Factory Settings

Project Name: Arecibo Observatory Switchgear
Serial # G100133700

Unit Order #: 7071681

Model #: PCIL2004R-772F

Setup Screen

Genset #1 kW Rating:	1000
Genset #2 kW Rating:	1000
Genset #3 kW Rating:	1000
Genset #4 kW Rating:	1000
Genset #5 kW Rating:	0
Genset #6 kW Rating:	0
Genset #7 kW Rating:	0
Genset #8 kW Rating:	0
Rated Genset L-L Voltage:	4160
Rated Genbus L-L Voltage:	4160
Genbus PT ratio:	35:1
Genbus CT ratio:	200:5
Genbus MB+ Address:	51
Genbus - 3 or 4 wire:	4
English (0) or Metric (1) units:	0
ATS's (1) or Breakers (0):	0

Setup Screen Page 3

Project Details

Project Name	Arecibo Observatory Switchgear	Distributor Name	Cummins Caribbean
Model Number	PCIL2004R-772F	Distributor Phone Number	(763) 574 5000
Order Number	7071681		
Gen Meters Max. KW	1250	System Meters Max. KW	4000
Gen Meters Max. Amps	150	System Meters Max. Amps	700
Gen Meters Max. Volts(L-L)	4300	System Meters Max. Volts(	4300
System Frequency	60		

PLC I/O Health Setup: Setup Page2

Check the below box nos:

I/O	3
I/O	4
I/O	20
I/O	
I/O	
I/O	
I/O	

PowerCommand SCREEN TEST

Project: Arecibo Observatory Switchgear
Serial #G100133700

Unit order #: 7071681
Model #: PCIL2004R-772F

MAIN MENU - OPERATIONAL TEST

Screen Operations (Transfer to Screen)	
Main Oneline	✓
System Control	✓
Load Control	✓
Genset Summary	✓
Metering	✓
Current Alarms	✓
Historical Alarms	✓
Real-Time Trending	✓
Genset Oneline	✓
Set-up	✓

Screen Functions (Operate Correctly)	
Security	✓

MAIN ONELINE DIAGRAM - OPERATIONAL TEST

Screen Operations (Transfer to Screen)	
Main Menu	✓
System Control	✓
Emergency Bus Metering (Select Bus Symbol)	✓
Genset Online	✓

Screen Functions (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
Gen ON, C.B. Open (Symbol)	✓	✓	✓	✓
Gen ON, C.B. Closed (Symbol)	✓	✓	✓	✓
Breaker Trip (Flag)	✓	✓	✓	✓
Genset #	✓	✓	✓	✓
Genset % kW	✓	✓	✓	✓

Screen Symbols (Display Correctly)	52-G1	52-G2	52-G3	52-G4
Breaker Open Hot	✓	✓	✓	✓
Breaker Open Cold	✓	✓	✓	✓
Breaker Closed Hot	✓	✓	✓	✓
Breaker Closed Cold	N/A	N/A	N/A	N/A
Manual	✓	✓	✓	✓
Fail CLR	✓	✓	✓	✓
Tripped	✓	✓	✓	✓
Bus Hot	✓	✓	✓	✓
Bus Cold	✓	✓	✓	✓

Screen Symbols (Display Correctly)	52-F1	52-F2
Breaker Open Hot	✓	✓
Breaker Open Cold	✓	✓
Breaker Closed Hot	✓	✓
Breaker Closed Cold	✓	✓
Fail	✓	✓
Ground Fault	N/A	N/A
Tripped	✓	✓
Manual	✓	N/A

Screen Buttons (Operate Correctly)	52-F1
Close Button	✓
Open Button	✓

Misc Screen Symbols (Display Correctly)	
System in Manual (flashing flag)	✓
Emergency Bus Hot	✓
Emergency Bus Cold	✓
System Runtime Display	✓
Gen Bar Graph	✓
Gen KW	✓

PowerCommand SCREEN TEST

Project: Arecibo Observatory Switchgear

Unit order #: 7071681
Model #: PCIL2004R-772F

GEN ONELINE DIAGRAM - OPERATIONAL TEST

Screen Operations (Transfer to Screen)	
Main Menu	✓
System Control	✓
Emergency Bus Metering (Select Bus Symbol)	✓
Main Online	✓
Help	NA

