

A world map is shown in a dark, low-contrast style. Overlaid on the map are several glowing, curved lines in shades of pink, orange, and red, suggesting energy or data flow. The lines are thick and have a soft, ethereal glow.

ENERGY MEASUREMENT

A Successful Strategy Begins With
Comprehensive And Accurate Data

ENERGY TRIAGE

Assess The Current Situation (data trending)

1. How much energy is consumed by the whole facility,
2. What systems or individual pieces of equipment are the major energy hogs,
3. How much energy are these components consuming,
4. When are they consuming the energy.



DENT Instruments, Inc.

*Delivering Innovation and Excellence To Energy
Professionals Around The World*



DENT Instruments, Inc.

Tools For The Energy Professional

- **ELITE***pro*[™]
- **DATA***pro*[™]
- **LIGHTING***logger*[™]
 - **MAG***logger*[™]
 - **CT***logger*[™]
 - **PLUG***logger*[™]

ELITE^{pro}



Designed To Perform

- Load Profiling on critical panels and switchgear,
 - Sub-Metering tenants, process lines, etc.
- Measurement & Verification for capital upgrades,
 - Energy Surveys to determine demand profiles,
 - Demand & Power Metering to view physical characteristics of delivered electricity,
 - Substantiate energy savings.

ELITE*pro*

Measure – Store – Analyze:

Volts,

Amps,

Watts,

Volt-Amps,

Volt-Amps Reactive,

Kilowatts,

Kilowatt Hours, and

Power Factor.

ELITE*pro*

- **Four channels of Current up to 6000 amps.**
- **Three channels of Voltage 0-600V ac or dc.**
- **Power Quality Features:**
 1. **View voltage, current & power waveforms,**
 2. **Calculate harmonics through 63rd,**
 3. **Report total harmonic distortion (THD), Crest Factor & Peak Voltage & Current.**

ELITE*pro*

- **Monitor Simultaneously;**
 - 1. Up to four single-phase loads, or**
 - 2. Two three-phase Delta loads, or**
 - 3. One three-phase Wye load.**

A total of 144 separate measurement parameters.

ELITE*pro*

- **Powered by internal battery or external power transformer.**
- **Internal memory to 25,000 or 100,000 records.**
- **Sampling Rates;**
 1. **Waveform Sampling – 128 times per cycle,**
 2. **Analog Sampling Rate – 3 sec's on DC power, 1 min. on battery,**
- **Communication Options;**
 1. **Direct serial connection,**
 2. **Ethernet (wired or wireless),**
 3. **Land or Cellular phone lines.**

ELOG Software Features

Logger Set Up Table

STable1

← Back Next → Send to Logger

Setup Table Device Type: ELITEpro

Setup Table Description: [Empty]

Line Frequency: 60 Hz

Integration Period: 15 Minutes

Logging

Start: Immediately

Date (mm/dd/yy): 02 / 05 / 03

Time (hh:mm:ss): 15 : 31 : 00

Stop: Never (Ring Memory)

When Memory Is Full

Date (mm/dd/yy): 02 / 05 / 03

Time (hh:mm:ss): 15 : 31 : 00

Calculated Days Until Memory Exhausted

Standard Memory Option: 426 Days 15.92 Hours

High Memory Option: 1777 Days 18.58 Hours

ELOG Software Features

Channel Setup

1 to 4 Power Channels
2 Power Sum Channels

ELOG 2004 - [STable1]

File Edit View Logger Tools Data Window Help

Back Next Send to Logger View Typical Setup

Channel	Name	VHi	VLo	PT	CT	Volts	Amps	KW	KVA	PF	KVAR	Notes
Channel 1	Chiller A	L1	N	1.0000	100.000	A	A,N,X,H	H				Channel 1 Notes
Channel 2	Chiller B	L2	N	1.0000	100.000	A	A,N,X,H	H				Channel 2 Notes
Channel 3	Chiller C	L3	N	1.0000	100.000	A	A,N,X,H	H				Channel 3 Notes
Channel 4	Off											
Channel 5	Bldg.12 All Chillers	Combine Channels				Volts	Amps	KW	KVA	PF	KVAR	Channel 5 Notes
		1,2,3				A	A,N,X,H	H				
Channel 6	Off											

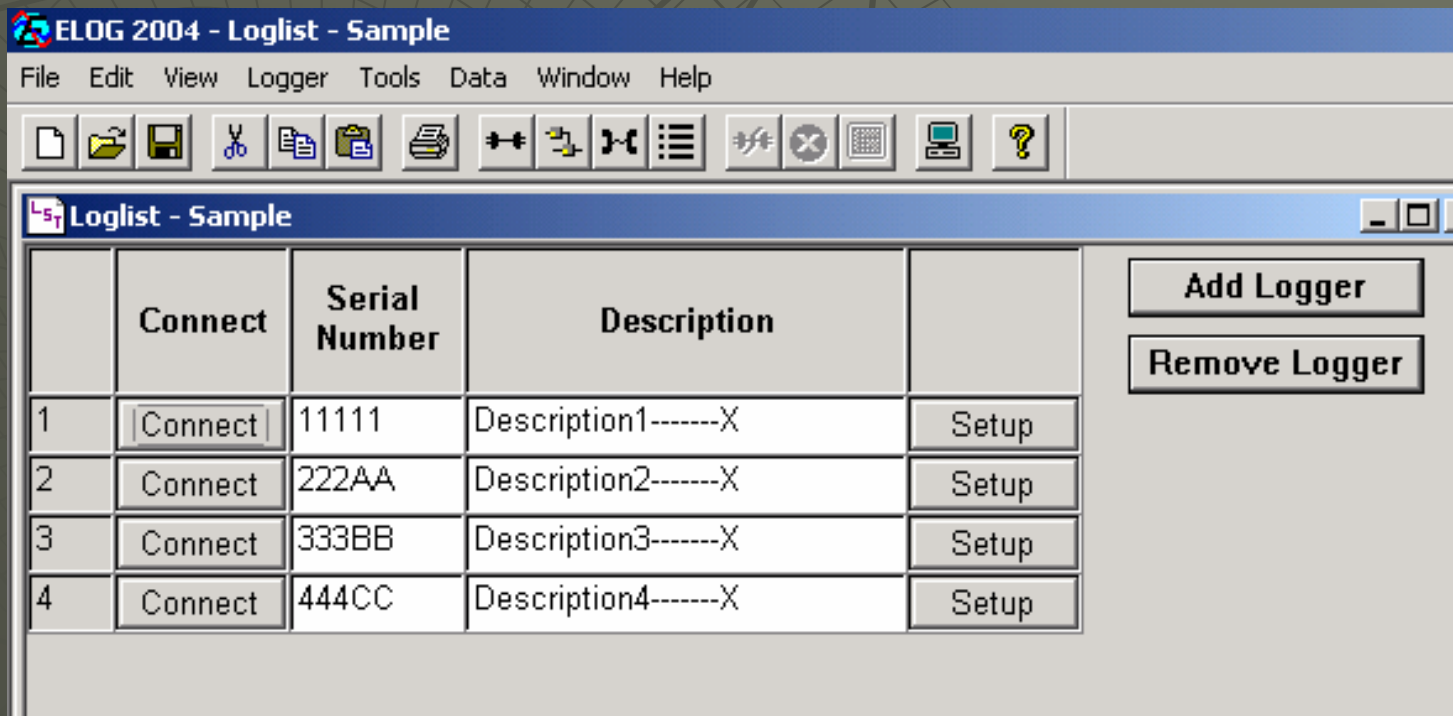
Context Menu for Channel 5 KW:

