CUSTOMER
	Trip Mode	CUSTOMER
	Block	BLK On (VO5)
	Target	Latched
	Events	Enabled
STATOR DIFFERENTIAL [GROUP 1]		
	Function	Enabled
	Line End Source	LINE (SRC 2)
	Neutral End Source	NEUTRAL (SRC1)
	Pickup	0.090 pu
	Slope 1	12%
	Break 1	1.50 pu
	Slope 2	50%
	Break 2	3.11 pu
	Block	OFF
	Target	Latched
	Events	Enabled
GENERATOR UNBALANCE [GROUP 1]		
	Function	Enabled
	Source	LINE (SRC 2)
	Inom	0.795 pu
	Stage 1 Pickup	8 %
	Stage 1 K-Value	10
	Stage 1 Tmin	0 s
	Stage 1 Tmax	1000 s
	Stage 1 K-Reset	600 s
	Stage 2 Pickup	5.6 %
	Stage 2 Pickup Delay	2.0 s
	Block	OFF
	Target	Latched
	Events	Enabled
VOLTAGE ELEMENTS: PHASE UV [GROUP 1]		
	PHASE UV1: Function	Enabled
	PHASE UV1: Signal Source	LINE (SRC 2)

	PHASE UV1: Mode	Phase to Phase
	PHASE UV1: Pickup	0.900 pu
	PHASE UV1: Curve	Definite Time
	PHASE UV1: Delay	1 s
	PHASE UV1: Minimum Voltage	0.100 pu
	PHASE UV1: Block	BLK On (VO5)
	PHASE UV1: Target	Self-Reset
	PHASE UV1: Events	Enabled
PHASE TIME OVERCURRENT		
	Function	Enabled
	Source	Line (SRC 2)
	Pickup	CUSTOMER
	Curve	CUSTOMER
	TD Multiplier	CUSTOMER
	Reset	CUSTOMER
	Restraint	Enabled
	Block A	OFF
	Block B	OFF
	Block C	OFF
	Target	Latched
	Events	Enabled
PHASE OVERVOLTAGE		
	Function	Enabled
	Source	LINE (SRC 2)
	Pickup	1.060
	Pickup Delay	10.00
	Reset Delay	0.00
	Block	OFF
	Target	Self-Reset
	Events	Enabled
AUXILIARY OV [GROUP 1]		
	AUXILIARY OV 1: Function	Enabled
	AUXILIARY OV 1: Source	NEUTRL (SRC1)
	AUXILIARY OV 1: Pickup	0.021 pu
	AUXILIARY OV 1: Pickup Delay	5.00 s
	AUXILIARY OV 1: Reset Delay	0.00 s
	AUXILIARY OV 1: Block	OFF
	AUXILIARY OV 1: Target	Latched
	AUXILIARY OV 1: Events	Enabled
VOLTS PER HERTZ [GROUP 1]		
	VOLTS PER HERTZ 1: Function	Enabled
	VOLTS PER HERTZ 1: Source	Line (SRC2)

	VOLTS PER HERTZ 1: Pickup	1.11 pu
	VOLTS PER HERTZ 1: Curves	INVERSE A
	VOLTS PER HERTZ 1: TD Multiplier	6.0 secs
	VOLTS PER HERTZ 1: T Reset	600
	VOLTS PER HERTZ 1: Block	OFF
	VOLTS PER HERTZ 1: Target	Latched
	VOLTS PER HERTZ 1: Events	Enabled
	VOLTS PER HERTZ 2: Function	Enabled
	VOLTS PER HERTZ 2: Source	Line (SRC2)
	VOLTS PER HERTZ 2: Pickup	1.18 pu
	VOLTS PER HERTZ 2: Curves	Definite Time
	VOLTS PER HERTZ 2: TD Multiplier	2.00 secs
	VOLTS PER HERTZ 2: T Reset	600
	VOLTS PER HERTZ 2: Block	OFF
	VOLTS PER HERTZ 2: Target	Latched
	VOLTS PER HERTZ 2: Events	Enabled
LOSS OF EXCITATION [GROUP 1]		
	Function	Enabled
	Source	LINE (SRC 2)
	Center 1	10.90
	Radius 1	8.72
	UV Supervision Enable 1	Disabled
	Pickup Delay 1	0.060 s
	Center 2	19.70
	Radius 2	17.52
	UV Supervision Enable 2	Disabled
	Pickup Delay 2	0.500 s
	UV Supervision	0.000 pu
	Block	SRC2 VT FUSE FAIL OP
	Target	Latched
	Events	Enabled
ACCIDENTAL ENERGIZATION [GROUP 1]		
	Function	Enabled
	Source	SRC 2
	Accidental Energization Arming Mode	UV AND OFFLINE
	Accidental Energization OC Pickup	0.100
	Accidental Energization UV Pickup	0.150
	Accidental Energization Offline	52G/b On (H7a)
	Block	OFF
	Target	Latched
	Events	Enabled
SENSITIVE DIRECTIONAL POWER: SENSITIVE DIRECTIONAL POWER [GROUP 1]		

	SENS DIR POWER1: Function	Enabled
	SENS DIR POWER1: Signal Source	LINE (SRC 2)
	SENS DIR POWER1: Sensitive Directional Power RCA	180 °
	SENS DIR POWER1: Sensitive Directional Power Calibration	0 °
	SENS DIR POWER1: Stage 1 SMIN	0.027 pu
	SENS DIR POWER1: Stage 1 Delay	10 s
	SENS DIR POWER1: Stage 2 SMIN	0.027 pu
	SENS DIR POWER1: Stage 2 Delay	10 s
	SENS DIR POWER1: Block	52G/b On(H7a)
	SENS DIR POWER1: Target	Latched
	SENS DIR POWER1: Events	Enabled
STATOR GROUND		
	Stator Ground: Source	LINE (SRC 2)
3RD HARMONIC NTRL UV [GROUP 1]		
	Function	Disabled (See Note 1)
	Pickup	FIELD DATA REQ'D
	Delay	FIELD DATA REQ'D
	Max Power	FIELD DATA REQ'D
	Min Power	FIELD DATA REQ'D
	Volt Supervision	FIELD DATA REQ'D
	Block	52G/b On(H7a)
	Target	Latched
	Events	Enabled
CONTROL ELEMENTS		
UNDERFREQUENCY		
	UNDERFREQUENCY 1: Function	Enabled
	UNDERFREQUENCY 1: Block	52G/b On(H7a)
	UNDERFREQUENCY 1: Source	LINE (SRC 2)
	UNDERFREQUENCY 1: Min Volt/Amp	CUSTOMER pu
	UNDERFREQUENCY 1: Pickup	56.4 Hz
	UNDERFREQUENCY 1: Pickup Delay	0.100 s
	UNDERFREQUENCY 1: Reset Delay	0.000 s
	UNDERFREQUENCY 1: Target	Latched
	UNDERFREQUENCY 1: Events	Enabled
OVERFREQUENCY		
	OVERFREQUENCY 1: Function	Enabled
	OVERFREQUENCY 1: Block	52G/b On(H7a)
	OVERFREQUENCY 1: Source	LINE (SRC 2)
	OVERFREQUENCY 1: Pickup	CUSTOMER
	OVERFREQUENCY 1: Pickup Delay	CUSTOMER

	OVERFREQUENCY 1: Reset Delay	CUSTOMER
	OVERFREQUENCY 1: Target	Self-Reset
	OVERFREQUENCY 1: Events	Enabled
DIGITAL ELEMENTS		
	DIGITAL ELEMENT 1: Function	Enabled
	DIGITAL ELEMENT 1: Name	59GN
	DIGITAL ELEMENT 1: Input	AUX OV 1 OP
	DIGITAL ELEMENT 1: Pickup Delay	0.000 s
	DIGITAL ELEMENT 1: Reset Delay	0.000 s
	DIGITAL ELEMENT 1: Pickup LED	Disabled
	DIGITAL ELEMENT 1: Block	OFF
	DIGITAL ELEMENT 1: Target	Latched
	DIGITAL ELEMENT 1: Events	Enabled
MONITORING ELEMENTS: VT FUSE FAILURE		
	Function	Enabled
INPUTS/OUTPUTS: CONTACT INPUTS		
	H7A: ID	52G/b
	H7A: Debounce Time	2.0 ms
	H7A: Events	Enabled
	U7A: ID	EXT TRIG
	U7A: Debounce Time	2.0 ms
	U7A: Events	Enabled
CONTACT INPUT THRESHOLDS		
	52G/b : Cont Ip 2 : Cont Ip 3 : Cont Ip 4(H7a : H7c : H8a : H8c)	84 Vdc
	EXT TRIG : Cont Ip 10 : Cont Ip 11 : Cont Ip 12(U7a : U7c : U8a : U8c)	84 Vdc
CONTACT OUTPUTS		
	H1: ID	86G-1A
	H1: Operate	86G-1A On (VO1)
	H1: Seal-In	OFF
	H1: Events	Enabled
	H2: ID	86G-2A
	H2: Operate	86G-2A On (VO2)
	H2: Seal-In	OFF
	H2: Events	Enabled
	H3: ID	TRIP 52G TC1
	H3: Operate	BRKR TRIP On (VO3)
	H3: Seal-In	OFF
	H3: Events	Enabled
	H4: ID	TRIP 52G TC2
	H4: Operate	BRKR TRIP On (VO3)

	H4: Seal-In	OFF
	H4: Events	Enabled
	H5: ID	50/27
	H5: Operate	ACCDNT ENRG OP
	H5: Seal-In	OFF
	H5: Events	Enabled
	P1: ID	ANY TRIP
	P1: Operate	ANY TRIP On (VO4)
	P1: Seal-In	OFF
	P1: Events	Enabled
	P2: ID	24(A)
	P2: Operate	24A (FE 1) OP
	P2: Seal-In	OFF
	P2: Events	Enabled
	P3: ID	46(A)
	P3: Operate	GEN UNBAL STG2 OP
	P3: Seal-In	OFF
	P3: Events	Enabled
	P4: ID	81O
	P4: Operate	OVERFREQ 1 OP
	P4: Seal-In	OFF
	P4: Events	Enabled
	P5: ID	GEN VTFF
	P5: Operate	SRC2 VT FUSE FAIL OP
	P5: Seal-In	OFF
	P5: Events	Enabled
	P6: ID	OFF
	P6: Operate	OFF
	P6: Seal-In	OFF
	P6: Events	Enabled
	U1: ID	27P(A)
	U1: Operate	PHASE UV1 OP
	U1: Seal-In	OFF
	U1: Events	Enabled
	U2: ID	59P(A)
	U2: Operate	PHASE OV1 OP
	U2: Seal-In	OFF
	U2: Events	Enabled
	U3: ID	IBF 52G
	U3: Operate	BRKR TRIP On (VO3)
	U3: Seal-In	OFF
	U3: Events	Enabled

	U4: ID	OFF
	U4: Operate	OFF
	U4: Seal-In	OFF
	U4: Events	Enabled
	U5: ID	TR OSC G60B
	U5: Operate	ANY TRIP On (VO4)
	U5: Seal-In	OFF
	U5: Events	Enabled
	U6: ID	TR OSC T60
	U6: Operate	ANY TRIP On (VO4)
	U6: Seal-In	OFF
	U6: Events	Enabled
VIRTUAL OUTPUTS		
	VIRTUAL OUTPUT 1: ID	86G-1A
	VIRTUAL OUTPUT 1: Events	Enabled
	VIRTUAL OUTPUT 2: ID	86G-2A
	VIRTUAL OUTPUT 2: Events	Enabled
	VIRTUAL OUTPUT 3: ID	BRKR TRIP
	VIRTUAL OUTPUT 3: Events	Enabled
	VIRTUAL OUTPUT 4: ID	ANY TRIP
	VIRTUAL OUTPUT 4: Events	Enabled
	VIRTUAL OUTPUT 5: ID	BLK
	VIRTUAL OUTPUT 5: Events	Enabled
	VIRTUAL OUTPUT 6: ID	TRIG OSC
	VIRTUAL OUTPUT 6: Events	Enabled

C60 - Breaker Management Relay Settings
Product Order Code: C60-G01-HCH-F8H-H6P-M8F-P6P-U6P-WXX
Version: 5.0

PRODUCT SETUP: DISPLAY PROPERTIES		
	Flash Message Time	1.0 s
	Default Message Timeout	300 s
	Default Message Intensity (VFD Only)	25%
	Screen Saver Feature (LCD Only)	Disabled
	Screen Saver Wait Time (LCD Only)	30 min
	Current Cutoff Level	0.020 pu
	Voltage Cutoff Level	1.0 V
COMMUNICATIONS: SERIAL PORTS		
	RS485 Com2 Baud Rate	9600
	RS485 Com2 Parity	None
	RS485 Com2 Response Min Time	0 ms
Network		
	IP Address	CUSTOMER
	IP Subnet Mask	CUSTOMER
	Gateway IP Address	CUSTOMER
	OSI Network Address (NSAP)	CUSTOMER
MODBUS PROTOCOL		
	Modbus Slave Address	CUSTOMER
	Modbus TCP Port Number	CUSTOMER
UCA MMS		
	Default GOOSE Update Time	60 s
	UCA Logical Device Name	UCADevice
	UCA/MMS TCP Port Number	102
	GOOSE Function	Disabled
	UCA GLOBE.ST.LocRemDS	OFF
HTTP		
	HTTP TCP Port Number	80
TFTP		
	TFTP Main UDP Port Number	69
	TFTP Data UDP Port Number	10
	TFTP Data UDP Port Number	20
REAL TIME CLOCK		
	IRIG-B Signal Type	None
OSCILLOGRAPHY		
	Number Of Records	6
	Trigger Mode	Automatic Overwrite

	Trigger Position	25%
	Trigger Source	ANY TRIP On (VO1)
	AC Input Waveforms	64 samples/cycle
	Digital Channel 1	BKR FAIL 1 T1 OP
	Digital Channel 2	BKR FAIL 1 TRIP OP
	Digital Channel 3	BKR FAIL 1 RETRIP
	Digital Channel 4	OFF
	Digital Channel 5	OFF
	Digital Channel 6	NEUTRAL OV1 PKP
	Digital Channel 7	NEUTRAL OV1 OP
	Digital Channel 8	PHASE IOC1 OP A
	Digital Channel 9	PHASE IOC1 OP B
	Digital Channel 10	PHASE IOC1 OP C
	Digital Channel 11	PHASE TOC1 PKP A
	Digital Channel 12	PHASE TOC1 PKP B
	Digital Channel 13	PHASE TOC1 PKP C
	Digital Channel 14	PHASE TOC1 OP A
	Digital Channel 15	PHASE TOC1 OP B
	Digital Channel 16	PHASE TOC1 OP C
	Digital Channel 17	ANY TRIP On (VO1)
	Digital Channel 18	BUS VTFF(DE1) OP
	Digital Channel 19	OFF
	Digital Channel 20	OFF
	Digital Channel 21	OFF
	Digital Channel 22	OFF
	Digital Channel 23	PHASE IOC2 OP A
	Digital Channel 24	PHASE IOC2 OP B
	Digital Channel 25	PHASE IOC2 OP C
	Digital Channel 26	59BN (DE2) OP
	Digital Channel 27	OFF
	Digital Channel 28	OFF
	Digital Channel 29	OFF
	Digital Channel 30	OFF
	Digital Channel 31	OFF
	Digital Channel 32	OFF
	Digital Channel 33	PHASE TOC2 PKP A
	Digital Channel 34	PHASE TOC2 PKP B
	Digital Channel 35	PHASE TOC2 PKP C
	Digital Channel 36	PHASE TOC2 OP A
	Digital Channel 37	PHASE TOC2 OP B
	Digital Channel 38	PHASE TOC2 OP C
	Digital Channel 39	OFF

	Digital Channel 40	52G/a Off(H7a)
	Digital Channel 41	IBF On(H7c)
	Digital Channel 42	50/62BF IOn (H1)
	Digital Channel 43	50BF TC1 IOn (H2)
	Digital Channel 44	50BF TC2 IOn (H3)
	Digital Channel 45	OFF
	Digital Channel 46	BUS GND IOn (H5)
	Digital Channel 47	50/51 AUX I IOn (H6)
	Digital Channel 48	C60 TRIP IOn (P1)
	Digital Channel 49	BKR FAIL IOn (P2)
	Digital Channel 50	BUS VTFF IOn (P3)
	Digital Channel 51	OFF
	Digital Channel 52	OFF
	Digital Channel 53	50/51 AUX II IOn (P6)
	Digital Channel 54	OFF
	Digital Channel 55	OFF
	Digital Channel 56	TRIG T60U IOn (U3)
	Digital Channel 57	TRIG G60A IOn (U4)
	Digital Channel 58	TRIG G60B IOn (U5)
	Digital Channel 59	OFF
	Digital Channel 60	OFF
	Digital Channel 61	OFF
	Digital Channel 62	OFF
	Digital Channel 63	OFF
	Analog Channel 1	SRC1 Ia Mag
	Analog Channel 2	SRC1 Ib Mag
	Analog Channel 3	SRC1 Ic Mag
	Analog Channel 4	SRC1 Vab Mag
	Analog Channel 5	SRC1 Vbc Mag
	Analog Channel 6	SRC1 Vca Mag
	Analog Channel 7	SRC1 V_0 Mag
	Analog Channel 8	SRC2 V_0 Mag
	Analog Channel 9	SRC1 V_2 Mag
	Analog Channel 10	SRC2 V_2 Mag
	Analog Channel 11	SRC2 P
	Analog Channel 12	SRC2 Q
	Analog Channel 13	SRC2 FREQ
	Analog Channel 14	OFF
	Analog Channel 15	OFF
	Analog Channel 16	OFF
	Data Logger	DEFAULT
	Demand	DEFAULT

USER-PROGRAMMABLE LEDS: LED TEST		
	Function	Disabled
	Control	OFF
TRIP AND ALARMS LEDS		
	Trip LED Input	ANY TRIP On (VO3)
	Alarm LED Input	ANY SELF TESTS
USER PROGRAMMABLE LEDS		
	LED 1: OPERAND	BKR FAIL 1 T1 OP
	LED 1: TYPE	Latched
	LED 2: OPERAND	BKR FAIL 1 RETRIP
	LED 2: TYPE	Latched
	LED 3: OPERAND	OFF
	LED 3: TYPE	OFF
	LED 4: OPERAND	OFF
	LED 4: TYPE	OFF
	LED 5: OPERAND	59BN (DE2) OP
	LED 5: TYPE	Latched
	LED 6: OPERAND	PHASE IOC1 OP A
	LED 6: TYPE	Latched
	LED 7: OPERAND	PHASE IOC1 OP B
	LED 7: TYPE	Latched
	LED 8: OPERAND	PHASE IOC1 OP C
	LED 8: TYPE	Latched
	LED 9: OPERAND	PHASE TOC1 OP A
	LED 9: TYPE	Latched
	LED 10: OPERAND	PHASE TOC1 OP B
	LED 10: TYPE	Latched
	LED 11: OPERAND	PHASE TOC1 OP C
	LED 11: TYPE	Latched
	LED 12: OPERAND	NEUTRAL OV1 PKP
	LED 12: TYPE	Latched
	LED 13: OPERAND	NEUTRAL OV1 OP
	LED 13: TYPE	Latched
	LED 14: OPERAND	BUS VTFF(DE1) OP
	LED 14: TYPE	Latched
	LED 15: OPERAND	OFF
	LED 15: TYPE	OFF
	LED 16: OPERAND	OFF
	LED 16: TYPE	OFF
	LED 17: OPERAND	OFF
	LED 17: TYPE	OFF
	LED 18: OPERAND	ANY TRIP On (VO1)

	LED 18: TYPE	Latched
	LED 19: OPERAND	PHASE IOC2 OP A
	LED 19: TYPE	Latched
	LED 20: OPERAND	PHASE IOC2 OP B
	LED 20: TYPE	Latched
	LED 21: OPERAND	PHASE IOC2 OP C
	LED 21: TYPE	Latched
	LED 22: OPERAND	PHASE TOC2 OP A
	LED 22: TYPE	Latched
	LED 23: OPERAND	PHASE TOC2 OP B
	LED 23: TYPE	Latched
	LED 24: OPERAND	PHASE TOC2 OP C
	LED 24: TYPE	Latched
	LED 25: OPERAND	52G/a Off(H7a)
	LED 25: TYPE	Self-Reset
	LED 26: OPERAND	IBF On(H7c)
	LED 26: TYPE	Latched
	LED 27: OPERAND	50/62BF IOn (H1)
	LED 27: TYPE	Latched
	LED 28: OPERAND	BKR FAIL 1 RETRIP(H2)
	LED 28: TYPE	Latched
	LED 29: OPERAND	BKR FAIL 1 RETRIP(H3)
	LED 29: TYPE	Latched
	LED 30: OPERAND	OFF
	LED 30: TYPE	OFF
	LED 31: OPERAND	BUS GND IOn (H5)
	LED 31: TYPE	Latched
	LED 32: OPERAND	50/51 AUX I IOn (H6)
	LED 32: TYPE	Latched
	LED 33: OPERAND	C60 TRIP IOn (P1)
	LED 33: TYPE	Self-Reset
	LED 34: OPERAND	BKR FAIL IOn (P2)
	LED 34: TYPE	Self-Reset
	LED 35: OPERAND	BUS VTFF IOn (P3)
	LED 35: TYPE	Self-Reset
	LED 36: OPERAND	OFF
	LED 36: TYPE	OFF
	LED 37: OPERAND	OFF
	LED 37: TYPE	OFF
	LED 38: OPERAND	50/51 AUX II IOn (P6)
	LED 38: TYPE	Latched
	LED 39: OPERAND	OFF