Screen Operations (Transfer toScreen)	
Gen 1 Summary Screen (Select Sym)	✓
Gen 2 Summary Screen (Select Sym)	✓
Gen 3 Summary Screen (Select Sym)	✓
Gen 4 Summary Screen (Select Sym)	✓

Screen Operations (Transfer to Screen)	
Gen 1 Control Screen (Select Sym)	✓
Gen 2 Control Screen (Select Sym)	✓
Gen 3 Control Screen (Select Sym)	✓
Gen 4 Control Screen (Select Sym)	✓

GENSET ONE LINE - OPERATIONAL TEST (CONTINUED)

Screen Functions (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
Gen OFF, C.B. Open (Symbol)	✓	✓	✓	✓
Gen ON. C.B. Open (Symbol)	✓	✓	✓	✓
Gen ON, C.B. Closed (Symbol)	✓	✓	✓	✓
Shutdown (Symbol))	✓	✓	✓	✓
Warning (Symbol)	✓	✓	✓	✓
Stopped (Symbol)	✓	✓	✓	✓
Running (Symbol)	✓	✓	✓	✓
Cooldown at Idle (Symbol) (PCC II)	✓	✓	✓	✓
Cooldown at Rated (Symbol) (PCC I)	N/A	N/A	N/A	N/A
Load Demand (Symbol)	✓	✓	✓	✓
Breaker Trip (Flag)	✓	✓	✓	✓
Switch in Auto (Flag)	✓	✓	✓	✓
Switch in Off (Flag)	✓	✓	✓	✓
Switch in Run (Flag)	✓	✓	✓	✓
Genset #	✓	✓	✓	✓
Genset % kW	✓	✓	✓	✓

Screen Symbols (Display Correctly)	52-G1	52-G2	52-G3	52-G4
Breaker Open Hot	✓	✓	✓	✓
Breaker Open Cold	✓	✓	✓	✓
Breaker Closed Hot	✓	✓	✓	✓
Breaker Closed Cold	N/A	N/A	N/A	N/A
Manual	✓	✓	✓	✓
Fail	✓	✓	✓	✓
Tripped	✓	✓	✓	✓
Bus Hot	✓	✓	✓	✓
Bus Cold	✓	✓	✓	✓

Screen Symbols (Display Correctly)	52-F1	52-F2
Breaker Open Hot	✓	✓
Breaker Open Cold	✓	✓
Breaker Closed Hot	✓	✓
Breaker Closed Cold	✓	✓
Fail	✓	✓
Ground Fault	N/A	N/A
Tripped	✓	✓
Manual	✓	N/A

Misc Screen Symbols (Display Correctly)	
System in Manual (flashing flag)	✓
Emergency Bus Hot	✓

Emergency Bus Cold	✓
System Runtime Display	✓

AC METERING - OPERATIONAL TEST

Screen Operations (Transfer to Screen)	
Main Menu	✓
Back	✓

Emergency Bus Metering (Display Correctly)	
L-L Volts Average	✓
Volts L1-L2	✓
Volts L2-L3	✓
Volts L3-L1	✓
L-N Volts Average	✓
Volts L1-N	✓
Volts L2-N	✓
Volts L3-N	✓
Amps Average	✓
L1 Amps	✓
L2 Amps	✓
L3 Amps	✓
Total kW	✓
L1 kW	✓
L2 kW	✓
L3 kW	✓
Total KVA	✓
L1 kVA	✓
L2 kVA	✓
L3 kVA	✓
Total KVAR	✓
L1 kVAR	✓
L2 kVAR	✓
L3 kVAR	✓
Frequency	✓
Power Factor	✓
kW Hours (Import)	✓
KVAR Hours (Import)	✓
kW Hours (Export)	✓
KVAR Hours (Export)	✓

GENSET CONTROL SCREEN - OPERATIONAL TEST

Screen Operations (Transfer to Screen)	
Main Menu	✓
Genset Oneline	✓
Genset Tabs (Transfer between Gens)	✓

Screen Functions (Operate Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
Control Mode - Automatic, Open Transition In this mode, verify that all control buttons are greyed out.	✓	✓	✓	✓
Control Mode - Manual In this mode, verify that "press to start" button is enabled.	✓	✓	✓	✓
Press to Start Pushbutton	✓	✓	✓	✓
Press to Stop Pushbutton	✓	✓	✓	✓
Press to Open Circuit Breaker P.B.	✓	✓	✓	✓
Press to Close Circuit Breaker P.B.	✓	✓	✓	✓
Press to Reset (Gen. Fault) P.B.	✓	✓	✓	✓

