SNMP

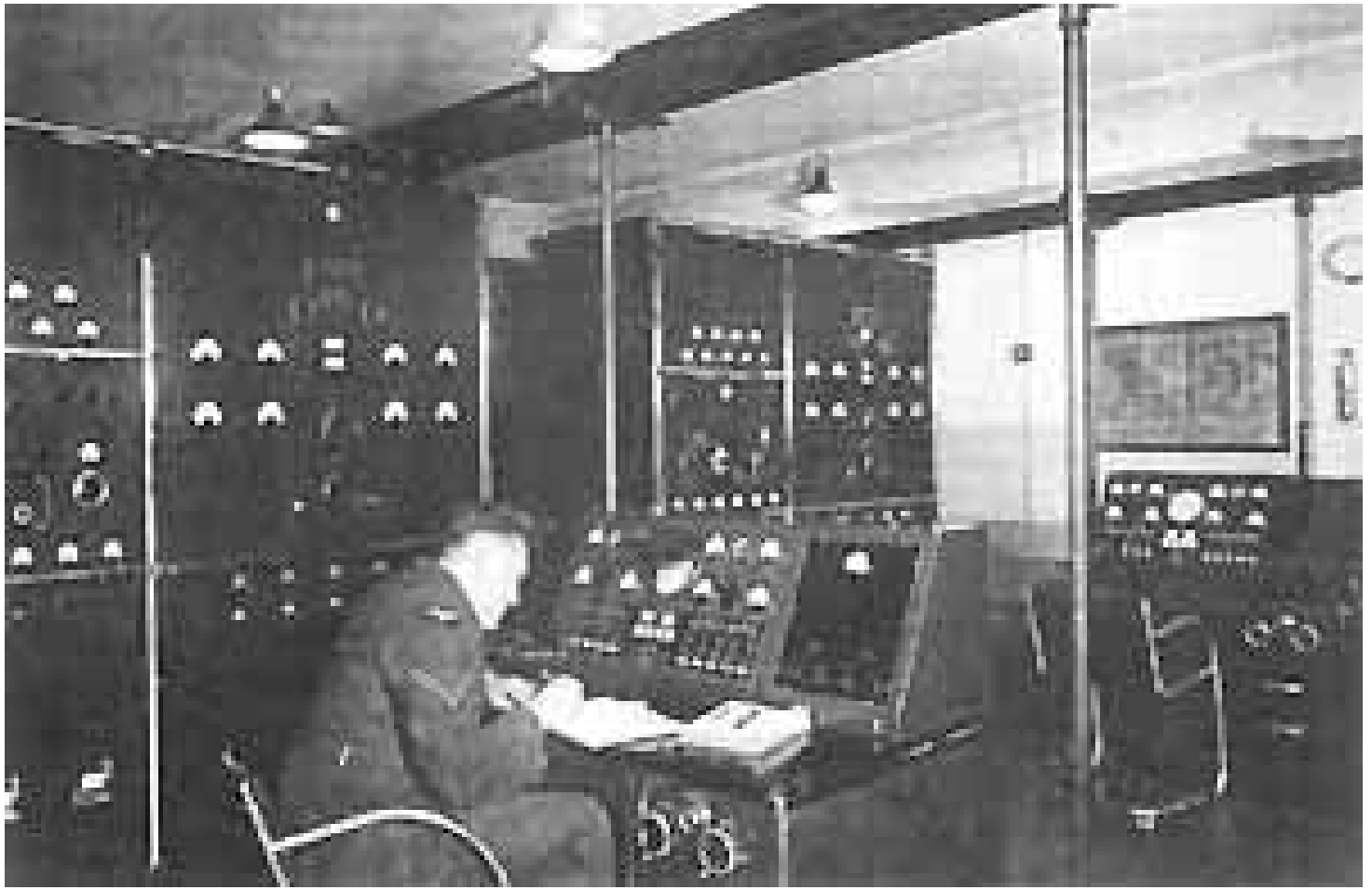
And todays remote control

By Tom Bosscher, October, 2016

Madison Broadcast Clinic

In the beginning

We had people at the transmitter.



Then the transmitter remote controls started to appear.

Led by Rust and others, “simple” transmitter sites were allowed to be remote controlled.

A revolutionary step occurred when Russ Gentner produced the VRC-1000.

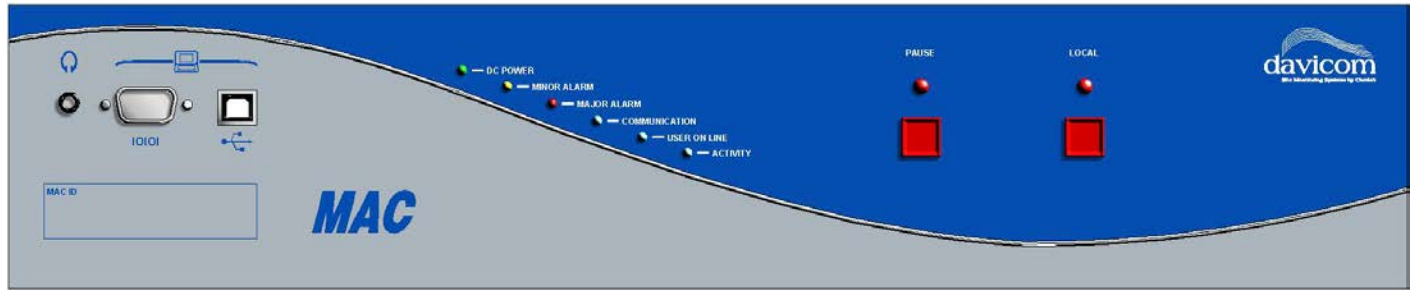
We could now monitor our transmitters by telephone.

We learned very quickly where all the pay phones were.

But today, we have a new breed of remote controls. They look just like the past generation, but they have an Ethernet jack.
And that jack is for more than connecting to the Internet.

Davicom, Burk, Audemat and others now offer broadcast remote controls that at first look, seem to be like the remote controls of old. But there is a major technological advantage.

And the word is SNMP, for Simple Network Management Protocol. A new word to learn, and make your job easier.


DC POWER
MINOR ALARM
MAJOR ALARM
COMMUNICATION
USER ON LINE
ACTIVITY
PAUSE
LOCAL
davicom
MAC ID
MAC


BURK
TECHNOLOGY
BURK-FM
21:31:28
KEY PAD
TX-A FWD
0.0
Watt
TX-A TO ANT
TX-B TO ANT
TX-B ON ANTENNA
MENU
STATUS
HELP
ARCPlus Touch


Remote Control
silver
Audemat-Aztec

And now, a new large learning curve.

The one critical item to remember is that SNMP moves around your plant using your existing Ethernet network.

MIB and other Acronyms.

No, not Men in Black the movie, but try **M**anagement **I**nformation **B**ase.

This a list of information about a specific piece of equipment

And that leads us to OIDs, or **O**bject **ID**entifiers.

OIDs uniquely identify managed objects within the MIB hierarchy.

And now you get to learn a whole lot of new terminology.

But that wonderful Internet supplies us so many learning aids.

Start with Wikipedia. I'm not kidding:

https://en.wikipedia.org/wiki/Simple_Network_Management_Protocol

Then the others:

http://www.snmplink.org/articles/abeginnersguide/

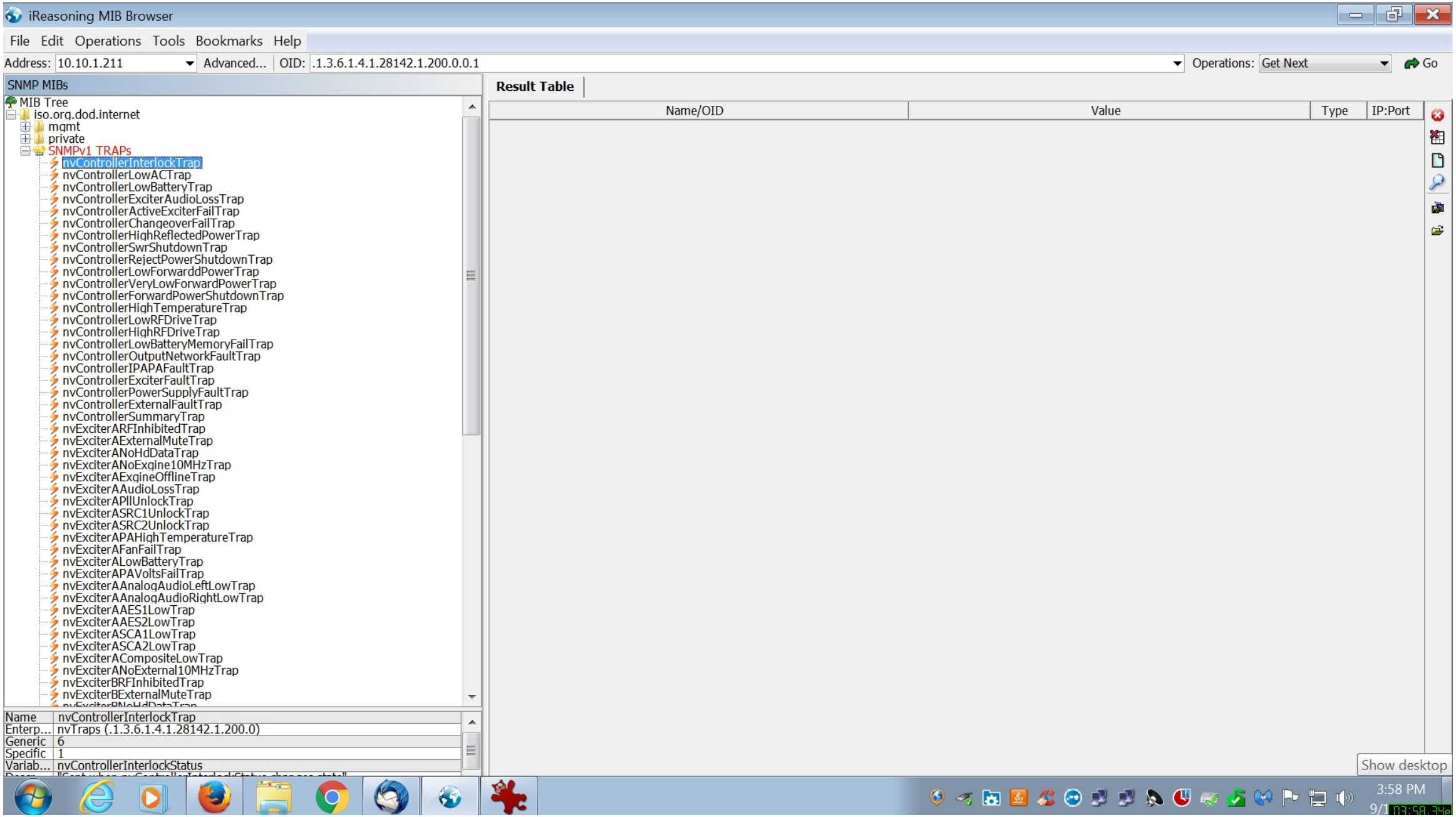
http://net-snmp.sourceforge.net/ **http://www.simpleweb.org/**