	LED 39: TYPE	OFF
	LED 40: OPERAND	OFF
	LED 40: TYPE	Self-Reset
	LED 41: OPERAND	TRIG T60U IOn (U3)
	LED 41: TYPE	Self-Reset
	LED 42: OPERAND	TRIG G60A IOn (U4)
	LED 42: TYPE	Self-Reset
	LED 43: OPERAND	TRIG G60B IOn (U5)
	LED 43: TYPE	Self-Reset
	LED 44: OPERAND	OFF
	LED 44: TYPE	OFF
	LED 45: OPERAND	OFF
	LED 45: TYPE	OFF
	LED 46: OPERAND	OFF
	LED 46: TYPE	OFF
	LED 47: OPERAND	OFF
	LED 47: TYPE	OFF
	LED 48: OPERAND	OFF
	LED 48: TYPE	OFF
USER-PROGRAMMABLE SELF TESTS		
	Remote Device Off Function	Disabled
	Battery Fail Function	Enabled
	SNTP Fail Function	Disabled
	IRIG B Fail Function	Disabled
INSTALLATION		
	Relay Settings	Not Programmed
	Relay Name	CUSTOMER
SYSTEM SETUP:		
AC INPUTS: CURRENT		
	CT F1: Phase CT Primary	CUSTOMER
	CT F1: Phase CT Secondary	5A
	CT F1: Ground CT Primary	1 A
	CT F1: Ground CT Secondary	1 A
	CT M1: Phase CT Primary	CUSTOMER
	CT M1: Phase CT Secondary	5A
	CT M1: Ground CT Primary	1 A
	CT M1: Ground CT Secondary	1 A
	CT F5: Phase CT Primary	CUSTOMER
	CT F5: Phase CT Secondary	5A
	CT F5: Ground CT Primary	1 A
	CT F5: Ground CT Secondary	1 A
VOLTAGE		

	VT M5: Phase VT Connection	Wye
	VT M5: Phase VT Secondary	69.4
	VT M5: Phase VT Ratio	150.0
	VT M5: Auxiliary VT Connection	None
	VT M5: Auxiliary VT Secondary	None
	VT M5: Auxiliary VT Ratio	None
POWER SYSTEM		
	Nominal Frequency	60
	Phase Rotation	ABC
	Frequency And Phase Reference	SRC 1
	Frequency Tracking Function	Enabled
SIGNAL SOURCES		
	SOURCE 1: Name	BRKR
	SOURCE 1: Phase CT	F1
	SOURCE 1: Ground CT	None
	SOURCE 1: Phase VT	M5
	SOURCE 1: Auxiliary VT	None
	SOURCE 2: Name	BUS I
	SOURCE 2: Phase CT	M1
	SOURCE 2: Ground CT	None
	SOURCE 2: Phase VT	None
	SOURCE 2: Auxiliary VT	None
	SOURCE 3: Name	BUS II
	SOURCE 3: Phase CT	F5
	SOURCE 3: Ground CT	None
	SOURCE 3: Phase VT	None
	SOURCE 3: Auxiliary VT	None
FLEXLOGIC: FLEXLOGIC EQUATION EDITOR		
	FlexLogic Entry 1 (Protection Element)	BKR FAIL 1 TRIP OP
	FlexLogic Entry 2 (Protection Element)	BKR FAIL 1 T1 OP
	FlexLogic Entry 3 (Virtual Outputs On)	50/51 AUX I On (VO2)
	FlexLogic Entry 4 (Virtual Outputs On)	50/51 AUX II On (VO3)
	FlexLogic Entry 5 (Protection Element)	NEUTRAL OV1 OP
	FlexLogic Entry 6 (OR)	OR(5)
	FlexLogic Entry 7 (Assign Virtual Output)	= ANY TRIP (VO1)
	FlexLogic Entry 8 (Protection Element)	PHASE IOC1 OP
	FlexLogic Entry 9 (Protection Element)	PHASE TOC1 OP
	FlexLogic Entry 10 (OR)	OR(2)
	FlexLogic Entry 11 (Assign Virtual Output)	=50/51 AUX I (VO2)
	FlexLogic Entry 12 (Protection Element)	PHASE IOC2 OP
	FlexLogic Entry 13 (Protection Element)	PHASE TOC2 OP
	FlexLogic Entry 14 (OR)	OR(2)

	FlexLogic Entry 15 (Assign Virtual Output)	=50/51 AUX II (VO3)
	FlexLogic Entry 16	END
GROUPED ELEMENTS		
PHASE CURRENT: PHASE TOC [GROUP 1]		
	PHASE TOC1: Function	Enabled
	PHASE TOC1: Source	SRC 2
	PHASE TOC1: Input	RMS
	PHASE TOC1: Pickup	CUSTOMER
	PHASE TOC1: Delay	CUSTOMER
	PHASE TOC1: Reset Delay	CUSTOMER
	PHASE TOC1: Block A	OFF
	PHASE TOC1: Block B	OFF
	PHASE TOC1: Block C	OFF
	PHASE TOC1: Voltage Restraint	Enabled
	PHASE TOC1: Target	Self-Reset
	PHASE TOC1: Events	Enabled
	PHASE TOC2: Function	Enabled
	PHASE TOC2: Source	SRC 3
	PHASE TOC2: Input	RMS
	PHASE TOC2: Pickup	CUSTOMER
	PHASE TOC2: Delay	CUSTOMER
	PHASE TOC2: Reset Delay	CUSTOMER
	PHASE TOC2: Block A	OFF
	PHASE TOC2: Block B	OFF
	PHASE TOC2: Block C	OFF
	PHASE TOC2: Voltage Restraint	Enabled
	PHASE TOC2: Target	Self-Reset
	PHASE TOC2: Events	Enabled
PHASE CURRENT: PHASE IOC [GROUP 1]		
	PHASE IOC1: Function	Enabled
	PHASE IOC1: Source	SRC 2
	PHASE IOC1: Pickup	CUSTOMER
	PHASE IOC1: Delay	CUSTOMER
	PHASE IOC1: Reset Delay	CUSTOMER
	PHASE IOC1: Block A	OFF
	PHASE IOC1: Block B	OFF
	PHASE IOC1: Block C	OFF
	PHASE IOC1: Target	Self-Reset
	PHASE IOC1: Events	Enabled
	PHASE IOC2: Function	Enabled
	PHASE IOC2: Source	SRC 3
	PHASE IOC2: Pickup	CUSTOMER

	PHASE IOC2: Delay	CUSTOMER
	PHASE IOC2: Reset Delay	CUSTOMER
	PHASE IOC2: Block A	OFF
	PHASE IOC2: Block B	OFF
	PHASE IOC2: Block C	OFF
	PHASE IOC2: Target	Self-Reset
	PHASE IOC2: Events	Enabled
Breaker Failure [Group 1]		
	BF1: Function	Enabled
	BF1: Mode	CUSTOMER
	BF1: Source	CUSTOMER
	BF1: Current Supervision	CUSTOMER
	BF1: Use Seal-In	CUSTOMER
	BF1: Three Pole Initiate	IBF On(H7c)
	BF1: Block	OFF
	BF1: Phase Current Supv Pickup	CUSTOMER
	BF1: Neutral Current Supv Pickup	CUSTOMER
	BF1: Use Timer 1	CUSTOMER
	BF1: Timer 1 Pickup Delay	CUSTOMER
	BF1: Use Timer 2	CUSTOMER
	BF1: Timer 2 Pickup Delay	CUSTOMER
	BF1: Use Timer 3	CUSTOMER
	BF1: Timer 3 Pickup Delay	CUSTOMER
	BF1: Breaker Pos1 Phase A/3P	52G/a On(H7a)
	BF1: Breaker Pos2 Phase A/3P	OFF
	BF1: Breaker Test On	OFF
	BF1: Phase Current HiSet Pickup	CUSTOMER
	BF1: Neutral Current HiSet Pickup	CUSTOMER
	BF1: Phase Current LoSet Pickup	CUSTOMER
	BF1: Neutral Current LoSet Pickup	CUSTOMER
	BF1: LoSet Time Delay	CUSTOMER
	BF1: Trip Dropout Delay	CUSTOMER
	BF1: Target	Latched
	BF1: Events	Enabled
	BF1: Phase A Initiate	CUSTOMER
	BF1: Phase B Initiate	CUSTOMER
	BF1: Phase C Initiate	CUSTOMER
	BF1: Breaker Pos1 Phase B	CUSTOMER
	BF1: Breaker Pos1 Phase C	CUSTOMER
	BF1: Breaker Pos2 Phase B	CUSTOMER
	BF1: Breaker Pos2 Phase C	CUSTOMER
NEUTRAL OV [GROUP 1]		

	NEUTRAL OV 1: Function	Enabled
	NEUTRAL OV 1: Source	BRKR (SRC 1)
	NEUTRAL OV 1: Pickup	CUSTOMER
	NEUTRAL OV 1: Pickup Delay	CUSTOMER
	NEUTRAL OV 1: Reset Delay	CUSTOMER
	NEUTRAL OV 1: Block	OFF
	NEUTRAL OV 1: Target	Latched
	NEUTRAL OV 1: Events	Enabled
DIGITAL ELEMENTS		
	DIGITAL ELEMENT 1: Function	Enabled
	DIGITAL ELEMENT 1: Name	BUS VTFF
	DIGITAL ELEMENT 1: Input	SRC2 VT FUSE FAIL OP
	DIGITAL ELEMENT 1: Pickup Delay	0.000 s
	DIGITAL ELEMENT 1: Reset Delay	0.000 s
	DIGITAL ELEMENT 1: Block	OFF
	DIGITAL ELEMENT 1: Target	Self-Reset
	DIGITAL ELEMENT 1: Events	Enabled
	DIGITAL ELEMENT 2: Function	Enabled
	DIGITAL ELEMENT 2: Name	59BN
	DIGITAL ELEMENT 2: Input	NEUTRAL OV1 OP
	DIGITAL ELEMENT 2: Pickup Delay	0.000 s
	DIGITAL ELEMENT 2: Reset Delay	0.000 s
	DIGITAL ELEMENT 2: Block	OFF
	DIGITAL ELEMENT 2: Target	Latched
	DIGITAL ELEMENT 2: Events	Enabled
MONITORING ELEMENTS: VT FUSE FAILURE		
	VT FUSE FAILURE 1: Function	Enabled
	VT FUSE FAILURE 2: Function	Enabled
INPUTS/OUTPUTS		
CONTACT INPUTS		
	H7A: ID	52G/a
	H7A: Debounce Time	2.0 ms
	H7A: Events	Enabled
	H7C: ID	IBF
	H7C: Debounce Time	2.0 ms
	H7C: Events	Enabled
	CONTACT INPUT THRESHOLDS	84 Vdc
CONTACT OUTPUTS		
	H1: ID	50/62BF
	H1: Operate	BKR FAIL 1 T1 OP
	H1: Seal-In	OFF
	H1: Events	Enabled

	H2: ID	BKR RETRIP
	H2: Operate	BKR FAIL 1 RETRIP
	H2: Seal-In	OFF
	H2: Events	Enabled
	H3: ID	BKR RETRIP
	H3: Operate	BKR FAIL 1 RETRIP
	H3: Seal-In	OFF
	H3: Events	Enabled
	H4: ID	OFF
	H4: Operate	OFF
	H4: Seal-In	OFF
	H4: Events	OFF
	H5: ID	59BN
	H5: Operate	59BN(DE2) OP
	H5: Seal-In	OFF
	H5: Events	Enabled
	H6: ID	50/51
	H6: Operate	50/51 AUX I On (VO2)
	H6: Seal-In	OFF
	H6: Events	Enabled
	P1: ID	C60 Trip
	P1: Operate	ANY TRIP On (VO1)
	P1: Seal-In	OFF
	P1: Events	Enabled
	P2: ID	BKR RETRIP
	P2: Operate	BKR FAIL 1 RETRIP
	P2: Seal-In	OFF
	P2: Events	Enabled
	P3: ID	BUS VTFF
	P3: Operate	BUS VTFF(DE1) OP
	P3: Seal-In	OFF
	P3: Events	Enabled
	P4: ID	OFF
	P4: Operate	OFF
	P4: Seal-In	OFF
	P4: Events	OFF
	P5: ID	OFF
	P5: Operate	OFF
	P5: Seal-In	OFF
	P5: Events	OFF
	P6: ID	50/51
	P6: Operate	50/51 AUX II On (VO3)

	P6: Seal-In	OFF
	P6: Events	Enabled
	U1: ID	OFF
	U1: Operate	OFF
	U1: Seal-In	OFF
	U1: Events	OFF
	U2: ID	OFF
	U2: Operate	OFF
	U2: Seal-In	OFF
	U2: Events	Disabled
	U3: ID	TRIG T60U
	U3: Operate	ANY TRIP On (VO1)
	U3: Seal-In	OFF
	U3: Events	Enabled
	U4: ID	TRIG G60A
	U4: Operate	ANY TRIP On (VO1)
	U4: Seal-In	OFF
	U4: Events	Enabled
	U5: ID	TRIG G60B
	U5: Operate	ANY TRIP On (VO1)
	U5: Seal-In	OFF
	U5: Events	Enabled
VIRTUAL OUTPUTS		
	VIRTUAL OUTPUT 1: ID	ANY TRIP
	VIRTUAL OUTPUT 1: Events	Enabled
	VIRTUAL OUTPUT 2: ID	50/51 AUX I
	VIRTUAL OUTPUT 2: Events	Enabled
	VIRTUAL OUTPUT 3: ID	50/51 AUX II
	VIRTUAL OUTPUT 3: Events	Enabled

T60U - 3 Restraint Transformer Protection Relay Settings
Product Order Code: T60-G01-HCH-F8F-H6P-M8H-P6P-UXX-WXX
Version: 5.0

PRODUCT SETUP: DISPLAY PROPERTIES		
	Flash Message Time	1.0 s
	Default Message Timeout	300 s
	Default Message Intensity (VFD Only)	25%
	Screen Saver Feature (LCD Only)	Disabled
	Screen Saver Wait Time (LCD Only)	30 min
	Current Cutoff Level	0.020 pu
	Voltage Cutoff Level	1.0 V
COMMUNICATIONS: SERIAL PORTS		
	RS485 Com2 Baud Rate	9600
	RS485 Com2 Parity	None
	RS485 Com2 Response Min Time	0 ms
Network		
	IP Address	CUSTOMER
	IP Subnet Mask	CUSTOMER
	Gateway IP Address	CUSTOMER
	OSI Network Address (NSAP)	CUSTOMER
MODBUS PROTOCOL		
	Modbus Slave Address	CUSTOMER
	Modbus TCP Port Number	CUSTOMER
UCA MMS		
	Default GOOSE Update Time	60 s
	UCA Logical Device Name	UCADevice
	UCA/MMS TCP Port Number	102
	GOOSE Function	Disabled
	UCA GLOBE.ST.LocRemDS	OFF
HTTP		
	HTTP TCP Port Number	80
TFTP		
	TFTP Main UDP Port Number	69
	TFTP Data UDP Port Number	10
	TFTP Data UDP Port Number	20
REAL TIME CLOCK		
	IRIG-B Signal Type	None
OSCILLOGRAPHY		
	Number Of Records	6
	Trigger Mode	Automatic Overwrite

	Trigger Position	25%
	Trigger Source	TRIG OSC On (VO3)
	AC Input Waveforms	64 samples/cycle
	Digital Channel 1	XFMR INST DIFF OP A
	Digital Channel 2	XFMR INST DIFF OP B
	Digital Channel 3	XFMR INST DIFF OP C
	Digital Channel 4	XFMR PCNT DIFF OP A
	Digital Channel 5	XFMR PCNT DIFF OP B
	Digital Channel 6	XFMR PCNT DIFF OP C
	Digital Channel 7	XFMR PCNT DIFF PKP A
	Digital Channel 8	XFMR PCNT DIFF PKP B
	Digital Channel 9	XFMR PCNT DIFF PKP C
	Digital Channel 10	VOLTS PER HERTZ 1 PKP
	Digital Channel 11	VOLTS PER HERTZ 1 OP
	Digital Channel 12	VOLTS PER HERTZ 2 PKP
	Digital Channel 13	VOLTS PER HERTZ 2 OP
	Digital Channel 14	OFF
	Digital Channel 15	OFF
	Digital Channel 16	PHASE IOC1 OP A
	Digital Channel 17	PHASE IOC1 OP B
	Digital Channel 18	PHASE IOC1 OP C
	Digital Channel 19	PHASE TOC1 PKP A
	Digital Channel 20	PHASE TOC1 PKP B
	Digital Channel 21	PHASE TOC1 PKP C
	Digital Channel 22	PHASE TOC1 OP A
	Digital Channel 23	PHASE TOC1 OP B
	Digital Channel 24	PHASE TOC1 OP C
	Digital Channel 25	GROUND TOC1 PKP
	Digital Channel 26	GROUND TOC1 OP
	Digital Channel 27	ANY TRIP On (VO2)
	Digital Channel 28	TRIG OSC On (VO3)
	Digital Channel 29	OFF
	Digital Channel 30	OFF
	Digital Channel 31	OFF
	Digital Channel 32	OFF
	Digital Channel 33	OFF
	Digital Channel 34	OFF
	Digital Channel 35	OFF
	Digital Channel 36	OFF
	Digital Channel 37	OFF
	Digital Channel 38	OFF
	Digital Channel 39	OFF

	Digital Channel 40	OFF
	Digital Channel 41	SETTING GROUP ACT 1
	Digital Channel 42	SETTING GROUP ACT 2
	Digital Channel 43	LCI ON On(H7c)
	Digital Channel 44	EXT TRIG On(P7a)
	Digital Channel 45	OFF
	Digital Channel 46	TRIP 86U IOn (H1)
	Digital Channel 47	GSU GND OC IOn (H2)
	Digital Channel 48	OFF
	Digital Channel 49	OFF
	Digital Channel 50	OFF
	Digital Channel 51	T60U TRIP IOn (P1)
	Digital Channel 52	TRIG G60A IOn (P5)
	Digital Channel 53	TRIG G60B IOn (P6)
	Digital Channel 54	OFF
	Digital Channel 55	OFF
	Digital Channel 56	OFF
	Digital Channel 57	OFF
	Digital Channel 58	OFF
	Digital Channel 59	OFF
	Digital Channel 60	OFF
	Digital Channel 61	OFF
	Digital Channel 62	OFF
	Digital Channel 63	OFF
	Analog Channel 1	SRC1 Ia Mag
	Analog Channel 2	SRC2 Ia Mag
	Analog Channel 3	SRC3 Ia Mag
	Analog Channel 4	SRC1 Ib Mag
	Analog Channel 5	SRC2 Ib Mag
	Analog Channel 6	SRC3 Ib Mag
	Analog Channel 7	SRC1 Ic Mag
	Analog Channel 8	SRC2 Ic Mag
	Analog Channel 9	SRC3 Ic Mag
	Analog Channel 10	Xfmr Iad Mag
	Analog Channel 11	Xfmr Iad Angle
	Analog Channel 12	Xfmr Iar Mag
	Analog Channel 13	Xfmr Iar Angle
	Analog Channel 14	Volts Per Hertz 1
	Analog Channel 15	SRC2 Ig Mag
	Analog Channel 16	SRC2 Frequency
	DATA LOGGER	DEFAULT
	DEMAND	DEFAULT

USER-PROGRAMMABLE LEDS:		
TRIP AND ALARMS LEDS		
	Trip LED Input	ANY TRIP On (VO2)
	Alarm LED Input	ANY SELF TESTS
USER PROGRAMMABLE LEDS		
	LED 1: OPERAND	XFMR INST DIFF OP A
	LED 1: TYPE	Latched
	LED 2: OPERAND	XFMR INST DIFF OP B
	LED 2: TYPE	Latched
	LED 3: OPERAND	XFMR INST DIFF OP C
	LED 3: TYPE	Latched
	LED 4: OPERAND	XFMR PCNT DIFF OP A
	LED 4: TYPE	Latched
	LED 5: OPERAND	XFMR PCNT DIFF OP B
	LED 5: TYPE	Latched
	LED 6: OPERAND	XFMR PCNT DIFF OP C
	LED 6: TYPE	Latched
	LED 7: OPERAND	VOLTS PER HERTZ 1 OP
	LED 7: TYPE	Latched
	LED 8: OPERAND	VOLTS PER HERTZ 2 OP
	LED 8: TYPE	Latched
	LED 9: OPERAND	PHASE IOC1 OP A
	LED 9: TYPE	Latched
	LED 10: OPERAND	PHASE IOC1 OP B
	LED 10: TYPE	Latched
	LED 11: OPERAND	PHASE IOC1 OP C
	LED 11: TYPE	Latched
	LED 12: OPERAND	PHASE TOC1 OP A
	LED 12: TYPE	Latched
	LED 13: OPERAND	PHASE TOC1 OP B
	LED 13: TYPE	Latched
	LED 14: OPERAND	PHASE TOC1 OP C
	LED 14: TYPE	Latched
	LED 15: OPERAND	GROUND TOC 1 OP
	LED 15: TYPE	Latched
	LED 16: OPERAND	EXT TRIG On(P7a)
	LED 16: TYPE	Latched
	LED 17: OPERAND	TRIG OSC On(VO3)
	LED 17: TYPE	Latched
	LED 18: OPERAND	OFF
	LED 18: TYPE	OFF
	LED 19: OPERAND	OFF

