

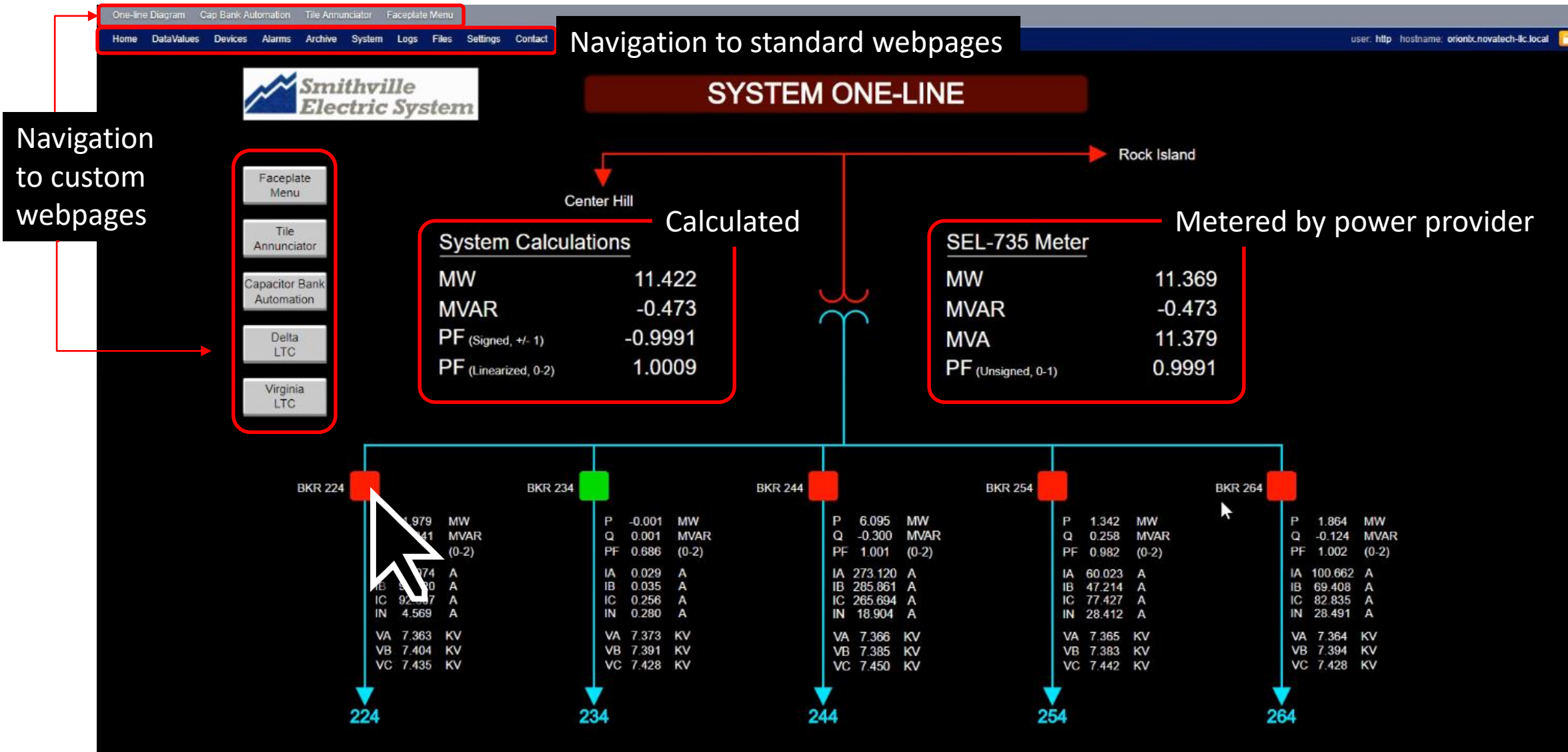


VAR Control at Smithville, TN

System Features

- Automatically switches capacitor banks IN and OUT to maintain power factor very close to unity
- Maintains ability to manually control all cap banks
- Sums power factor on each feeder and compares with metered value reported to power provider
- Provides web-based HMI for monitoring and control of breakers and IEDs in substation
- Includes features to reduce wear and maintenance:
 - Automation never switches the same bank twice in a row
 - User can set limits to prevent “hunting”
 - Algorithm also includes “settling delays” to reduce hunting
- Includes security features
 - Secure protocols: HTTPS, SSH, SFTP
 - Controls only permitted by authorized operator
 - “Syslog” records user access
- All monitoring, control, visualization and security provided by one box: the OrionLX Substation Automation Platform

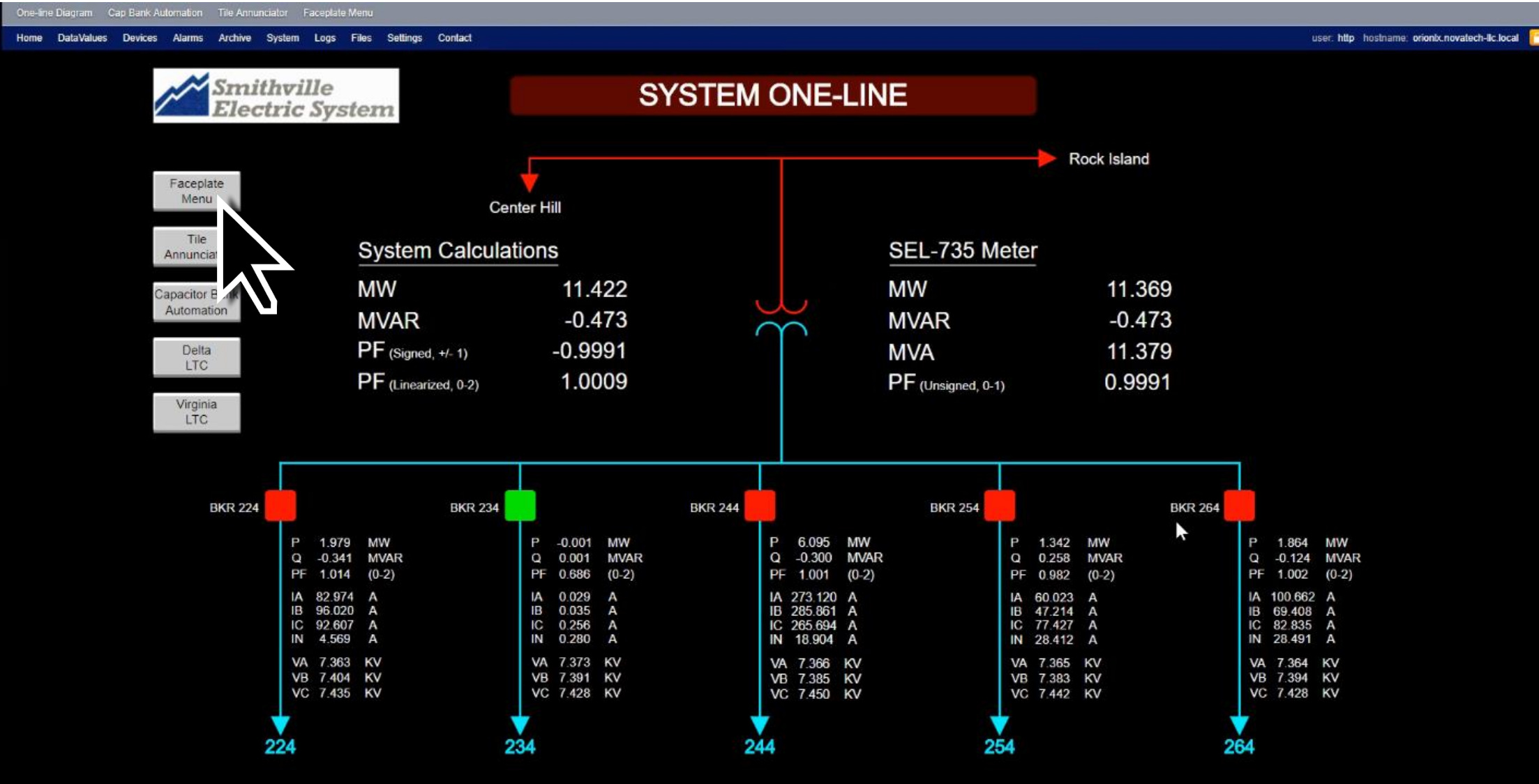
System One-Line Diagram



IED Faceplate

[illegible]