- Average
- Minimum
- Maximum
- KWh

ELOG Software Features

Communication

Logger List for networks with multiple loggers



ELOG Software Features

Display Present Readings

Instantaneous Channel Values

Serial Number: 00106 Description: DENT ELITEpro EPROM Ver: IL400.047

CH	Channel Type	Channel Values					
1	POWER	111.6 V	12.07 A	1.346 kW	1.348 kVA	1.00 PF	-0.004 kVAR
2	POWER	111.6 V	12.21 A	1.360 kW	1.362 kVA	1.00 PF	-0.030 kVAR
3	Off						
4	Off						
5	POWER SUM	111.6 V	24.28 A	2.705 kW	2.710 kVA	1.00 PF	-0.034 kVAR

Line Frequency: 60.00 Hz ■ = Parameter Logged ■ = Parameter Alarm Display Update: ON

Memory Remaining: 1.07 Days Battery State: Ext Power Logger Date: 02/21/97 Logging Is: On Sampling

Memory Used: 0.2% Battery Volts: Ext Power Logger Time: 22:59:18 Memory Type: Linear Integration Period: 15 Seconds Exit

Extract A Range of Data

Save a Range of Data [X]

Existing Date/Time Limits

File Starts: 6/14/99 10:15:00

File Ends: 7/20/99 21:45:00

Save Date/Time Limits

Format: mm/dd/yyyy hh:mm:ss

New Start: 6 / 14 / 99 at 10 : 15 : 00 Midnight

New End: 7 / 20 / 99 at 21 : 45 : 00 Midnight

OK Cancel

Save a Range of Data [X]

Select the range of records you want to extract and save

File Record Range: 1 to 3503

New Record Range: 1 to 3503

OK Cancel

ELOG Software Features

Viewing A Data File

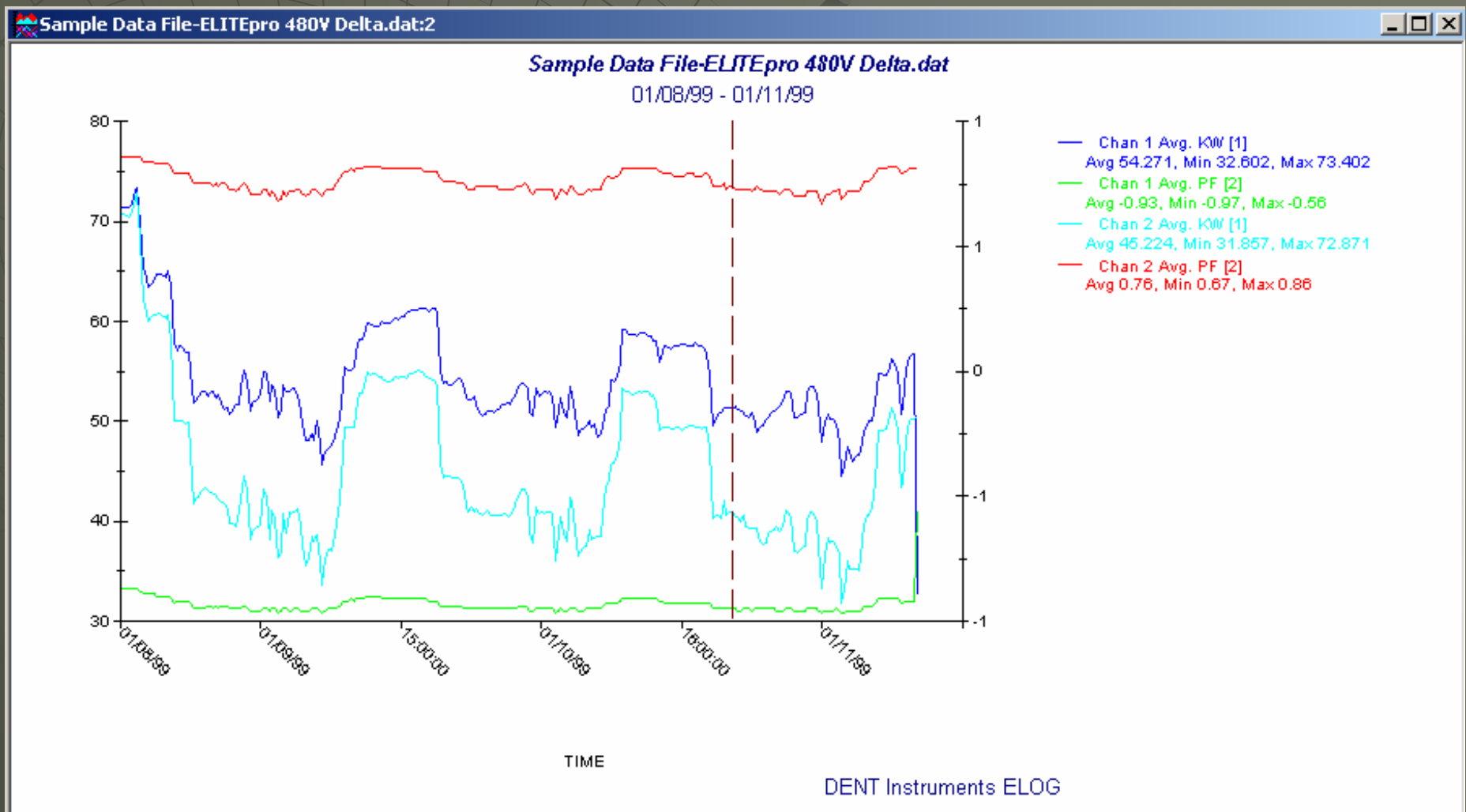
	Record Date	Record End Time	Chan 1 Avg. Volt	Chan 1 Avg. Amp	Chan 1 Avg. KW	Chan 2 Avg. Am
1	06/14/99	10:15:00	227.9	198.75	11.196	221.58
2	06/14/99	10:30:00	228.1	191.74	11.310	224.82
3	06/14/99	10:45:00	230.4	216.91		
4	06/14/99	11:00:00	225.7	217.90		
5	06/14/99	11:15:00	226.4	218.89		
6	06/14/99	11:30:00	231.3	218.62		
7	06/14/99	11:45:00	221.6	226.65		
8	06/14/99	12:00:00	230.1	223.47		
9	06/14/99	12:15:00	229.4	228.90		
10	06/14/99	12:30:00	228.5	241.45		
11	06/14/99	12:45:00	231.9	238.75	14.645	246.94