	LED 19: TYPE	OFF
	LED 20: OPERAND	OFF
	LED 20: TYPE	OFF
	LED 21: OPERAND	OFF
	LED 21: TYPE	OFF
	LED 22: OPERAND	OFF
	LED 22: TYPE	OFF
	LED 23: OPERAND	OFF
	LED 23: TYPE	OFF
	LED 24: OPERAND	OFF
	LED 24: TYPE	OFF
	LED 25: OPERAND	SETTING GROUP ACT 1
	LED 25: TYPE	Self-Reset
	LED 26: OPERAND	SETTING GROUP ACT 2
	LED 26: TYPE	Self-Reset
	LED 27: OPERAND	LCI ON On(H7c)
	LED 27: TYPE	Self-Reset
	LED 28: OPERAND	EXT TRIG On(P7a)
	LED 28: TYPE	Latched
	LED 29: OPERAND	OFF
	LED 29: TYPE	OFF
	LED 30: OPERAND	OFF
	LED 30: TYPE	OFF
	LED 31: OPERAND	OFF
	LED 31: TYPE	OFF
	LED 32: OPERAND	OFF
	LED 32: TYPE	OFF
	LED 33: OPERAND	TRIP 86U On (H1)
	LED 33: TYPE	Latched
	LED 34: OPERAND	GSU GND OC On (H2)
	LED 34: TYPE	Latched
	LED 35: OPERAND	OFF
	LED 35: TYPE	OFF
	LED 36: OPERAND	OFF
	LED 36: TYPE	OFF
	LED 37: OPERAND	OFF
	LED 37: TYPE	OFF
	LED 38: OPERAND	T60U TRIP On (P1)
	LED 38: TYPE	Latched
	LED 39: OPERAND	TRIG G60A On (P5)
	LED 39: TYPE	Latched
	LED 40: OPERAND	TRIG G60B On (P6)

	LED 40: TYPE	Latched
	LED 41: OPERAND	OFF
	LED 41: TYPE	OFF
	LED 42: OPERAND	OFF
	LED 42: TYPE	OFF
	LED 43: OPERAND	OFF
	LED 43: TYPE	OFF
	LED 44: OPERAND	OFF
	LED 44: TYPE	OFF
	LED 45: OPERAND	OFF
	LED 45: TYPE	OFF
	LED 46: OPERAND	OFF
	LED 46: TYPE	OFF
	LED 47: OPERAND	OFF
	LED 47: TYPE	OFF
	LED 48: OPERAND	OFF
	LED 48: TYPE	OFF
USER-PROGRAMMABLE SELF TESTS		
	Remote Device Off Function	CUSTOMER
	Pri Ethernet Fail Function	CUSTOMER
	Battery Fail Function	Enabled
	SNTP Fail Function	CUSTOMER
	IRIG B Fail Function	Enabled
INSTALLATION		
	Relay Settings	Not Programmed
	Relay Name	CUSTOMER
SYSTEM SETUP:		
AC INPUTS: CURRENT		
	CT F1: Phase CT Primary	9000 A
	CT F1: Phase CT Secondary	5 A
	CT F1: Ground CT Primary	1 A
	CT F1: Ground CT Secondary	1 A
	CT M1: Phase CT Primary	CUSTOMER
	CT M1: Phase CT Secondary	CUSTOMER
	CT M1: Ground CT Primary	1 A
	CT M1: Ground CT Secondary	1 A
	CT M5: Phase CT Primary	CUSTOMER
	CT M5: Phase CT Secondary	5A
	CT M5: Ground CT Primary	CUSTOMER
	CT M5: Ground CT Secondary	5A
AC INPUTS: VOLTAGE		
	VT F5: Phase VT Connection	CUSTOMER

	VT F5: Phase VT Secondary	CUSTOMER
	VT F5: Phase VT Ratio	CUSTOMER
	VT F5: Auxiliary VT Connection	Default
	VT F5: Auxiliary VT Secondary	Default
	VT F5: Auxiliary VT Ratio	Default
POWER SYSTEM		
	Nominal Frequency	60
	Phase Rotation	ABC
	Frequency And Phase Reference	SRC 2
	Frequency Tracking Function	Enabled
Signal Sources		
	SOURCE 1:Name	GEN
	SOURCE 1:Phase CT	F1
	SOURCE 1:Ground CT	None
	SOURCE 1:Phase VT	None
	SOURCE 1:Auxiliary VT	None
	SOURCE 2:Name	BUS
	SOURCE 2:Phase CT	M1
	SOURCE 2:Ground CT	None
	SOURCE 2:Phase VT	F5
	SOURCE 2:Auxiliary VT	None
	SOURCE 3:Name	GSU
	SOURCE 3:Phase CT	M5
	SOURCE 3:Ground CT	M5
	SOURCE 3:Phase VT	None
	SOURCE 3:Auxiliary VT	None
	TRANSFORMER:GENERAL	CUSTOMER
	TRANSFORMER:WINDINGS	CUSTOMER
	TRANSFORMER:THERMAL INPUTS	CUSTOMER
FLEXLOGIC: FLEXLOGIC EQUATION EDITOR		
	FlexLogic Entry 1 (Protection Element)	VOLTS PER HERTZ 1 OP
	FlexLogic Entry 2 (Protection Element)	VOLTS PER HERTZ 2 OP
	FlexLogic Entry 3 (Protection Element)	PHASE IOC1 OP
	FlexLogic Entry 4 (Protection Element)	PHASE TOC1 OP
	FlexLogic Entry 5 (Protection Element)	XFMR INST DIFF OP
	FlexLogic Entry 6 (Protection Element)	XFMR PCNT DIFF OP
	FlexLogic Entry 7 (OR)	OR(6)
	FlexLogic Entry 8 (Assign Virtual Output)	= TRIP 86U (VO1)
	FlexLogic Entry 9 (Virtual Output On)	TRIP 86U On (VO1)
	FlexLogic Entry 10 (Protection Element)	GROUND TOC1 OP
	FlexLogic Entry 11 (OR)	OR(2)
	FlexLogic Entry 12 (Assign Virtual Output)	= ANY TRIP (VO2)

	FlexLogic Entry 13 (Contact Input On)	EXT TRIG On(P7a)
	FlexLogic Entry 14 (Virtual Output On)	ANY TRIP On (VO2)
	FlexLogic Entry 15 (OR)	OR(2)
	FlexLogic Entry 16 (Timer)	TIMER 1
	FlexLogic Entry 17 (Assign Virtual Output)	= TRIG OSC (VO3)
	FlexLogic Entry 18	END
FLEXLOGIC TIMERS		
	TIMER 1:Type	millisecond
	TIMER 1:Pickup Delay	100
	TIMER 1:Dropout Delay	0
GROUPED ELEMENTS		
TRANSFORMER: PERCENT DIFFERENTIAL [GROUP 1]		
	Function	Enabled
	Pickup	CUSTOMER
	Slope 1	CUSTOMER
	Break 1	CUSTOMER
	Break 2	CUSTOMER
	Slope 2	CUSTOMER
	Inrush Inhibit Function	CUSTOMER
	Inrush Inhibit Mode	CUSTOMER
	Inrush Inhibit Level	CUSTOMER
	Overexcitation Inhibit Function	CUSTOMER
	Overexcitation Inhibit Level	CUSTOMER
	Block	OFF
	Target	Latched
	Events	Enabled
TRANSFORMER: INSTANTANEOUS DIFFERENTIAL [GROUP 1]		
	Function	Enabled
	Pickup	CUSTOMER
	Block	OFF
	Target	Latched
	Events	Enabled
GROUND CURRENT: GROUND TOC [GROUP 1]		
	GROUND TOC1:Function	Enabled
	GROUND TOC1:Source	CUSTOMER
	GROUND TOC1:Input	CUSTOMER
	GROUND TOC1:Pickup	CUSTOMER
	GROUND TOC1:Curve	CUSTOMER
	GROUND TOC1:TD Multiplier	CUSTOMER
	GROUND TOC1:Reset	CUSTOMER
	GROUND TOC1:Block	OFF
	Ground TOC1:Target	Latched

	GROUND TOC1:Events	Enabled
VOLTAGE ELEMENTS: VOLTS PER HERTZ [GROUP 1]		
	VOLTS PER HERTZ 1:Function	Enabled
	VOLTS PER HERTZ 1:SOURCE	CUSTOMER
	VOLTS PER HERTZ 1:Pickup	CUSTOMER
	VOLTS PER HERTZ 1:Curve	CUSTOMER
	VOLTS PER HERTZ 1:TD MULTIPLIER	CUSTOMER
	VOLTS PER HERTZ 1:T Reset	CUSTOMER
	VOLTS PER HERTz 1:Block	OFF
	VOLTS PER HERTZ 1:Target	Latched
	VOLTS PER HERTZ 1:Events	Enabled
	VOLTS PER HERTZ 2:Function	Enabled
	VOLTS PER HERTZ 2:Source	CUSTOMER
	VOLTS PER HERTZ 2:Pickup	CUSTOMER
	VOLTS PER HERTZ 2:Curve	CUSTOMER
	VOLTS PER HERTZ 2:TD Multiplier	CUSTOMER
	VOLTS PER HERTZ 2:T Reset	CUSTOMER
	VOLTS PER HERTZ 2:Block	OFF
	VOLTS PER HERTZ 2:Target	Latched
	VOLTS PER HERTZ 2:Events	Enabled
PHASE CURRENT: PHASE IOC [GROUP 1]		
	PHASE IOC1:Function	Enabled
	PHASE IOC1:Source	CUSTOMER
	PHASE IOC1:Pickup	CUSTOMER
	PHASE IOC1:Delay	CUSTOMER
	PHASE IOC1:Reset Delay	CUSTOMER
	PHASE IOC1:Block A	CUSTOMER
	PHASE IOC1:Block B	CUSTOMER
	PHASE IOC1:Block C	CUSTOMER
	PHASE IOC1:Target	Latched
	PHASE IOC1:Events	Enabled
PHASE CURRENT: PHASE TOC [GROUP 1]		
	PHASE TOC1:Function	Enabled
	PHASE TOC1:Signal Source	CUSTOMER
	PHASE TOC1:Input	CUSTOMER
	PHASE TOC1:Curve	CUSTOMER
	PHASE TOC1:TD Multiplier	CUSTOMER
	PHASE TOC1:Reset	CUSTOMER
	PHASE TOC1:Voltage Restraint	CUSTOMER
	PHASE TOC1:Block A	CUSTOMER
	PHASE TOC1:Block B	CUSTOMER
	PHASE TOC1:Block C	CUSTOMER

	PHASE TOC1:Target	Latched
	PHASE TOC1:Events	Enabled
TRANSFORMER: PERCENT DIFFERENTIAL [GROUP 2]		
	Function	Enabled
	Pickup	CUSTOMER
	Slope 1	CUSTOMER
	Break 1	CUSTOMER
	Break 2	CUSTOMER
	Slope 2	CUSTOMER
	Inrush Inhibit Function	CUSTOMER
	Inrush Inhibit Mode	CUSTOMER
	Inrush Inhibit Level	CUSTOMER
	Overexcitation Inhibit Function	CUSTOMER
	Overexcitation Inhibit Level	CUSTOMER
	Block	OFF
	Target	Latched
	Events	Enabled
TRANSFORMER: INSTANTANEOUS DIFFERENTIAL [GROUP 2]		
	Function	Enabled
	Pickup	CUSTOMER
	Block	OFF
	Target	Latched
	Events	Enabled
GROUND CURRENT: GROUND TOC [GROUP 2]		
	GROUND TOC1:Function	Enabled
	GROUND TOC1:Source	CUSTOMER
	GROUND TOC1:Input	CUSTOMER
	GROUND TOC1:Pickup	CUSTOMER
	GROUND TOC1:Curve	CUSTOMER
	GROUND TOC1:TD Multiplier	CUSTOMER
	GROUND TOC1:Reset	CUSTOMER
	GROUND TOC1:Block	OFF
	GROUND TOC1:Target	Latched
	GROUND TOC1:Events	Enabled
VOLTAGE ELEMENTS: VOLTS PER HERTZ [GROUP 2]		
	VOLTS PER HERTz 1:Function	Enabled
	VOLTS PER HERTZ 1:Source	CUSTOMER
	VOLTS PER HERTZ 1:Pickup	CUSTOMER
	VOLTS PER HERTZ 1:Curve	CUSTOMER
	VOLTS PER HERTZ 1:TD Multiplier	CUSTOMER
	VOLTS PER HERTZ 1:T Reset	CUSTOMER
	VOLTS PER HERTZ 1:Block	OFF

	VOLTS PER HERTZ 1:Target	Latched
	VOLTS PER HERTZ 1:Events	Enabled
	VOLTS PER HERTZ 2:Function	Enabled
	VOLTS PER HERTZ 2:Source	CUSTOMER
	VOLTS PER HERTZ 2:Pickup	CUSTOMER
	VOLTS PER HERTZ 2:Curve	CUSTOMER
	VOLTS PER HERTZ 2:TD Multiplier	CUSTOMER
	VOLTS PER HERTZ 2:T Reset	CUSTOMER
	VOLTS PER HERTZ 2:Block	OFF
	VOLTS PER HERTZ 2:Target	Latched
	VOLTS PER HERTZ 2:Events	Enabled
PHASE CURRENT: PHASE IOC [GROUP 2]		
	PHASE IOC1:Function	Enabled
	PHASE IOC1:Source	CUSTOMER
	PHASE IOC1:Pickup	CUSTOMER
	PHASE IOC1:Delay	CUSTOMER
	PHASE IOC1:Reset Delay	CUSTOMER
	PHASE IOC1:Block A	CUSTOMER
	PHASE IOC1:Block B	CUSTOMER
	PHASE IOC1:Block C	CUSTOMER
	PHASE IOC1:Target	Latched
	PHASE IOC1:Events	Enabled
	PHASE IOC1:Function	Enabled
PHASE CURRENT: PHASE TOC [GROUP 2]		
	PHASE TOC1:Function	Enabled
	PHASE TOC1:Input	CUSTOMER
	PHASE TOC1:Pickup	CUSTOMER
	PHASE TOC1:Curve	CUSTOMER
	PHASE TOC1:TD Multiplier	CUSTOMER
	PHASE TOC1:Reset	CUSTOMER
	PHASE TOC1:Voltage Restraint	CUSTOMER
	PHASE TOC1:Block A	CUSTOMER
	PHASE TOC1:Block B	CUSTOMER
	PHASE TOC1:Block C	CUSTOMER
	PHASE TOC1:Target	Latched
	PHASE TOC1:Events	Enabled
CONTROL ELEMENTS:		
SETTINGS GROUPS		
	Function	Enabled
	Block	OFF
	Group 2 Activate On	LCI ON On(H7c)
	Events	Enabled

INPUTS/OUTPUT		
CONTACT INPUTS		
	H7c:ID	LCI ON
	H7c:Debounce Time	2.0 ms
	H7c:Events	Enabled
	P7A:ID	EXT TRIG
	P7A:Debounce Time	2.0 ms
	P7A:Events	Enabled
	CONTACT INPUT THRESHOLDS	84Vdc
CONTACT OUTPUTS		
	H1:ID	TRIP 86U
	H1:Operate	TRIP 86U On (VO1)
	H1:Seal-In	OFF
	H1:Events	Enabled
	H2:ID	TRIP 86U
	H2:Operate	GROUND TOC1 OP
	H2:Seal-In	OFF
	H2:Events	Enabled
	H3:ID	OFF
	H3:Operate	OFF
	H3:Seal-In	OFF
	H3:Events	Enabled
	H4:ID	OFF
	H4:Operate	OFF
	H4:Seal-In	OFF
	H4:Events	Enabled
	H5:ID	OFF
	H5:Operate	OFF
	H5:Seal-In	OFF
	H5:Events	Enabled
	P1:ID	TCP ALARM
	P1:Operate	TRIG OSC On (VO3)
	P1:Seal-In	OFF
	P1:Events	Enabled
	P5:ID	TRIG G60A
	P5:Operate	TRIG OSC On (VO3)
	P5:Seal-In	OFF
	P5:Events	Enabled
	P6:ID	TRIG G60B
	P6:Operate	TRIG OSC On (VO3)
	P6:Seal-In	OFF
	P6:Events	Enabled

VIRTUAL OUTPUTS

	VIRTUAL OUTPUT 1:ID	TRIP 86U
	VIRTUAL OUTPUT 1:Events	Enabled
	VIRTUAL OUTPUT 2:ID	ANY TRIP
	VIRTUAL OUTPUT 2:Events	Enabled
	VIRTUAL OUTPUT 3:ID	TRIG OSC
	VIRTUAL OUTPUT 3:Events	Enabled

T60T - 3 Restraint Transformer Protection Relay Settings
Product Order Code: T60-G01-HCH-F8F-H6P-M8H-P6P-UXX-WXX
Version: 5.0

PRODUCT SETUP: DISPLAY PROPERTIES		
	Flash Message Time	1.0 s
	Default Message Timeout	300 s
	Default Message Intensity (VFD Only)	25%
	Screen Saver Feature (LCD Only)	Disabled
	Screen Saver Wait Time (LCD Only)	30 min
	Current Cutoff Level	0.020 pu
	Voltage Cutoff Level	1.0 V
COMMUNICATIONS: SERIAL PORTS		
	RS485 Com2 Baud Rate	9600
	RS485 Com2 Parity	None
	RS485 Com2 Response Min Time	0 ms
Network		
	IP Address	CUSTOMER
	IP Subnet Mask	CUSTOMER
	Gateway IP Address	CUSTOMER
	OSI Network Address (NSAP)	CUSTOMER
MODBUS PROTOCOL		
	Modbus Slave Address	CUSTOMER
	Modbus TCP Port Number	CUSTOMER
UCA MMS		
	Default GOOSE Update Time	60 s
	UCA Logical Device Name	UCADevice
	UCA/MMS TCP Port Number	102
	GOOSE Function	Disabled
	UCA GLOBE.ST.LocRemDS	OFF
HTTP		
	HTTP TCP Port Number	80
TFTP		
	TFTP Main UDP Port Number	69
	TFTP Data UDP Port Number	10
	TFTP Data UDP Port Number	20
REAL TIME CLOCK		
	IRIG-B Signal Type	None
OSCILLOGRAPHY		
	Number Of Records	6
	Trigger Mode	Automatic Overwrite

	Trigger Position	25%
	Trigger Source	ANY TRIP On (VO2)
	AC Input Waveforms	64 samples/cycle
	Digital Channel 1	XFMR INST DIFF OP A
	Digital Channel 2	XFMR INST DIFF OP B
	Digital Channel 3	XFMR INST DIFF OP C
	Digital Channel 4	XFMR PCNT DIFF OP A
	Digital Channel 5	XFMR PCNT DIFF OP B
	Digital Channel 6	XFMR PCNT DIFF OP C
	Digital Channel 7	XFMR PCNT DIFF PKP A
	Digital Channel 8	XFMR PCNT DIFF PKP B
	Digital Channel 9	XFMR PCNT DIFF PKP C
	Digital Channel 10	VOLTS PER HERTZ 1 PKP
	Digital Channel 11	VOLTS PER HERTZ 1 OP
	Digital Channel 12	VOLTS PER HERTZ 2 PKP
	Digital Channel 13	VOLTS PER HERTZ 2 OP
	Digital Channel 14	OFF
	Digital Channel 15	OFF
	Digital Channel 16	PHASE IOC1 OP A
	Digital Channel 17	PHASE IOC1 OP B
	Digital Channel 18	PHASE IOC1 OP C
	Digital Channel 19	PHASE TOC1 PKP A
	Digital Channel 20	PHASE TOC1 PKP B
	Digital Channel 21	PHASE TOC1 PKP C
	Digital Channel 22	PHASE TOC1 OP A
	Digital Channel 23	PHASE TOC1 OP B
	Digital Channel 24	PHASE TOC1 OP C
	Digital Channel 25	GROUND TOC1 PKP
	Digital Channel 26	GROUND TOC1 OP
	Digital Channel 27	ANY TRIP On (VO2)
	Digital Channel 28	OFF
	Digital Channel 29	OFF
	Digital Channel 30	OFF
	Digital Channel 31	OFF
	Digital Channel 32	OFF
	Digital Channel 33	OFF
	Digital Channel 34	OFF
	Digital Channel 35	OFF
	Digital Channel 36	OFF
	Digital Channel 37	OFF
	Digital Channel 38	OFF
	Digital Channel 39	OFF

	Digital Channel 40	OFF
	Digital Channel 41	SETTING GROUP ACT 1
	Digital Channel 42	SETTING GROUP ACT 2
	Digital Channel 43	LCI ON On(H7c)
	Digital Channel 44	OFF
	Digital Channel 45	63PT GSU PRESS On(H7a)
	Digital Channel 46	TRIP 86T IOn (H1)
	Digital Channel 47	GSU GND OC IOn (H2)
	Digital Channel 48	OFF
	Digital Channel 49	OFF
	Digital Channel 50	OFF
	Digital Channel 51	T60 TRIP IOn (P1)
	Digital Channel 52	TRIG G60A IOn (P5)
	Digital Channel 53	TRIG G60B IOn (P6)
	Digital Channel 54	OFF
	Digital Channel 55	OFF
	Digital Channel 56	OFF
	Digital Channel 57	OFF
	Digital Channel 58	OFF
	Digital Channel 59	OFF
	Digital Channel 60	OFF
	Digital Channel 61	OFF
	Digital Channel 62	OFF
	Digital Channel 63	OFF
	Analog Channel 1	SRC1 Ia Mag
	Analog Channel 2	SRC2 Ia Mag
	Analog Channel 3	SRC3 Ia Mag
	Analog Channel 4	SRC1 Ib Mag
	Analog Channel 5	SRC2 Ib Mag
	Analog Channel 6	SRC3 Ib Mag
	Analog Channel 7	SRC1 Ic Mag
	Analog Channel 8	SRC2 Ic Mag
	Analog Channel 9	SRC3 Ic Mag
	Analog Channel 10	Xfmr Iad Mag
	Analog Channel 11	Xfmr Iad Angle
	Analog Channel 12	Xfmr Iar Mag
	Analog Channel 13	Xfmr Iar Angle
	Analog Channel 14	Volts Per Hertz 1
	Analog Channel 15	SRC2 Ig Mag
	Analog Channel 16	SRC2 Frequency
	DATA LOGGER	DEFAULT
	DEMAND	DEFAULT