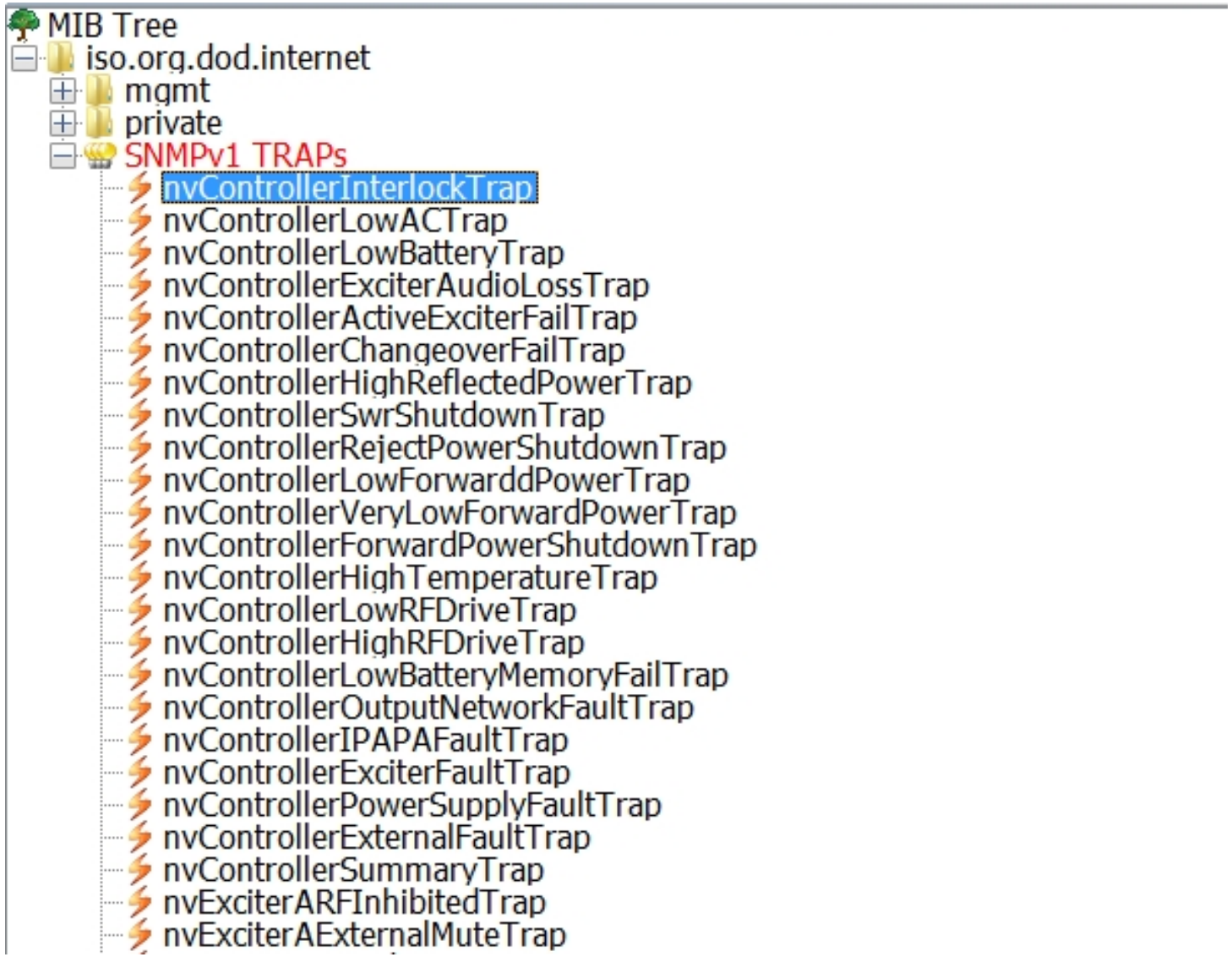
http://www.lammertbies.nl/comm/info/modbus.html

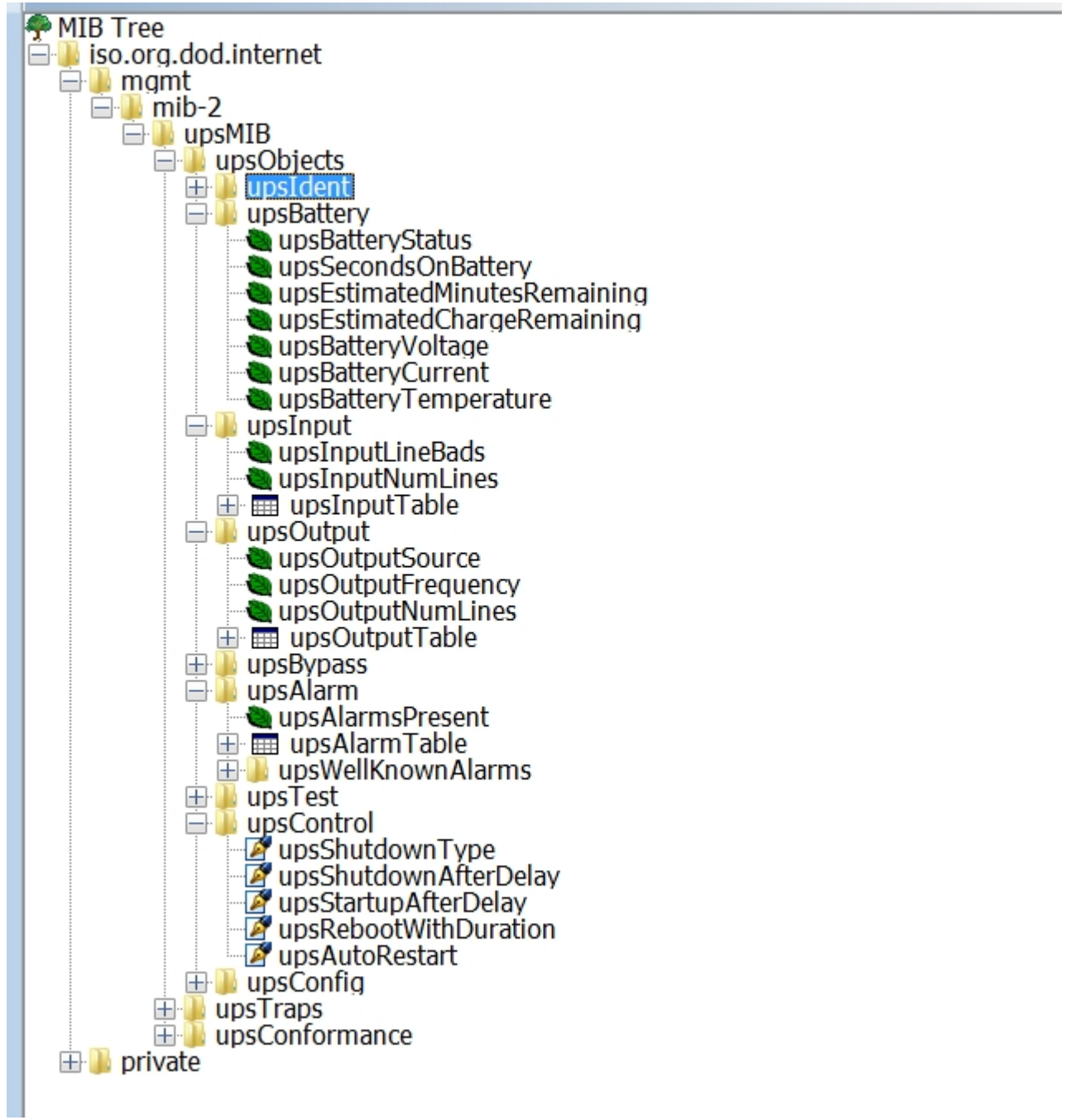
What you then need to graduate to is an SNMP management and snooping tool.

One very good one is the free version of Ireasoning, a MIB browser.