Status Indicators (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
STOPPED	✓	✓	✓	✓
TD Start	✓	✓	✓	✓
IDLE (PCC II)	N/A	N/A	N/A	N/A
RATED HZ, VOLTS	✓	✓	✓	✓
SYNCHRONIZING	✓	✓	✓	✓
LOAD SHARE / LOAD GOVERN	✓	✓	✓	✓
LOAD DEMAND	✓	✓	✓	✓

Screen Functions (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
Gen OFF, C.B. Open (Symbol)	✓	✓	✓	✓
Gen ON. C.B. Open (Symbol)	✓	✓	✓	✓
Gen ON, C.B. Closed (Symbol)	✓	✓	✓	✓
Shutdown (Symbol))	✓	✓	✓	✓
Warning (Symbol)	✓	✓	✓	✓
Stopped (Symbol)	✓	✓	✓	✓
Running (Symbol)	✓	✓	✓	✓
Cooldown at Idle (Symbol) (PCC II)	✓	✓	✓	✓
Cooldown at Rated (Symbol) (PCC I)	N/A	N/A	N/A	N/A
Load Demand (Symbol)	✓	✓	✓	✓
Breaker Trip (Flag)	✓	✓	✓	✓
Switch in Auto (Flag)	✓	✓	✓	✓
Switch in Off (Flag)	✓	✓	✓	✓
Switch in Run (Flag)	✓	✓	✓	✓
Genset #	✓	✓	✓	✓
Genset % kW	✓	✓	✓	✓

GENSET SUMMARY DISPLAY - OPERATIONAL TEST

Screen Operations (Transfer to Screen)	
Main Menu	✓
Genset Oneline	✓
Genset Meters	✓
Genset Tabs (Transfer between Gens)	✓

Engine Data (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
Engine RPM	✓	✓	✓	✓
Oil Pressure	✓	✓	✓	✓
Coolant Temperature	✓	✓	✓	✓
DC Volts	✓	✓	✓	✓
Fuel Rate (PCC II)	N/A	N/A	N/A	N/A
Total Fuel (PCC II)	✓	✓	✓	✓
Engine Hours	✓	✓	✓	✓
kW Hours	✓	✓	✓	✓
Number of Starts	✓	✓	✓	✓

AC Data (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
Voltage L1-L2	✓	✓	✓	✓
Voltage L2-L3	✓	✓	✓	✓
Voltage L3-L1	✓	✓	✓	✓
Voltage L1-N	✓	✓	✓	✓
Voltage L2-N	✓	✓	✓	✓
Voltage L3-N	✓	✓	✓	✓
Bus Voltage L1-L2	✓	✓	✓	✓
Bus Voltage L2-L3	✓	✓	✓	✓
Bus Voltage L3-L1	✓	✓	✓	✓
Bus Voltage L1-N	✓	✓	✓	✓
Bus Voltage L2-N	✓	✓	✓	✓
Bus Voltage L3-N	✓	✓	✓	✓
Frequency	✓	✓	✓	✓
Bus Frequency	✓	✓	✓	✓
Current L1	✓	✓	✓	✓
Current L2	✓	✓	✓	✓
Current L3	✓	✓	✓	✓
Power Factor	✓	✓	✓	✓
kW	✓	✓	✓	✓
kW%	✓	✓	✓	✓
KVA	✓	✓	✓	✓
KVAR	✓	✓	✓	✓

GENSET SUMMARY DISPLAY - OPERATIONAL TEST (CONTINUED)

Screen Functions (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
Gen OFF, C.B. Open (Symbol)	✓	✓	✓	✓
Gen ON. C.B. Open (Symbol)	✓	✓	✓	✓
Gen ON, C.B. Closed (Symbol)	✓	✓	✓	✓
Shutdown (Symbol))	✓	✓	✓	✓
Warning (Symbol)	✓	✓	✓	✓
Stopped (Symbol)	✓	✓	✓	✓
Running (Symbol)	✓	✓	✓	✓
Cooldown at Idle (Symbol) (PCC II)	✓	✓	✓	✓
Cooldown at Rated (Symbol) (PCC I)	N/A	N/A	N/A	N/A
Load Demand (Symbol)	✓	✓	✓	✓
Breaker Trip (Flag)	✓	✓	✓	✓
Switch in Auto (Flag)	✓	✓	✓	✓
Switch in Off (Flag)	✓	✓	✓	✓
Switch in Run (Flag)	✓	✓	✓	✓
Genset #	✓	✓	✓	✓
Genset % kW	✓	✓	✓	✓