USER-PROGRAMMABLE LEDS:		
TRIP AND ALARMS LEDS		
	Trip LED Input	ANY TRIP On (VO2)
	Alarm LED Input	ANY SELF TESTS
USER PROGRAMMABLE LEDS		
	LED 1: OPERAND	XFMR INST DIFF OP A
	LED 1: TYPE	Latched
	LED 2: OPERAND	XFMR INST DIFF OP B
	LED 2: TYPE	Latched
	LED 3: OPERAND	XFMR INST DIFF OP C
	LED 3: TYPE	Latched
	LED 4: OPERAND	XFMR PCNT DIFF OP A
	LED 4: TYPE	Latched
	LED 5: OPERAND	XFMR PCNT DIFF OP B
	LED 5: TYPE	Latched
	LED 6: OPERAND	XFMR PCNT DIFF OP C
	LED 6: TYPE	Latched
	LED 7: OPERAND	VOLTS PER HERTZ 1 OP
	LED 7: TYPE	Latched
	LED 8: OPERAND	VOLTS PER HERTZ 2 OP
	LED 8: TYPE	Latched
	LED 9: OPERAND	PHASE IOC1 OP A
	LED 9: TYPE	Latched
	LED 10: OPERAND	PHASE IOC1 OP B
	LED 10: TYPE	Latched
	LED 11: OPERAND	PHASE IOC1 OP C
	LED 11: TYPE	Latched
	LED 12: OPERAND	PHASE TOC1 OP A
	LED 12: TYPE	Latched
	LED 13: OPERAND	PHASE TOC1 OP B
	LED 13: TYPE	Latched
	LED 14: OPERAND	PHASE TOC1 OP C
	LED 14: TYPE	Latched
	LED 15: OPERAND	GROUND TOC 1 OP
	LED 15: TYPE	Latched
	LED 16: OPERAND	OFF
	LED 16: TYPE	OFF
	LED 17: OPERAND	OFF
	LED 17: TYPE	OFF
	LED 18: OPERAND	OFF
	LED 18: TYPE	OFF
	LED 19: OPERAND	OFF

	LED 19: TYPE	OFF
	LED 20: OPERAND	OFF
	LED 20: TYPE	OFF
	LED 21: OPERAND	OFF
	LED 21: TYPE	OFF
	LED 22: OPERAND	OFF
	LED 22: TYPE	OFF
	LED 23: OPERAND	OFF
	LED 23: TYPE	OFF
	LED 24: OPERAND	OFF
	LED 24: TYPE	OFF
	LED 25: OPERAND	SETTING GROUP ACT 1
	LED 25: TYPE	Self-Reset
	LED 26: OPERAND	SETTING GROUP ACT 2
	LED 26: TYPE	Self-Reset
	LED 27: OPERAND	LCI ON On(H7c)
	LED 27: TYPE	Self-Reset
	LED 28: OPERAND	OFF
	LED 28: TYPE	Latched
	LED 29: OPERAND	63PT GSU PRESS On(H7a)
	LED 29: TYPE	Latched
	LED 30: OPERAND	OFF
	LED 30: TYPE	OFF
	LED 31: OPERAND	OFF
	LED 31: TYPE	OFF
	LED 32: OPERAND	OFF
	LED 32: TYPE	OFF
	LED 33: OPERAND	TRIP 86T On (H1)
	LED 33: TYPE	Latched
	LED 34: OPERAND	GSU GND OC On (H2)
	LED 34: TYPE	Latched
	LED 35: OPERAND	OFF
	LED 35: TYPE	Latched
	LED 36: OPERAND	OFF
	LED 36: TYPE	Latched
	LED 37: OPERAND	OFF
	LED 37: TYPE	Latched
	LED 38: OPERAND	T60T TRIP On (P1)
	LED 38: TYPE	Latched
	LED 39: OPERAND	TRIG G60A On (P5)
	LED 39: TYPE	Latched
	LED 40: OPERAND	TRIG G60B On (P6)

	LED 40: TYPE	Latched
	LED 41: OPERAND	OFF
	LED 41: TYPE	OFF
	LED 42: OPERAND	OFF
	LED 42: TYPE	OFF
	LED 43: OPERAND	OFF
	LED 43: TYPE	OFF
	LED 44: OPERAND	OFF
	LED 44: TYPE	OFF
	LED 45: OPERAND	OFF
	LED 45: TYPE	OFF
	LED 46: OPERAND	OFF
	LED 46: TYPE	OFF
	LED 47: OPERAND	OFF
	LED 47: TYPE	OFF
	LED 48: OPERAND	OFF
	LED 48: TYPE	OFF
USER-PROGRAMMABLE SELF TESTS		
	Remote Device Off Function	CUSTOMER
	Pri Ethernet Fail Function	CUSTOMER
	Battery Fail Function	CUSTOMER
	SNTP Fail Function	CUSTOMER
	IRIG B Fail Function	Disabled
INSTALLATION		
	Relay Settings	Not Programmed
	Relay Name	CUSTOMER
SYSTEM SETUP:		
AC INPUTS: CURRENT		
	CT F1: Phase CT Primary	9000 A
	CT F1: Phase CT Secondary	5 A
	CT F1: Ground CT Primary	1 A
	CT F1: Ground CT Secondary	1 A
	CT M1: Phase CT Primary	CUSTOMER
	CT M1: Phase CT Secondary	5A
	CT M1: Ground CT Primary	1 A
	CT M1: Ground CT Secondary	1 A
	CT M5: Phase CT Primary	CUSTOMER
	CT M5: Phase CT Secondary	5A
	CT M5: Ground CT Primary	CUSTOMER
	CT M5: Ground CT Secondary	5A
AC INPUTS: VOLTAGE		
	VT F5: Phase VT Connection	CUSTOMER

	VT F5: Phase VT Secondary	CUSTOMER
	VT F5: Phase VT Ratio	CUSTOMER
POWER SYSTEM		
	Nominal Frequency	60
	Phase Rotation	ABC
	Frequency And Phase Reference	SRC 2
	Frequency Tracking Function	Enabled
Signal Sources		
	SOURCE 1:Name	GEN
	SOURCE 1:Phase CT	F1
	SOURCE 1:Ground CT	None
	SOURCE 1:Phase VT	None
	SOURCE 1:Auxiliary VT	None
	SOURCE 2:Name	BUS
	SOURCE 2:Phase CT	M1
	SOURCE 2:Ground CT	None
	SOURCE 2:Phase VT	F5
	SOURCE 2:Auxiliary VT	None
	SOURCE 3:Name	GSU
	SOURCE 3:Phase CT	M5
	SOURCE 3:Ground CT	M5
	SOURCE 3:Phase VT	None
	SOURCE 3:Auxiliary VT	None
	TRANSFORMER:GENERAL	CUSTOMER
	TRANSFORMER:WINDINGS	CUSTOMER
	TRANSFORMER:THERMAL INPUTS	CUSTOMER
FLEXLOGIC: FLEXLOGIC EQUATION EDITOR		
	FlexLogic Entry 1 (Protection Element)	VOLTS PER HERTZ 1 OP
	FlexLogic Entry 2 (Protection Element)	VOLTS PER HERTZ 2 OP
	FlexLogic Entry 3 (Protection Element)	PHASE IOC1 OP
	FlexLogic Entry 4 (Protection Element)	PHASE TOC1 OP
	FlexLogic Entry 5 (Protection Element)	63PTX (DE1) OP
	FlexLogic Entry 6 (Protection Element)	XFMR INST DIFF OP
	FlexLogic Entry 7 (Protection Element)	XFMR PCNT DIFF OP
	FlexLogic Entry 8 (OR)	OR(7)
	FlexLogic Entry 9 (Assign Virtual Output)	= TRIP 86T (VO1)
	FlexLogic Entry 10 (Virtual Output On)	TRIP 86T On (VO1)
	FlexLogic Entry 11 (Protection Element)	GROUND TOC1 OP
	FlexLogic Entry 12 (OR)	OR(2)
	FlexLogic Entry 13 (Assign Virtual Output)	= ANY TRIP (VO2)
	FlexLogic Entry 14	END
GROUPED ELEMENTS		

TRANSFORMER: PERCENT DIFFERENTIAL [GROUP 1]		
	Function	Enabled
	Pickup	CUSTOMER
	Slope 1	CUSTOMER
	Break 1	CUSTOMER
	Break 2	CUSTOMER
	Slope 2	CUSTOMER
	Inrush Inhibit Function	CUSTOMER
	Inrush Inhibit Mode	CUSTOMER
	Inrush Inhibit Level	CUSTOMER
	Overexcitation Inhibit Function	CUSTOMER
	Overexcitation Inhibit Level	CUSTOMER
	Block	OFF
	Target	Latched
	Events	Enabled
TRANSFORMER: INSTANTANEOUS DIFFERENTIAL [GROUP 1]		
	Function	Enabled
	Pickup	CUSTOMER
	Block	OFF
	Target	Latched
	Events	Enabled
GROUND CURRENT: GROUND TOC [GROUP 1]		
	GROUND TOC1:Function	Enabled
	GROUND TOC1:Source	SRC 2
	GROUND TOC1:Input	CUSTOMER
	GROUND TOC1:Pickup	CUSTOMER
	GROUND TOC1:Curve	CUSTOMER
	GROUND TOC1:TD Multiplier	CUSTOMER
	GROUND TOC1:Reset	CUSTOMER
	GROUND TOC1:Block	OFF
	GROUND TOC1:Target	Latched
	GROUND TOC1:Events	Enabled
VOLTAGE ELEMENTS: VOLTS PER HERTZ [GROUP 1]		
	VOLTS PER HERTZ 1:Function	Enabled
	VOLTS PER HERTZ 1:SOURCE	SRC 2
	VOLTS PER HERTZ 1:Pickup	CUSTOMER
	VOLTS PER HERTZ 1:Curve	CUSTOMER
	VOLTS PER HERTZ 1:TD MULTIPLIER	CUSTOMER
	VOLTS PER HERTZ 1:T Reset	CUSTOMER
	VOLTS PER HERTz 1:Block	OFF
	VOLTS PER HERTZ 1:Target	Latched
	VOLTS PER HERTZ 1:Events	Enabled

	VOLTS PER HERTZ 2:Function	Enabled
	VOLTS PER HERTZ 2:Source	SRC 2
	VOLTS PER HERTZ 2:Pickup	CUSTOMER
	VOLTS PER HERTZ 2:Curve	CUSTOMER
	VOLTS PER HERTZ 2:TD Multiplier	CUSTOMER
	VOLTS PER HERTZ 2:T Reset	CUSTOMER
	VOLTS PER HERTZ 2:Block	OFF
	VOLTS PER HERTZ 2:Target	Latched
	VOLTS PER HERTZ 2:Events	Enabled
PHASE CURRENT: PHASE IOC [GROUP 1]		
	PHASE IOC1:Function	Enabled
	PHASE IOC1:Source	CUSTOMER
	PHASE IOC1:Pickup	CUSTOMER
	PHASE IOC1:Delay	CUSTOMER
	PHASE IOC1:Reset Delay	CUSTOMER
	PHASE IOC1:Block A	CUSTOMER
	PHASE IOC1:Block B	CUSTOMER
	PHASE IOC1:Block C	CUSTOMER
	PHASE IOC1:Target	Latched
	PHASE IOC1:Events	Enabled
PHASE CURRENT: PHASE TOC [GROUP 1]		
	PHASE TOC1:Function	Enabled
	PHASE TOC1:Signal Source	CUSTOMER
	PHASE TOC1:Input	CUSTOMER
	PHASE TOC1:Curve	CUSTOMER
	PHASE TOC1:TD Multiplier	CUSTOMER
	PHASE TOC1:Reset	CUSTOMER
	PHASE TOC1:Voltage Restraint	CUSTOMER
	PHASE TOC1:Block A	CUSTOMER
	PHASE TOC1:Block B	CUSTOMER
	PHASE TOC1:Block C	CUSTOMER
	PHASE TOC1:Target	Latched
	PHASE TOC1:Events	Enabled
TRANSFORMER: PERCENT DIFFERENTIAL [GROUP 2]		
	Function	Enabled
	Pickup	CUSTOMER
	Slope 1	CUSTOMER
	Break 1	CUSTOMER
	Break 2	CUSTOMER
	Slope 2	CUSTOMER
	Inrush Inhibit Function	CUSTOMER
	Inrush Inhibit Mode	CUSTOMER

	Inrush Inhibit Level	CUSTOMER
	Overexcitation Inhibit Function	CUSTOMER
	Overexcitation Inhibit Level	CUSTOMER
	Block	OFF
	Target	Latched
	Events	Enabled
TRANSFORMER: INSTANTANEOUS DIFFERENTIAL [GROUP 2]		
	Function	Enabled
	Pickup	CUSTOMER
	Block	OFF
	Target	Latched
	Events	Enabled
GROUND CURRENT: GROUND TOC [GROUP 2]		
	GROUND TOC1:Function	Enabled
	GROUND TOC1:Source	CUSTOMER
	GROUND TOC1:Input	CUSTOMER
	GROUND TOC1:Pickup	CUSTOMER
	GROUND TOC1:Curve	CUSTOMER
	GROUND TOC1:TD Multiplier	CUSTOMER
	GROUND TOC1:Reset	CUSTOMER
	GROUND TOC1:Block	OFF
	GROUND TOC1:Target	Latched
	GROUND TOC1:Events	Enabled
VOLTAGE ELEMENTS: VOLTS PER HERTZ [GROUP 2]		
	VOLTS PER HERTz 1:Function	Enabled
	VOLTS PER HERTZ 1:Source	CUSTOMER
	VOLTS PER HERTZ 1:Pickup	CUSTOMER
	VOLTS PER HERTZ 1:Curve	CUSTOMER
	VOLTS PER HERTZ 1:TD Multiplier	CUSTOMER
	VOLTS PER HERTZ 1:T Reset	CUSTOMER
	VOLTS PER HERTZ 1:Block	OFF
	VOLTS PER HERTZ 1:Target	Latched
	VOLTS PER HERTZ 1:Events	Enabled
	VOLTS PER HERTZ 2:Function	Enabled
	VOLTS PER HERTZ 2:Source	CUSTOMER
	VOLTS PER HERTZ 2:Pickup	CUSTOMER
	VOLTS PER HERTZ 2:Curve	CUSTOMER
	VOLTS PER HERTZ 2:TD Multiplier	CUSTOMER
	VOLTS PER HERTZ 2:T Reset	CUSTOMER
	VOLTS PER HERTZ 2:Block	OFF
	VOLTS PER HERTZ 2:Target	Latched
	VOLTS PER HERTZ 2:Events	Enabled

PHASE CURRENT: PHASE IOC [GROUP 2]		
	PHASE IOC1:Function	Enabled
	PHASE IOC1:Source	CUSTOMER
	PHASE IOC1:Pickup	CUSTOMER
	PHASE IOC1:Delay	CUSTOMER
	PHASE IOC1:Reset Delay	CUSTOMER
	PHASE IOC1:Block A	CUSTOMER
	PHASE IOC1:Block B	CUSTOMER
	PHASE IOC1:Block C	CUSTOMER
	PHASE IOC1:Target	Latched
	PHASE IOC1:Events	Enabled
	PHASE IOC1:Function	Enabled
PHASE CURRENT: PHASE TOC [GROUP 2]		
	PHASE TOC1:Function	Enabled
	PHASE TOC1:Input	CUSTOMER
	PHASE TOC1:Pickup	CUSTOMER
	PHASE TOC1:Curve	CUSTOMER
	PHASE TOC1:TD Multiplier	CUSTOMER
	PHASE TOC1:Reset	CUSTOMER
	PHASE TOC1:Voltage Restraint	CUSTOMER
	PHASE TOC1:Block A	CUSTOMER
	PHASE TOC1:Block B	CUSTOMER
	PHASE TOC1:Block C	CUSTOMER
	PHASE TOC1:Target	Latched
	PHASE TOC1:Events	Enabled
CONTROL ELEMENTS:		
SETTINGS GROUPS		
	Function	Enabled
	Block	OFF
	Group 2 Activate On	LCI ON On(H7c)
	Events	Enabled
DIGITAL ELEMENTS		
	DIGITAL ELEMENT 1:Function	Enabled
	DIGITAL ELEMENT 1:Name	63PTX
	DIGITAL ELEMENT 1:Input	63PT (H7a) ON
	DIGITAL ELEMENT 1:Pickup Delay	0.000 s
	DIGITAL ELEMENT 1:Reset Delay	0.000 s
	DIGITAL ELEMENT 1:Block	OFF
	DIGITAL ELEMENT 1:Target	Latched
	DIGITAL ELEMENT 1:Events	Enabled
INPUTS/OUTPUT		
CONTACT INPUTS		

	H7a:ID	63PT
	H7a:Debounce Time	2.0 ms
	H7a:Events	Enabled
	H7c:ID	LCI ON
	H7c:Debounce Time	2.0 ms
	H7c:Events	Enabled
	CONTACT INPUT THRESHOLDS	84Vdc
CONTACT OUTPUTS		
	H1:ID	TRIP 86T
	H1:Operate	TRIP 86T On (VO1)
	H1:Seal-In	OFF
	H1:Events	Enabled
	H2:ID	TRIP 86T
	H2:Operate	GROUND TOC1 OP
	H2:Seal-In	OFF
	H2:Events	Enabled
	H3:ID	OFF
	H3:Operate	OFF
	H3:Seal-In	OFF
	H3:Events	Enabled
	H4:ID	OFF
	H4:Operate	OFF
	H4:Seal-In	OFF
	H4:Events	Enabled
	H5:ID	OFF
	H5:Operate	OFF
	H5:Seal-In	OFF
	H5:Events	Enabled
	P1:ID	TCP ALARM
	P1:Operate	ANY TRIP On (VO2)
	P1:Seal-In	OFF
	P1:Events	Enabled
	P5:ID	TRIG G60A
	P5:Operate	ANY TRIP On (VO2)
	P5:Seal-In	OFF
	P5:Events	Enabled
	P6:ID	TRIG G60B
	P6:Operate	ANY TRIP On (VO2)
	P6:Seal-In	OFF
	P6:Events	Enabled
VIRTUAL OUTPUTS		
	VIRTUAL OUTPUT 1:ID	TRIP 86T

	VIRTUAL OUTPUT 1:Events	Enabled
	VIRTUAL OUTPUT 2:ID	ANY TRIP
	VIRTUAL OUTPUT 2:Events	Enabled

Notes:

1. GE cannot provide the setting for 27TN until the site provides data collected during load test (for various active loads on the machine for varying power factors). Unit should initially be run with 27TN disabled.
2. Changes in Rev A (from Rev -):
   a. Updated One-line revision # to "Rev D"

   c. G60A/B:

Oscillography:
Trigger Source, Digital Channels 1 up dated

System Set-up:
Voltage: VT F5 Aux VT Connection changed to Vn

Signal Sources:
Source 2: Aux VT changed to F5

Flexlogic Equation Editor
Entries updated

Grouped Elements:
Accidental Energization: Offline settings updated
Sensitive Directional Power1: Delay, Block settings updated
Third Harmonic Neutral: Block settings updated

Control Elements
Underfrequency: Block settings updated
Overfrequency; Block settings updated

Input/Output
Contact Inputs: H7a, updated
Contact Outputs: H5, U5, U6 updated; H6 deleted

d. C60:

Product Order Code updated

Oscillography:
Digital Channels: Entries updated

User Programmable LEDs:
Updated: entries updated

System Set-up: AC Inputs:
Current: CT F5 added
Voltage: VT F5 VT deleted

Signal Sources:
Source 1, 2 updated; Source 3 added

Flexlogic Equation Editor:
Entries updated; TIMER deleted

Grouped Elements:
PHASE TOC2 added
PHASE UV1 deleted

Control Elements:
Deleted

Digital Elements:
Updated

Contact Outputs:

H4-U5: Updated

Virtual Outputs:

1-3 updated, 4 deleted

e. T60U:

Oscillography:

Digital Channels 14-15 turned OFF

Flexlogic Equation Editor

Entries updated

f. T60T:

Oscillography:

Digital Channels 14-15 turned OFF

Flexlogic Equation Editor

Entries updated

Notes:

1. GE cannot provide the setting for 27TN until the site provides data collected during load test (for various active loads on the machine for varying power factors). Unit should initially be run with 27TN disabled.