System One-Line Diagram




Faceplate Menu

One-line DiagramCap Bank AutomationTile AnnunciatorFaceplate Menu

HomeValuesDevicesAlarmsArchiveSystemLogsFilesSettingsContact

user: http hostname: orionlx.novatech-llc



FACEPLATE MENU

Five feeders

Breakers

Cap Banks

Load Tap Changers

BKR 224 - SEL 351S

CATHY'S
HIGH SCHOOL2 banks

BKR 234 - SEL 351S

FOUTCH
TSC
NURSERY3 banks

BKR 244 - SEL 351S

O'REILLYS
GRAVEYARD
FM
STEWARTS4 banks

BKR 254 - SEL 351S

ANTHONY AVE A1 bank

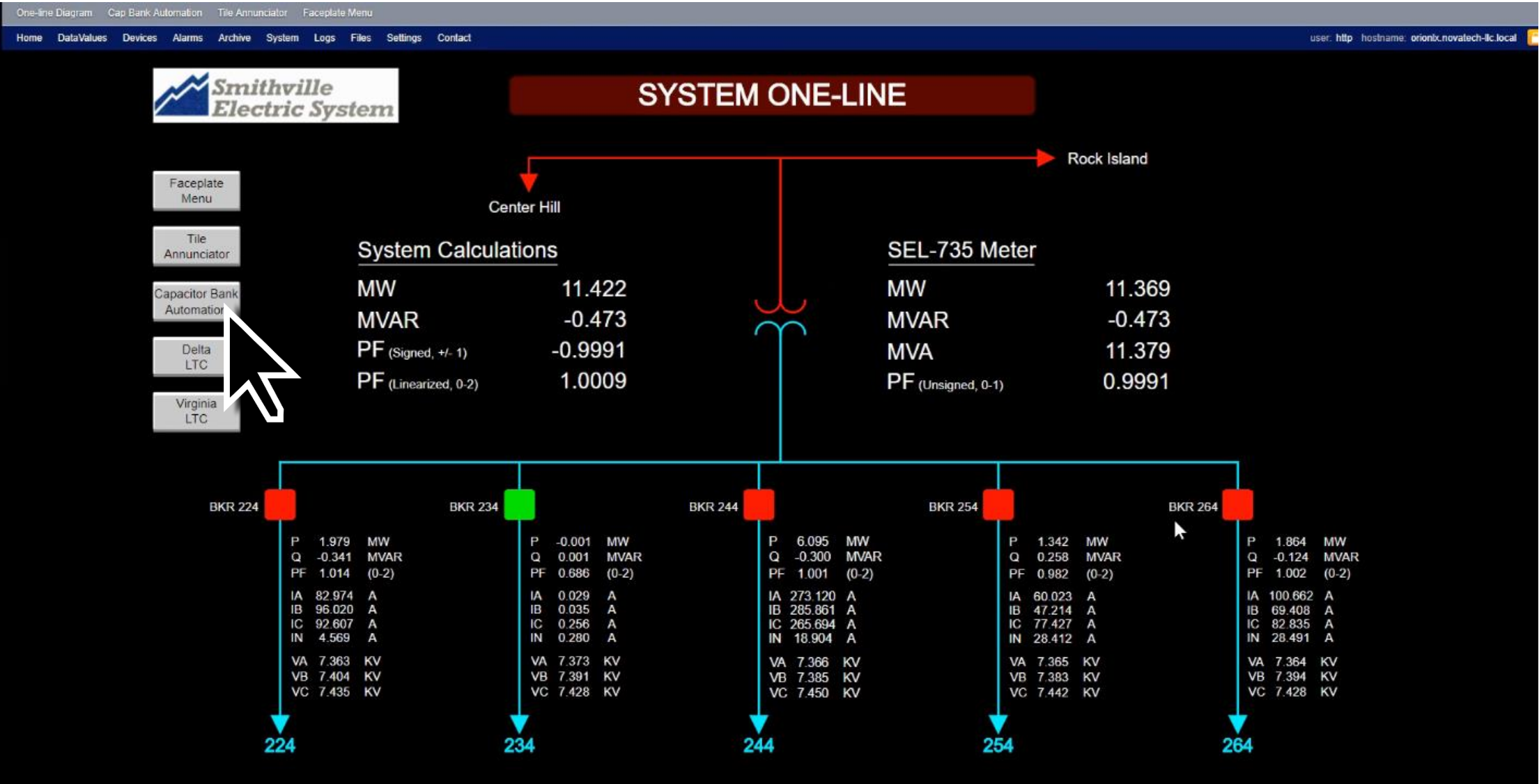
BKR 264 - SEL 351S

DCB1 bank

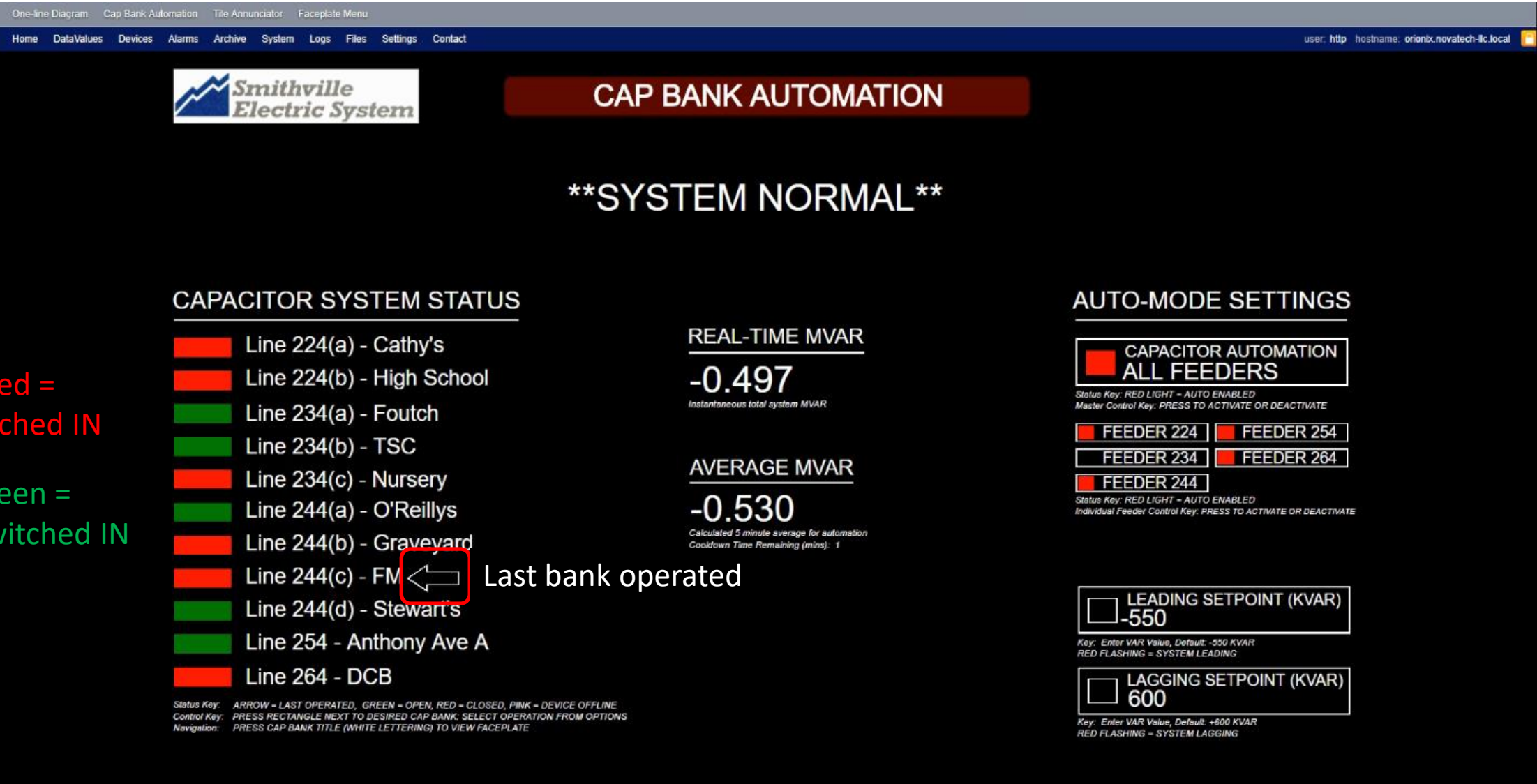
DELTA

VIRGINIA

System One-Line Diagram



Cap Bank Automation




Cap Bank Automation

One-line DiagramCap Bank AutomationTie AnnunciatorFaceplate Menu

HomeDataValuesDevicesAlarmsArchiveSystemLogsFilesSettingsContact

user: httphostname: orionlx.novatech-llc.local



CAP BANK AUTOMATION

SYSTEM NORMAL

CAPACITOR SYSTEM STATUS

Line 224(a) - Cathy's

Line 224(b) - High School

Line 234(a) - Foutch

Line 234(b) - TSC

Line 234(c) - Nursery

Line 244(a) - O'Reillys

Line 244(b) - Graveyard

Line 244(c) - FM

Line 244(d) - Stewart's

Line 254 - Anthony Ave A

Line 264 - DCB

Status Key: ARROW - LAST OPERATED, GREEN - OPEN, RED - CLOSED, PINK - DEVICE OFFLINE

Control Key: PRESS RECTANGLE NEXT TO DESIRED CAP BANK. SELECT OPERATION FROM OPTIONS

Navigation: PRESS CAP BANK TITLE (WHITE LETTERING) TO VIEW FACEPLATE

REAL-TIME MVAR

-0.497

Instantaneous total system MVAR

AVERAGE MVAR

-0.530

Calculated 5 minute average for automation

Cooldown Time Remaining (mins): 1

AUTO-MODE SETTINGS

CAPACITOR AUTOMATION

ALL FEEDERS

Status Key: RED LIGHT - AUTO ENABLED

Master Control Key: PRESS TO ACTIVATE OR DEACTIVATE

FEEDER 224

FEEDER 254