Status Indicators (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
STOPPED	✓	✓	✓	✓
TD Start	✓	✓	✓	✓
IDLE (PCC II)	N/A	N/A	N/A	N/A
RATED HZ, VOLTS	✓	✓	✓	✓
SYNCHRONIZING	✓	✓	✓	✓
LOAD SHARE / LOAD GOVERN	✓	✓	✓	✓
LOAD DEMAND	✓	✓	✓	✓

GENSET SUMMARY DISPLAY - OPERATIONAL TEST (CONTINUED)

Bar Graphs (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
L1 Amps	✓	✓	✓	✓
L2 Amps	✓	✓	✓	✓
L3 Amps	✓	✓	✓	✓
%kW	✓	✓	✓	✓
PF	✓	✓	✓	✓
Hz	✓	✓	✓	✓
L1-L2 Volts	✓	✓	✓	✓
L2-L3 Volts	✓	✓	✓	✓
L3-L1 Volts	✓	✓	✓	✓
Bus Hz	✓	✓	✓	✓
Bus L1-L2 Volts	✓	✓	✓	✓
Bus L2-L3 Volts	✓	✓	✓	✓
Bus L3-L1 Volts	✓	✓	✓	✓

ANALOG METERING - OPERATIONAL TEST

Analog Meters (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
Kilowatts	✓	✓	✓	✓
Voltage L-L (Ave)	✓	✓	✓	✓
Current (Ave)	✓	✓	✓	✓
Frequency	✓	✓	✓	✓
Oil Pressure	✓	✓	✓	✓
Coolant Temperature	✓	✓	✓	✓
Engine Speed	✓	✓	✓	✓
Battery Voltage	✓	✓	✓	✓

SYSTEM CONTROL SCREEN-OPERATIONAL TEST

Screen Operations (Transfer to Screen)	
Main Menu	✓
Help	✓
Genset Oneline	✓
Main Oneline	✓

System Test (Functions Enabled)	
Off	✓
Test With Load	✓
Test W/O Load	✓
Remote Test W/Load(Indicator	✓

Remote Test Enable (Functions Enabled)	
Off	✓
On	✓

Load Transfer Control (Able to Modify Settings)	Add	She
Load #1	✓	✓
Load #2	✓	✓
Load #3	✓	✓
Load #4	✓	✓
Load #5	✓	✓
Load #6	✓	✓
Load #7	✓	✓
Load #8	✓	✓

TRANSMITTERS

Operation with ~~Transmeters~~ (Functions Enabled)	
On	✓
Off	✓
Gen 1 select	✓
Gen 2 select	✓
Gen 3 select	✓
Gen 4 select	✓

Load Demand Mode (Functions Enabled)	
On	✓
Off	✓

Load Demand (Settings)		
Initial Time Delay	15	Min.
Shutdown Time Delay	15	Min.
KW Pickup Level	80	%
KW Dropout Level	60	%

Load Demand Shutdown Sequence	
Lead	1
B	2
C	3
D	4
E	N/A
F	
G	
H	

LOAD CONTROL SCREEN - OPERATIONAL TEST

Screen Operations (Transfer to Screen)	
Main Menu	✓
Help	✓
Main Oneline	✓

AC Data (Display Correctly)	
System Load, Amps	✓
System Load, kW	✓
System Capacity, Amps	✓
System Capacity, kW	✓
Spare Capacity, Amps	✓
Spare Capacity, kW	✓
Percent Online Amps Bargraph	✓
Percent Online Power Bargraph	✓

Load Add Levels (Display and Operate Correctly)	Off/On Status	Manual Add
Level 1	✓	✓
Level 2	✓	✓
Level 3	✓	✓
Level 4	✓	✓
Level 5	✓	✓
Level 6	✓	✓
Level 7	✓	✓
Level 8	✓	✓

Load Shed Levels (Display and Operate Correctly)	Norm/Shed Status	Manual Shed/Restore
Level 1	N/A	N/A
Level 2	✓	✓
Level 3	✓	✓
Level 4	✓	✓
Level 5	✓	✓
Level 6	✓	✓
Level 7	✓	✓