Also, take a look at Worldcastsystems website. They have a limited time offer on their “WorldCast Manager”, an SNMP monitoring tool.


iReasoning MIB Browser
File Edit Operations Tools Bookmarks Help
Address: 10.10.1.211 Advanced... OID: .1.3.6.1.4.1.28142.1.200.0.0.1 Operations: Get Next Go
SNMP MIBs
MIB Tree
iso.org.dod.internet
mgmt
private
SNMPv1 TRAPs
nvControllerInterlockTrap
nvControllerLowACTrap
nvControllerLowBatteryTrap
nvControllerExciterAudioLossTrap
nvControllerActiveExciterFailTrap
nvControllerChangeoverFailTrap
nvControllerHighReflectedPowerTrap
nvControllerSwrShutdownTrap
nvControllerRejectPowerShutdownTrap
nvControllerLowForwarddPowerTrap
nvControllerVeryLowForwardPowerTrap
nvControllerForwardPowerShutdownTrap
nvControllerHighTemperatureTrap
nvControllerLowRFDriveTrap
nvControllerHighRFDriveTrap
nvControllerLowBatteryMemoryFailTrap
nvControllerOutputNetworkFaultTrap
nvControllerIPAPAFaultTrap
nvControllerExciterFaultTrap
nvControllerPowerSupplyFaultTrap
nvControllerExternalFaultTrap
nvControllerSummaryTrap
nvExciterARFInhibitedTrap
nvExciterAExternalMuteTrap
nvExciterANoHdDataTrap
nvExciterANoExgine10MHzTrap
nvExciterAExgineOfflineTrap
nvExciterAAudioLossTrap
nvExciterAPllUnlockTrap
nvExciterASRC1UnlockTrap
nvExciterASRC2UnlockTrap
nvExciterAPAHighTemperatureTrap
nvExciterAFanFailTrap
nvExciterALowBatteryTrap
nvExciterAPAVoltsFailTrap
nvExciterAAnalogAudioLeftLowTrap
nvExciterAAnalogAudioRightLowTrap
nvExciterAAES1LowTrap
nvExciterAAES2LowTrap
nvExciterASCA1LowTrap
nvExciterASCA2LowTrap
nvExciterACompositeLowTrap
nvExciterANoExternal10MHzTrap
nvExciterBRFInhibitedTrap
nvExciterBExternalMuteTrap
Name nvControllerInterlockTrap
Enterp... nvTraps (.1.3.6.1.4.1.28142.1.200.0)
Generic 6
Specific 1
Variab... nvControllerInterlockStatus
Result Table
Name/OID
Value
Type
IP:Port
Show desktop
3:58 PM


MIB Tree
iso.org.dod.internet
mgmt
private
SNMPv1 TRAPs
nvControllerInterlockTrap
nvControllerLowACTrap
nvControllerLowBatteryTrap
nvControllerExciterAudioLossTrap
nvControllerActiveExciterFailTrap
nvControllerChangeoverFailTrap
nvControllerHighReflectedPowerTrap
nvControllerSwrShutdownTrap
nvControllerRejectPowerShutdownTrap
nvControllerLowForwarddPowerTrap
nvControllerVeryLowForwardPowerTrap
nvControllerForwardPowerShutdownTrap
nvControllerHighTemperatureTrap
nvControllerLowRFDriveTrap
nvControllerHighRFDriveTrap
nvControllerLowBatteryMemoryFailTrap
nvControllerOutputNetworkFaultTrap
nvControllerIPAPAFaultTrap
nvControllerExciterFaultTrap
nvControllerPowerSupplyFaultTrap
nvControllerExternalFaultTrap
nvControllerSummaryTrap
nvExciterARFInhibitedTrap
nvExciterAExternalMuteTrap


MIB Tree
iso.org.dod.internet
mgmt
mib-2
upsMIB
upsObjects
upsIdent
upsBattery
upsBatteryStatus
upsSecondsOnBattery
upsEstimatedMinutesRemaining
upsEstimatedChargeRemaining
upsBatteryVoltage
upsBatteryCurrent
upsBatteryTemperature
upsInput
upsInputLineBads
upsInputNumLines
upsInputTable
upsOutput
upsOutputSource
upsOutputFrequency
upsOutputNumLines
upsOutputTable
upsBypass
upsAlarm
upsAlarmsPresent
upsAlarmTable
upsWellKnownAlarms
upsTest
upsControl
upsShutdownType
upsShutdownAfterDelay
upsStartupAfterDelay
upsRebootWithDuration
upsAutoRestart
upsConfig
upsTraps
upsConformance
private

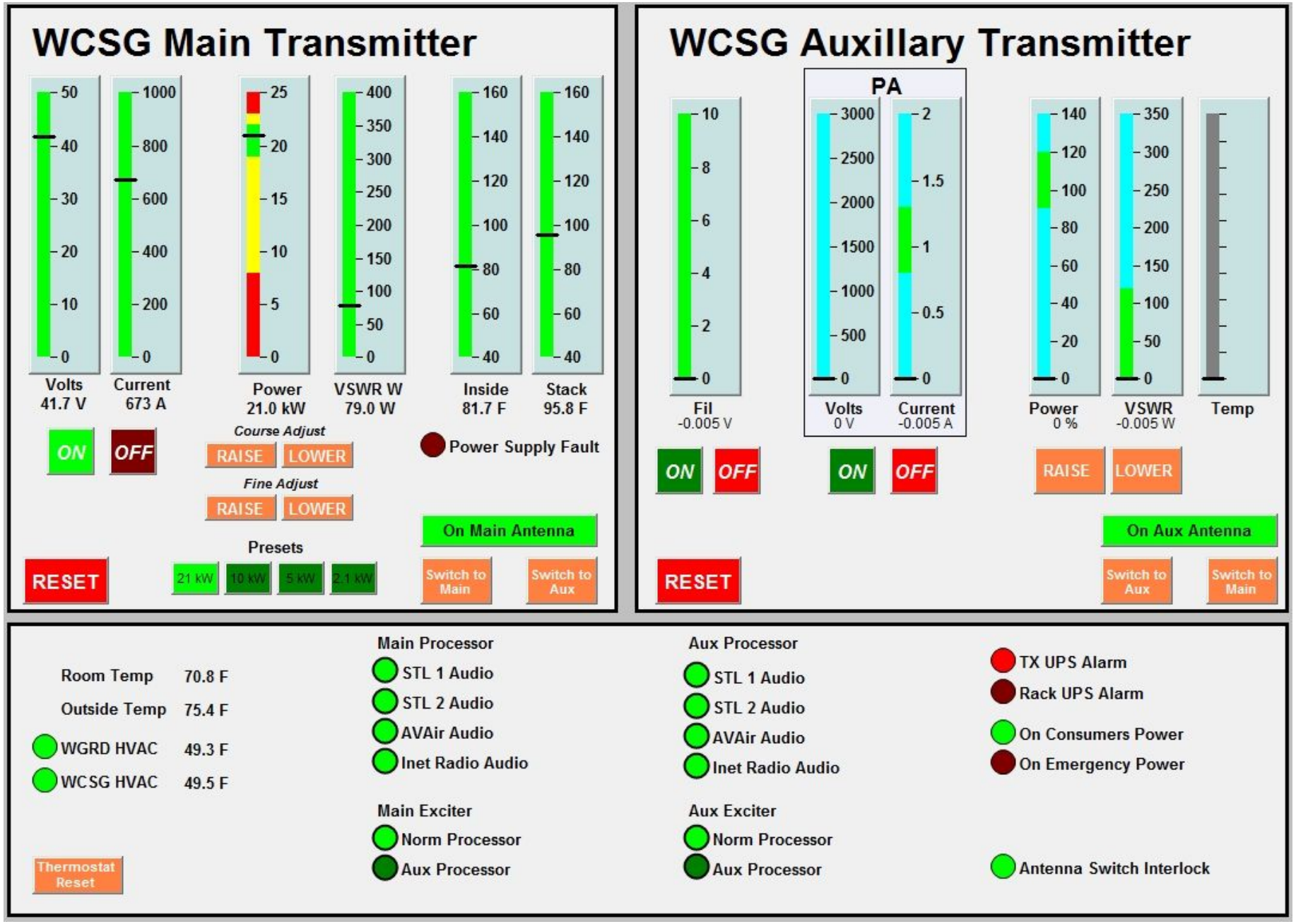
The newer remote controls, notably the Davicoms, the Audemats and the Burks, will talk to your equipment using SNMP and also by Modbus, which is another management protocol.