FEEDER 234

FEEDER 264

FEEDER 244

Status Key: RED LIGHT - AUTO ENABLED

Master Control Key: PRESS TO ACTIVATE OR DEACTIVATE

LEADING SETPOINT (KVAR)

-550

Key: Enter VAR Value, Default: -550 KVAR

RED FLASHING - SYSTEM LEADING

LAGGING SETPOINT (KVAR)

600

Key: Enter VAR Value, Default: +600 KVAR

RED FLASHING - SYSTEM LAGGING

Feeder 244 is highlighted with a red box and a mouse cursor pointing to it.


Feeder 244 is highlighted with a red box and a mouse cursor pointing to it.

Cap Bank Automation

One-line DiagramCap Bank AutomationTie AnnunciatorFaceplate Menu

HomeDataValuesDevicesAlarmsArchiveSystemLogsFilesSettingsContact

user: http hostname: orionlx.novatech-llc.local



CAP BANK AUTOMATION

****SYSTEM NORMAL****

CAPACITOR SYSTEM STATUS

Line 224(a) - Cathy's

Line 224(b) - High School

Line 234(a) - Foutch

Line 234(b) - TSC

Line 234(c) - Nursery

Line 244(a) - O'Reillys

Line 244(b) - Graveyard

Line 244(c) - FM

Line 244(d) - Stewart's

Line 254 - Anthony Ave A

Line 264 - DCB

Status Key: ARROW - LAST OPERATED, GREEN - OPEN, RED - CLOSED, PINK - DEVICE OFFLINE

Control Key: PRESS RECTANGLE NEXT TO DESIRED CAP BANK. SELECT OPERATION FROM OPTIONS

Navigation: PRESS CAP BANK TITLE (WHITE LETTERING) TO VIEW FACEPLATE

CTRL_CAP234_Control @Logic

CAP Bank Feeder 234

OFF

ON

Cancel

CAPACITOR AUTOMATION

ALL FEEDERS

Status Key: RED LIGHT - AUTO ENABLED

Master Control Key: PRESS TO ACTIVATE OR DEACTIVATE

FEEDER 224

FEEDER 254

FEEDER 234

FEEDER 264

FEEDER 244

Status Key: RED LIGHT - AUTO ENABLED

Individual Feeder Control Key: PRESS TO ACTIVATE OR DEACTIVATE

LEADING SETPOINT (KVAR)

-550

Key: Enter VAR Value, Default: -550 KVAR

RED FLASHING - SYSTEM LEADING


LAGGING SETPOINT (KVAR)

