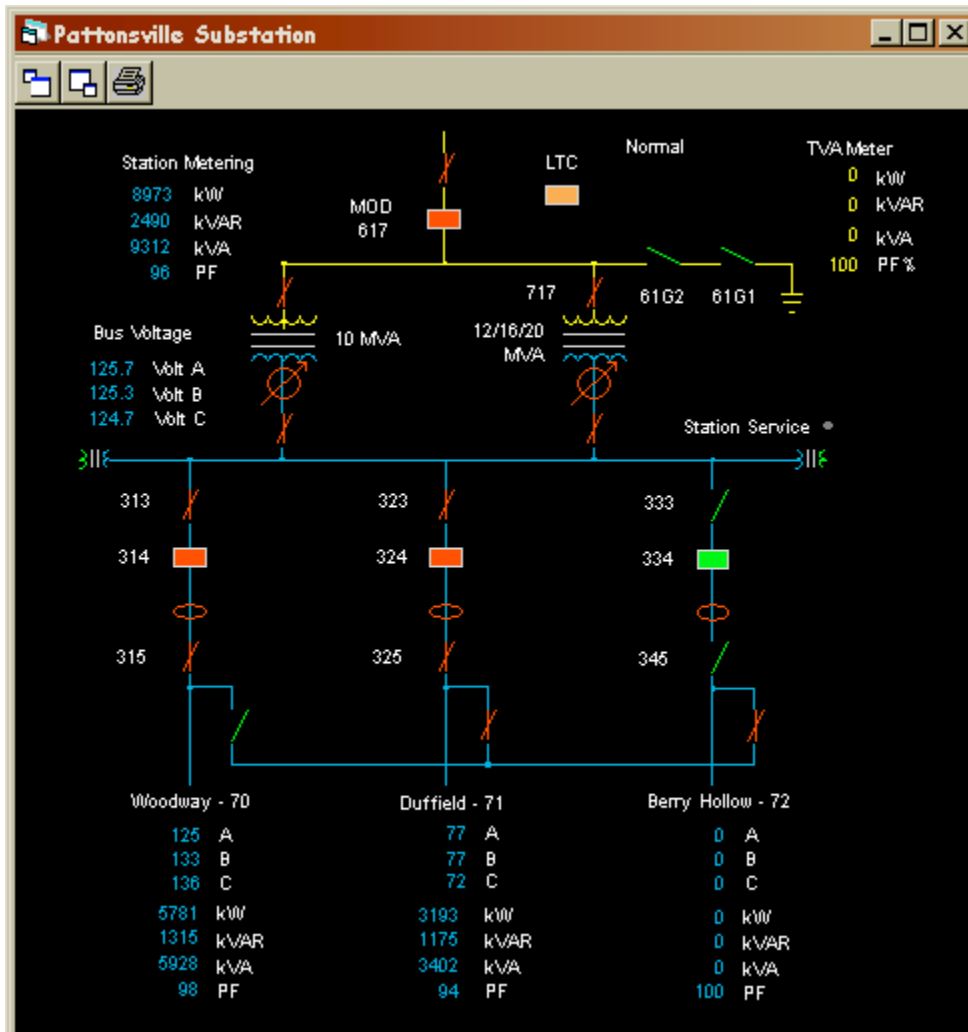


System Overview and Single Line Diagram

Scada System Overview					
Substation	kW	kVAR	kVA	Pwr Factor	Status
Keokee	405	- 86	414	97.8	OK
Pattonville	9171	2594	9531	96.2	OK
Sneedville	12347	3500	12833	96.2	Flat Gap Open
Kyles Ford	5190	1525	5409	96.0	OK
Harrogate	10001	2728	10366	96.5	OK
Tazewell Distribution	33719	6651	34369	98.1	OK
PV Total Load	70833	16912	72922	97.1	
Generation	0	0	0	0.0	
TVA Load	70833	16912	72922	97.1	
Tazewell Transmission Billing	43408	9038	44338	97.9	OK
Kyles Ford Transmission Billing	14500	1168	14547	99.7	
Total Billing	70660	13620	72132	98.0	



The VsNet Master Station uses standard PC compatible computers with Microsoft Windows 2000 or XP. It has all of the features necessary for monitoring and control of the distribution and/or transmission system.