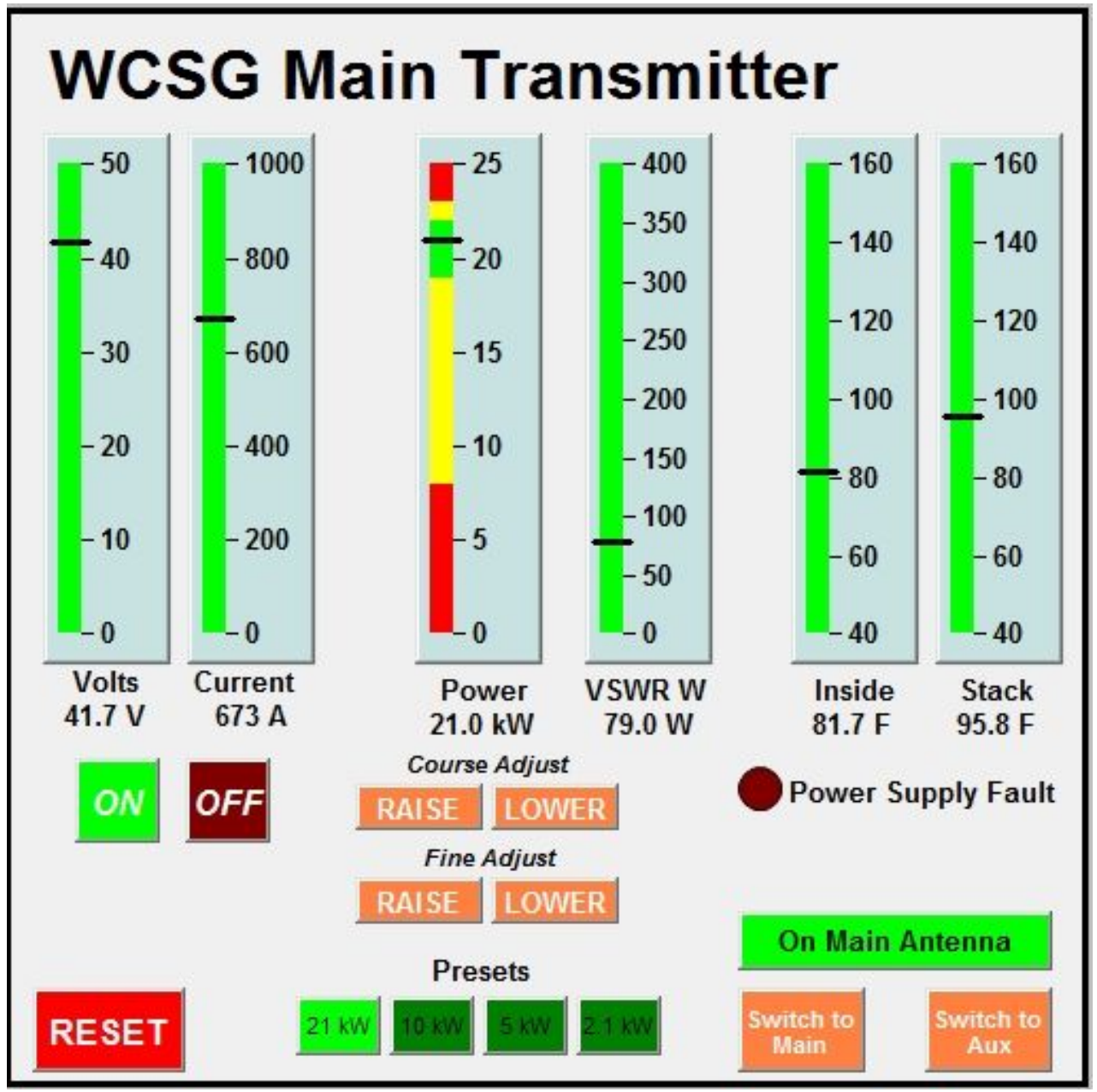
Be fair to yourself, and give yourself some time to be educated about this new method of inter-machine information transfer.

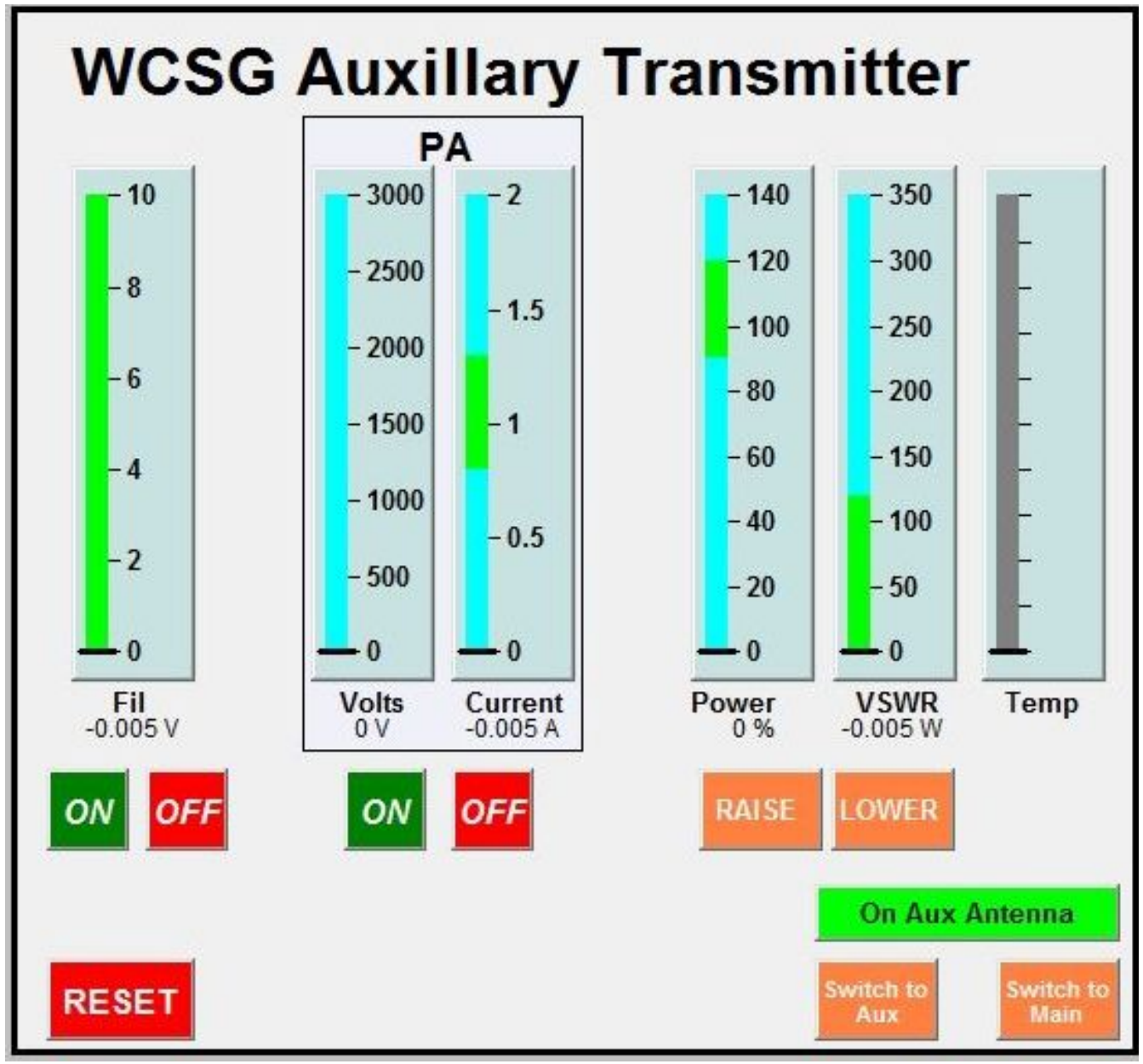
It will take a while, but the difficulty in learning will be replaced by the easiness of expansion without additional wires.

Let’s take a look at a few examples.
At the WCSG transmitter site, we have a Nautel NV-20.

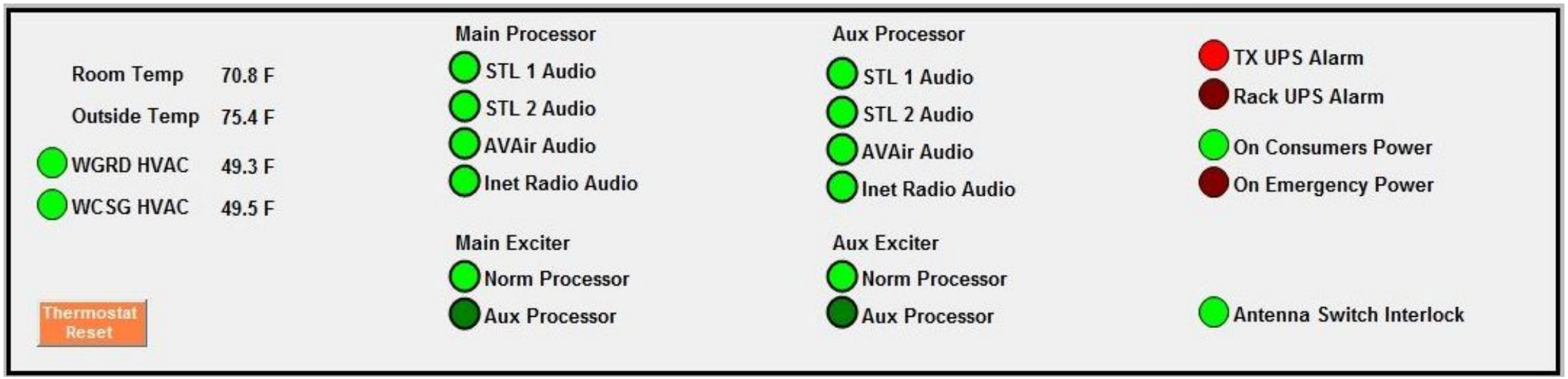
While it can talk to a typical remote control using analog samples and hard wired contact closures, just about everything we need to monitor the NV-20 is available with SNMP.
Matter of fact, over 150 parameters can be looked at.
Keep in mind any limitation of the number of SNMP parameters that you can look at.
With the Davicom, it is 96.