SIZE	DWG NO	REV
D	215D1108	F

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	REVISED EQUIPMENT LOCATION KEY. UPDATED REVISION STATUS BLOCK.	07-11-16	SLM2/SS45
B	UPDATED REVISION STATUS BLOCK.	07-12-19	SLM2/SS45
C	UPDATED REVISION STATUS BLOCK.	08-02-14	SLM2/SS45
D	REVISED EQUIPMENT LOCATION KEY AND NOTE. UPDATED REVISION STATUS BLOCK.	08-03-17	SLM2/SS45
E	REVISED NOMENCLATURE & DESCRIPTION. UPDATED REVISION STATUS BLOCK. THE DWG UPDATED AS PER DCI08026251.	08-07-14	SLM2/SS45
F	UPDATED REVISION STATUS BLOCK. THE DWG UPDATED AS PER DCI08041246.	08-12-05	SLM2/SS45

TABLE OF CONTENTS (TOTAL SHEETS INCL THIS SHEET: = 8)

EQUIPMENT LOCATION KEY

SYMBOLS	LOCATION
	PURCHASER'S EQUIPMENT
	GENERATOR PROTECTION PANEL (GPP)
	MOTOR CONTROL CENTER (MCC)
	GENERATOR TERMINAL ENCLOSURE (GTE)
	TURBINE CONTROL PANEL (TCP)
	EXCITATION COMPARTMENT W/ THOUT HIGH VOLTAGE (EC)
	LOI / EXCITATION COMPARTMENT
	GE EQUIPMENT SEPARATELY MOUNTED
	GENERATOR COMPARTMENT
	PACKAGE ELECTRICAL AND ELECTRONIC CONTROL CENTER (PEECC)
	TURBINE BASE
	COOLING WATER SYSTEM
	CO2 FIRE PROTECTION SKID
	LOAD SHAFT COMPARTMENT
LCI	LOAD COMMUTATED INVERTER
ISO	ISOLATION TRANSFORMER
DCR	DC LINK REACTOR
EXT	EXCITATION TRANSFORMER (EPT)
ACR	AC LINK REACTOR
LOI	ACCESSORY MODULE - LUBE OIL MODULE
LFAM	LIQUID FUEL ATOMIZER AIR MODULE
DFP	DISTILLATE FUEL FORWARDING SKID
WIS	WATER INJECTION SKID (N/X)
FP	FIRE PROTECTION PANEL
TAI	TURBINE AIR INLET COMPARTMENT
ACM	ACCESSORY MODULE - GAS VALVE AREA
EC	EVAPORATIVE COOLER SKID
HGD	HYDROGEN GAS DRYER
WWS	WATER WASH SKID
GAMP	GAS AUXILIARY MONITORING PANEL (GAMP)
AIS	AIR PROCESS SKID
EX	EXCITER (EX2100)
FH	FUEL HEATING SKID

NOMENCLATURE & DESCRIPTION

NOMENCLATURE	DESCRIPTION	RELAY
21	PHASE DISTANCE	G60
24	VOLTS PER HERTZ	G60,T60
25	SYNCHROCHECK	C60
32	SENSITIVE DIRECTIONAL POWER	G60
40	LOSS OF EXCITATION	G60
46	GENERATOR UNBALANCE (NEG SEQUENCE)	G60
78	OUT OF STEP (LOSS OF SYNCH)	G60
81	FREQUENCY	G60
27DE	DEAD BUS DETECTION (NOT USED)	C60
27P	PHASE UNDERVOLTAGE	G60
27TN	3RD HARMONIC NEUTRAL UNDERVOLTAGE (GND PROTECTION)	G60
41AC	EXCITATION TRANSFORMER SUPPLY BREAKER	MISC
50/27	INADVERTENT ENERGIZATION	C60
50/51	PHASE OVERCURRENT	T60
50/51(AT4)	AUX BUS OVERCURRENT RELAY	C60
50/62BF	BREAKER FAILURE WITH TIMER	C60
50BF	BREAKER FAILURE (FOR RETRIP)	C60
51PV	PHASE TIME OVERCURRENT, VOLTAGE RESTRAINED	G60
51TN	GENERATOR XFMR NEUTRAL OVERCURRENT RELAY	T60
52G	GENERATOR CIRCUIT BREAKER	MISC
52L	HIGH SIDE LINE CIRCUIT BREAKER	MISC
52SS	STATIC START SUPPLY BREAKER	MISC
59BN	BUS GROUND DETECTION	C60
59N	OVERVOLTAGE, NEUTRAL (GND PROTECTION)	G60
59P	PHASE OVERVOLTAGE	G60
63PT	TRANSFORMER FAULT PRESSURE SWITCH RELAY	MISC
63PTX	AUX CONTACT TO LATCH CLOSE ON 63PT INPUT	T60
86BF	BREAKER FAILURE LOCKOUT RELAY	MISC
86G-1A	GENERATOR LOCKOUT RELAY	MISC
86G-1B	GENERATOR LOCKOUT RELAY	MISC
86G-2A	GENERATOR LOCKOUT RELAY	MISC
86G-2B	GENERATOR LOCKOUT RELAY	MISC
86IE	INADVERTENT ENERGIZATION LOCKOUT RELAY	MISC
86T	TRANSFORMER DIFFERENTIAL LOCKOUT RELAY	MISC
86U	UNIT DIFFERENTIAL LOCKOUT RELAY	MISC
87T	TRANSFORMER DIFFERENTIAL	T60
87S	STATOR DIFFERENTIAL	G60
87TSSX	ATT STARTUP SETTINGS SELECT CONTACT	T60
87U	UNIT DIFFERENTIAL	T60
89NE	NEUTRAL GROUND DISCONNECT SWITCH	MISC
89SS	STATIC START DISCONNECT SWITCH	MISC
5800	Transducer - WATTS / VARS	Nexus
8800	Transducer - WATTS	Moore
VTFF	VOLTAGE TRANSFORMER FUSE FAILURE	G60,C60
49T	TRANSFORMER WINDING TEMPERATURE ALARM	MISC

LEGEND

TURBINE CONTROL SYSTEM (HMI)

HMI	MACHINE INTERFACE	G60	GENERATOR MANAGEMENT RELAY
GSU	GENERATOR STEP-UP TRANSFORMER	T60	TRANSFORMER MANAGEMENT RELAY
IBF	INITIATE BREAKER FAILURE	C60	BREAKER MANAGEMENT RELAY
TS	TEST SWITCH	GEN.DMM	GENERATOR DIGITAL MULTIMETER
LA	LIGHTNING ARRESTER	BUS.DMM	BUS DIGITAL MULTIMETER
SR	SPARE		

CUSTOMER / GE TERMINATION POINT

THIRD ANGLE PROJECTION

NOTES:

POWER CABLES: ALL POWER CABLES FROM CUSTOMER EQUIPMENT TO GE EQUIPMENT AND BETWEEN GE PROVIDED EQUIPMENT IS BY CUSTOMER UNLESS SPECIFICALLY MARKED AS GE.

CT POLARITY & GROUNDING: CURRENT TRANSFORMER CONNECTION TO THE RELAYS DO NOT INDICATE THEIR POLARITY OR GROUNDING DETAILS.

52G STATUS AUX CONTACTS: GENERATOR PROTECTION REQUIRES (3) NORMALLY OPEN AND (3) NORMALLY CLOSED CONTACTS FOR 52G STATUS.

LOCKOUT RELAY:
ALL LOCKOUT RELAY (86) FUSES ARE MONITORED BY ALARM TO TURBINE CONTROL PANEL. THE 125VDC GENERATOR PANEL POWER SUPPLY IS MONITORED BY ALARM IN THE TURBINE CONTROL PANEL. ON ALL 7 DECK LOCKOUT RELAYS 1 DECK WILL BE WIRED AS SPARE FOR CUSTOMER USE. ON ALL 10 DECK LOCKOUT RELAYS 2 DECKS WILL BE WIRED AS SPARE FOR CUSTOMER USE. TRANSFORMER AND BREAKER FAILURE LOCKOUT RELAYS ARE 10 DECK. ALL OTHER LOCKOUT RELAYS ARE 7 DECK. ALL LOCKOUT RELAYS SHOWN ON THE ONELINE ARE LOCATED PHYSICALLY IN THE GENERATOR PROTECTION PANEL UNLESS THEY SHOWN TO BE LOCATED ELSEWHERE.

RELAY SETTINGS AND CONFIGURATION: TYPICALLY, GE SETS THE GENERATOR PROTECTION RELAY ONLY. THE TRANSFORMER PROTECTION AND BUS PROTECTION RELAY ARE NOT SET BY GE. ALL THE RELAYS SHOULD BE CONFIGURED PER RELAY CONFIGURATIONS SHOWN IN THIS DRAWING, IRRESPECTIVE OF WHO SETS THE RELAYS.

27TN RELAY SETTING: THESE SETTINGS WILL NOT BE PROVIDED WITH THE INITIAL RELEASE OF THE RELAY SETTINGS DRAWING. THIS RELAY WILL BE SET ONLY AFTER THE MACHINE IS RUN AND 3RD HARMONIC VOLTAGE DATA IS AVAILABLE FROM SITE.

BREAKER FAILURE RETRIP RELAY CONFIGURATION: DO NOT CONFIGURE FUNCTION 50BF TO OUTPUT P1 ON THE C60 RELAY. DOING SO WILL RESULT IN A NUISANCE ALARM WHENEVER THE BREAKER TRIPS AND INITIATES A BREAKER FAILURE RETRIP.

GEN PROTECTION FAILURE IN GAS TURBINES: NORMAL SHUTDOWN WILL OCCUR VIA TURBINE CONTROLS WHEN BOTH PRIMARY AND BACKUP GENERATOR PROTECTION FAIL. IN ADDITION, THE FAILURE OF ANY ONE (OR BOTH) OF THE GENERATOR PROTECTION RELAY WILL RESULT IN AN ALARM.

IMPACT OF STATIC START ON 87T: FOR APPLICATION WHERE T60 RELAY RECEIVES INPUT FROM CTS THAT WILL SEE CURRENT ASSOCIATED WITH STATIC START (UNIT DIFFERENTIAL PROTECTION), THE T60 RELAY MUST HAVE 2 SELECTABLE SETTINGS, ONE FOR STARTUP, ONE FOR NORMAL RUN CONDITIONS, TCP CONTACT 87TSSX IS USED TO SELECT THE STARTUP SETTINGS AND REVERT (DEFAULT) BACK TO THE NORMAL SETTING WHEN THE UNIT IS NOT STARTING (I.E. TCP SIGNAL NOT PRESENT)

TEST SWITCHES: ALL TEST SWITCHES WIRED TO THE GENERATOR PROTECTION RELAYS ARE ALSO LOCATED WITH THEM IN THE GENERATOR PROTECTION PANEL.

MCC SHORT CIRCUIT REQUIREMENT: CUSTOMER'S SYSTEM SHOULD NOT EXCEED 65,000 AMPS RMS SYMMETRICAL SHORT CIRCUIT CURRENT AT THE MCC INCOMING TERMINALS. MOTOR AND HEATER RATINGS SHOWN IN THIS SKETCH WILL BE UPDATED TO ACTUAL RATINGS DURING REQUISITION.

INCOMING CABLE CONNECTION TO MCC: INCOMING CABLE TO MCC SHALL TERMINATE ON COPPER BUS BARS. CABLE MUST UTILIZE STANDARD CABLE CONNECTOR FOR TERMINATION.

52SS CONTROL: AUTOMATIC CONTROL OF THE 52SS FEEDER BREAKER IS FROM THE STATIC STARTER. 52SS CAN BE CYCLED AFTER EACH STATIC START OR KEPT CLOSED FOR EXTENDED PERIOD OF TIME BY APPROPRIATE OPTION SELECTION AT THE TURBINE CONTROLLER HUMAN - MACHINE INTERFACE. 52SS CAN BE TRIPPED FROM ANY EXTERNAL LOCATION OF CUSTOMER'S CHOICE INDEPENDENT OF THE AUTOMATIC CONTROL IN STATIC STARTER. IT IS, HOWEVER, GE'S PRACTICE TO CLOSE 52SS ONLY FROM THE STATIC STARTER AS A PART OF STARTUP PROCESS AND NOT FROM ANY OTHER EXTERNAL LOCATION.

STATIC START PRE-TRIP: ANY DEVICE THAT TRIPS THE ISOLATION TRANSFORMER SUPPLY POWER (SUCH AS 86SS) WHILE THE STATIC STARTER IS OPERATING SHOULD BE GROUPED IN TO THE PRE-TRIP NORMALLY CLOSED CONTACT STRING. THIS STRING SHOULD BE WIRED IN SERIES WITH THE 52SS STATUS CONTACT AND WIRED INTO THE STATIC START.

STARTING MULTIPLE TURBINES: UNDER NO CONDITION CAN TWO UNITS BE STARTED FROM THE SAME STATIC STARTER AT THE SAME TIME. THE STATIC START EQUIPMENT IS RATED TO SUPPORT UNLIMITED NUMBER OF SIMULTANEOUS STARTUPS. EXTERNAL ELECTRICAL INTERLOCKS SHOULD PREVENT MORE THAN ONE GENERATOR FROM GETTING CONNECTED TO THE STATIC STARTER.

STATIC START FEEDER PROTECTION: TYPICALLY, CUSTOMER IS EXPECTED TO PROTECT THE STATIC START FEEDER (52SS TO ISOLATION XFMR) FOR OVERCURRENT AND GROUND FAULT.

AUX BUS TRANSFORMER SIZING RECOMMENDATION: RECOMMENDED MINIMUM SHORT CIRCUIT AVAILABLE ON THE CUSTOMER'S AUXILIARY BUS IS 200MVA. REDUCED AMOUNTS OF BUS KVA WILL RESULT IN INCREASED LEVELS OF VOLTAGE AND CURRENT DISTORTION, REFERENCE IEEE 519 - HARMONIC CONTROL AND REACTIVE COMPENSATION OF STATIC POWER CONVERTERS FOR ADDITIONAL INFORMATION.

STATIC START CIRCUIT BREAKER / CABLE SIZING CRITERIA: THE STATIC START LOAD IMPOSED ON THE POWER SYSTEM IS 3250 KVA STEADY STATE AND 8000 KVA TRANSIENTLY FOR 2 MINUTES EACH START. THE STATIC START COMPONENTS ARE DESIGNED TO MEET THIS DUTY CYCLE WITHOUT RESTRICTION TO A NUMBER OF REPEATED BACK TO BACK STARTS. THE CIRCUIT BREAKER & CABLES THAT CONNECT THE STATIC STARTER TO THE POWER SOURCE SHOULD BE SIZED BASED ON THIS REQUIREMENT.

COOLING WATER: COOLING WATER MUST BE SUPPLIED TO THE STATIC STARTER HEAT EXCHANGER WHENEVER THE STATIC STARTER IS IN OPERATION

11-CT-CTG-001
12-CT-CTG-001

D	F	E	C	F	REV
8	7	6	5	4	3	2	1	SH

REV STATUS OF SHEETS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS
3 PLACE DECIMALS
ANGLES
FRACTIONS

DRAWN/ISSUED	SIGNATURES	DATE
DRAWN	S.SARAVANAN	07-10-08
CHECKED	RAMNATH BHAT	07-10-08
ENGRG	RAMNATH BHAT	07-10-08
APPROVED	S.SARAVANAN	07-10-08

GE PowerGeneration — DRIVING ELECTRIC COMPANY, Salisbury, NC, USA

ONE LINE DIAGRAM
GAS TURBINE

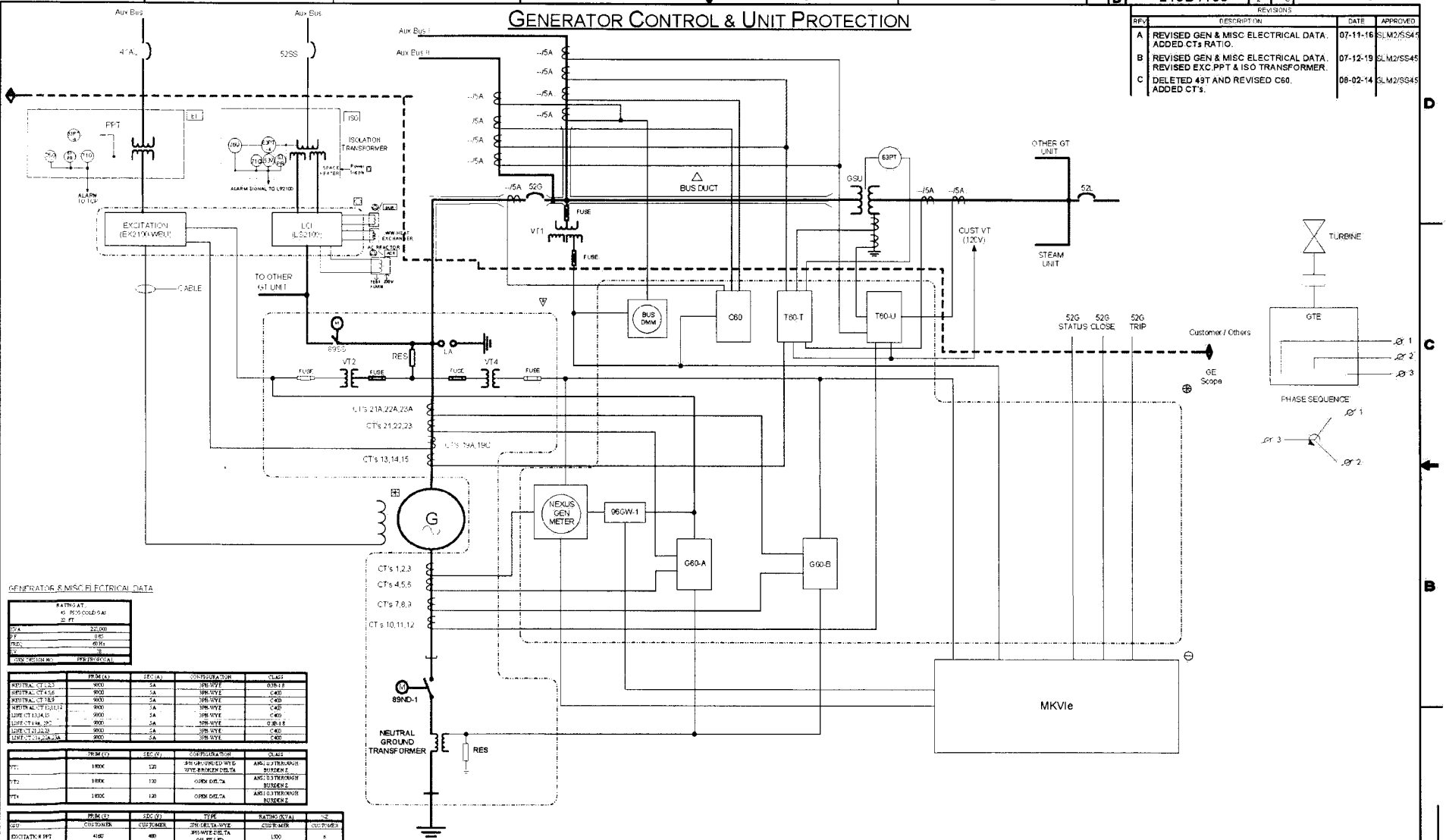
337X446 0444

SIZE	CAGE CODE	DWG NO	REV
D		215D1108	F

SCALE — SHEET 1

DIM TO

GENERATOR CONTROL & UNIT PROTECTION



GENERATOR & MISC ELECTRICAL DATA

RATING AT 45 PSIG COLD GAS 25 FT	
KVA	22,000
PF	0.85
FREQ	60 Hz
RPM	3600
CONNECTION	PER DIAGRAM

	PRIM (A)	SEC (A)	CONFIGURATION	CLASS
NEUTRAL CT 1,2,3	9000	5A	3PH-WYE	C400
NEUTRAL CT 4,5,6	9000	5A	3PH-WYE	C400
NEUTRAL CT 7,8,9	9000	5A	3PH-WYE	C400
NEUTRAL CT 10,11,12	9000	5A	3PH-WYE	C400
LINE CT 19A,19C	9000	5A	3PH-WYE	C400
LINE CT 21,22,23	9000	5A	3PH-WYE	C400
LINE CT 21A,22A,23A	9000	5A	3PH-WYE	C400

	PRIM (V)	SEC (V)	CONFIGURATION	CLASS
VT1	18000	120	3PH GROUNDED WYE WYE-BROKEN DELTA	ANSI 0.3 THROUGH BURDEN Z
VT2	18000	120	OPEN DELTA	ANSI 0.3 THROUGH BURDEN Z
VT4	18000	120	OPEN DELTA	ANSI 0.3 THROUGH BURDEN Z