Analysis Functions

- Average
- Load Factor
- Maximum
- Minimum
- Total
- Graph
- Daily Profile Graph
- Daily Profile Data Points
- Extract a Range of Data

ELOG Software Features

Create A Graph



Data File Summary

Data File Name: 00000-01.dat
First Data Record End Time: 02/02/04 12:55:15
Last Data Record End Time: 02/02/04 12:58:30
Monitoring Period Duration: 0.00 day
Peak Demand: 277.002kW on Monday 02/02/04 at 12:55:00
Total Usage (Channel 5): 11kWh, 15kVAh, 0kVARh
Total Usage (Channel 6): 0kWh

Average	Maximum (Date Time)	Minimum (Date Time)	Total
-----	-----	-----	-----
Chan 1 Avg. KW 112.373	151.521 (02/02/04 12:55:30)	98.160 (02/02/04 12:58:15)	1573.228
Chan 1 Avg. PF 0.75	0.76 (02/02/04 12:58:15)	0.73 (02/02/04 12:55:30)	10.52
Chan 2 Avg. KW 113.959	153.113 (02/02/04 12:55:15)	99.800 (02/02/04 12:56:30)	1595.427
Chan 2 Avg. PF 0.75	0.77 (02/02/04 12:57:45)	0.73 (02/02/04 12:55:30)	10.53
Chan 5 KW Hours 0.943	1.269 (02/02/04 12:55:30)	0.825 (02/02/04 12:58:15)	13.204
Chan 5 Avg. KVA 301.104	416.661 (02/02/04 12:55:30)	259.440 (02/02/04 12:58:15)	4215.459
Chan 5 KVAR Hours 0.068	0.075 (02/02/04 12:56:45)	0.053 (02/02/04 12:55:30)	0.958

Setup Summary

Setup Table Description:

Channel 1 - Power: VHi: L1, VLo: N; PT = 100.000; CT = 150.000

Channel 2 - Power: VHi: L1, VLo: N; PT = 100.000; CT = 100.000

Channel 5 - Power Sum: 1,2

Memory Type: Ring

Line Frequency: 60 Hz

Integration Period: 15 Seconds

Channel 5 Peak kW Demand Window: Moving, Width = 1 minutes

Logger Summary

Logger Description Line: DENT ELITEpro Logger

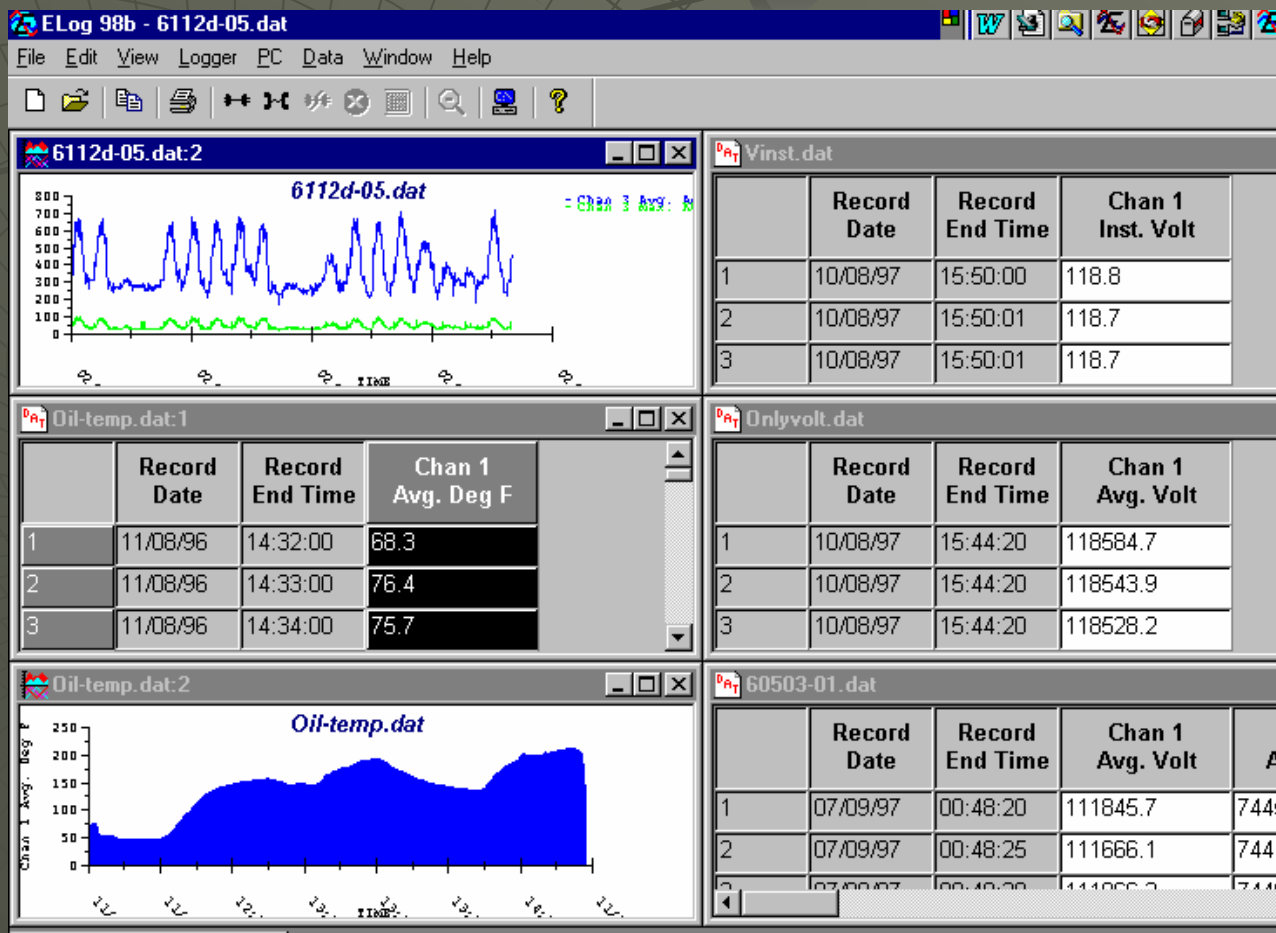
Logger Serial Number: 00000

Logger type: ELITEpro

Firmware Version: IL400.057

ELOG Software Features

Multiple Window Display



PROVEN APPLICATIONS

- University of Illinois
 - U.S. Navy – Fleet Operations
 - Newark Transit Authority
 - Jefferson County School District, Denver CO.
 - Ft. Lewis Army Base
 - Conoco-Phillips
 - Black Hills Power, South Dakota
 - Trane, Global Controls & Contracting Division
 - University of Washington
 - TXU
 - Lawrence Livermore National Labs
 - E & J Gallo Winery
 - Bonneville Power Administration
 - Pacific Gas & Electric
-

DATA^{pro}

We Don't Make The Sensors You Use
– We Make The Sensors You Use
Smarter.



DATA*pro*

All DATApros Have 4 Input Channels To Fit A Variety of Measurement Applications;

- 1T/3P 1- temperature channel & 3 pulse counters,
- 2T2P 2- temperature channels & 2 pulse counters,
- 4T 4- temperature channels,
- 4C 4- AC current measurements,
- 4M 4- 0-25ma or 4-20ma inputs,
- 4V 4- 0-10Vdc inputs,
- 4P 4- pulse counters.

DATApro Software Features

For Temperature & Pulse Loggers

(Models 1T/3P, 2T2P, 4T, 4P)

Channel 1	Name	Slope	Offset	Units	Record	Channel 1 Notes
Temperature	Sample Temperature	1.0000	0.0000	Fahrenheit	A	

Channel 2	Name	Sensor	Scale	Units	Record	Channel 2 Notes
Contact/Pulse	Sample Pulse Counter		1.0000		C	

DATApro Software Features

For 4-20 and 0-25ma Loggers
(Model 4M)

Channel 1	Name	Sensor	Slope	Offset	Units	Record		Channel 1 Notes
4 - 20mA	4-20 mA Sensor		1.0000	0.0000	Units	A		

Channel 2	Name	Sensor	Slope	Offset	Units	Record		Channel 2 Notes
0 - 25mA	0-25 mA Sensor		1.0000	0.0000	Units	A		

DATApro Software Features

For AC Current Loggers
(Model 4C)

Channel 1	Name	CT	Record		Channel 1 Notes
Current 	AC Current	100.00	A		

DATApro Software Features

For DC Voltage Loggers
(Model 4V)

Channel 1	Name	Sensor	Slope	Offset	Units	Record	 Channel 1 Notes
0 - 10Vdc	0-10 Vdc Sensor	Any	1.0000	0.0000	VoltsDC	A	

PROVEN APPLICATIONS

- Siemens Building Technologies
 - Sea-Tac Airport, Seattle
 - Kema / Xenergy
 - Los Angeles Department of Water & Power
-

SMARTloggers

Single Channel, On-Off
Data Loggers

Time-Of-Use and
Operating Schedule
Information



SMART*loggers*

Three Models

- **LIGHTING***logger*, Model TOU-L for monitoring lights.
- **MAG***logger*, Model TOU-M for monitoring electric motors, compressors, computers, or any device generating a magnetic field.
- **CT***logger*, Model TOU-CT-S for monitoring electric load status using a clamp-on probe.

SMART *loggers*

FEATURES

- **Ease of Installation, no wires to connect.**
- **No Electrical Knowledge Necessary to install.**
- **No computer needed for set-up.**
- **Easy to use software for analysis and graphing.**
- **Largest Internal Memory in Industry, 8,192 transitions.**
- **Longest battery life in industry, 10 years.**
- **Built-in durability with a 3 year warranty.**