WCSG Main Transmitter
Volts
41.7 V
Current
673 A
Power
21.0 kW
VSWR W
79.0 W
Inside
81.7 F
Stack
95.8 F
ON
OFF
Course Adjust
RAISE
LOWER
Fine Adjust
RAISE
LOWER
Power Supply Fault
On Main Antenna
Presets
21 kW
10 kW
5 kW
2.1 kW
RESET
Switch to Main
Switch to Aux
WCSG Auxillary Transmitter
PA
Fil
-0.005 V
Volts
0 V
Current
-0.005 A
Power
0 %
VSWR
-0.005 W
Temp
ON
OFF
ON
OFF
RAISE
LOWER
On Aux Antenna
RESET
Switch to Aux
Switch to Main
Room Temp 70.8 F
Outside Temp 75.4 F
WGRD HVAC 49.3 F
WCSG HVAC 49.5 F
Thermostat Reset
Main Processor
STL 1 Audio
STL 2 Audio
AVAir Audio
Inet Radio Audio
Main Exciter
Norm Processor
Aux Processor
Aux Processor
STL 1 Audio
STL 2 Audio
AVAir Audio
Inet Radio Audio
Aux Exciter
Norm Processor
Aux Processor
TX UPS Alarm
Rack UPS Alarm
On Consumers Power
On Emergency Power
Antenna Switch Interlock


WCSG Main Transmitter
50
40
30
20
10
0
1000
800
600
400
200
0
25
20
15
10
5
0
400
350
300
250
200
150
100
50
0
160
140
120
100
80
60
40
160
140
120
100
80
60
40
Volts
41.7 V
Current
673 A
Power
21.0 kW
VSWR W
79.0 W
Inside
81.7 F
Stack
95.8 F
ON
OFF
Course Adjust
RAISE
LOWER
Fine Adjust
RAISE
LOWER
Power Supply Fault
On Main Antenna
Presets
21 kW
10 kW
5 kW
2.1 kW
RESET
Switch to Main
Switch to Aux


WCSG Auxillary Transmitter
PA
10
8
6
4
2
0
Fil
-0.005 V
3000
2500
2000
1500
1000
500
0
Volts
0 V
2
1.5
1
0.5
0
Current
-0.005 A
140
120
100
80
60
40
20
0
Power
0 %
350
300
250
200
150
100
50
0
VSWR
-0.005 W
Temp
ON
OFF
ON
OFF
RAISE
LOWER
On Aux Antenna
RESET
Switch to Aux
Switch to Main

So far I have showed you that SNMP can monitor equipment supplied voltage/current readings, and status's. But keep in mind that SNMP can control equipment. The buttons on the screen are valid and hot, and they do work.

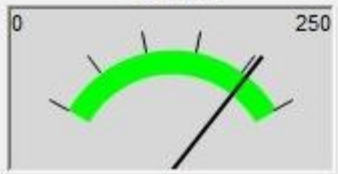

Room Temp 70.8 F
Outside Temp 75.4 F
WGRD HVAC 49.3 F
WCSG HVAC 49.5 F
Thermostat Reset
Main Processor
STL 1 Audio
STL 2 Audio
AVAir Audio
Inet Radio Audio
Main Exciter
Norm Processor
Aux Processor
Aux Processor
STL 1 Audio
STL 2 Audio
AVAir Audio
Inet Radio Audio
Aux Exciter
Norm Processor
Aux Processor
TX UPS Alarm
Rack UPS Alarm
On Consumers Power
On Emergency Power
Antenna Switch Interlock

We had this SNMP setup going at the transmitter site, when one day I was visiting it, and I remembered. Our Asco generator transfer switch has an Ethernet module is it.

Transfer Switch

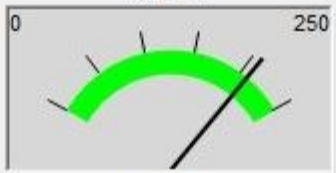
Utility

Line AB



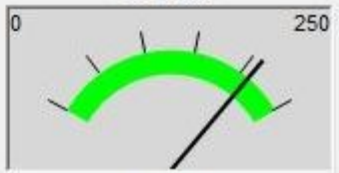
206 V

Line BC



208 V

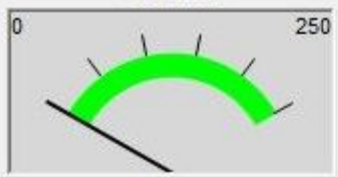
Line CA



209 V

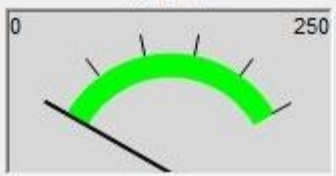
Generator

Line AB



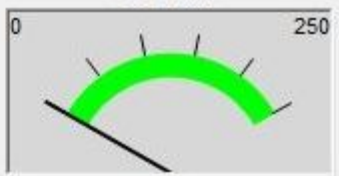
0 V

Line BC



0 V

Line CA



0 V

Main Available

Emergency Available

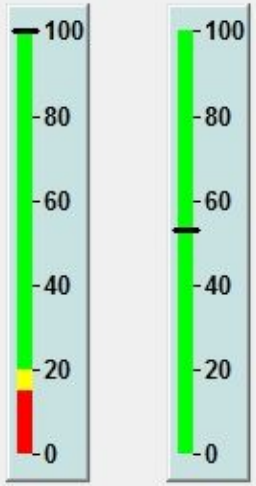
On Main

On Emergency

Transmitter UPS

Battery Remaining (Minutes)	0	100 %
Battery Voltage	27.4 V	
Line Input	118 V	
Line Output	120 V	
Load	53.0 %	
Time on Battery (seconds)	0	

TX UPS Alarm



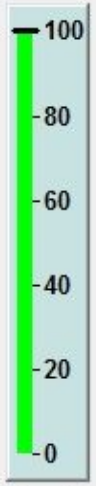
% Battery Level

% Load

Rack UPS

Battery Remaining (Minutes)	105	100 %
Battery Voltage	54.0 V	
Line Input	119 V	
Line Output	120 V	
Time on Battery (seconds)	0	

Rack UPS Alarm



% Battery Level

Transfer Switch

Utility

Line AB	Line BC	Line CA
206 V	208 V	209 V

Generator

Line AB	Line BC	Line CA
0 V	0 V	0 V

Main Available

Emergency Available

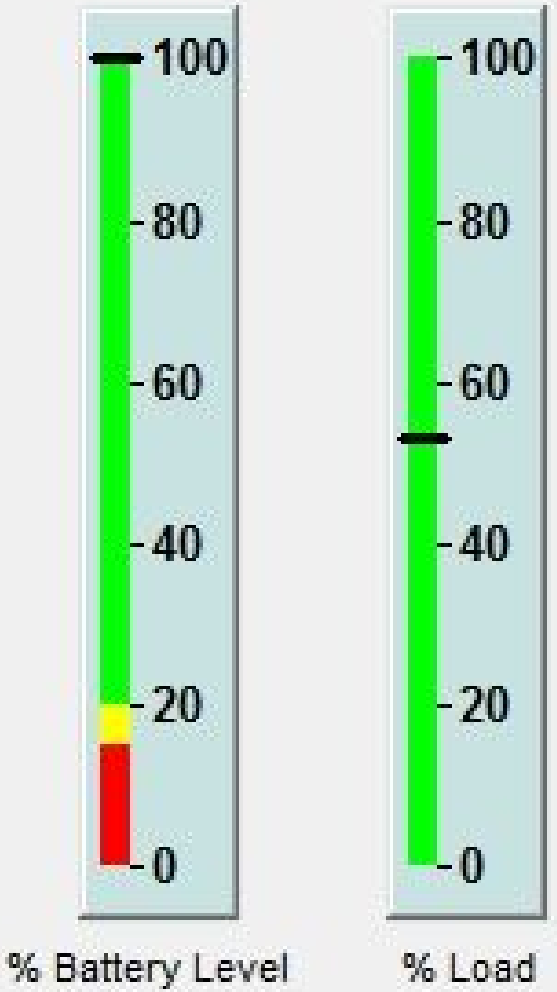
On Main

On Emergency

Transmitter UPS

Battery Remaining (Minutes)	0	100 %
Battery Voltage	27.4 V	
Line Input	118 V	
Line Output	120 V	
Load	53.0 %	
Time on Battery (seconds)	0	

TX UPS Alarm



But wait, there's more!

I like to monitor temperature at my transmitter sites.

I like to monitor the two air conditioners, the room temperature, the transmitter exhaust and the outside temperature. That takes up five more analog inputs.

But with SNMP and Modbus, there are inexpensive solutions.

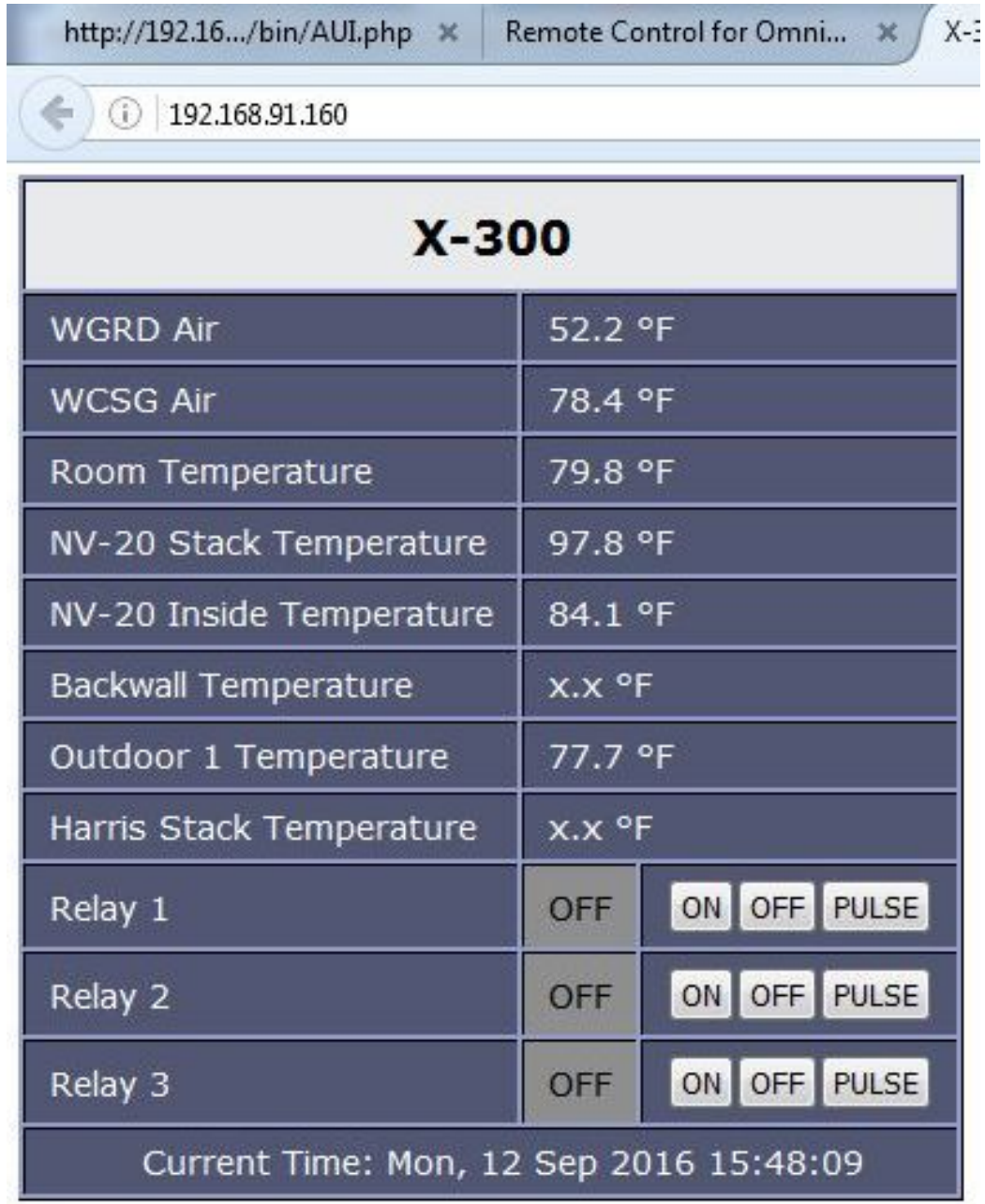
This is the X-300, by Controlbyweb.