600

Key: Enter VAR Value, Default: +600 KVAR

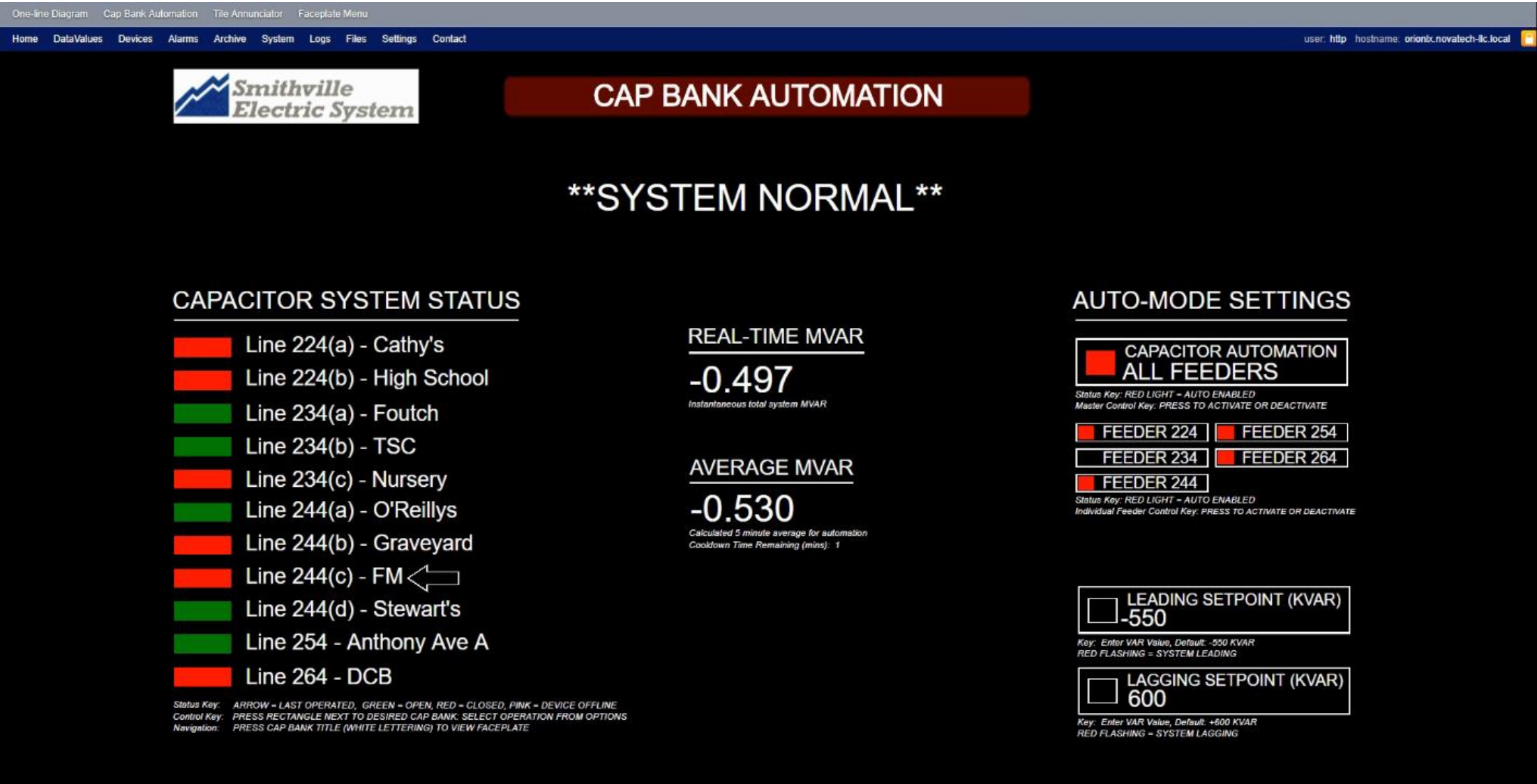
RED FLASHING - SYSTEM LAGGING

2018 Annual NovaTech Users' Group Meeting and Technical Symposium
Little Rock, AR
Wednesday, January 10, 2018

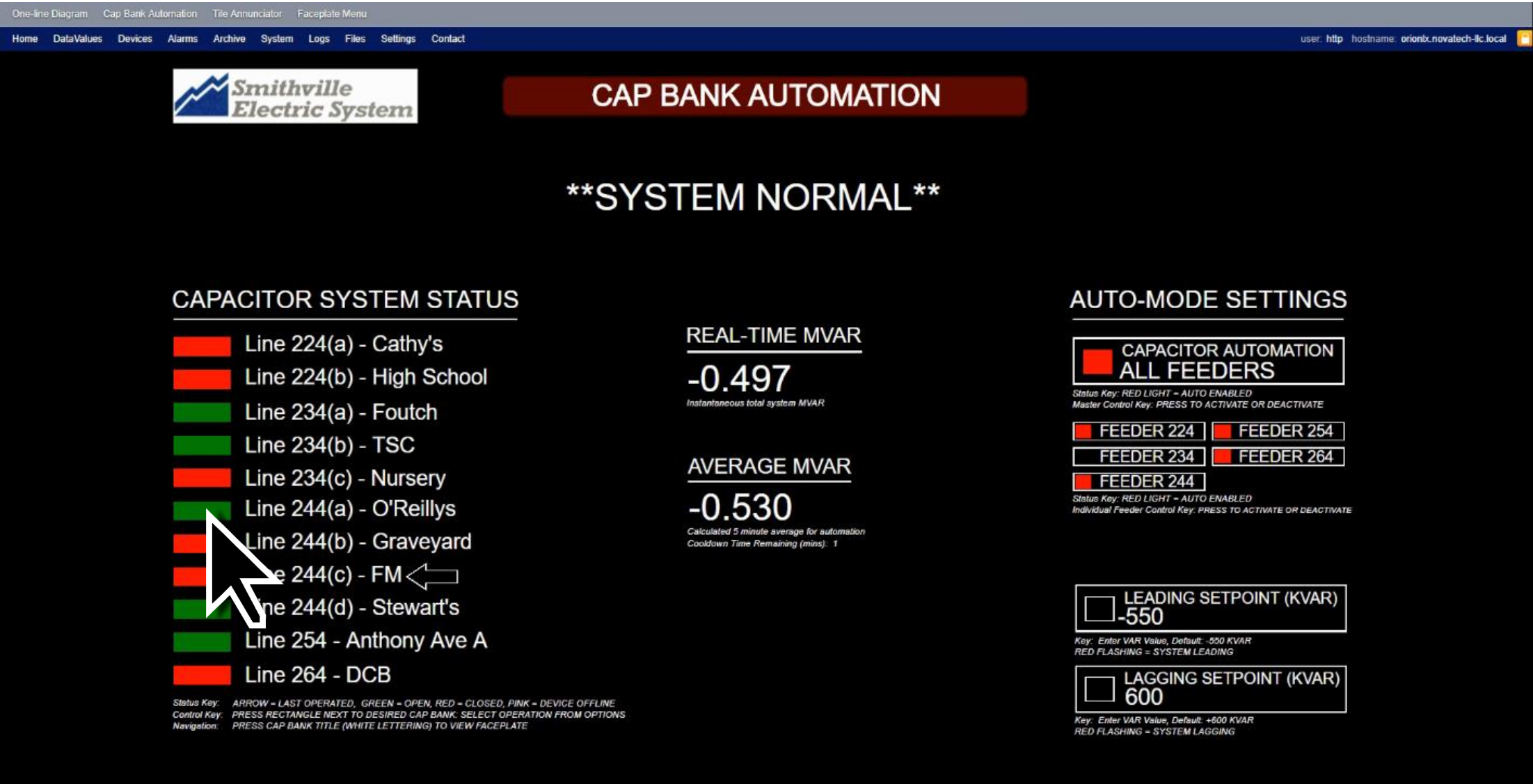
 NovaTech

10

Cap Bank Automation



Cap Bank Automation




Cap Bank Automation

[One-line Diagram](#) [Cap Bank Automation](#) [Tie Annunciator](#) [Faceplate Menu](#)