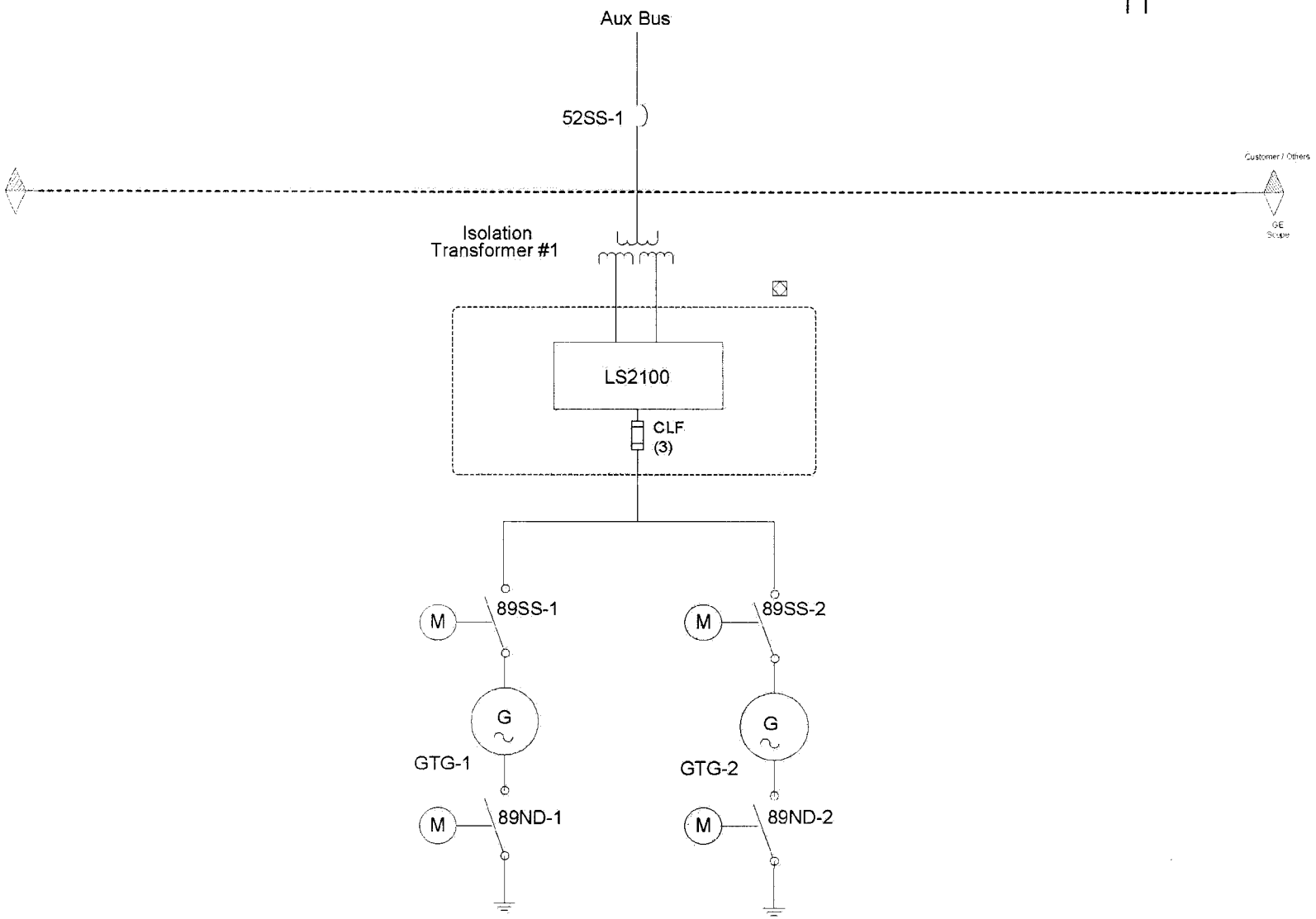
	PRIM (V)	SEC (V)	TYPE	RATING (KVA)	HZ
GSU	CUSTOMER	CUSTOMER	3PH-DELTA-WYE	CUSTOMER	CUSTOMER
EXCITATION XFMR	4160	480	3PH-WYE-DELTA OIL FILLED	1500	6
ISOLATION TRF	4160	208/208C	3PH-DELTA-WYE-DELTA OIL FILLED	3200/625/625	6
NGT	1200	240	DRY-TYPE	25	6

	RESISTANCE (OHMS)	CURRENT (A)	TIME (MIN)
NGR	10 ±5	400	1

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	REVISED GEN & MISC ELECTRICAL DATA. ADDED CTs RATIO.	07-11-16	SLM2/SS45
B	REVISED GEN & MISC ELECTRICAL DATA. REVISED EXC.PPT & ISO TRANSFORMER.	07-12-19	SLM2/SS45
C	DELETED 49T AND REVISED C60. ADDED CT's.	08-02-14	SLM2/SS45

GE Power Generation	SIZE D	CAGE CODE	DWG NO 215D1108
DRAWN S SARAVANAN	SCALE		SHEET 2
DESIGN S SARAVANAN			

PLANT STATIC STARTUP CONFIGURATION



REV	DESCRIPTION	DATE	APPROVED

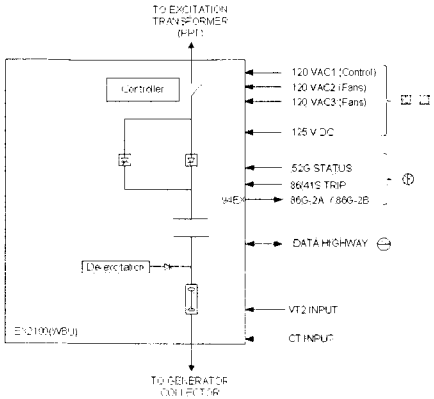
GE Power Generation	SIZE D	DWG NO 215D1108	REV
DRAWN S.SARAVANAN	SCALE	SHEET 3	
CHK'D S.SARAVANAN			

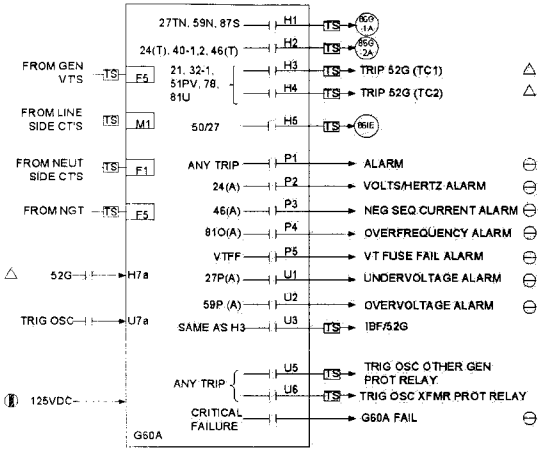
RELAY / METER / CONTROLLER CONFIGURATION

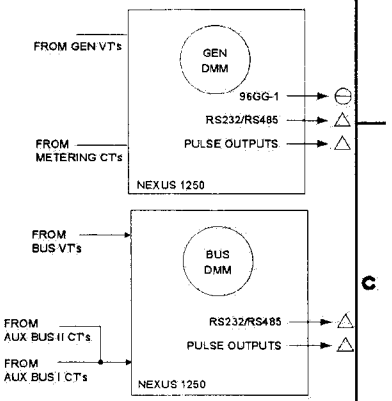
SIZE	DWG NO	SH	REV
D	215D1108	4	E

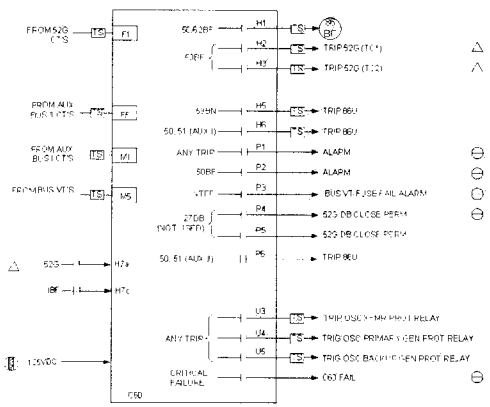
REVISIONS

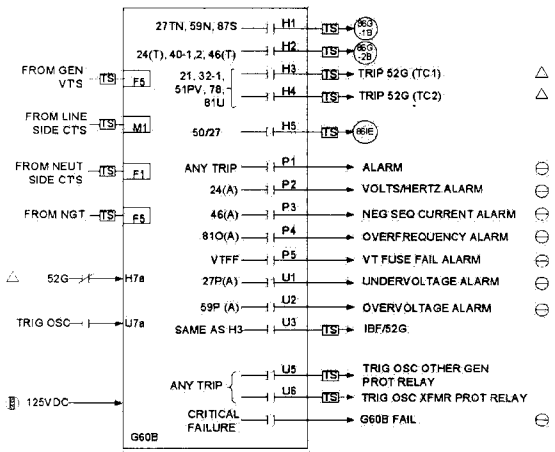
REV	DESCRIPTION	DATE	APPROVED
C	REVISED C60,G60B,G60A,EX2100 AND NEXUS 1250.	08-02-14	SLM2/SS45
E	REVISED C60.	08-07-14	SLM2/SS45

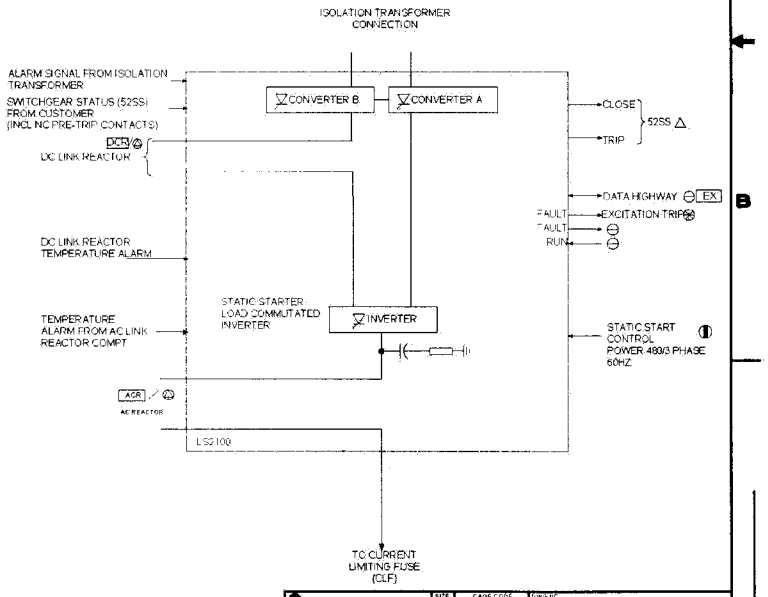












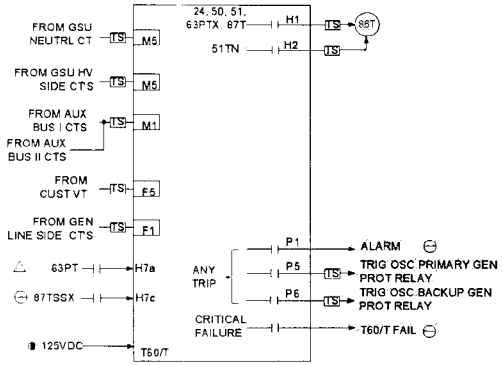
GEPowerGeneration	SIZE D	CAGE CODE	DWG NO 215D1108
DRAWN S.SARAVANAN	SCALE		SHEET 4
DESIGN S.SARAVANAN			

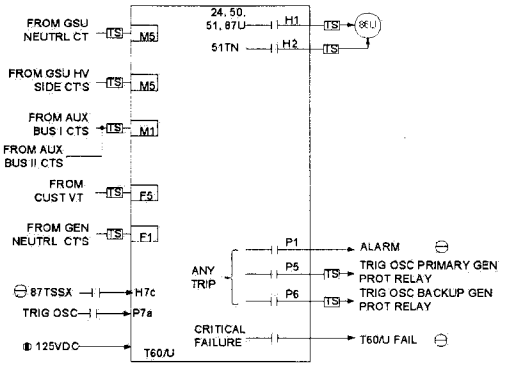
RELAY / METER / CONTROLLER CONFIGURATION-CONTD..

SIZE	DWG NO	SH	REV
D	215D1108	5	C

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
C	REVISED T60/T AND T60/U.	09-02-14	SLM2/SS45





GEPowerGeneration	SIZE D	CAGE CODE	DWG NO 215D1108
DRAWN S.SARAVANAN			
DESIGN S.SARAVANAN	SCALE		SHEET 5

LOCKOUT / AUX RELAY OUTPUT CONTACT ASSIGNMENT

SIZE	DWG NO	SH	REV
D	215D1108		

REVISIONS

REV	DESCRIPTION	DATE	APPROVED

86G-1A CONTACT ASSIGNMENT

CONTACTS	FUNCTION
	TRIP TURBINE & ALARM
	TRIP EXCITATION
	TRIP 52G COIL #1
	TRIP 52G COIL #2
	BLOCK CLOSE 52G
	IBF/52G

86G-2A CONTACT ASSIGNMENT

CONTACTS	FUNCTION
	ALARM
	TRIP EXCITATION
	TRIP 52G COIL #1
	TRIP 52G COIL #2
	BLOCK CLOSE 52G
	IBF/52G

86IE CONTACT ASSIGNMENT

CONTACTS	FUNCTION
	ALARM
	TRIP 52G COIL #1
	TRIP 52G COIL #2
	BLOCK CLOSE 52G
	IBF/52G

86G-1B CONTACT ASSIGNMENT

CONTACTS	FUNCTION
	TRIP TURBINE & ALARM
	TRIP EXCITATION
	TRIP 52G COIL #1
	TRIP 52G COIL #2
	BLOCK CLOSE 52G
	IBF/52G

86G-2B CONTACT ASSIGNMENT

CONTACTS	FUNCTION
	ALARM
	TRIP EXCITATION
	TRIP 52G COIL #1
	TRIP 52G COIL #2
	BLOCK CLOSE 52G
	IBF/52G

86U/86T CONTACT ASSIGNMENT

CONTACTS	FUNCTION
	TRIP TURBINE & ALARM
	TRIP EXCITATION
	TRIP 52G COIL #1
	TRIP 52G COIL #2
	BLOCK CLOSE 52G
	IBF/52G
	TRIP 52L COIL #1
	TRIP 52L COIL #2
	BLOCK CLOSE 52L
	IBF/52L
	TRIP 52AUX COIL #1
	TRIP 52AUX COIL #2
	BLOCK CLOSE 52AUX
	TRIP 52G COIL#1 OTHER GT UNIT
	TRIP 52G COIL#2 OTHER GT UNIT
	BLOCK CLOSE 52G OTHER GT UNIT
	IBF/52G OTHER GT UNIT
	TRIP 52AUX COIL#1 OTHER GT UNIT
	TRIP 52AUX COIL#2 OTHER GT UNIT
	BLOCK CLOSE 52AUX OTHER GT UNIT
	TRIP 52G COIL#1 ST UNIT
	TRIP 52G COIL#2 ST UNIT
	BLOCK CLOSE 52G ST UNIT
	IBF/52G ST UNIT

86BF CONTACT ASSIGNMENT

CONTACTS	FUNCTION
	TRIP TURBINE & ALARM
	TRIP EXCITATION
	TRIP 52G COIL #1
	TRIP 52G COIL #2
	BLOCK CLOSE 52G
	IBF/52L
	TRIP 52L COIL #1
	TRIP 52L COIL #2
	BLOCK CLOSE 52L
	TRIP 52AUX COIL #1
	TRIP 52AUX COIL #2
	BLOCK CLOSE 52AUX
	TRIP 52G COIL#1 OTHER GT UNIT
	TRIP 52G COIL#2 OTHER GT UNIT
	BLOCK CLOSE 52G OTHER GT UNIT
	IBF/52G OTHER GT UNIT
	TRIP 52AUX COIL#1 OTHER GT UNIT
	TRIP 52AUX COIL#2 OTHER GT UNIT
	BLOCK CLOSE 52AUX OTHER GT UNIT
	TRIP 52G COIL#1 ST UNIT
	TRIP 52G COIL#2 ST UNIT
	BLOCK CLOSE 52G ST UNIT
	IBF/52G ST UNIT

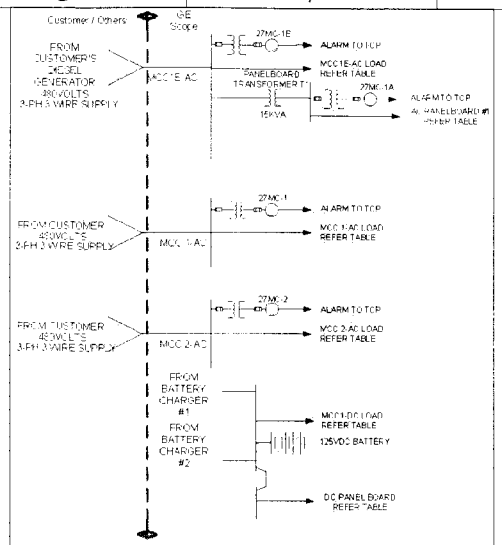
GEPowerGeneration	SIZE: D	CAGE CODE	DWG NO: 215D1108
DRAWN: S.SARAVANAN	SCALE		SHEET 8
DES'D: S.SARAVANAN			

MOTOR CONTROL CENTER (MCC)

SIZE	DWG NO	SH	REV
D	215D1108	1	F

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	REVISED MCC LOAD TABLES.	07-11-16	SLM2/SS45
B	REVISED MCC LOAD TABLES & AC PANEL BOARD #1	07-12-19	SLM2/SS45
C	REVISED MCC1E-AC,MCC1-AC,MCC2-AC AND AC PANEL BOARD #1.	08-02-14	SLM2/SS45
D	REVISED MCC1E-AC,MCC1-AC AND MCC2-AC.	08-03-17	SLM2/SS45
E	REVISED MCC1E-AC AND MCC2-AC.	08-07-14	SLM2/SS45
F	REVISED MCC1-AC AND MCC2-AC.	08-12-05	SLM2/SS45



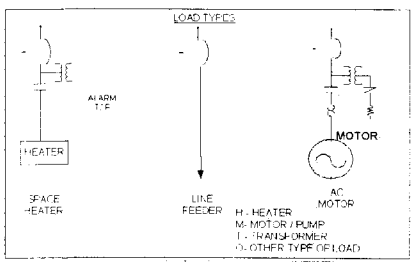
MCC BUS RATING SUMMARY

Bus #	MCC-1E	
Rated voltage	480	Volts
Rated current	1200	Amps
Short ckt rating	65000	Amps
configuration	3ph-3 wire	
Rated Frequency	60	Hz

Bus #	MCC1-AC	
Rated voltage	480	Volts
Rated current	1200	Amps
Short ckt rating	65000	Amps
configuration	3ph-3 wire	
Rated Frequency	60	Hz

Bus #	MCC2-AC	
Rated voltage	480	Volts
Rated current	1200	Amps
Short ckt rating	65000	Amps
configuration	3ph-3 wire	
Rated Frequency	60	Hz

Bus #	MCC-DC	
Rated voltage	125	Volts
Rated current	225	Amps
Short ckt rating	10000	Amps



MCC1E-AC : LOAD TABLE

DEVICE NOMENCLATURE	SECONDARY DEVICE NOMENCLATURE	DEVICE DESCRIPTION	TYPE	RATING	UNITS	STARTER	BREAKER	EQUIPMENT LOCATION
88BN-1	23BN-1	Cooling Air Fan Motor #2 Bearing Area #1	M	7.5	HP	1	20	
88BT-1	23BT-1	Turbine Compartment Cooling Air Fan #1	M	30	HP	3	70	
88FP-1A		Fire Protection CO2 Refrigeration Com. Motor (Feeder Only)	M	2.0	HP		30	
88HQ-1	23HQ-1	Hydraulic Supply Pump Motor #1	M	80	HP	4	125	
88QA-1	23QA-1	Auxiliary Lube Oil Pump #1	M	100	HP	4	200	
88QS-1	23QS-1	Generator Auxiliary Seal Oil Pump #1	M	10	HP	1	20	
88QV-1A	23QV-2A	Lube Mist Separator #1A	M	5	HP	1	15	
88TG-1	23TG-1	Turning Gear Motor #1	M	5	HP	1	15	
88HA-1		PEECC Air Conditioner #1	O				30	
		Alarm	O					
		Battery Charger #1	O				40	
		Spare	O				30	SR
		Panel Board Transformer T1 (480/240/120V)	T	15	KVA		50	

MCC1-AC : LOAD TABLE

DEVICE NOMENCLATURE	SECONDARY DEVICE NOMENCLATURE	DEVICE DESCRIPTION	TYPE	RATING	UNITS	STARTER	BREAKER	EQUIPMENT LOCATION
23HG-1A		Space Heater - Generator	H	2.25	KW			
23HG-1B		Space Heater - Generator	H	2.25	KW	1	15	
23HG-1C		Space Heater - Generator	H	3.6	KW			
23HT-3A		Space Heater Turbine Compartment Humidity Control #3A (1ph)	H	3.6	KW	1	20	
23HT-3B		Space Heater Turbine Compartment Humidity Control #3B (1ph)	H	3.6	KW			
23QT-1		Immersion Heater Lube Oil Tank #1	H	15	KW	3	70	
23QT-2		Immersion Heater Lube Oil Tank #2	H	15	KW			
23QT-3		Immersion Heater Lube Oil Tank #3	H	15	KW			
23VC-1		Space Heater Gas Valve Compartment Humidity Control #3 (1ph)	H	3.6	KW	1	15	
88AC-1A	23AC-1A	Turbine Air Inlet Evaporative Cooler Pump Motor	M	20	HP	2	50	
88BL-1	23BL-1	Skid Cooling Air Fan Motor Lube Oil Skid #1	M	5	HP	1	15	
88FV-1	23FV-1	Cooling Air Fan Motor Liquid Fuel Skid #1	M	5	HP	1	15	
88FDF-1A (1B)	23FDF-1A (1B)	Fuel Forwarding Skid Pump # 1 Motor (1A for Turbine # 1 and 1B for Turbine # 2)	M	50	HP	3	100	
88FDF-1		Fuel Forwarding Skid Vent Fan Motor (Feeder Only)	M	0.5	HP	-	15	
88FD-1		Fuel Heating Skid Vent Fan Motor (Feeder Only)	M	0.5	HP	-	15	
88DC-1		Dust Collection System Blower Motor (Feeder Only)	M	2	HP	-	15	
88QU-1		Lube Oil Conditioner Motor (Feeder Only)	M	1	HP	-	15	
88TK-1	23TK-1	Turbine Exhaust Frame Cooling Blower #1	M	75	HP	4	200	
88VG-1	23VG-1	Load Compartment Cooling Air Fan #1	M	5	HP	1	15	
		Alarm	O					
		Spare	O				30	SR
		Spare	O				30	SR
		LEC/Excitation Panel Board Feeder Breaker	O				125	
23FGH-1		Fuel Heating Skid Fuel Heater (Feeder Only)	H	350	KW	-	600	

MCC2-AC : LOAD TABLE

DEVICE NOMENCLATURE	SECONDARY DEVICE NOMENCLATURE	DEVICE DESCRIPTION	TYPE	RATING	UNITS	STARTER	BREAKER	EQUIPMENT LOCATION
23ES-3		Space Heater Liquid Fuel Module Humidity Control #3 (1ph)	H	3.6	KW	1	15	
23HL-3		Space Heater Lube Oil Skid Humidity Control #3 (1ph)	H	3.6	KW	1	15	
		Spare					30	SR
88AC-1B	23AC-1B	Turbine Air Inlet Evaporative Cooler Pump Motor	M	20	HP	2	50	
88BL-2	23BL-2	Skid Cooling Air Fan Motor Lube Oil Skid #2	M	5	HP	1	15	
88BN-2	23BN-2	Cooling Air Fan Motor #2 Bearing Area #2	M	7.5	HP	1	20	
88BT-2	23BT-2	Turbine Compartment Cooling Air Fan #2	M	30	HP	3	70	
88FV-2	23FV-2	Cooling Air Fan Motor Liquid Fuel Skid #2	M	5	HP	1	15	
88HQ-2	23HQ-2	Hydraulic Supply Pump Motor #2	M	80	HP	4	125	
88QA-2	23QA-2	Auxiliary Lube Oil Pump #2	M	100	HP	4	200	
88QV-1B	23QV-2B	Lube Mist Separator #1B	M	5	HP	1	15	
88TK-2	23TK-2	Turbine Exhaust Frame Cooling Blower #2	M	75	HP	4	200	
88VG-2	23VG-2	Load Compartment Cooling Air Fan #2	M	5	HP	1	15	
88HA-2		PEECC Air Conditioner #2	O				30	
		Alarm	O					
		Battery Charger #2	O				40	
		Spare	O				30	SR
FM 2256A E		Gas Dryer Blower Motor (Feeder Only)	M	1.0	HP		15	
★ 88FDF-2	23FDF-2	Fuel Forwarding Skid Pump #2 Motor	M	50.0	HP	3	100	
		Water Wash Skid (Feeder Only)	O	SEE SHEET 8 THIS DWG			300	
		Water Injection Skid (Feeder Only)	O	SEE SHEET 8 THIS DWG			500	

DC MCC : LOAD TABLE

DEVICE NOMENCLATURE	DEVICE DESCRIPTION	TYPE	RATING	UNITS	STARTER	BREAKER	EQUIPMENT LOCATION
88ES-1	Emergency Seal Oil Pump Motor #1	M	10	HP	3	100	
88GE-1	Emergency Lube Oil Pump Motor #1	M	20	HP	5	225	

NOTE: IF THE AC MCC RATING IS HIGHER THAN 600 AMPS, THEN TWO (2) INCOMING SECTIONS PER MCC ARE PROVIDED. CUSTOMER HAS TO PROVIDE AN EVEN NUMBER OF CABLES PER PHASE; EACH PHASE CAN ACCEPT (2) # 2 AWG - 600 MCM CABLES.