SETUP SCREEN - OPERATIONAL TEST				
Page No.1				
Screen Operations				
Transfer to Screen				
Main Menu	✓			
Page No.2	✓			
Page No.3	✓			
Diagnostics	✓			
Page No.1				
Genset Constants	Gen 1	Gen 2	Gen 3	Gen 4
(Display Correctly)				
Kilowatts	✓	✓	✓	✓
Rated Genset L-L Voltage	✓			
Rated Genbus L-L Voltage	✓			
ATS or Breaker	✓			
English or Metric Units	✓			
Metering Constants	Meter 1			
(Display Correctly)				
PT Ratio	✓			
CT Ratio	✓			
Total Amps	✓			
MB+ Address	✓			
3 or 4 Wire	✓			

Page No.2	
Screen Operations	
Transfer to Screen	
Main Menu	✓
Page No.1	✓
Page No.3	✓
Diagnostics	✓
Page No.2	
Display Correctly	
PLC I/O Health Setup	✓
Page No.3	
Screen Operations	
Transfer to Screen	
Main Menu	✓
Page No.1	✓
Page No.2	✓
Diagnostics	✓
Page No.3	
Display Correctly	
Project Details	
Project Name	✓
Model Number	✓
Order Number	✓
Distributor Name	✓
Distributor Phone Number	✓
Gen Meters Max. KW	✓
Gen Meters Max. Amps	✓
Gen Meters Max. Volts(L-L)	✓
System Meters Max. KW	✓
System Meters Max. Amps	✓
System Meters Max. Volts(L-L)	✓
System Frequency	✓

Diagnostics														
Screen Operations														
Transfer to Screen														
Main Menu	✓													
Page No.1	✓													
Page No.2	✓													
Page No.3	✓													
Prev	✓													
Next	✓													
Diagnostics														
Display Correctly														
PLC Input and Output State	✓													

TREND CHART SCREEN OPERTIONAL TEST

Screen Operations	
Main Menu	✓

System Pens (Display Correctly)	
kilowatts (Emergency Bus)	✓
Frequency (Emergency Bus)	✓
Amps (Emergency Bus)	✓
Volts L-L (Emergency Bus)	✓

CURRENT ALARMS SCREEN - OPERATIONAL TEST

Screen Operations	
Main Menu	✓
Back	✓

System Alarms (Display Correctly)	
Date	✓
Time	✓
Alarm Description	✓
Acknowledge Time/Date	✓

System Alarm Buttons (Operate Correctly)	
Alarm Ack/Horn Silence	✓
System Alarm Reset	✓

Generator Alarms (Display Correctly)	Gen 1	Gen 2	Gen 3	Gen 4
Check Genset	✓	✓	✓	✓
Emergency Stop	✓	✓	✓	✓
Fail to Close	✓	✓	✓	✓
Fail to Start	✓	✓	✓	✓
Pre High Engine Temp	✓	✓	✓	✓
High Engine Temp	✓	✓	✓	✓
Low Coolant Level	N/A	N/A	N/A	N/A
Low AC Voltage	✓	✓	✓	✓
Pre Low Oil Pressure	✓	✓	✓	✓
Low Oil Pressure	✓	✓	✓	✓
Overcurrent	✓	✓	✓	✓
Overload	✓	✓	✓	✓
Overspeed	✓	✓	✓	✓
Charger AC Failure	N/A	N/A	N/A	N/A
Fail to Sync	N/A	N/A	N/A	N/A
Ground Fault	N/A	N/A	N/A	N/A
High Battery Voltage	N/A	N/A	N/A	N/A
High AC Voltage	✓	✓	N/A	✓
Low Battery Voltage	N/A	N/A	N/A	N/A
Low Coolant Temp	✓	✓	✓	✓
Low Fuel Level	N/A	N/A	N/A	N/A
Not in Auto	✓	✓	✓	✓
Reverse kVAR	N/A	N/A	N/A	N/A
Reverse Power	N/A	N/A	N/A	N/A
Short Circuit	N/A	N/A	N/A	N/A
Under Frequency	N/A	N/A	N/A	N/A