Because most personnel are already familiar with the Windows environment, they inherently have a head start in learning to operate the SCADA System.

Tabular displays and single line diagrams are constructed by utility personnel using CAD and database tools designed by VSI. These tools are included as part of the SCADA System software.

Security IDs and passwords insure that only authorized persons are able to operate equipment or modify system parameters.

VsNet RTU

The VsNet Remote Terminal Unit (RTU) connects to substation equipment in a unique way that makes it easy to install. Measurement of electrical quantities is done through connection to existing PTs and CTs.

No transducers are used.

Modular three phase CT and PT circuit boards monitor the secondaries of substation voltage and current transformers. These boards hand the waveforms to the RTU for digital signal analysis.

This is called Transducerless Technology. Valquest's chief engineer pioneered this technology in 1983.

Transducerless Technology allows the Master Station to display any electrical parameter (single phase or 3 phase composite) from any measurement point. These parameters include:

- Voltage
- Current
- Neutral Current
- kW
- kVAr
- kVA
- Power Factor
- Phase Angle

On any given feeder or meter point, this would amount to 29 different values. These can be seen in the detail view in the Master Station screen on the first page.

Transducerless Technology provides many benefits when compared to using transducers:

- Considerably less expensive
- Requires less space
- Uses less power
- Less burden on CTs and PTs
- Considerable improvement in safety
- Provides much more data
- More reliable
- More accurate
- Uses fewer RTU components
- Acquires more harmonic information
- Does not require annual calibration



VsNet Features

- Master Station
 - PC Based
 - Personality Design by Operators
 - CAD and Database Tools
 - Multiple Communication Paths
 - Standalone or Redundant Fail-over
 - Remote Workstations
 - Unattended Operation using Pagers and Remote Computers
- Substation RTUs
 - Equipment Control
 - Status Monitoring
 - Detailed Transducerless Metering
 - IED Communications
 - Modular Design
 - Programming & Checkout Tools for Laptop
 - Security Monitoring
- Historical Reporting
 - Report Design by Operators
 - Sortable Event Log
 - Tabular and Graphical Metered Data
 - Spreadsheet Export
 - Trend Reports
 - Load Factor Studies
- Installation & Maintenance Assistance
 - System Consulting
 - Master Station Installation
 - Database Construction
 - Single Line Diagram Drawing
 - Report Formatting
 - RTU Planning / Wiring / Checkout

VsNet SCADA Specifications

Master Station

Computer	PC Compatible
Processor	1ghz or faster
Memory	256 Meg
Program installation and backup	CD Writer
Monitor	20 inch Flat Screen 1600 X 1200 pixel resolution
Audible Alarm	Sound card with speakers
Maintenance Interface	Modem
Report generation	Printers as required by utility
Inter-Computer Communication	Ethernet network interface
RTU communications	Serial port(s) as needed or Ethernet network interface
Maximum number of RTUs	255
kW Accuracy	0.5%
kVAr Accuracy	0.5%
Power Factor Accuracy	0.5%

RTU

Power Source	120 vac, 125 vdc, 48 vdc, 24 vdc, 12 vdc
Power Requirements	25 watts max
Power Supply Capacity	Capable of supporting RTU and Radio as needed
Operating Temperature Range	-40F to 165 F
Humidity (non-condensing)	95%
Large Cabinet Size	42"H x 36"W x 12"D
Small Cabinet Size	30"H x 30"W x 8"D
Cabinet Type	Metal – Nema 4
Maximum 3 Phase CT Points	20
Maximum 3 Phase PT Points	8
Maximum Digital Status Points	256
Maximum Pulse Inputs	8
Maximum Momentary Relay Pairs	256
Maximum Latching Relays	256
Maximum IED interfaces	32
Communications Baud Rates	1200,2400,4800, 9600, 19200
Communications Media	Radio, Fiber Optics, Telephone Modem, TCP/IP Network
Inherent Communications Isolation	Fiber Optics
Voltage Accuracy	0.2%
Current Accuracy	0.5 %
Phase Angle Accuracy	+/- 0.5 degree