AC PANEL BOARD # 1: 120/240VAC, 225A, 60HZ, 10KA SYM, 30 CIRCUIT

BREAKER NUMBER	BREAKER RATING	LOAD DESCRIPTION	EQUIPMENT LOCATION
0	60	Panel board incoming breaker	
1	20	Monitors & Transducers Ignition	
2	20	Compartment Lighting	
5	20	Gas Auxiliary Monitoring Panel	
6	20	Spare	SR
7	20	Fire Protection Panel	
8	20	Dew Point Sensor 96TB1A,1B,1C	
9	20	Spare	SR
10	20	Spare	SR
11	20	Spare	SR
12	20	Compartment Lighting	
13	20	Air Process Skid (23AP-1)	
14	20	Compartment Conv. Outlets	
15	20	Spare	SR
16	20	Spare	SR
18	20	Spare	SR
19	20	Spare	SR
20	20	Spare	SR
21	20	Inlet Compartment (Lights, Receptacles, 34TF-1, 88MH-1)	
22	20	Cooling Air Fan Motor Liquid Fuel Skid #5	
23	60	Inlet Compartment (Lights, Receptacles, 34TF-1, 88MH-1)	
25	20	23IC Motor Heater for 88IC	
26	20	88ND Neutral Grdg Disc Switch	
27	20	89SS Disconnect Switch	
28	20	Smoke Detectors	
29	20	Battery Compartment Fans	
30	20	Spare	SR

DC PANEL BOARD MCC1-DC : 125VDC, 225A PANEL BOARD

BREAKER NUMBER	BREAKER RATING	LOAD DESCRIPTION	EQUIPMENT LOCATION
1	20	Fire Protection Auxiliary Relays	
2	20	Compartment Lighting	
3	20	Gas Auxiliary Monitoring Panel	
4	20	Exciter	
5	20	GP2100 (CB0) Control Power	
6	20	GP2100 (Primary) Control Power	
7	20	GP2100 (Redundant) Control Power	
8	20	TCP Control Power	
9	20	Spare	SR
10	20	Spare	SR
11	20	Spare	SR
12	20	Spare	SR

★ 88FDF-2 - PROJECT INCLUDES (1) PUMP COMMON TO BOTH GT UNITS WITH (2) FEEDERS. (1) FEEDER FROM EACH PEECC. THE PUMP SHALL BE CONTROLLED BY A COMMON DUAL STARTER LOCATED IN GT UNIT #1 PEECC. STARTER SHALL HAVE MECHANICAL AND ELECTRICAL INTERLOCKS TO PREVENT SIMULTANEOUS ENERGIZATION.

GE Power Generation	SIZE	CAGE CODE	DWG NO
	D		215D1108
DRAWN S.SARAVANAN	SCALE		SHEET 7
CHKD S.SARAVANAN			

SIZE D | DWG NO 215D1108 | SH 8 | REV D

PANEL BOARDS AND MISCELLANEOUS LOADS

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	REVISED WATER WASH SKIDS AND AUX POWER LOAD TABLE.	07-11-16	SLM2/SS45
B	REVISED WATER WASH SKIDS AND AUX POWER LOAD TABLE. ADDED WATER INJECTION SKID TABLE.	07-12-19	SLM2/SS45
C	REVISED 240V LEC PANEL BOARD,UPS AND 240V EXCOMPT.PANEL BOARD.	08-02-14	SLM2/SS45
D	REVISED LOADS POWERED BY CUSTOMER AUX POWER AND WATER WASH SKID TABLES TITILE.	08-03-17	SLM2/SS45

480V LEC PANEL BOARD (480V,3WIRE,125A,65KA) POWERED BY MCC 1 AC(APPLICABLE FOR UNIT I ONLY)

BREAKER NUMBER	BREAKER RATING	LOAD DESCRIPTION	EQUIPMENT LOCATION
0	125	LEC Distribution panel board incoming breaker (480V AC level)	
1	30	A/C Unit #1 (5 ton typ cal)	
2	30	A/C Unit #2 (5 ton typ cal)	
3	60	Static Starter Control Power	LCI
4	40	10KVA 480-240/120 VAC Transformer to 240 V EX Compt Panelboard (see below)	

480V EX COMPT PANEL BOARD (480V,3WIRE,125A,65KA) POWERED BY MCC 1 AC(APPLICABLE FOR UNIT-II ONLY)

BREAKER NUMBER	BREAKER RATING	LOAD DESCRIPTION	EQUIPMENT LOCATION
0	125	EX Compt. panel board incoming breaker (480V AC level)	
1	30	A/C Unit #1 (5 ton typical)	
2	30	A/C Unit #2 (5 ton typical)	
3	20	10KVA 480-240/120 VAC Transformer to 240 V EX Compt Panelboard (see below)	

240V LEC PANEL BOARD (1PHASE,60HZ,3WIRE,240/120V,125A,10KA)APPLICABLE FOR UNIT-I (2&3-1)

BREAKER NUMBER	BREAKER RATING	LOAD DESCRIPTION	EQUIPMENT LOCATION
0	60	LEC Distribution panel board incoming breaker	
1	30	Exciter Control	EX
2	20	Isolation Transf	EX
3	20	Exciter Fans	EX
4	30	Exciter Fans	EX
5	30	Compartment Receptacles	
6	20	Compartment Lights	
7	20	Static Starter Space Htr	LCI
8	20	Compartment Smoke Detectors	
9	20	DC Link Reactor Space Htr	DCR
10	20	Excitation Transformer	EXT
11	20	AC Link Radiator Space Heat heater	ACR
12	40	Spare	SR

240V EX COMPT PANEL BOARD (1PHASE,60HZ,3WIRE,240/120V,125A,10KA)APPLICABLE FOR UNIT-II ONLY)

BREAKER NUMBER	BREAKER RATING	LOAD DESCRIPTION	EQUIPMENT LOCATION
0	60	EX Compt panel board incoming breaker, (240V AC level)	
1	20	Exciter Control	EX
2	20	Excitation Transformer	EX
3	20	Exciter Fan	EX
4	20	Exciter Fan	EX
5	20	Compartment Receptacles	
6	20	Compartment Lights	
7	20	Spare	
8	20	Compartment Smoke Detectors	
9	20	Spare	
10	20	Spare	
11	20	Spare	
12	20	Spare	

120VAC BY CUSTOMER → UPS PANEL BOARD, 125A ► UPS PANEL BOARD LOAD TABLE

UPS PANEL BOARD LOAD TABLE (1PH,60HZ,3W, 120/240V ,125A,10KA)

BREAKER NUMBER	BREAKER RATING	LOAD DESCRIPTION	EQUIPMENT LOCATION
1	20	TCP Control Pwr	
2	20	HMI (480VAC)	
3	20	ETHERNET SWITCH - A (120VAC LEC (EC)	EX EX
4	20	HYDROGEN CONTROL PANEL (230VAC)	TRON SR
5	20	Spare	
6	20	Spare	
7	20	ETHERNET SWITCH - B (120VAC - LEC (EC)	LCI LCI
8	20	Spare	
9	20	Spare	
10	20	Spare	
11	20	Spare	
12	20	Spare	

LOADS POWERED BY CUSTOMER AUX POWER

	DEVICE DESCRIPTION	TYPE	RATING	UNITS	POWER SOURCE
23AK-1	Space Heater Atomizing Air Compressor Motor #1	H	200	W	120VAC by Customer
23FP-1	Motor Heater for 88FP-1	H	200	W	120VAC by Customer
88AK-1	Atomizing Air System Compressor Drive Motor #1	M	500	HP	4160VAC by Customer
88FP-1	Liquid Fuel Pump Drive Motor	M	250	HP	4160VAC by Customer
29FGEH-1	Electric Heater Fuel Gas	H	350	KW	480VAC by Customer

WATER WASH SKID 480V, 3PH, 60HZ, 65KA (POWERED FROM MCC2-AC SINGLE POINT CONNECTION)

DEVICE NOMENCLATURE	SECONDARY DEVICE NOMENCLATURE	DEVICE DESCRIPTION	TYPE	RATING	UNITS	STARTER	BREAKER
23WK-1		Immersion Heater Water Wash		25	KW	2	40
23WK-2		Immersion Heater Water Wash		25	KW	2	40
88TW-1		Turbine / Compressor Wash Water Pump Motor #1	M	15	HP	2	40

WATER WASH SKID 120V/ 240V 1PH 60HZ PANEL BOARD (LOADS POWERED BY 480V FEEDER TO SKID)

BREAKER NUMBER	BREAKER RATING	LOAD DESCRIPTION
1	15	Water Wash Lighting
2	15	Water Wash Receptacles
3	15	Heater Water Wash Pump Motor #1 (23TW-1)
4	15	Water Wash Vent Fan Motor #1
5	15	Water Wash Control Power
6	15	Water Wash Spare

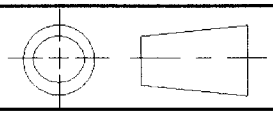
WATER INJECTION SKID 480V, 3PH, 60HZ, 65KA (SINGLE POINT POWER CONNECTION FROM MCC1E-AC)

DEVICE NOMENCLATURE	SECONDARY DEVICE NOMENCLATURE	DEVICE DESCRIPTION	TYPE	RATING	UNITS
23WR-1		Water Injection Skid Compt. Heater	H	10	KW
88WN-1	23WN-1	Water Injection Pump Motor #1	M	300	HP
88JS-1		Water Injection Skid Cooling Air Fan Motor (120V)	M	2.5	HP
		Lights (120V)	O	15	A
		Receptacles (120V)	O	15	A

GE Power Generation | SIZE D | CAGE CODE | DWG NO 215D1108 | REV D
DRAWN S SARAVANAN | SCALE | SHEET 8
CHECKED S SARAVANAN

IZE	DWG NO	SH	REV
A	383A6540	1	-

THIRD ANGLE PROJECTION



REVISIONS

REV	DESCRIPTION	DATE	APPROVED

THIS DOCUMENT SHALL BE REVISED IN ITS ENTIRETY. ALL SHEETS OF THIS DOCUMENT ARE THE SAME REVISION LEVEL AS INDICATED IN THE REVISION BLOCK.

EMPIRE GENERATING PROJECT
13-ST-STG-001

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON:	DRAWN Ken Bina	10/21/2008
2 PL DECIMALS ±	CHECKED Ken Bina	10/21/2008
3 PL DECIMALS ±	ENGRG Ken Bina	10/21/2008
ANGLES ±	ISSUED Alan Conkling	10/22/2008
FRACTIONS ± ✓		
APPLIED PRACTICES		
	SIM TO:	

GENERAL ELECTRIC COMPANY
GE Energy
SCHENECTADY, NY

RECOMMENDED RELAY SETTINGS

FIRST MADE FOR: 290T605 MLI: C183

SIZE	CAGE CODE	DWG NO
A		383A6540

SCALE		SHEET
		1 OF 6

DT -1N

CE1E

One line diagram number: 207D1529 (C)

C902 Rev: 378A4584 (B)

Generator Gen-Info

Varname	Description	Settings	Units
G_AppPow	APPARENT POWER	358240	KVA
G_TV	TERMINAL VOLTAGE	18	KV
G_Freq	FREQUENCY	60	Hz
G_rpm	RPM	3600	Rpm
G_PF	POWER FACTOR	0.85	PF
G_Ip	CURRENT TRANSFORMER PRIMARY	14000	A
G_Is	CURRENT TRANSFORMER SECONDARY	5	A
G_Vp	VOLTAGE TRANSFORMER PRIMARY	18000	Volts
G_Vs	VOLTAGE TRANSFORMER SECONDARY	120	Volts
G_VTnprim	V.T. NEUTRAL PRIMARY	12000	Volts
G_VTnsec	V.T. NEUTRAL SEC.	240	Volts
G_NtrlCTprim	NEUTRAL CT PRIMARY	14000	A
G_NtrlCTsec	NEUTRAL CT SECONDARY	5	A
G_Xd	UNSATURATED SYNCHRONOUS REACTANCE OF THE MACHINE (Xd)	2.16	PU
G_X'd	UNSATURATED TRANSIENT REACTANCE OF THE MACHINE (X'd)	0.31	PU
G_Phase	PHASE ROTATION	A-B-C(0)	
G_VTCONN	TYPE OF VT CONECTION	DELTA(1)	
LCI Started	LCI Started	NO	

DGP Settings

DGP Gen-Info

Varname	Description	Settings	Units
G_I2	I2 CAPABILITY OF THE MACHINE	8	%
G_Ibase	BASE CURRENT	11490.55	A
G_KW	REAL POWER	304504	KW
G_Mpow	MOTORING POWER	1523	KW
G_Zb	BASE IMPEDANCE OF THE MACHINE	16.88	Ohms
G_Xds	Xd (secondary)	36.47	Ohms
G_X'ds	X'd (secondary)	5.23	Ohms

Setting#	Varname	Description	Settings	Units
101	UNITID	Unit ID number	290T605	
102	SYSFREQ	System Frequency	60	Hz
103	SEL TVM	Select Trip Voltage Monitoring	1110	
104	SEL TCM	Select Trip Current Monitoring	1110	
105	SEL PRIM	Select Primary/Secondary units	Prim(1)	
106	CT RATIO	Current Transformer Ratio	2800	
107	VT RATIO	Voltage Transformer Ratio	150.0	
108	COMMPORT	Communication Port	CUSTOMER	
109	PHASE	Phase Rotation	A-B-C(0)	
110	TIMESYNC	Time Synchronizing source	INTRNL(0)	
111	NUMFLTS	Number of Fault events stored	3	
112	PREFLT	Number of pre-fault cycles	---	
113	OSC TRIG	External oscillography		
114	NOM VOLT	Nominal Voltage of generator	120	Volts
115	RATEDCUR	Rated Current of generator	4.1	Amps
116	VT CONN	Type of VT connection	DELTA(1)	
117	NCT RATIO	Neutral Current Transformer Ratio	2800	
87G				
201	87G-TRIP	Configure trip outputs	1000	
202	87G-ALARM	Configure alarm output	0000	
203	87G-K1	K factor	2	%
204	87G-PICKUP	Pickup level	0.3	Amps
46A				
301	46A-ALARM	Configure alarm outputs	0100	
302	46A-PICKUP	Pickup current (negative seq.)	0.23	Amps
303	46ATL14	Timer TL14 setting	2	Sec
46T				
401	46T-TRIP	Configure trip outputs	1000	
402	46T-ALARM	Configure alarm outputs	0000	
403	46T-PICKUP	Pickup current (negative seq.)	0.33	Amps
404	46T-K2	K factor	10	
40-1				
501	SELV2SUP	Select V2 supervision of 40	ENABLE(1)	
601	40-1-TRIP	Configure trip outputs	1000	
602	40-1-ALARM	Configure alarm outputs	0000	
603	40-1-CENTER	Center of characteristic	11.06	Ohms
604	40-1-RADIUS	Radius of Characteristic	8.44	Ohms

DGP Settings

Setting#	Varname	Description	Settings	Units
605	40-1-TL12	Timer TL12 setting	0.06	Sec
40-2				
701	40-2-TRIP	Configure trip outputs	1000	
702	40-2-ALARM	Configure alarm outputs	0000	
703	40-2-CENTER	Center of Characteristic	20.85	Ohms
704	40-2-RADIUS	Radius of Characteristic	18.23	Ohms
705	40-2-TL13	Timer TL13 setting	0.5	Sec
32-1				
801	32-1-TRIP	Configure trip outputs	0110	
802	32-1-ALARM	Configure alarm outputs	0000	
803	32-1-SQ TR EN	Enable sequential trip	YES	
804	32-1-REV PWR	Reverse power pickup	2.54	Watts
805	32-1-TL1	Timer TL1 setting	3	Sec
32-2				
901	32-2-TRIP	Configure trip outputs	0110	
902	32-2-ALARM	Configure alarm outputs	0000	
903	32-2-REV PWR	Reverse power pickup	2.54	Watts
904	32-2-TL2	Timer TL2 setting	30	Sec
51V				
1001	51V-TRIP	Configure trip outputs	0110	
1002	51V-ALARM	Configure alarm outputs	0000	
1003	51VPICKUP	Pickup Current	CUSTOMER	
1004	51V-TIME FAC	Time factor	CUSTOMER	
64G1				
1101	64G1-TRIP	Configure trip outputs	1000	
1102	64G1-ALARM	Configure alarm outputs	0000	
1103	64G1-PICKUP	Pickup Voltage	5	Volts
1104	64G1-TL4	Timer TL4 Setting	5	Sec
64G2				
1201	64G2-TRIP	Configure trip outputs	0000	
1202	64G2-ALARM	Configure alarm outputs	0000	
1203	64G2-TL5	Timer TL5 Setting	0	Sec
24A				
1301	24A-ALARM	Configure alarm outputs	1000	
1302	24A-PICKUP	Pickup (V/Hz)	1.06	Per unit
1303	24A-TL6	Timer TL6 Setting	9.9	Sec
24T				
1401	24-TRIP-ON	Configure trip outputs (on-line)	1000	
1402	24-TRIP-OFF	Configure trip outputs (off-line)	1000	
1403	24T-ALARM	Configure alarm outputs	0000	
1404	24T-CURVE#	Curve number (inv characteristics)	1	
1405	24T-INV PU	Pickup-V/Hz (inv characteristics)	1.11	Per unit
1406	24T-TIME FAC	Time factor	6	Sec
1407	24T-INST PU	Pikup-V/Hz(instantaneous)	1.18	Per unit
1408	24T-TL7	Timer TL7 Setting	2	Sec
1409	24T-RESET	Reset Time	600	Sec
59				
1501	59-TRIP	Configure trip outputs	1000	
1502	59-ALARM	Configure alarm outputs	0000	