Home DataValues Devices Alarms Archive System Logs Files Settings Contact

user: http hostname: orionlx.novatech-llc.local



CAP BANK AUTOMATION

****SYSTEM NORMAL****

CAPACITOR SYSTEM STATUS

Line 224(a) - Cathy's

Line 224(b) - High School

Line 234(a) - Foutch

Line 234(b) - TSC

Line 234(c) - Nursery

Line 244(a) - O'Reillys

Line 244(b) - Graveyard

Line 244(c) - FM

Line 244(d) - Stewart's

Line 254 - Anthony Ave A

Line 264 - DCB

Status Key: ARROW - LAST OPERATED, GREEN - OPEN, RED - CLOSED, PINK - DEVICE OFFLINE

Control Key: PRESS RECTANGLE NEXT TO DESIRED CAP BANK. SELECT OPERATION FROM OPTIONS

Navigation: PRESS CAP BANK TITLE (WHITE LETTERING) TO VIEW FACEPLATE

REAL-TIME MVAR

-0.497

Instantaneous total system MVAR

AVERAGE MVAR

-0.530

Calculated 5 minute average for automation

Cooldown Time Remaining (mins): 1

AUTO-MODE SETTINGS

Ctrl Trip Close @CB 700 W Broad St Oreillys

Operate Cap Bank

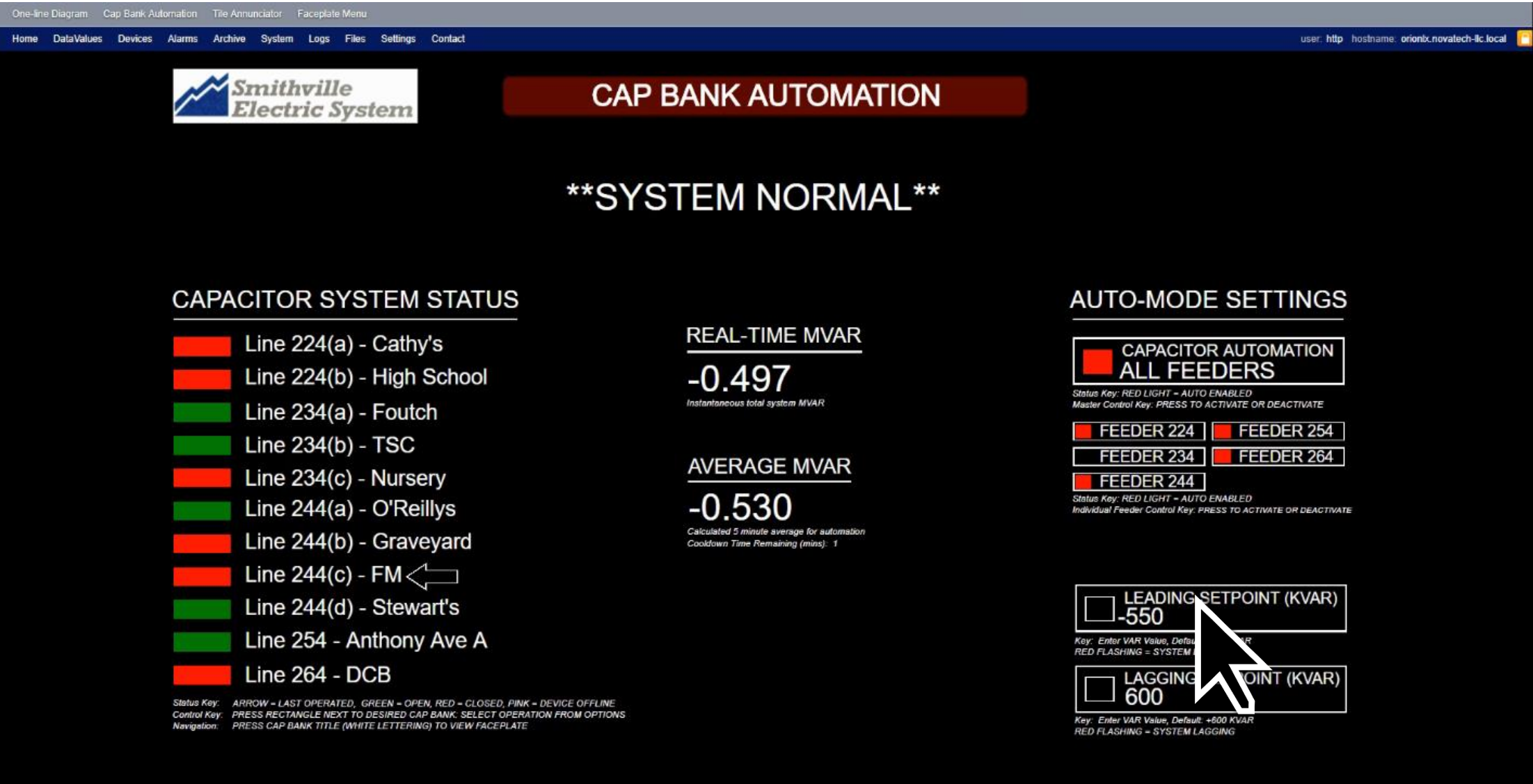
OPEN CLOSE Cancel

600

Key: Enter VAR Value, Default: +600

RED FLASHING - SYSTEM LAG

Cap Bank Automation




Cap Bank Automation

One-line DiagramCap Bank AutomationTie AnnunciatorFaceplate Menu

HomeDataValuesDevicesAlarmsArchiveSystemLogsFilesSettingsContact

user: httphostname: orionlx.novatech-llc.local



CAP BANK AUTOMATION

SYSTEM NORMAL

CAPACITOR SYSTEM STATUS

Line 224(a) - Cathy's

Line 224(b) - High School

Line 234(a) - Foutch

Line 234(b) - TSC

Line 234(c) - Nursery

Line 244(a) - O'Reillys

Line 244(b) - Graveyard

Line 244(c) - FM

Line 244(d) - Stewart's

Line 254 - Anthony Ave A

Line 264 - DCB

Status Key: ARROW - LAST OPERATED, GREEN - OPEN, RED - CLOSED, PINK - DEVICE OFFLINE

Control Key: PRESS RECTANGLE NEXT TO DESIRED CAP BANK. SELECT OPERATION FROM OPTIONS

Navigation: PRESS CAP BANK TITLE (WHITE LETTERING) TO VIEW FACEPLATE

REAL-TIME MVAR

-0.497

Instantaneous total system MVAR

SYS_KVAR_LEADING_LIMIT_CTRL @Logic

-500

Max: -1.000000

Enter Value

SendCancel

AUTO-MODE SETTINGS

CAPACITOR AUTOMATION

ALL FEEDERS

Status Key: RED LIGHT - AUTO ENABLED

Master Control Key: PRESS TO ACTIVATE OR DEACTIVATE

FEEDER 224

FEEDER 254

FEEDER 234

FEEDER 264

FEEDER 244

Status Key: RED LIGHT - AUTO ENABLED

Individual Feeder Control Key: PRESS TO ACTIVATE OR DEACTIVATE

LEADING SETPOINT (KVAR)

-550

Key: Enter VAR Value, Default: -550 KVAR

RED FLASHING - SYSTEM LEADING

LAGGING SETPOINT (KVAR)

600

Key: Enter VAR Value, Default: +600 KVAR


RED FLASHING - SYSTEM LAGGING

Cap Bank Automation

[One-line Diagram](#) [Cap Bank Automation](#) [Tie Annunciator](#) [Faceplate Menu](#)

Home DataValues Devices Alarms Archive System Logs Files Settings Contact

user: http hostname: orionlx.novatech-llc.local



CAP BANK AUTOMATION

SYSTEM NORMAL

CAPACITOR SYSTEM STATUS

Line 224(a) - Cathy's

Line 224(b) - High School

Line 234(a) - Foutch

Line 234(b) - TSC

Line 234(c) - Nursery

Line 244(a) - O'Reillys

Line 244(b) - Graveyard

Line 244(c) - FM

Line 244(d) - Stewart's

Line 254 - Anthony Ave A

Line 264 - DCB

Status Key: ARROW - LAST OPERATED, GREEN - OPEN, RED - CLOSED, PINK - DEVICE OFFLINE

Control Key: PRESS RECTANGLE NEXT TO DESIRED CAP BANK. SELECT OPERATION FROM OPTIONS

Navigation: PRESS CAP BANK TITLE (WHITE LETTERING) TO VIEW FACEPLATE

REAL-TIME MVAR

-0.497

Instantaneous total system MVAR

SYS_KVAR_LEADING_LIMIT_CTRL @Logic

-500

Min: -32768.000000 Max: -1.000000

Send Cancel

AUTO-MODE SETTINGS

CAPACITOR AUTOMATION

ALL FEEDERS

Status Key: RED LIGHT - AUTO ENABLED

Master Control Key: PRESS TO ACTIVATE OR DEACTIVATE

FEEDER 224

FEEDER 254

FEEDER 234

FEEDER 264

FEEDER 244

Status Key: RED LIGHT - AUTO ENABLED

Individual Feeder Control Key: PRESS TO ACTIVATE OR DEACTIVATE

LEADING SETPOINT (KVAR)

-550

Key: Enter VAR Value, Default: -550 KVAR

RED FLASHING - SYSTEM LEADING


LAGGING SETPOINT (KVAR)

