Wireless and Mobile Computing Initiatives and PI

Gopal Gopalkrishnan(Kesler/OSIsoft)

Kesler Engineering is co-owned by OSIsoft

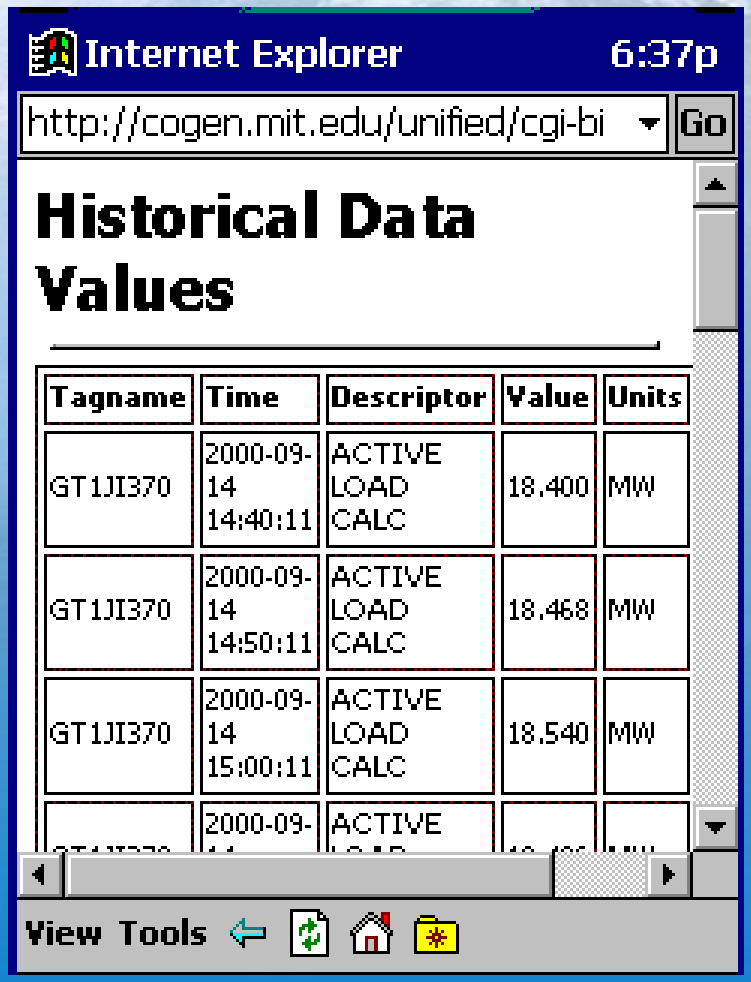
Presentation Topics

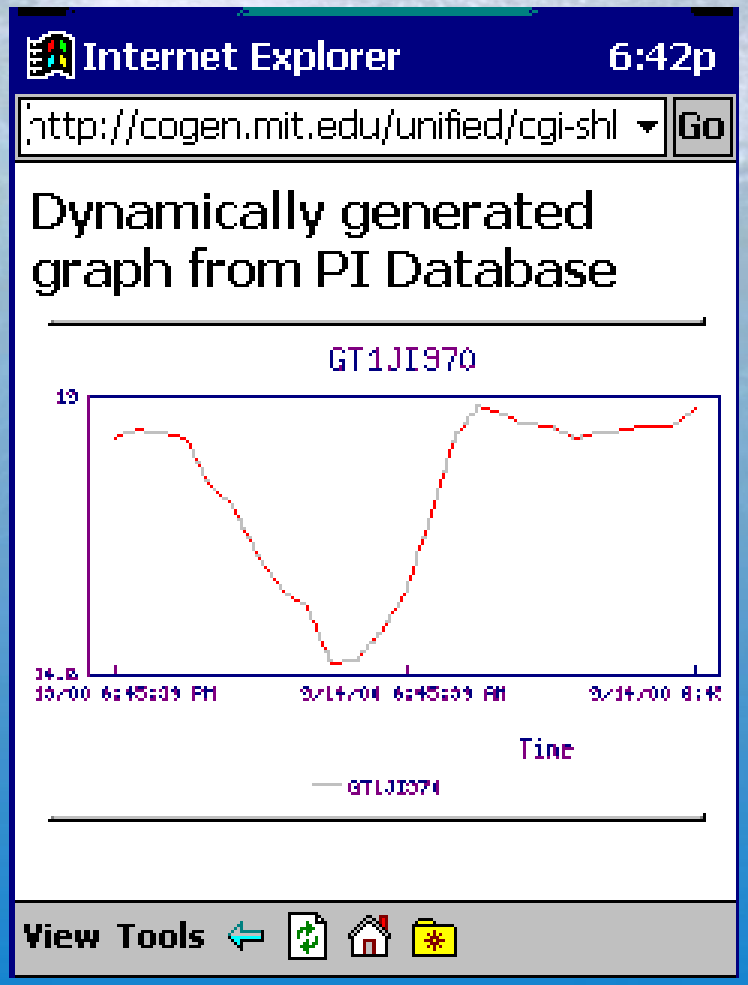
- Wireless and Mobile Computing
  - PI Data Collection
  - PI Data Display
  - Invite audience to share their wireless and mobile computing initiatives