DGP Settings

Setting#	Varname	Description	Settings	Units
1503	59-PICKUP	Inv. Function pickup Voltage(Pos. Seq)	132	Volts
1504	59-TIME FAC	Time factor	7	Sec
1505	59-CURVE#	Curve Number	INVERSE(1)	
1506	59-INST PU	Inst-Pickup Voltage/Positive Sequence	240	Volts
81U-1				
1601	UVCUTOFF	Under voltage cutoff level for function 81	85	%
1701	81U-1-TRIP	Configure trip outputs	0110	
1702	81U-1-ALARM	Configure alarm outputs	0000	
1703	81U-1-SETPNT	Set Point	57.00	Hz
1704	81U-1-TL8	Timer TL8 Setting	0.1	Sec
81U-2				
1801	81U-2-TRIP	Configure trip outputs	0000	
1802	81U-2-ALARM	Configure alarm outputs	0000	
1803	81U-2-SETPNT	Set Point	---	Hz
1804	81U-2-TL9	Timer TL9 Setting	---	Sec
81U-3				
1901	81U-3-TRIP	Configure trip outputs	0000	
1902	81U-3-ALARM	Configure alarm outputs	0000	
1903	81U-3-SETPNT	Set Point	---	Hz
1904	81U-3-TL10	Timer TL10 Setting	---	Sec
81U-4				
2001	81U-4-TRIP	Configure trip outputs	0000	
2002	81U-4-ALARM	Configure alarm outputs	0000	
2003	81U-4-SETPNT	Set Point	---	Hz
2004	81U-4-TL11	Timer TL11 Setting	---	Sec
81O-1				
2101	81O-1-TRIP	Configure trip outputs	0000	
2102	81O-1-ALARM	Configure alarm outputs	0001	
2103	81O-1-SETPNT	Set Point	CUSTOMER	Hz
2104	81O-1-TL15	Timer TL15 Setting	CUSTOMER	Sec
81O-2				
2201	81O-2-TRIP	Configure trip outputs	0000	
2202	81O-2-ALARM	Configure alarm outputs	0000	
2203	81O-2-SETPNT	Set Point	---	Hz
2204	81O-2-TL16	Timer TL16 Setting	---	Sec
81O-3				
2301	81O-3-TRIP	Configure trip outputs	0000	
2302	81O-3-ALARM	Configure alarm outputs	0000	
2303	81O-3-SETPNT	Set Point	---	Hz
2304	81O-3-TL17	Timer TL17 Setting	---	Sec
81O-4				
2401	81O-4-TRIP	Configure trip outputs	0000	
2402	81O-4-ALARM	Configure alarm outputs	0000	
2403	81O-4-SETPNT	Set Point	---	Hz
2404	81O-4-TL18	Timer TL18 Sett7ing	---	Sec
DIGITAL INPUTS				
2501	SELBKDI1	Sel blocking action by DI1	BLK9	
2502	DI3 TRIP	Configure trip outputs	0	
2503	DI3 ALARM	Configure alarm outputs	0000	

DGP Settings

Setting#	Varname	Description	Settings	Units
2504	DI3 TMR	Pickup Delay, DI3 Timer	-	Sec
2505	DI4 TRIP	Configure trip outputs	0000	
2506	DI4 ALARM	Configure alarm outputs	0000	
2507	DI4 TMR	Pickup Delay, DI4 Timer	0	Sec
2508	DI6 FUNC	Define DI6 function	EXTVTFF(0)	
VOLTAGE TRANSFORMER FUSE FAIL				
2601	VTFF	Enable/Disable VTFF	ENABLE(1)	
ACCIDENTAL ENERGIZATION				
2701	AE-TRIP	Configure trip outputs	0000	
2702	AE-ALARM	Configure alarm outputs	0000	
2703	AE-AE ARM	Arming logic, Accidental Energization	AND(0)	
GROUND OVERCURRENT				
2801	51GN-TRIP	Configure trip outputs	0000	
2802	51GN-ALARM	Configure alarm outputs	0000	
2803	51GN-PICKUP	Pickup Current	---	Amps
2804	51GN-TIME FAC	Time factor	---	Sec
UNDER VOLTAGE:27				
2901	27-TRIP	Configure trip outputs	0110	
2902	27-ALARM	Configure alarm outputs	0000	
2903	27-PICKUP	Pickup voltage (positive seq.)	108	Volts
2904	27-TIME FAC	Time Factor	1	Sec
2905	27-CURVE#	Curve number	DEFINITE(2)	
UNDER VOLTAGE 3rd HARMONIC:27TN				
3001	27TN-TRIP	Configure trip outputs	1000	
3002	27TN-ALARM	Configure alarm outputs	0000	
3003	27TN-PICKUP	Pickup voltage (3rd Har)	---	Volts
3004	27TNTL20	Timer TL20 setting	---	Sec
3005	27TN-FORWR-L	Lower limit of forward power window	---	Watts
3006	27TN-FORWR-U	Upper limit of forward power window	---	Watts

- Customer must provide the settings for functions 51V, 51GN and 81.
- For units that include 27TN in GE scope of supply, GE Energy cannot provide the setting for 27TN until the site provides data collected during load test (for various active loads on the machine for varying power factors). Machine will run without 27TN function initially.

RELAY & DEVICE NOMENCLATURE

(SEE GPP ELEMENTARY FOR ADDITIONAL DETAILS)

26Q-( )	TRANSFORMER OIL TEMPERATURE ALARM
27BS-1,2	SYNCH UNDERVOLTAGE RELAY (HGA11J)
33S1	STEAM TURBINE STOP VALVE LIMIT SWITCH
50RE	INSTANTANEOUS OVERCURRENT RELAY (MDPA730000BA)
52ET	EXCITATION TRANSFORMER SUPPLY BREAKER
63PR( )	TRANSFORMER OIL PRESSURE RELIEF
71Q-( )	TRANSFORMER LIQUID LEVEL GAGE
81RE	INADVERTANT ENERGIZATION FREQUENCY RELAY
86G	GENERATOR LOCKOUT RELAY (HEA61V 6NO, 8NC)
86G2	GENERATOR LOCKOUT RELAY (HEA61V 6NO, 8NC)
86PE	INADVERTANT ENERGIZATION LOR (HEA61V 6NO 8NC)
86T	CUSTOMER GSU LOCKOUT RELAY
96G( )	TRANSDUCER (G=WATTS/VARS

LPSC

MODEL LPSOB35U23HE1N

21	DISTANCE RLY
VTFF	VOLTAGE TRANSFORMER FUSE FAILURE

LEGEND

HMI	TURBINE CONTROL SYSTEM HUMAN MACHINE INTERFACE
LA	LIGHTNING ARRESTER
SR	SPARE
#	OPTIONAL ALTERNATIVE
$	OPTIONAL EXTRA
+	IF REQUIRED
*	TYPICAL
	GE / CUSTOMER TERMINATION POINT

EXCITER FUNCTIONS

30EX	GLOBAL ALARM OUTPUT RELAY
64FA/T	GENERATOR FIELD GROUND ALARM / TRIP
94EX	TRIP OUTPUT RELAY

REGULATOR A & B

AVR	AUTOMATIC VOLTAGE REGULATOR (auto)
FCR	FIELD CURRENT REGULATOR
PSS	POWER SYSTEM STABILIZER
RCC	REACTIVE CURRENT COMPENSATION
UEL	UNDER EXCITATION LIMIT
OEL	OVER EXCITATION LIMIT
V/Hz	VOLTS per HERTZ LIMIT
26EX	BRIDGE OVER TEMPERATURE ALARM / TRIP
27EX	AC/DC SOURCE UNDERVOLTAGE ALARM
60EX	VT (VTFF) FAILURE ALARM / TRANSFER / TRIP

PROTECTION MODULE

24EX	V/Hz ALARM/TRIP
40EX	LOSS OF EXCITER TRANSFER / TRIP
47EX	BRIDGE AC PHASE UNBALANCE ALARM / TRIP
59EX	OVERVOLTAGE ALARM / TRIP
60EX	VT (VTFF) FAILURE ALARM / TRANSFER / TRIP
76EX	OVER EXCITATION ALARM / TRIP

DGP DIGITAL GENERATOR PROTECTION

DGP54A4B4

24A/24T	VOLTS PER HERTZ ALARM/TRIP
27G	GENERATOR UNDERVOLTAGE
32-1	REVERSE POWER
40-1,40-2	LOSS OF EXCITATION
46A/46T	NEGATIVE SEQUENCE ALARM/TRIP
51V	SYSTEM PHASE FAULT BACKUP
59G	OVERVOLTAGE RLY
64G1	GENERATOR STATOR GROUND FAULT
74( )	DGP ALARM OUTPUT CONTACT
81U-1/81O-1	UNDERFREQUENCY/OVERFREQUENCY
87G	GENERATOR DIFFERENTIAL RLY (DGP)
94G( )	DGP TRIP OUTPUT CONTACT
VTFF	VOLTAGE TRANSFORMER FUSE FAILURE

EQUIPMENT LOCATION KEY

EX	EXCITER (EX2K)
ET	EXCITATION TRANSFORMER (PPT)
	GE EQUIPMENT MOUNTED SEPARATE FROM PACKAGE
	GENERATOR PROTECTION PANEL (GPP)
	GENERATOR COMPARTMENT
	GENERATOR BUSHING
	TURBINE CONTROL PANEL (TCP)
	CUSTOMER'S EQUIPMENT
VT	VT COMPARTMENT
NGD	NEUTRAL GROUND DEVICE
	STATIC EXCITATION COMPARTMENT

NOTES:

1a. GENERATOR DIGITAL MULTI-METER (GEN DMM) (NEXUS 1250) SELECTABLE DISPLAYS:
- VOLTS 3Ø PHASE-PHASE AND PHASE-NEUTRAL
- AMPS 3Ø
- FREQUENCY, MW, MVAR, PF, MVA, MVARHR, MWHR

1b. 4 TO 20mA ANALOG OUTPUTS FOR MW, MVAR, PF, FREQ AS WELL AS OTHER TURBINE PARAMETERS ARE AVAILABLE AS FIELD SELECTABLE OUTPUTS OUT OF THE TURBINE CONTROL PANEL; SEE MLI 4108.

2. GENERATOR PROTECTION REQUIRES (3) NORMALLY OPEN AND (3) NORMALLY CLOSED CONTACTS FOR 52G STATUS.

3. VT'S ARE NON-DRAWOUT.

4. BREAKER FAILURE PROTECTION IS RECOMMENDED AS PART OF THE CUSTOMER SYSTEM.

5. ALL LOCKOUT RELAY (86) FUSES ARE MONITORED BY ALARM TO TURBINE CONTROL PANEL. THE 125VDC GENERATOR PANEL POWER SUPPLY IS MONITORED BY ALARM IN THE TURBINE CONTROL PANEL.

6. THE CRITICAL CONTACT OF THE DGP WILL INITIATE A SIGNAL TO BEGIN NORMAL SHUTDOWN. HOWEVER, IF THERE IS A BACKUP GENERATOR PROTECTION (DGP/SR489/BECKWITH), NORMAL SHUTDOWN WILL OCCUR ONLY WHEN BOTH DGP AND BACKUP FAIL.

STEAM SL 270T605
ST DL 290T605
ML ITEM F049

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	CHG'D STATUS OF DRAWING TO "FOR APPROVAL"	01-08-17	AD/ALK
B	CHG'D STATUS OF DRAWING TO "APPROVED FOR CONSTRUCTION" SHEET 1: 1. UPDATED REVISION STATUS BLOCK 2. ADDED DESCRIPTION OF REVISION B SHEET 2: 1. CHG'D THE RATING OF THE EXCITATION TRANSFORMER 2. REPLACED THE EXCITATION PANELBOARD 3. ADDED GENERATOR DESIGN NUMBER IN GENERATOR RATING TABLE 4. CHG'D CT RATIO'S TO 14,000/5 5. ADDED TO CUSTOMER TO CT'S 16,17,18 6. CHG'D CUSTOMER BOUNDARY LINE TO INCLUDE VT COMPARTMENT	02-10-21	AD/ALK
C	SHEET 1: 1. UPDATED REVISION STATUS BLOCK 2. REVISED CUSTOMER DETAILS. 3. ADDED DESCRIPTION OF REVISION C. DRAWING UPDATED AS PER DCI0802408. SHEET 2: 1. REVISED GENERATOR LINE SIDE CT's. AND GENERATOR PHASE SEQUENCE.	08-07-07	SK24/RE5

C	C	REV	REV STATUS OF SHEETS
2	1	SH	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON:
2 PL DECIMALS ±
3 PL DECIMALS ±
ANGLES ±
FRACTIONS ±

PROJECT: EMPIRE GENERATING PROJECT
MADE FOR: LG CONSTRUCTORS, INC

APPROVED FOR CONSTRUCTION		
SIGNATURES		DATE
DRAWN	A L KENDALL	01-05-31
CHECKED	A DHAR	01-05-31
PMU ENG	MacLAUGHLIN	01-05-31
ISSUED	A L KENDALL	01-05-31
CIVIL	N/A	N/A
ELECTRICAL	A DHAR	01-05-31
MECHANICAL	N/A	N/A
CONTROLS	N/A	N/A

EMPIRE GENERATING PROJECT
13-ST-STG-001

GE POWER SYSTEMS — GENERAL ELECTRIC COMPANY, GENERAL ELECTRIC INTERNATIONAL INC, GLOBAL POWER PLANT SYSTEMS DEPARTMENT, Schenectady, NY - USA

ONE LINE DIAGRAM

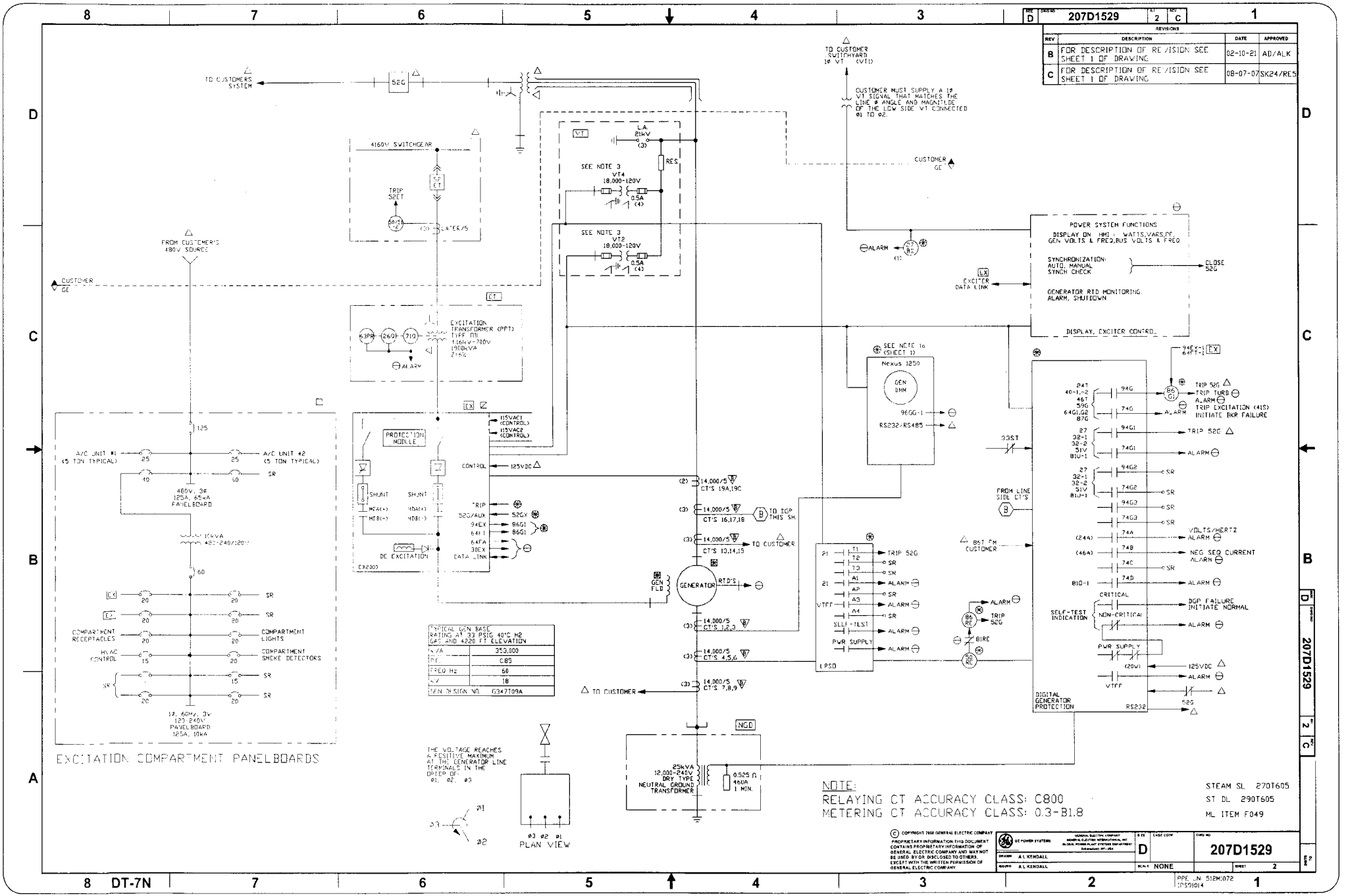
FIRST MADE FOR ML-512M1072 F049

SIZE D | CAGE CODE | DWG NO 207D1529 | REV C
SCALE NONE | SHEET 1 OF 1

THIRD ANGLE PROJECTION

PPE_LIN: 512M1072
IPS01014

207D1529


207D1529
REVISIONS
REV B: FOR DESCRIPTION OF REVISION SEE SHEET 1 OF DRAWING — 02-10-21 — AD/ALK
REV C: FOR DESCRIPTION OF REVISION SEE SHEET 1 OF DRAWING — 08-07-07 — SK24/RES
TO CUSTOMERS SYSTEM
52G
TO CUSTOMER SWITCHYARD 1Φ VT (VT1)
CUSTOMER MUST SUPPLY A 1Φ VT SIGNAL THAT MATCHES THE LINE Φ ANGLE AND MAGNITUDE OF THE LOW SIDE VT CONNECTED Φ1 TO Φ2.
4160V SWITCHGEAR
TRIP 52ET
50/51 GS
LA 21kV (3)
RES
SEE NOTE 3 VT4 18,000-120V 0.5A (4)
SEE NOTE 3 VT5 18,000-120V 0.5A (4)
CUSTOMER GE
ALARM
27 59 (1)
FROM CUSTOMERS 480V SOURCE
CUSTOMER GE
EXCITATION TRANSFORMER (PPT) TYPE DT 4.16kV-480V 1500kVA Z=5%
63PR 26Q 71Q
ALARM
POWER SYSTEM FUNCTIONS
DISPLAY ON HMI : WATTS,VARS,PF, GEN VOLTS & FREQ,BUS VOLTS & FREQ
SYNCHRONIZATION: AUTO, MANUAL SYNCH CHECK
CLOSE 52G
GENERATOR RTD MONITORING ALARM, SHUTDOWN
DISPLAY, EXCITER CONTROL
EXCITER DATA LINK
SEE NOTE 1a (SHEET 1)
Nexus 1250
GEN DMM
96GG-1
RS232/RS485
94EX-1 64FT-1
125
A/C UNIT #1 (5 TON TYPICAL)
A/C UNIT #2 (5 TON TYPICAL)
SR
460V, 3Φ 125A, 65kA PANELBOARD
10kVA 480-240/120V
COMPARTMENT RECEPTACLES
COMPARTMENT LIGHTS
HVAC CONTROL
COMPARTMENT SMOKE DETECTORS
12, 60Hz, 3W 120/240V PANELBOARD 125A, 10kA
EXCITATION COMPARTMENT PANELBOARDS
PROTECTION MODULE
115VAC1 (CONTROL)
115VAC2 (CONTROL)
CONTROL
125VDC
SHUNT
MZA(+)
MZB(-)
MDA(+)
MDB(-)
TRIP
52G/AUX
94EX
86G1
64FT
30EX
DATA LINK
DC EXCITATION
EX2000
14,000/5 CT'S 19A,19C
14,000/5 CT'S 16,17,18
TO DGP THIS SH.
14,000/5 CT'S 13,14,15
TO CUSTOMER
GEN FLD
GENERATOR
RTD'S
14,000/5 CT'S 1,2,3
14,000/5 CT'S 4,5,6
14,000/5 CT'S 7,8,9
TO CUSTOMER
TRIP 52G
SR
ALARM
SELF-TEST
PWR SUPPLY
LPSD
33ST
FROM LINE SIDE CT'S
B87 FM CUSTOMER
ALARM
TRIP 52G
BIRE
86 RE
50 RE
24T 40-1,-2 46T 59G 64G1,G2 87G
94G
TRIP 52G
TRIP TURB
ALARM
TRIP EXCITATION (41S)
INITIATE BKR FAILURE
74G
27 32-1 32-2 51V 81U-1
94G1
TRIP 52G
74G1
94G2
74G2
94G3
74G3
VOLTS/HERTZ ALARM
74A
NEG. SEQ. CURRENT ALARM
74B
74C
74D
81U-1
CRITICAL
NON-CRITICAL
SELF-TEST INDICATION
DGP FAILURE INITIATE NORMAL
PWR SUPPLY
125VDC
ALARM
VTFF
52G
RS232
DIGITAL GENERATOR PROTECTION
TYPICAL GEN. BASE RATING AT 33 PSIG 40°C H2 GAS AND 4220 FT ELEVATION
kVA 353,000
PF 0.85
FREQ Hz 60
kV 18
GEN DESIGN NO. G347T09A
NGD
25kVA 12,000-240V DRY TYPE NEUTRAL GROUND TRANSFORMER
0.525Ω 460A 1 MIN.
THE VOLTAGE REACHES A POSITIVE MAXIMUM AT THE GENERATOR LINE TERMINALS IN THE ORDER OF: Φ1, Φ2, Φ3
Φ1
Φ3
Φ2
Φ3 Φ2 Φ1
PLAN VIEW
NOTE:
RELAYING CT ACCURACY CLASS: C800
METERING CT ACCURACY CLASS: 0.3-B1.8
STEAM SL 270T605
ST DL 290T605
ML ITEM F049
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GE POWER SYSTEMS
DRAWN A.L.KENDALL
DESIGN A.L.KENDALL
SIZE D
CAGE CODE
DWG NO 207D1529
SCALE NONE
SHEET 2
PPE_LN: 512M072
IDS91014
DT-7N