SMARTware Software

Features

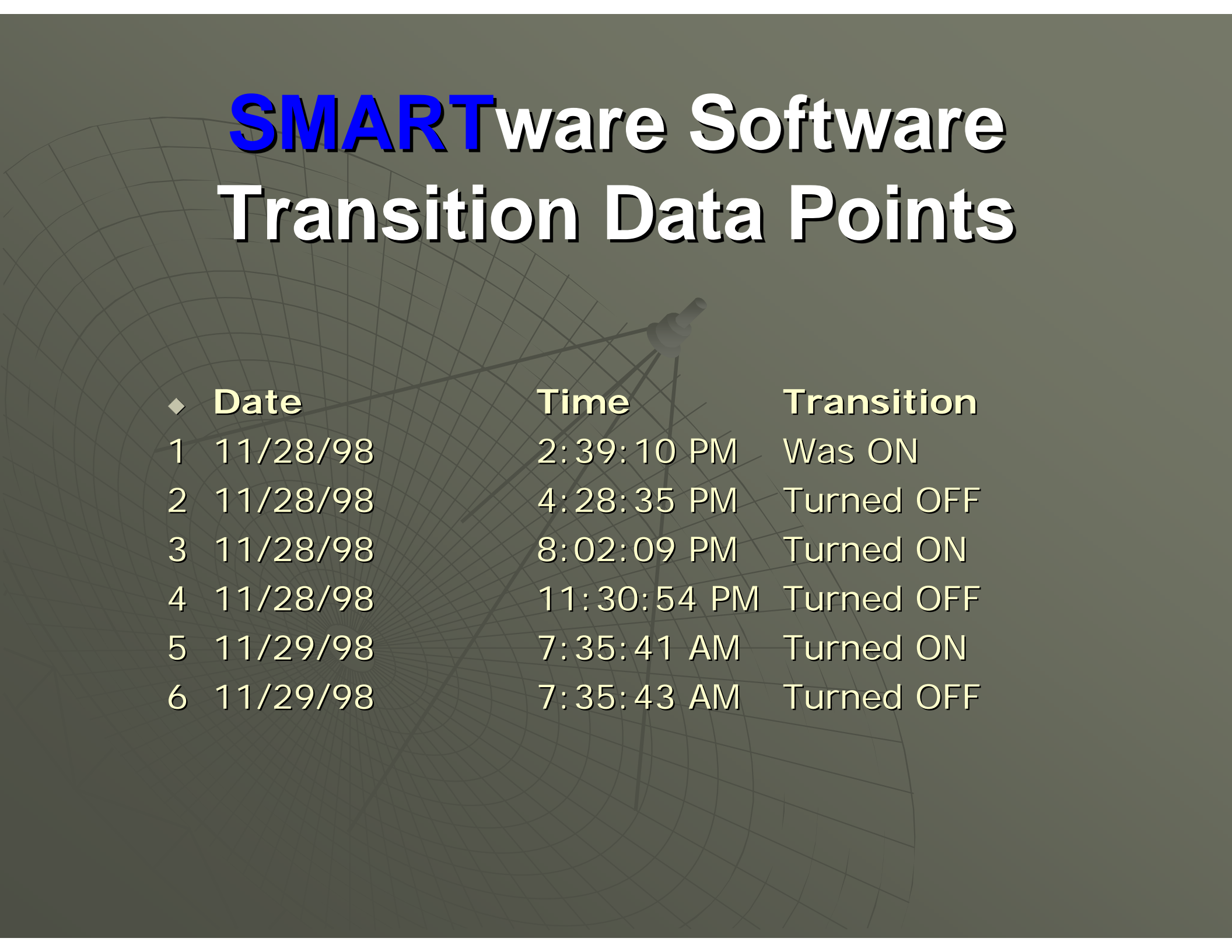
- ◆ Windows Based,
- ◆ Graphically displays recorded data,
- ◆ Total On-Time Rate Schedule Graphs and Summaries,
- ◆ Load Profile Graphs,
- ◆ Summary Statistics and Time Series Analysis,
- ◆ File Aggregation,
- ◆ Data File Exporting.

SMARTware Software

Example of Summary Report

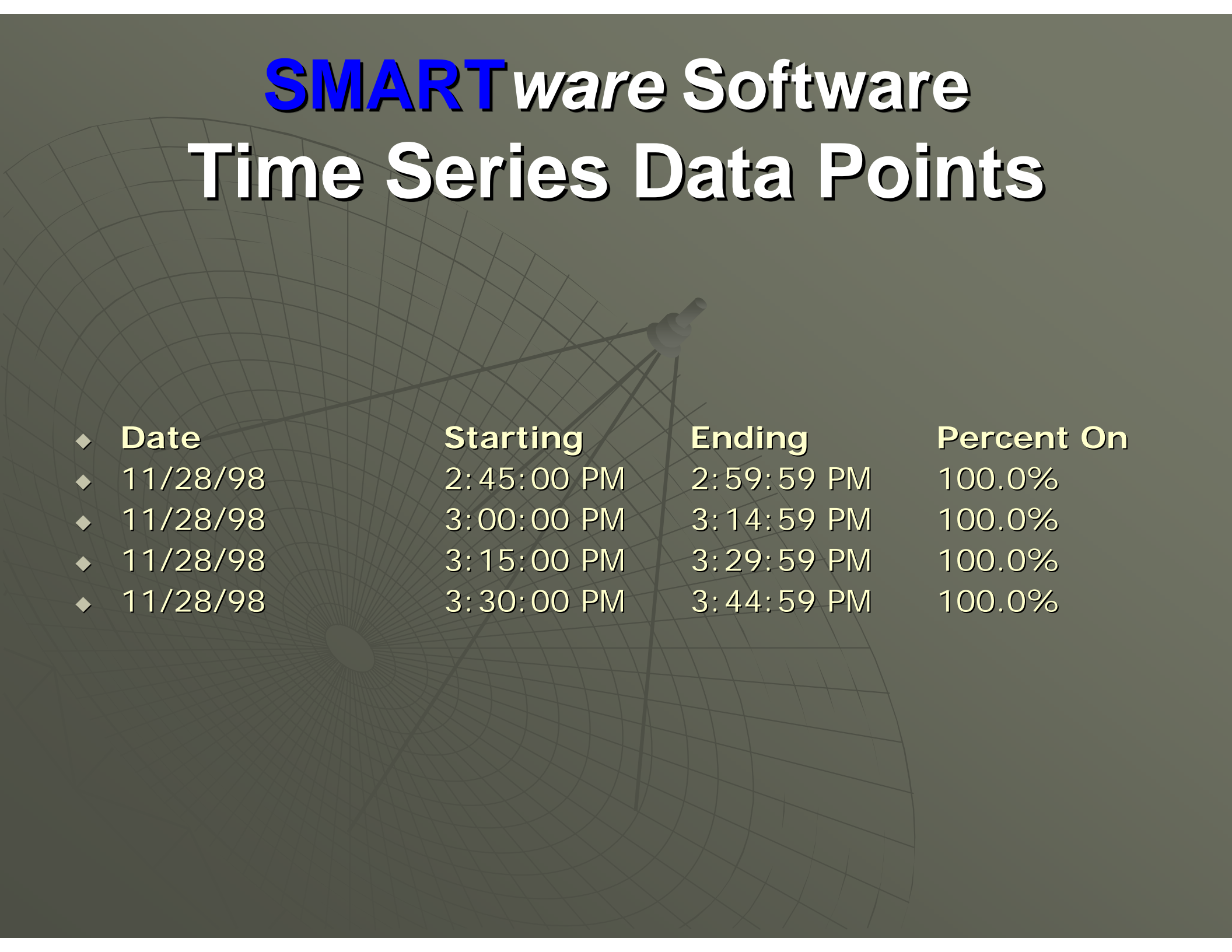
◆	Data File Name:	F:\Data\40131001.log
◆	Logger Serial Number:	930922-364
◆	Description:	Television
◆	Logger Reset:	11/28/98 2:39:10 PM
◆	Data Starts:	11/28/98 2:39:10 PM
◆	Data Ends:	1/31/99 7:20:13 PM
◆	Total Elapsed Time:	1540.68 hrs
◆	On-Time since Reset:	582.5 hrs
◆	Number of Turn-Ons:	216
◆	Percent On:	37.8 %
◆	Total On-Time:	582.56 hrs
◆	Average On-Time:	2.70 hrs
◆	Longest On-Time:	14.53 hrs
◆	Shortest On-Time:	< 0.01 hrs
◆	Number of Turn Off's:	215
◆	Percent Off:	62.2 %
◆	Total Off-Time:	958.12 hrs
◆	Average Off-Time:	4.46 hrs
◆	Longest Off-Time:	69.69 hrs
◆	Shortest Off-Time:	< 0.01 hrs