System Alarms (Display Correctly)	
PU% must exceed DO% by 20	✓
Bus Overload	✓
Illegal Load Demand Shutdown Seq.	✓
PLC Low Battery	✓
Genbus Xducer Comm Failure	✓
Check Station Battery	✓
PLC to Touchscreen Comm Failure	✓
Low Fuel Main Tank	✓
Min # of Gens Not Online	N/A
Touchscreen Manual Mode Active	✓
Load Shed Level #1 is on	N/A
Load Shed Level #2 is on	✓
Load Shed Level #3 is on	✓
Load Shed Level #4 is on	✓
Load Shed Level #5 is on	✓
Load Shed Level #6 is on	✓
Load Shed Level #7 is on	✓
Load Shed Level #8 is on	✓
52-F1 CB Ground Fault	N/A
52-F1 CB Trip (Bell Alarm)	✓
52-F1 CB Protection Relay Fail	✓
52-F2 CB Ground Fault	N/A
52-F2 CB Trip (Bell Alarm)	✓
52-F2 CB Protection Relay Fail	✓
52-F2 CB Fail to Close	✓
52-F3 CB Ground Fault	N/A
52-F3 CB Trip (Bell Alarm)	
52-F3 CB Protection Relay Fail	
52-F4 CB Ground Fault	
52-F4 CB Trip (Bell Alarm)	
52-F4 CB Protection Relay Fail	
52-F5 CB Ground Fault	
52-F5 CB Trip (Bell Alarm)	
52-F5 CB Protection Relay Fail	
52-F6 CB Ground Fault	
52-F6 CB Trip (Bell Alarm)	
52-F6 CB Protection Relay Fail	
52-F7 CB Ground Fault	
52-F7 CB Trip (Bell Alarm)	
52-F7 CB Protection Relay Fail	
52-F8 CB Ground Fault	
52-F8 CB Trip (Bell Alarm)	
52-F8 CB Protection Relay Fail	
52-G1 CB Ground Fault	N/A
52-G1 CB Trip (Bell Alarm)	✓
52-G1 CB Protection Relay Fail	✓
52-G2 CB Ground Fault	N/A
52-G2 CB Trip (Bell Alarm)	✓
52-G2 CB Protection Relay Fail	✓
52-G3 CB Ground Fault	N/A
52-G3 CB Trip (Bell Alarm)	✓
52-G3 CB Protection Relay Fail	✓
52-G4 CB Ground Fault	N/A
52-G4 CB Trip (Bell Alarm)	✓
52-G4 CB Protection Relay Fail	✓

HISTORICAL ALARMS SCREEN - OPERATIONAL TEST

Screen Operations	
Main Menu	✓
Help	N/A

System Alarms (Display Correctly)	
Date	✓
Time	✓
Alarm Description	✓
Acknowledge Time/Date	✓

System Alarm Buttons (Operate Correctly)	
Delete History	✓
Page Up	✓
Page Down	✓

Tester: Gary Ulchak Date: 8-20-2010

Engineer:_____ Date:_____

Functional Test

Project: Arecibo Observatory

Unit order #: 7071681
Model #: PCIL2004R-77F

Operating Sequences

Initial Conditions:
Generator Control switches are in the 'AUTO' position.
Master Control is in the 'AUTO OPEN TRANSITION' mode.
The electrically operated feeder breakers are open.
The facility loads are supplied from the normal source through transfer switches.
Set up the Load Transfer Control portion of the System Control screen as follows:
Feeder breakers 52-F1 and F2 are not controlled by the load add/shed scheme
Feeder breakers 52-F1 remains normally open
Feeder breakers 52-F2 remains normally open

Load Name	Add Level	Shed Level
Load No. 1	1	0
Load No. 2	2	7
Load No. 3	3	6
Load No. 4	4	5
Load No. 5	5	4
Load No. 6	6	3
Load No. 7	7	2
Load No. 8	8	1

System Test without Load	Static	Dynamic	Field
Select 'Test W/O Load' from the System Control Screen	✓		
All Gensets start and ramp up	✓		
First genset ready to load closes to emergency bus	✓		
Second genset ready to load closes to emergency bus	✓		
Third genset ready to load closes to emergency bus	✓		
Fourth genset ready to load closes to emergency bus	✓		
Select 'Off' from the System Test area of the System Control Screen	✓		
All paralleling, 52-G'N', breakers open	✓		
Gensets run for cooldown period and shutdown	✓		