600

Key: Enter VAR Value, Default: +600 KVAR

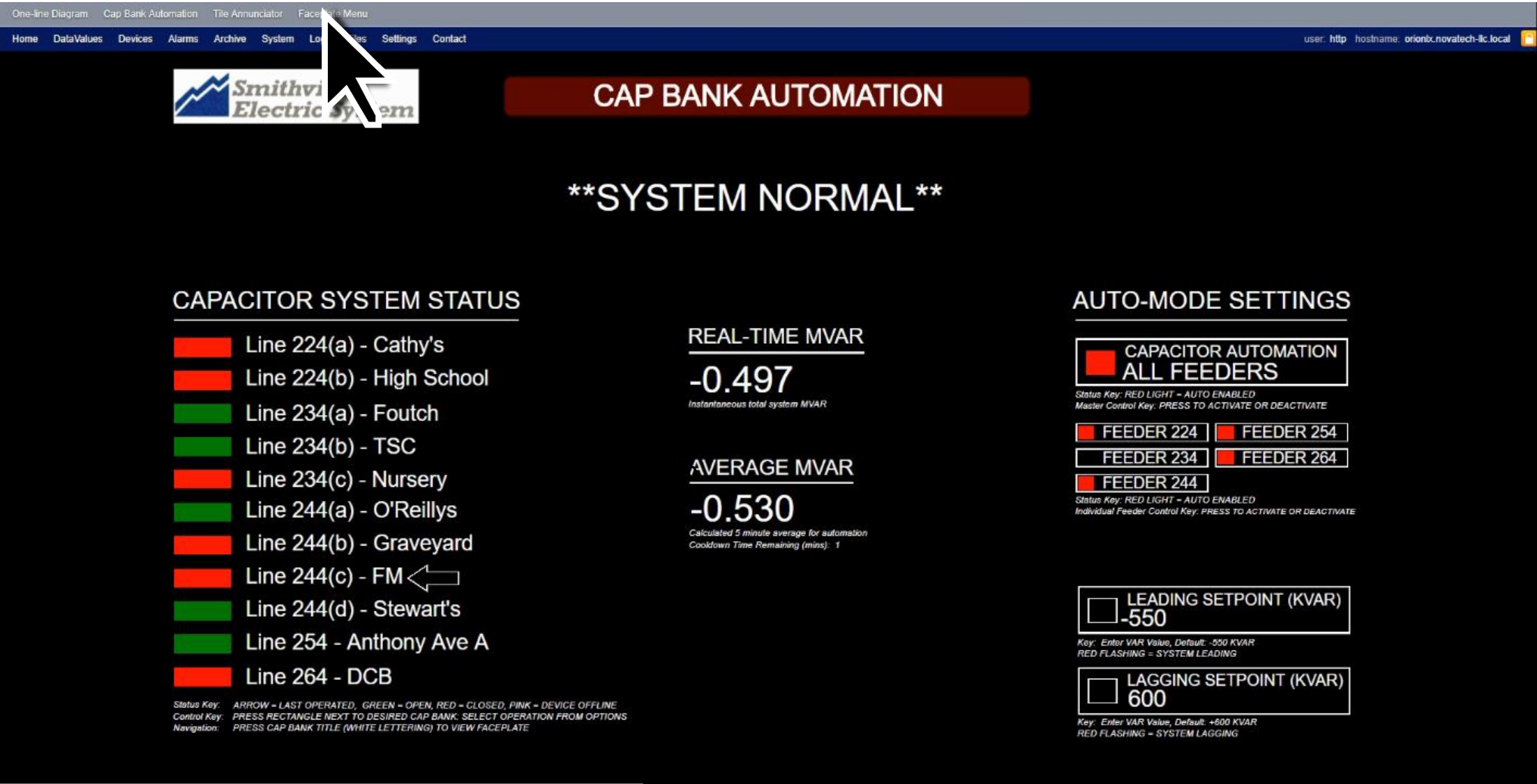
RED FLASHING - SYSTEM LAGGING

2018 Annual NovaTech Users' Group Meeting and Technical Syn
Little Rock, AR
Wednesday, January 10, 2018

 NovaTech

16

Cap Bank Automation




Faceplate Menu

One-line DiagramCap Bank AutomationTile AnnunciatorFaceplate Menu

HomeDataValuesDevicesAlarmsArchiveSystemLogsFilesSettingsContact

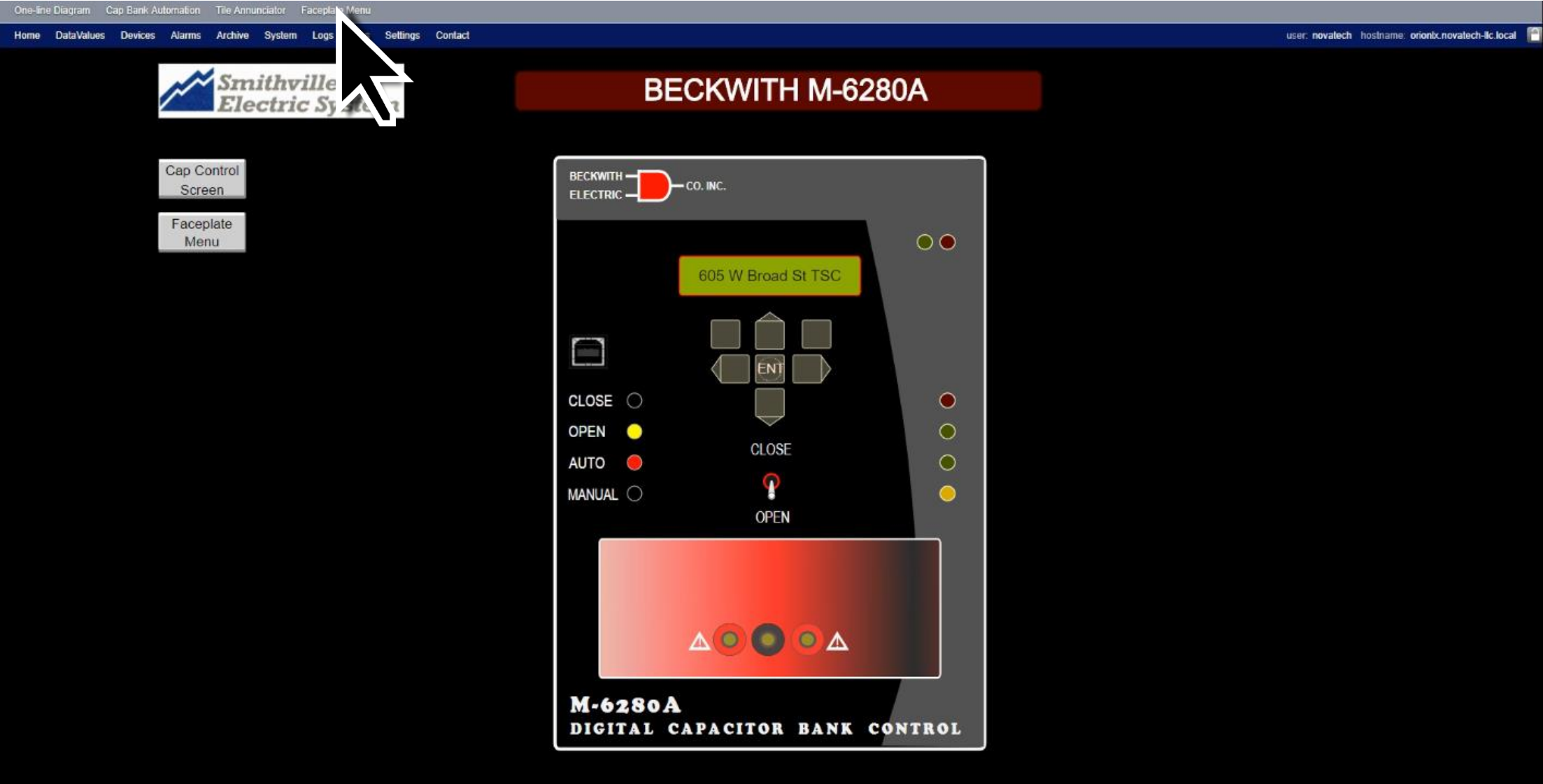
user: httphostname: orionlx.novatech-llc