SMARTware Software Transition Data Points



◆	Date	Time	Transition
1	11/28/98	2:39:10 PM	Was ON
2	11/28/98	4:28:35 PM	Turned OFF
3	11/28/98	8:02:09 PM	Turned ON
4	11/28/98	11:30:54 PM	Turned OFF
5	11/29/98	7:35:41 AM	Turned ON
6	11/29/98	7:35:43 AM	Turned OFF

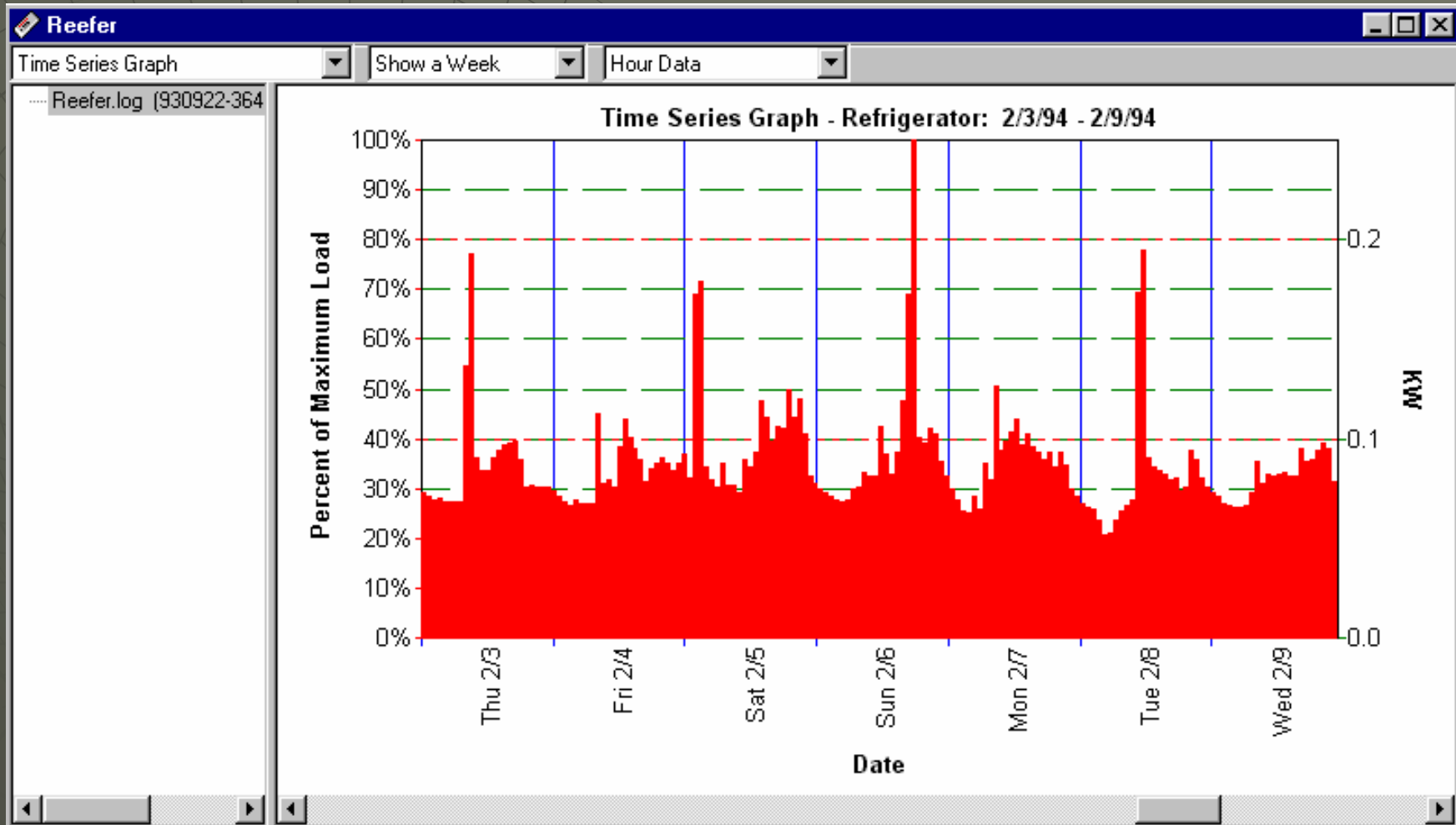
SMARTware Software Time Series Data Points



◆ Date	Starting	Ending	Percent On
◆ 11/28/98	2:45:00 PM	2:59:59 PM	100.0%
◆ 11/28/98	3:00:00 PM	3:14:59 PM	100.0%
◆ 11/28/98	3:15:00 PM	3:29:59 PM	100.0%
◆ 11/28/98	3:30:00 PM	3:44:59 PM	100.0%