The X-300 by Controlbyweb costs $ 215, including its power supply, and will let you monitor up to 8 digital temperature sensors. The sensors cost from $ 13 to $ 35 depending on cable length, or you can make your own.

The digital sensors are industry standards that do not need initial calibration. However, the X-300 does allow you to fine calibrate each sensor.

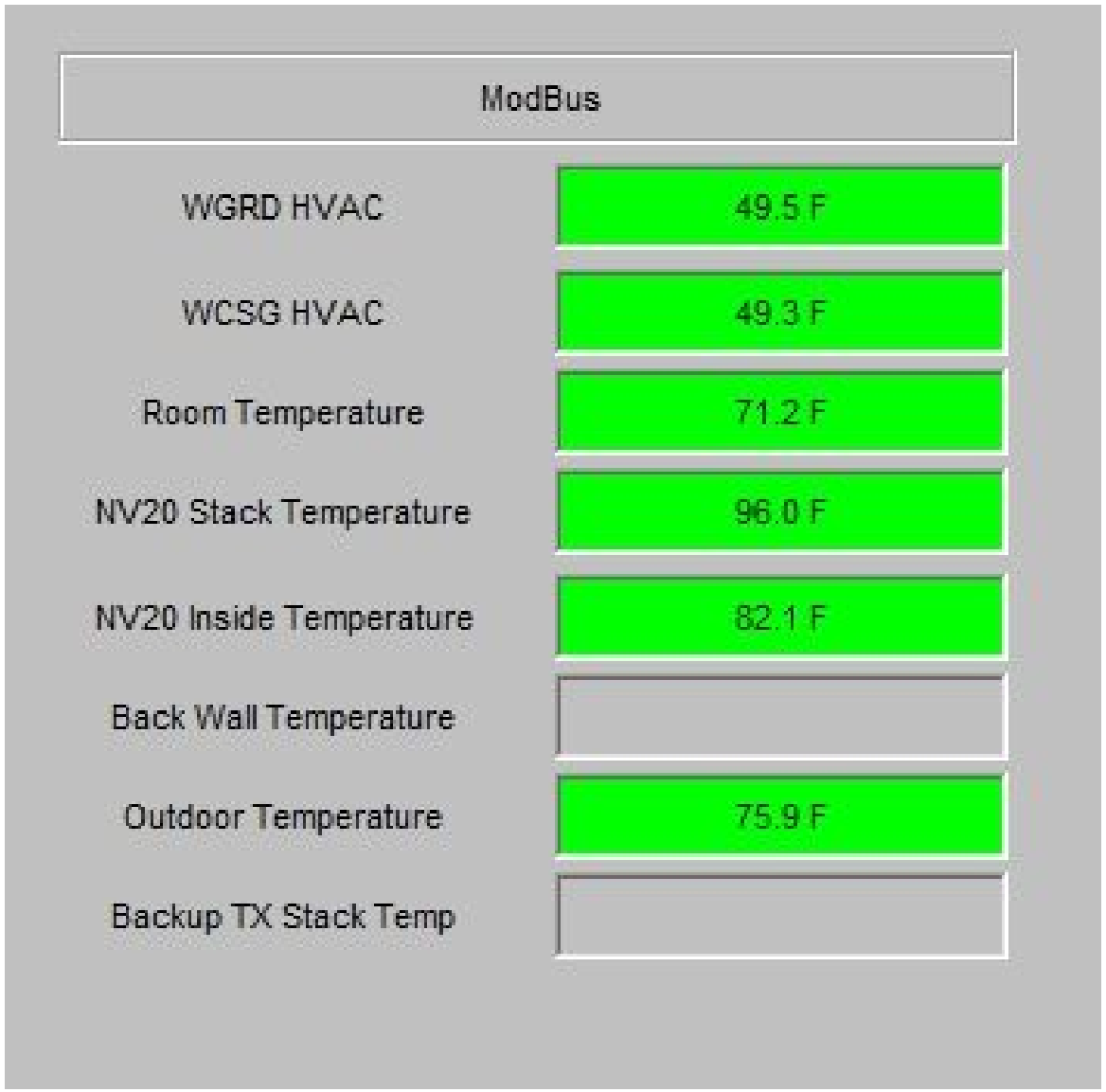
This is one of those digital temperature probes. These are known in the industry as “Dallas 1 wire protocol”. The most common part number is DS18B20.

With the X300, for around $ 300, I can now monitor my five desired temperatures. Data from this module is transmitted to the remote control using a protocol called Modbus, which is similar to SNMP.


http://192.16.../bin/AUI.php
Remote Control for Omni...
192.168.91.160
X-300
WGRD Air
52.2 °F
WCSG Air
78.4 °F
Room Temperature
79.8 °F
NV-20 Stack Temperature
97.8 °F
NV-20 Inside Temperature
84.1 °F
Backwall Temperature
x.x °F
Outdoor 1 Temperature
77.7 °F
Harris Stack Temperature
x.x °F
Relay 1
OFF
ON
OFF
PULSE
Relay 2
OFF
ON
OFF
PULSE
Relay 3
OFF
ON
OFF
PULSE
Current Time: Mon, 12 Sep 2016 15:48:09

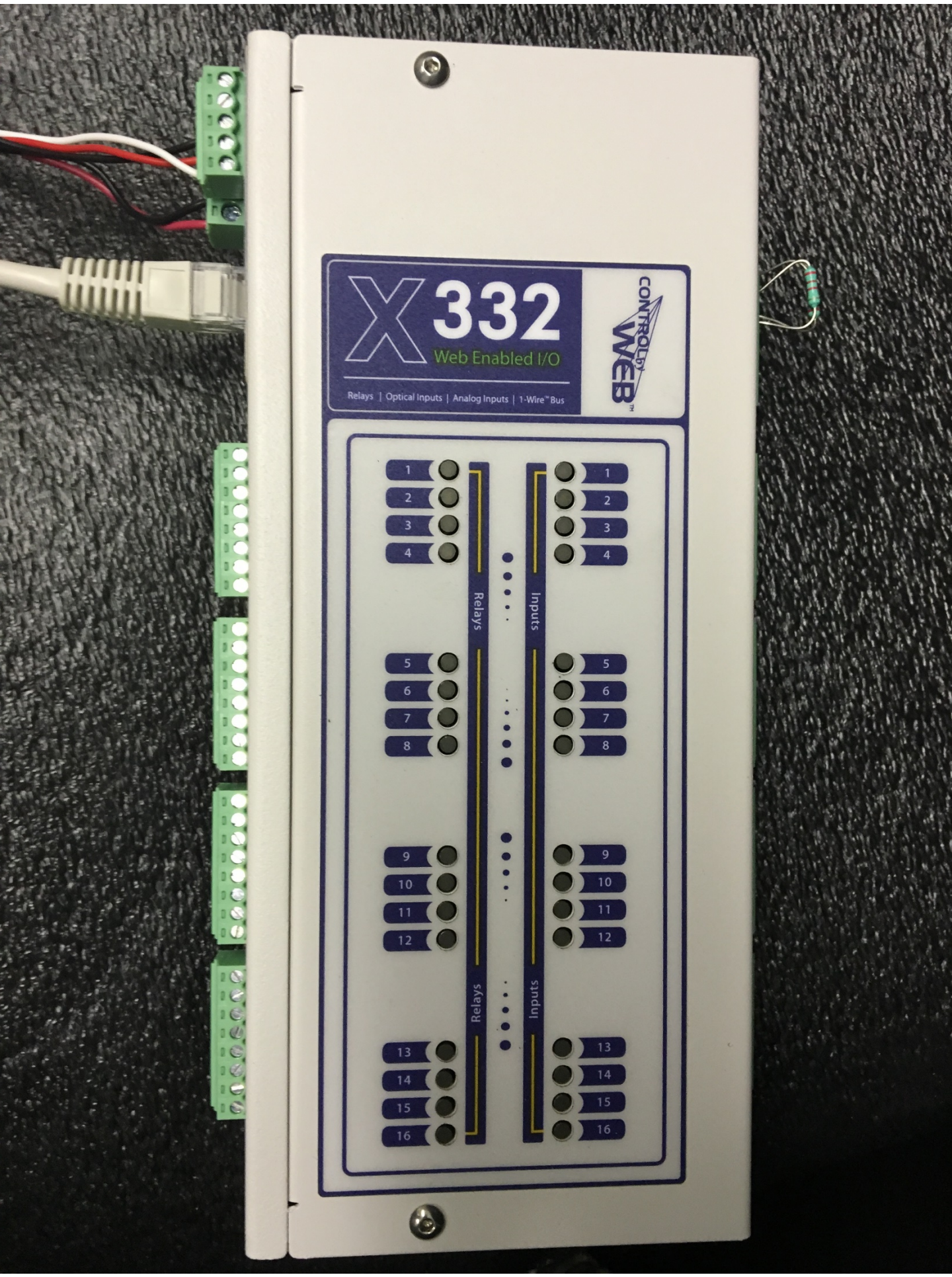
Main | Network | Advanced Network | Password | Date/Time | Logging | Sensors | Relays | Script | Control Page Setup | Control Page