FACEPLATE MENU

Breakers	Cap Banks	Load Tap Changers
BKR 224 - SEL 351S	CATHY'S	DELTA
	HIGH SCHOOL	VIRGINIA
BKR 234 - SEL 351S	FOUTCH	
	TSC	
	NURSERY	
	O'REILLYS	
BKR 244 - SEL 351S	GRAVEYARD	
	FM	
	STEWARTS	
BKR 254 - SEL 351S	ANTHONY AVE A	
BKR 264 - SEL 351S	DCB	

Beckwith M-6280 Cap Bank Controller




Faceplate Menu

One-line DiagramCap Bank AutomationTile AnnunciatorFaceplate Menu

HomeDataValuesDevicesAlarmsArchiveSystemLogsFilesSettingsContact

user: httphostname: orionlx.novatech-llc



FACEPLATE MENU

Breakers

BKR 224 - SEL 351S

BKR 234 - SEL 351S

BKR 244 - SEL 351S

BKR 254 - SEL 351S

BKR 264 - SEL 351S

Cap Banks

CATHY'S

HIGH SCHOOL

FOU

TSC

NURSERY

O'REILLYS

GRAVEYARD

FM

STEWARTS

ANTHONY AVE A

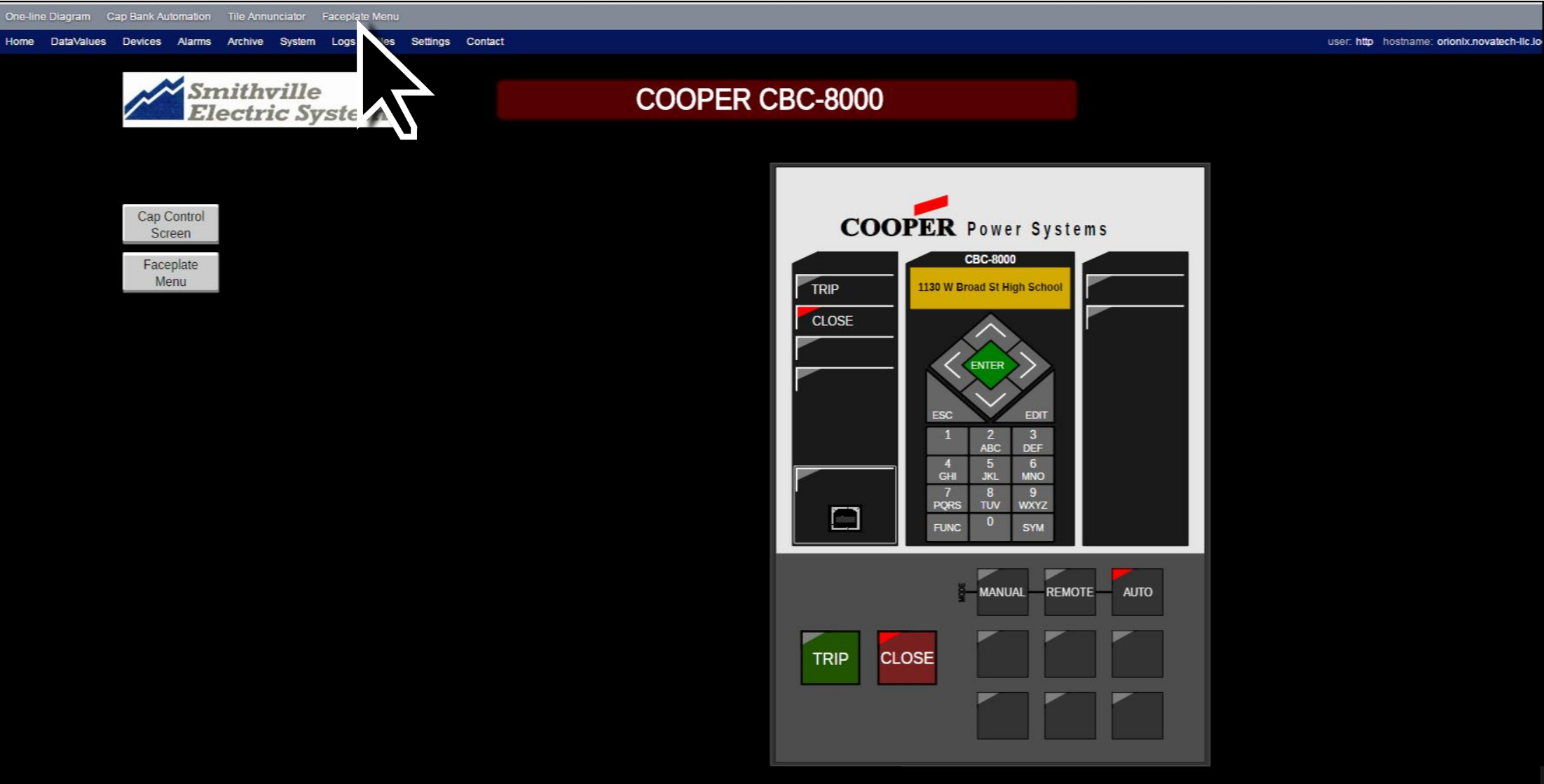
DCB

Load Tap Changers

DELTA

VIRGINIA

Cooper CDC-8000 Cap Bank Controller




Faceplate Menu

One-line DiagramCap Bank AutomationTile AnnunciatorFaceplate Menu

HomeDataValuesDevicesAlarmsArchiveSystemLogsFilesSettingsContact

user: httphostname: orionlx.novatech-llc



FACEPLATE MENU

Breakers

BKR 224 - SEL 351S

BKR 234 - SEL 351S

BKR 244 - SEL 351S

BKR 254 - SEL 351S

BKR 264 - SEL 351S

Cap Banks

CATHY'S

HIGH SCHOOL

FOUTCH

TSC

NURSERY

O'REILLYS

GRAVEYARD

FM

STEWARTS

ANTHONY W E A

DC

Load Tap Changers

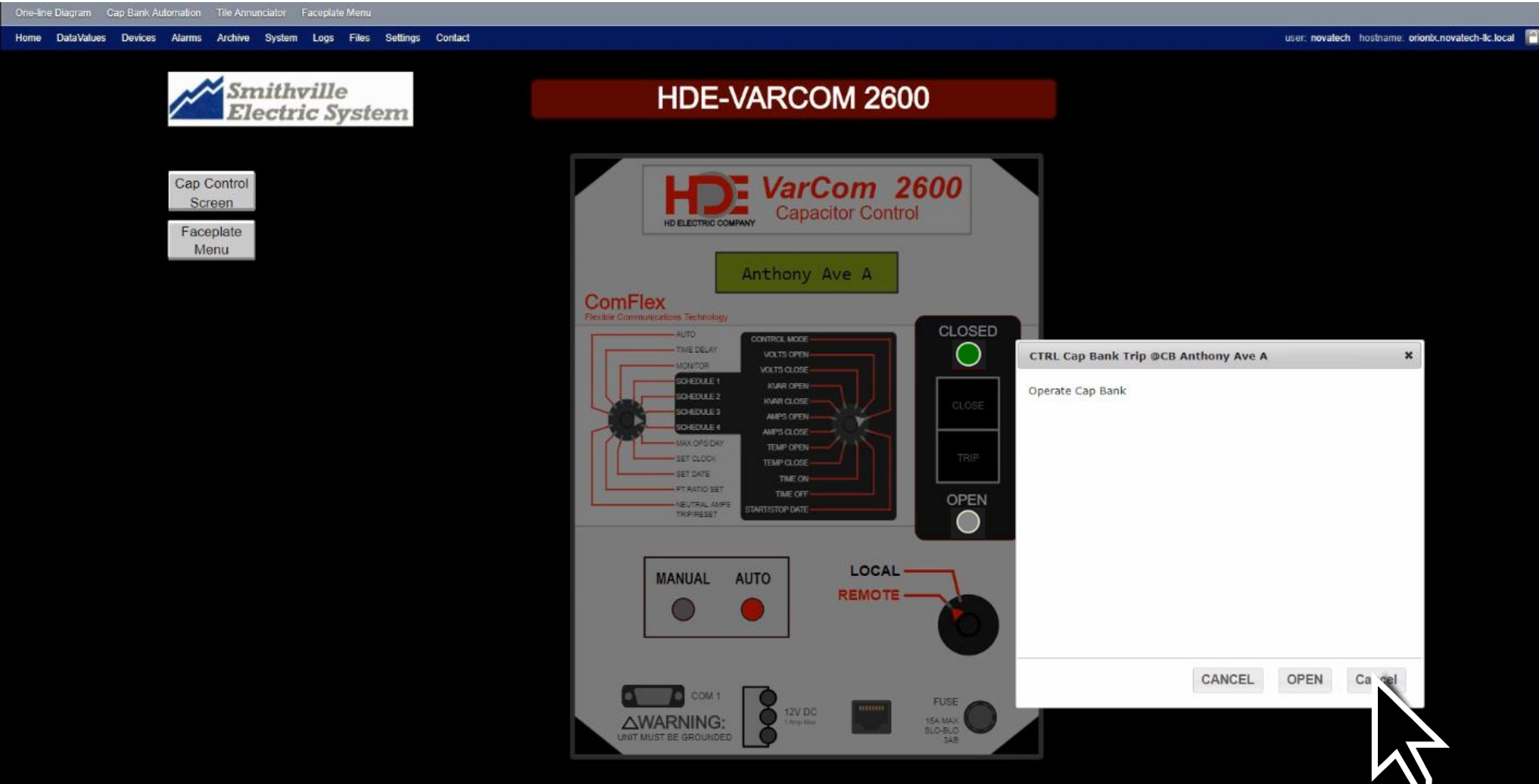
DELTA

VIRGINIA

HD Electric VarCom 2600 Cap Bank Controller



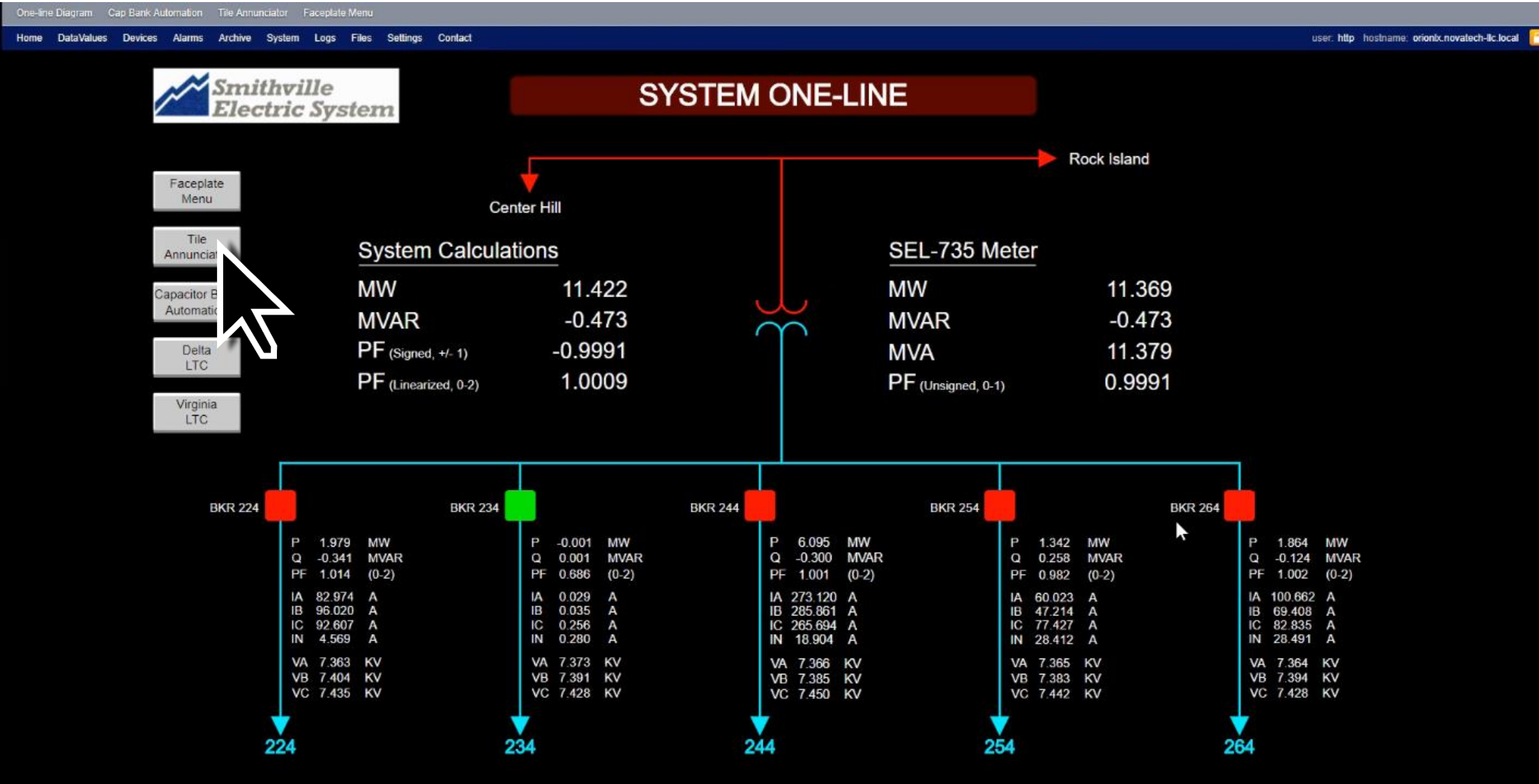