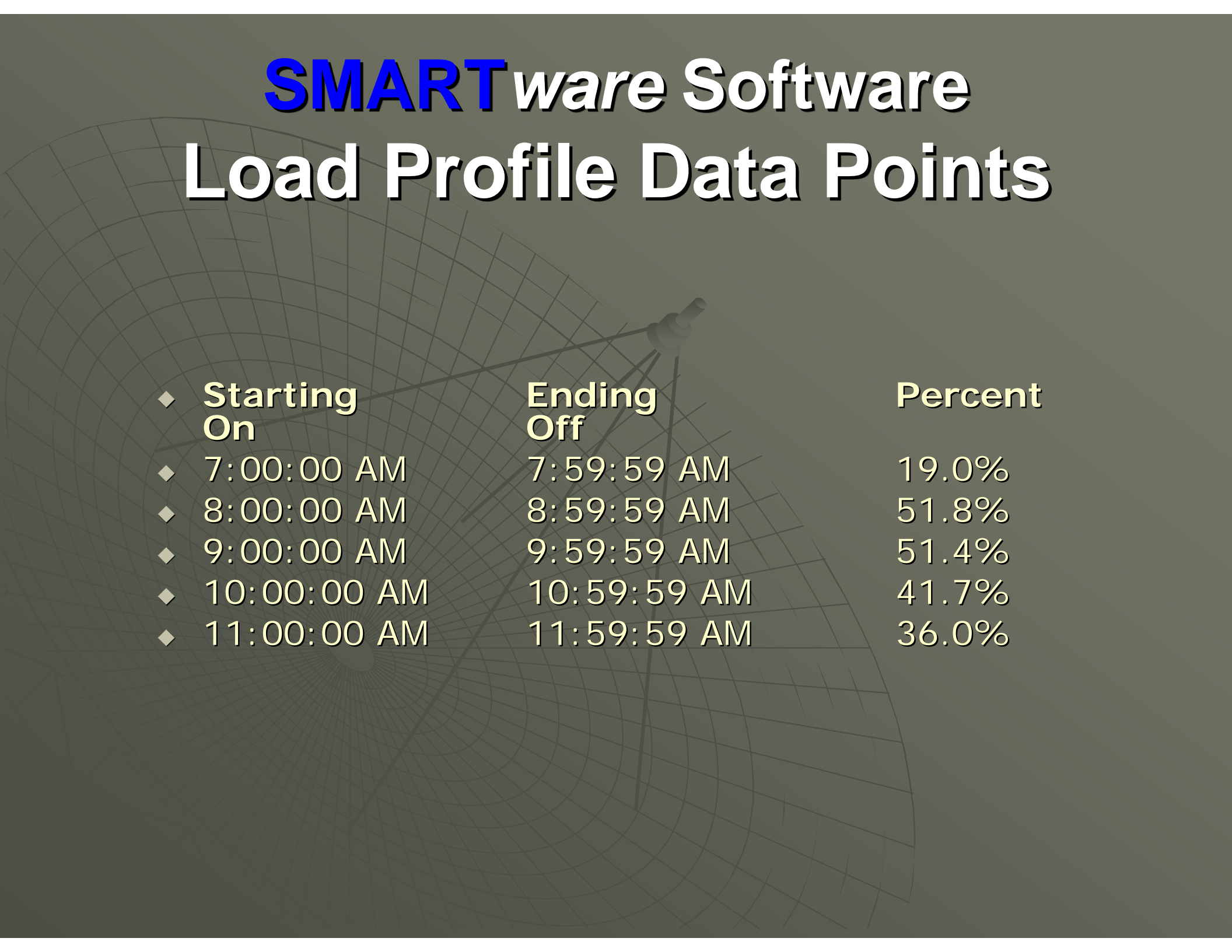
SMARTware

Time Series Graph



SMARTware Software

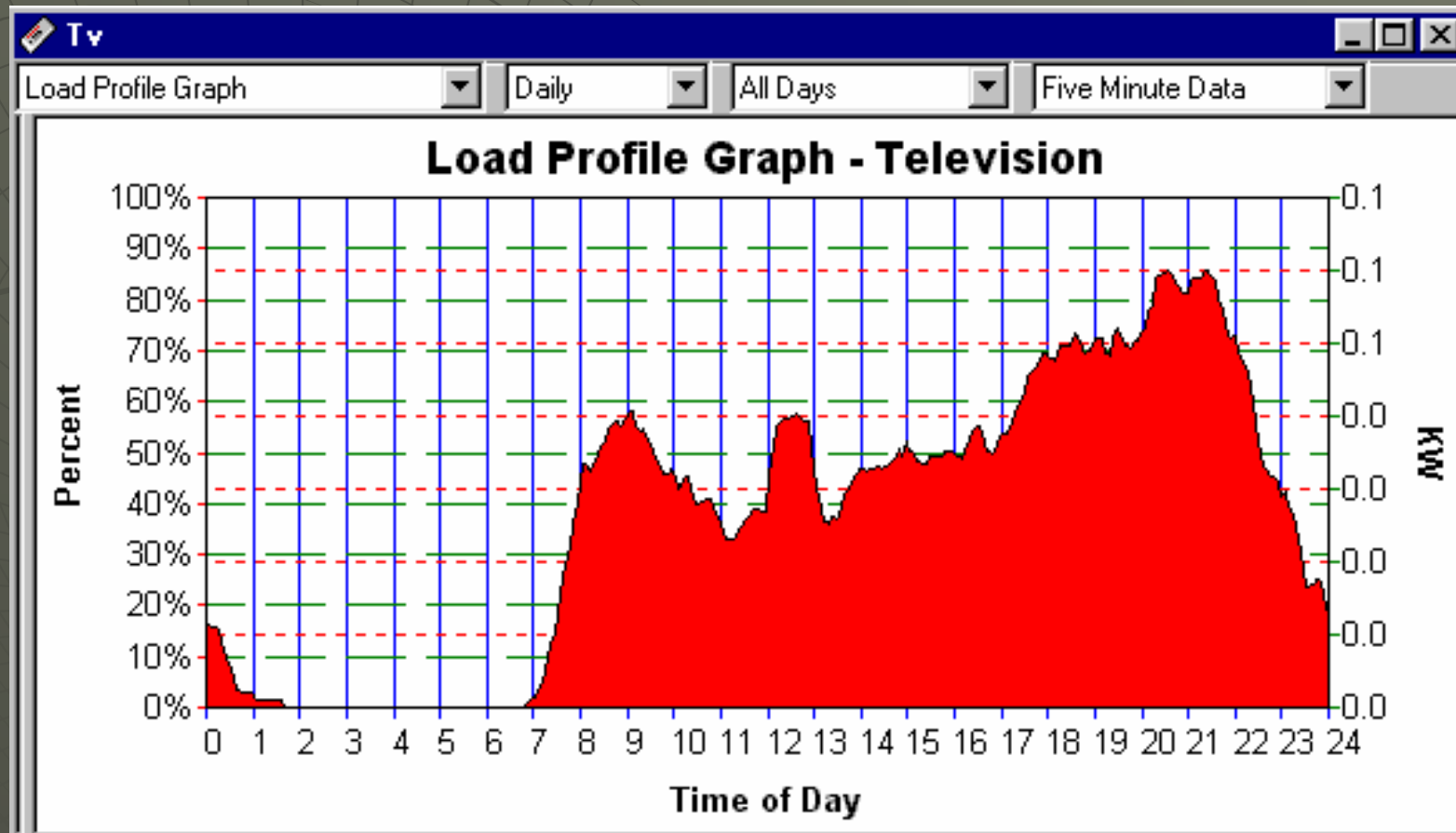
Load Profile Data Points



◆ Starting On	Ending Off	Percent
◆ 7:00:00 AM	7:59:59 AM	19.0%
◆ 8:00:00 AM	8:59:59 AM	51.8%
◆ 9:00:00 AM	9:59:59 AM	51.4%
◆ 10:00:00 AM	10:59:59 AM	41.7%
◆ 11:00:00 AM	11:59:59 AM	36.0%