System Test with Load	Static	Dynamic	Field
Select 'Test with Load' from the System Control Screen	✓		
All Gensets start and ramp up	✓		
First genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 1 energizes for 2 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Second genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 2 energizes for 2 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Third genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 3 energizes for 2 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Final genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 4 energizes for 2 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
52-F1 closes	✓		
Load add relay for Load No. 5 energizes for 2 seconds 5 seconds later	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load add relay for Load No. 6 energizes for 2 seconds 10 seconds later	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load add relay for Load No. 7 energizes for 2 seconds 15 seconds later	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load add relay for Load No. 8 energizes for 2 seconds 20 seconds later	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Select 'Off' from the System Test area of the System Control Screen	✓		
All paralleling, 52-G'N', breakers open	✓		
Gensets run for cooldown period and shutdown	✓		

Normal Source Failure	Static	Dynamic	Field
Simulate a normal source failure condition by placing a jumper across T9C1 19 to 20	✓		
All Gensets start and ramp up	✓		
First genset ready to load closes to emergency bus	✓		
52-F1 closes	✓		
Load add relay for Load No. 1 energizes for 2 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Second genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 2 energizes for 2 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Third genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 3 energizes for 2 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Final genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 4 energizes for 2 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load add relay for Load No. 5 energizes for 2 seconds 5 seconds later	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load add relay for Load No. 6 energizes for 2 seconds 10 seconds later	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load add relay for Load No. 7 energizes for 2 seconds 15 seconds later	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load add relay for Load No. 8 energizes for 2 seconds 20 seconds later	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Remove the jumper across TB9-C1 ~~15 to 16~~ 19 - 20	✓		
All paralleling, 52-G'N', breakers open	✓		

52-F1 opens			
Gensets run for cooldown period and shutdown	✓		

Load Control	Static	Dynamic	Field
Select 'Test with Load' from the System Control Screen	✓		
Wait for gensets to close to the emergency bus and all loads to add	✓		
Simulate an overload condition by placing a jumper between TB11-G1 18 and ground potential, 2D	✓		
52-F1 opens	✓		
Load Shed relay for Load No. 8 energizes after 1 second	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load Shed relay for Load No. 7 energizes after 2 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load Shed relay for Load No. 6 energizes after 3 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load Shed relay for Load No. 5 energizes after 4 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load Shed relay for Load No. 4 energizes after 5 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load Shed relay for Load No. 3 energizes after 6 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load Shed relay for Load No. 2 energizes after 7 seconds	✓		
Visually verify that the correct Load Add (hardware)relays energized	✓		
Load Shed relay for Load No. 1 never energizes	✓		
Remove the jumper between TB11-G1 18 and ground potential, 2D	✓		
Reset the bus overload condition on the Current Alarms screen	✓		
52-F1 closes	✓		
Verify that no loads are automatically restored	✓		
Using the load control screen maually add and shed load levels and verify that the relays assigned to those levels	✓		

Vary the load add shed levels on the System Control screen and repeat the test.			

For the following test the load bank must be connected to the system to simulate varying facility load.
Set the Load Demand initial time delay to 1 minute.
Set up the Load Demand Shutdown Sequence portion of the System Control screen as follows:

Lead	1
B	2
C	3
D	4
E	
F	

Load Demand	Static	Dynamic	Field
Select Load Demand 'On' from the System Control Screen	✓		
Select 'Test with Load' from the System Control Screen	✓		
Wait for gensets to close to the emergency bus and all loads to add	✓		
52-F1 closes	✓		
Set the load bank to zero facility load	✓		
Genset 4 goes into load demand shutdown 1 minute later	✓		
Genset 3 goes into load demand shutdown 1 minute later	✓		
Genset 2 goes into load demand shutdown 1 minute later	✓		
Genset 1 never shuts down	✓		
Using the load bank increase the facility load to 85% of genset 1 800 Kw	✓		
Genset 2 restarts and closes to the bus	✓		
Using the load bank increase the facility load to 85% of genset 1 and 2 1600 Kw	✓		
Genset 3 restarts and closes to the bus	✓		
Using the load bank increase the facility load to 85% of genset 1, 2, and 3 2400 Kw	✓		
Genset 4 restarts and closes to the bus	✓		
Using the load bank decrease the facility load to 55% of genset 1, 2, and 3 1800 Kw	✓		
Genset 4 goes into load demand shutdown after 1 minute	✓		
Using the load bank decrease the facility load to 55% of genset 1, and 2 1200 Kw	✓		
Genset 3 goes into load demand shutdown after 1 minute	✓		