HD Electric VarCom 2600 Cap Bank Controller



HD Electric VarCom 2600 Cap Bank Controller



System One-Line Diagram



Tile Annunciator

One-line Diagram

Cap Bank Automation

Tile Annunciator

Faceplate Menu

Home

DataValues

Devices

Alarms

Archive

System

Logs

Files

Settings

Contact

user: novatech

6

MAIN

11

CAPACITOR COMM FAIL

BREAKER COM

MAIN

Acknowledge all on page

LINE 224 CAP TROUBLE	LINE 234 CAP TROUBLE	LINE 244 CAP TROUBLE	LINE 254 CAP TROUBLE	LINE 264 CAP TROUBLE
BREAKER 224 TRIP	BREAKER 234 TRIP	BREAKER 244 TRIP	BREAKER 254 TRIP	BREAKER 264 TRIP
COMM FAIL SEL 735 METER				

Tile Annunciator

One-line Diagram

Cap Bank Automation

Tile Annunciator

Faceplate Menu

Home

Data Values

Devices

Alarms

Archive

System

Logs

Files

Settings

Contact

user: novatech

6

MAIN

11

CAPACITOR COMM FAIL

BREAKER COMM FAIL

CAPACITOR COMM FAIL

Acknowledge all on page

CATHYS	HICKORY		
FOUTCH	TSC	NURSERY	
OREILLYS	GRAVEYARD	FM	STEWARTS
ANTHONY AVE A			
DCB			

These *were* in alarm,
but went out of alarm,
but were not acknowledged

Tile Annunciator

One-line DiagramCap Bank AutomationTile AnnunciatorFaceplate Menu

HomeValuesDevicesAlarmsArchiveSystemLogsFilesSettingsContact

user: novatech

6

11CAPACITOR COMM FAIL

BREAKER COMM FAIL

CAPACITOR COMM FAIL

Acknowledge all on page

CATHYS	HIGH SCHOOL		
FOUTCH	TSC	NURSERY	
OREILLYS	GRAVEYARD	FM	STEWARTS
ANTHONY AVE A			
DCB			

System One-Line Diagram