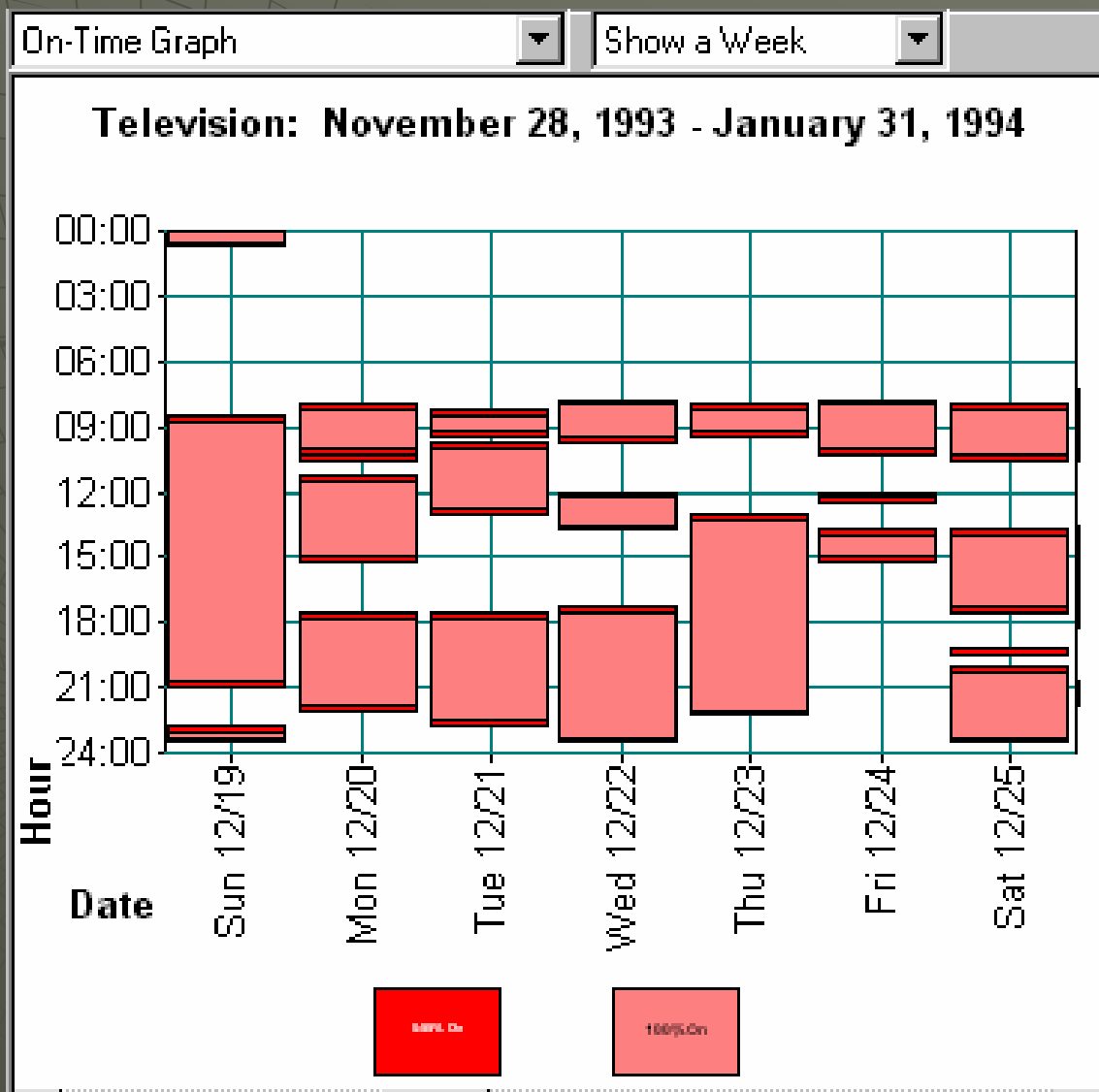
SMARTware

Load Profile Graph



SMARTware

On-Time Graph



PROVEN APPLICATIONS

- Cornell University
 - Xenergy
 - B.C. Hydro
 - Long Island Power Authority
 - Boeing
-

PLUGlogger



**Simple, Versatile, Compact & Convenient
Measurement of 110V Plug Loads**

**Total Energy Cost of The Load,
Look Ahead Predicted Average Monthly Energy
Cost,
Look Ahead Predicted Yearly Energy Cost,
Total Hours of Monitoring,
Line Voltage,
Current Draw of Load,
Power Draw in Watts,
Volt-Amps Drawn by The Load,
Displacement Power Factor,
Total Kilowatt-hours Consumed by The Load.**

PLUG*logger*

FEATURES

- **No Wires To Connect,**
- **Non-Volatile Flash Memory,**
- **Easy Reset,**
- **Settable Utility Rates,**
- **Compact,**
- **Durable Construction,**
- **Attractive Look.**

PROVEN APPLICATIONS

- ❑ State Community Action Programs
 - ❑ Florida Power & Light
 - ❑ Madison Gas & Electric
 - ❑ Milliken
 - ❑ Wright-Rundstad, Seattle
-



DENT Instruments, Inc.

- **Post Sales Support**
 - **Warranty**
 - **Tech Support**
 - **Factory Upgrades**
- **Software Enhancements**



DENT Instruments, Inc.

- **Seventeen Years Of Meeting The Needs Of Energy Professionals.**
- **Hundreds Of Long-Term Clients.**
- **Hundreds Of Peer Recommendations.**
- **Thousands of Instruments In The Field.**