Using the load bank decrease the facility load to 55% of genset 1 600 KW	✓		
Genset 2 goes into load demand shutdown after 1 minute	✓		
Select Load Demand 'Off' from the System Control Screen	✓		
Change the Load Demand Shutdown Sequence and repeat the test	✓		
Manually shutdown the lead unit	✓		
Verify that all units automatically start and close to the bus	✓		
Verify that B unit now becomes the lead unit	✓		
Return the lead unit to Auto	✓		
Place the C unit in off and repeat the test confirming that load demand ignores unit C and operates normally	✓		

Customer Inputs	Static	Dynamic	Field
Select Remote Test Enable 'On' from the System Control Screen	✓		
Place a jumper across TB9-C1 09 and 10 to simulate a remote system test	✓		
All Gensets start and ramp up	✓		
First genset ready to load closes to emergency bus	✓		
52-F1 closes	✓		
Load add relay for Load No. 1 energizes for 2 seconds	✓		
Second genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 2 energizes for 2 seconds	✓		
Third genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 3 energizes for 2 seconds	✓		
Final genset ready to load closes to emergency bus	✓		
Load add relay for Load No. 4 energizes for 2 seconds	✓		
Load add relay for Load No. 5 energizes for 2 seconds 5 seconds later	✓		
Load add relay for Load No. 6 energizes for 2 seconds 10 seconds later	✓		
Load add relay for Load No. 7 energizes for 2 seconds 15 seconds later	✓		
Load add relay for Load No. 8 energizes for 2 seconds 20 seconds later	✓		
Remove the jumper on TB9-C1 09 and 10	✓		
All paralleling, 52-G'N', breakers open	✓		
Gensets run for cooldown period and shutdown	✓		
52-F1 opens	✓		

Select Remote Test Enable 'Off' from the System Control Screen	✓		
Place a jumper across TB9-C1 09 and 10 to simulate a remote system test	✓		
Confirm that the system will not go into remote test	✓		

Operation with Transmitters	Static	Dynamic	Field
Select 'Operation with Transmitters' from the System Control Screen	✓		
The selected gensets start and close to the emergency bus	✓		
52-F2 closes	✓		
Remove the 'Operation with Transmitters' from the System Control Screen	✓		
52-F2 and all paralleling gen breakers open	✓		
Gensets run for cooldown period and shutdown	✓		

Operation with Transmitters - NSF	Static	Dynamic	Field
Enable Load Demand operation from the system control screen	✓		
Select 'Operation with Transmitters' from the System Control Screen	✓		
The selected gensets start and close to the emergency bus	✓		
52-F2 closes	✓		
Simulate a normal source failure condition by placing a jumper across T9C1 19 to 20	✓		
Fourth Genset automatically start, parallel and close to the emergency bus	✓		
52-F1 closes	✓		
Reduce the load to zero	✓		
Verify the fourth genset shuts down on load demand	✓		
Verify other generators keep running and do not shut down on load demand	✓		
Remove 'Operation with Transmitters' from the System Control Screen	✓		
52-F2 opens	✓		
Verify other generators now shut down on load demand per the selected sequence	✓		

Remove the jumper across T9C1 19 to 20	✓		
All generator paralleling breakers open	✓		
Gensets run for cooldown period and shutdown	✓		

Operation with Transmitters - NSF, Bus over load	Static	Dynamic	Field
Enable Load Demand operation from the system control screen	✓		
Select 'Operation with Transmitters' from the System Control Screen	✓		
The selected gensets start and close to the emergency bus	✓		
52-F2 closes	✓		
Simulate a normal source failure condition by placing a jumper across T9C1 19 to 20	✓		
Fourth Genset automatically starts, parallels and closes to the emergency bus	✓		
52-F1 closes	✓		
Reduce the load to zero	✓		
Verify the fourth genset shuts down on load demand	✓		
Simulate a bus over load	✓		
52-F1 opens	✓		
Fourth Genset automatically starts, parallels and closes to the emergency bus	✓		
Remove bus over load simulation	✓		
Acknowledge and reset bus overload on the HMI	✓		
52-F1 closes	✓		
Remove the jumper across T9C1 19 to 20	✓		
Remove 'Operation with Transmitters' selection	✓		
All the paralleling breakers open	✓		
Gensets run for cooldown period and shutdown	✓		

Engineer: [signature] Date: 08/26/2010

Tester: [signature] Date: 8-26-2010

Field Service Engineer: _____ Date: _____

Customer: _____ Date: _____