Sensor:	Sensor 3
Sensor Description:	Room Temperature
Sensor Address:	F20416362342FF28 Refresh List
Offset:	0.0
Alarm 1:	90.0 High Low
Alarm 2:	20.0 High Low
Deadband:	0.5
Email/Action Delay	0 Seconds
Email Option:	No Email Messages
Use Email Address:	
Relay 1 Action:	No Action when Alarm 1
Relay 2 Action:	No Action when Alarm 1
Relay 3 Action:	No Action when Alarm 1
Remote Relay 1 Action:	No Action when Alarm 1
Remote Relay 2 Action:	No Action when Alarm 1
Remote Relay 3 Action:	No Action when Alarm 1
Remote Service/SNMP:	No Action when Alarm 1


ModBus
WGRD HVAC
49.5 F
WCSG HVAC
49.3 F
Room Temperature
71.2 F
NV20 Stack Temperature
96.0 F
NV20 Inside Temperature
82.1 F
Back Wall Temperature
Outdoor Temperature
75.9 F
Backup TX Stack Temp

But wait, there is even more. At our campus, we have a 190 foot tower that we own and maintain that has a tenant FM station. They of course have their remote control. But I really would like to keep my eyes on the site. The tower is 2500 feet away, so running wires is a bit impractical.
I do have my broadcast Ethernet network available at that tower site.

Once again, Controlbyweb gives us the X-332 module. 16 relay contacts, 16 digital inputs, 4 analog inputs and 4 digital temperature sensor inputs. For $ 550.00


X332
Web Enabled I/O
Relays | Optical Inputs | Analog Inputs | 1-Wire™ Bus
CONTROL by WEB
Relays
Inputs
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

As with the temperature expansion module, the X-300, I have one of these X-332 located at the campus tower site. The studio remote control, a Davicom, picks up the information to and from this box via Ethernet.

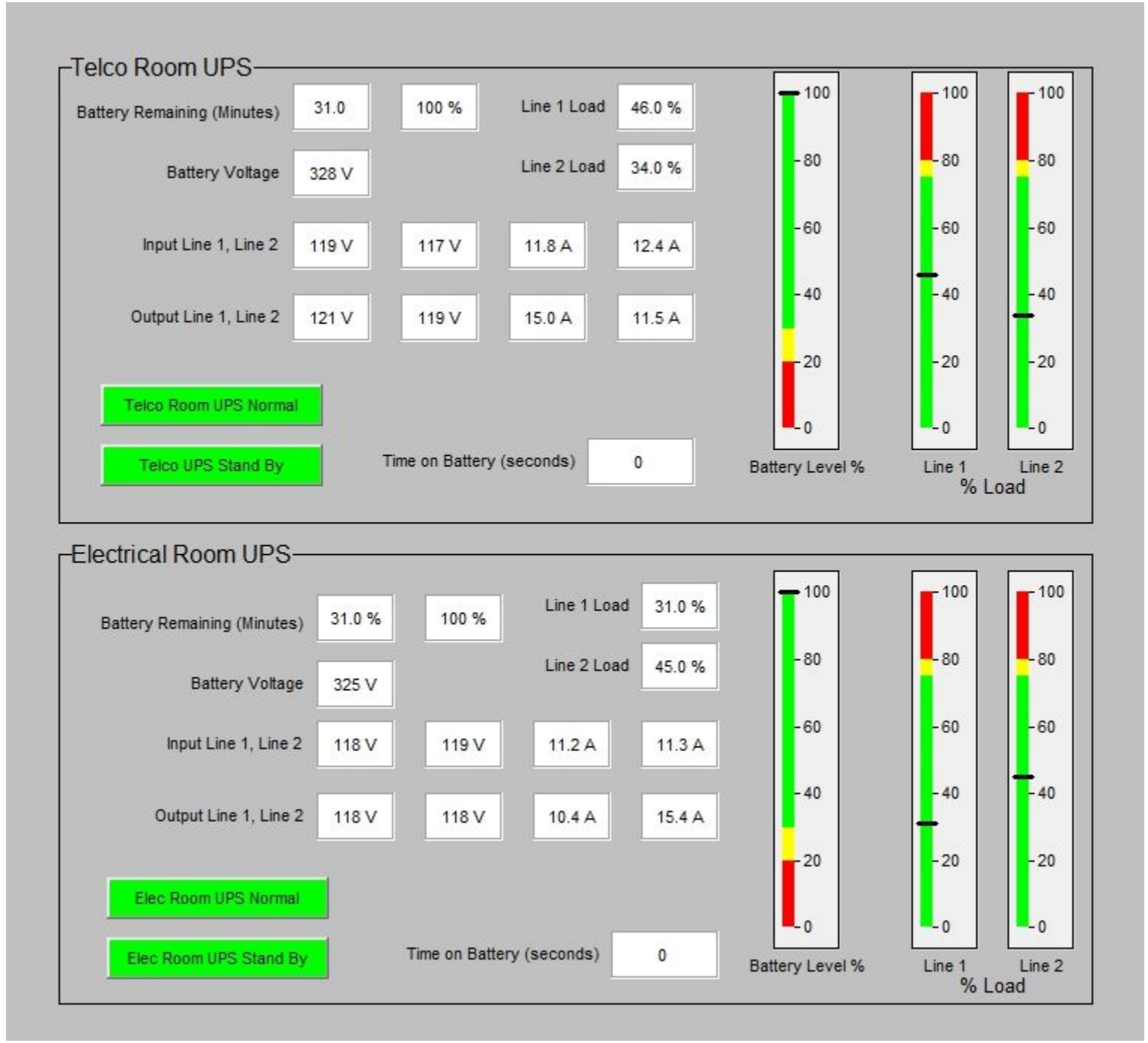
I monitor utility and generator voltage status's, transfer switch mode, four temperature probes, and even the generator battery voltage.

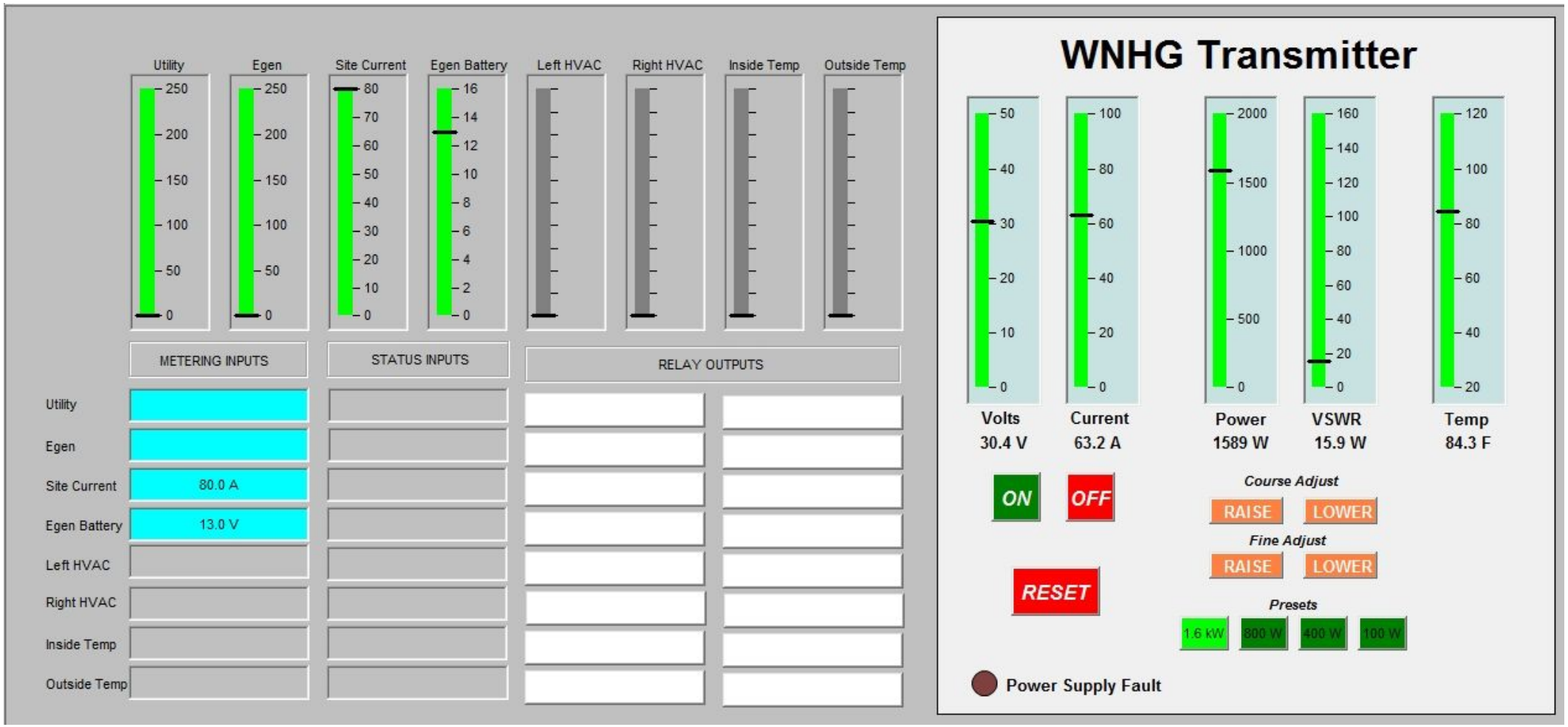
Yes, I said studio remote control. For 20 years, I have always had a studio remote control, using a typical “transmitter site” remote control. The uses are numerous:

Silence sense callouts (The PD gets these!)
Generator status
On Air studio Switching
Critical room temperature monitoring

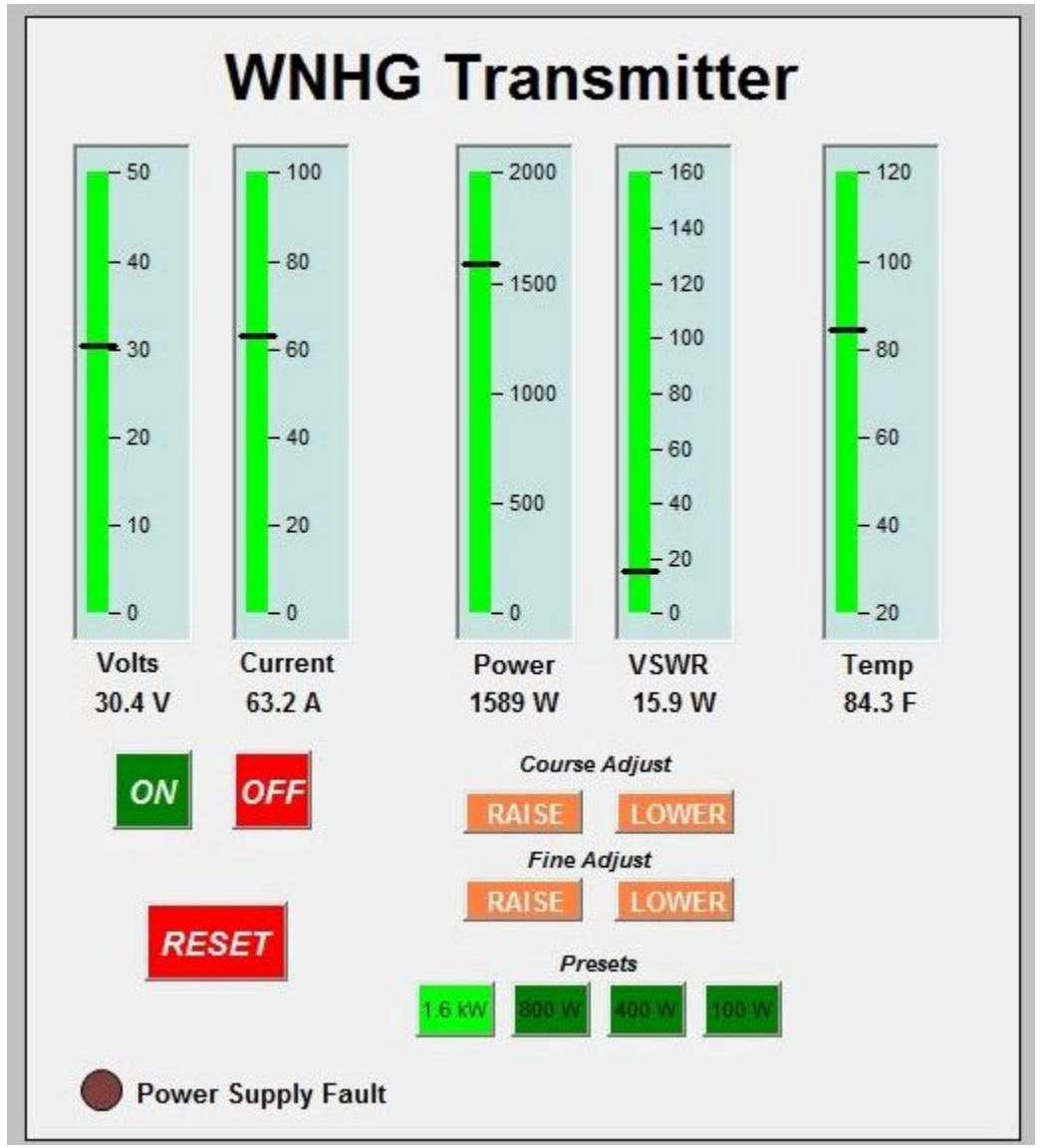
But with SNMP, you get so much more.


Site Current
0
120
%
84.9 %
120
100
80
60
40
20
0
Utility Voltage
100
Volts
260
218 V
260
240
220
200
180
160
140
120
100
Generator Voltage
100
Volts
260
-3.31 V
260
240
220
200
180
160
140
120
100
STATUS INPUTS
VIRITUAL INPUTS
RELAY OUTPUTS
VIRTUAL RELAYS
Power Source - Utility
Utility - Present
Generator - Stopped
WCSG Audio Normal
WCSG Audio Normal
HKR Stream
SFR Stream
Telco Room UPS Normal
Elec Room UPS Normal
Telco UPS Stand By
Elec Room UPS Stand By


Telco Room UPS
Battery Remaining (Minutes)
31.0
100 %
Line 1 Load
46.0 %
Battery Voltage
328 V
Line 2 Load
34.0 %
Input Line 1, Line 2
119 V
117 V
11.8 A
12.4 A
Output Line 1, Line 2
121 V
119 V
15.0 A
11.5 A
Telco Room UPS Normal
Telco UPS Stand By
Time on Battery (seconds)
0
100
80
60
40
20
0
Battery Level %
Line 1
Line 2
% Load
Electrical Room UPS
Battery Remaining (Minutes)
31.0 %
100 %
Line 1 Load
31.0 %
Line 2 Load
45.0 %
Battery Voltage
325 V
Input Line 1, Line 2
118 V
119 V
11.2 A
11.3 A
Output Line 1, Line 2
118 V
118 V
10.4 A
15.4 A
Elec Room UPS Normal
Elec Room UPS Stand By
Time on Battery (seconds)
0
Battery Level %
Line 1
Line 2
% Load


Utility
Egen
Site Current
Egen Battery
Left HVAC
Right HVAC
Inside Temp
Outside Temp
250
200
150
100
50
0
80
70
60
50
40
30
20
10
16
14
12
10
8
6
4
2
METERING INPUTS
STATUS INPUTS
RELAY OUTPUTS
Utility
Egen
Site Current
80.0 A
Egen Battery
13.0 V
Left HVAC
Right HVAC
Inside Temp
Outside Temp
WNHG Transmitter
50
40
30
20
10
100
80
60
40
2000
1500
1000
500
160
140
120
120
Volts
30.4 V
Current
63.2 A
Power
1589 W
VSWR
15.9 W
Temp
84.3 F
ON
OFF
RESET
Course Adjust
RAISE
LOWER
Fine Adjust
RAISE
LOWER
Presets
1.6 kW
800 W
400 W
100 W
Power Supply Fault


Utility
Egen
Site Current
Egen Battery
Left HVAC
Right HVAC
Inside Temp
Outside Temp
250
200
150
100
50
0
80
70
60
50
40
30
20
10
16
14
12
10
8
6
4
2
METERING INPUTS
STATUS INPUTS
RELAY OUTPUTS
Utility
Egen
Site Current
80.0 A
Egen Battery
13.0 V
Left HVAC
Right HVAC
Inside Temp
Outside Temp


WNHG Transmitter
50
40
30
20
10
0
100
80
60
40
20
0
2000
1500
1000
500
0
160
140
120
100
80
60
40
20
0
120
100
80
60
40
20
Volts
30.4 V
Current
63.2 A
Power
1589 W
VSWR
15.9 W
Temp
84.3 F
ON
OFF
RESET
Course Adjust
RAISE
LOWER
Fine Adjust
RAISE
LOWER
Presets
1.6 kW
800 W
400 W
100 W
Power Supply Fault

The studio remote control is monitoring the data from the cross campus tower via the Ethernet.

In addition, the two studio UPS's are monitored.

And this is where we have the remote controls work for us.

If there is a studio utility power failure, and the studio generator takes over, I get notified. But not at 3 AM. I've determined that that situation does not deserve to wake me up. So I set that as a minor alarm, and minor alarms are not called out from 11 PM to 7 AM.

However, the studio remote control is programmed to watch the input AC power to the UPS's. If they don't see any incoming power for 30 seconds, that is programmed to be a major alarm, and I get called.

WARNING !

With new technology, one has to be careful.

All of these really cool screens that we see here have one common situation.

They all come via your sites Ethernet, meaning there is a network switch in there.

If it fails, you will not be reading anything. Nor controlling anything.

At the WCSG transmitter site, we still have the main and backup transmitters, and antenna transfer switch, wired into the remote controls traditional analog inputs and control relays.

Ask me how I found out!

Commentary:

In conclusion, the world is a changing.

45 years ago, I could fix just about anything at a transmitter site with a 250 watt soldering gun.

Today, we have different tools to use. Adding SNMP features to todays remote control will give more and better information than we could ever get with off from any terminal strip.

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http://www.snmplink.org/articles/abeginnersguide/
http://net-snmp.sourceforge.net/ http://www.simpleweb.org/
http://www.lammertbies.nl/comm/info/modbus.html

Ireasoning, a MIB browser.
http://www.ireasoning.com/mibbrowser.shtml

Also, take a look at Audemat/Worldcastsystems website
http://www.audemat.com/radio-products-12-168.html

External Modbus interfaces:
http://www.controlbyweb.com/x300/

http://www.controlbyweb.com/x332/

Digital temperature are known as DS18B20.