Presentation Topics

- PI Data Collection
  - PDAs – with a cradle or fully wireless
    - PocketPCs, Win32 tablets, wearable computers (Win32 platforms)
      - » PI ManualLogger
- PI Data Display
  - PDAs, Cell Phones, Pagers - fully wireless
    - Auto-refreshing Trends/Graphics, tables
      - » PocketPI (PI-ICE and SVG based) for WinCE devices – currently at prototype stage
    - A few numbers or a small table, also trends as jpegs or gifs
      - » DevNet Download for Email notification or Pager alerts
      - » Samples are also available for HTML based displays or WML based WAP phones or mini-browsers

PI Display


Internet Explorer
6:37p
http://cogen.mit.edu/unified/cgi-bi
Go
Historical Data Values
Tagname | Time | Descriptor | Value | Units
GT1JI370 | 2000-09-14 14:40:11 | ACTIVE LOAD CALC | 18.400 | MW
GT1JI370 | 2000-09-14 14:50:11 | ACTIVE LOAD CALC | 18.468 | MW
GT1JI370 | 2000-09-14 15:00:11 | ACTIVE LOAD CALC | 18.540 | MW
View Tools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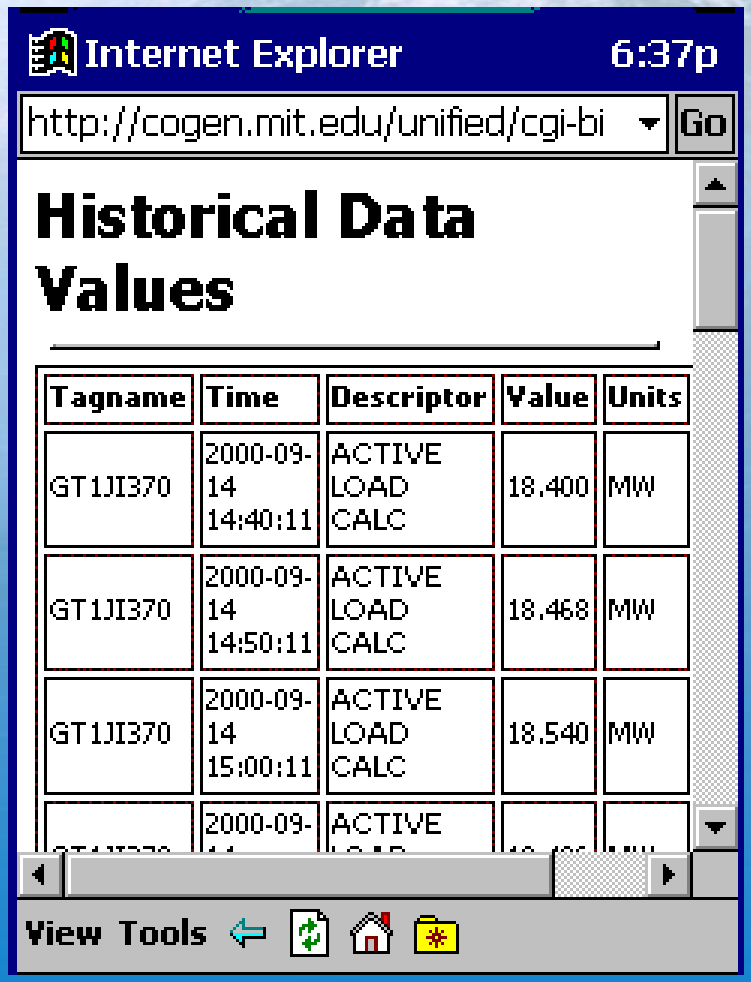
Dynamically generated graph from PI Database
GT1JI970
Time
GT1JI374
View Tools

PI Display


Internet Explorer
6:37p
http://cogen.mit.edu/unified/cgi-bi
Go
Historical Data Values
Tagname
Time
Descriptor
Value
Units
GT1JI370
2000-09-14 14:40:11
ACTIVE LOAD CALC
18.400
MW
GT1JI370
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ACTIVE LOAD CALC
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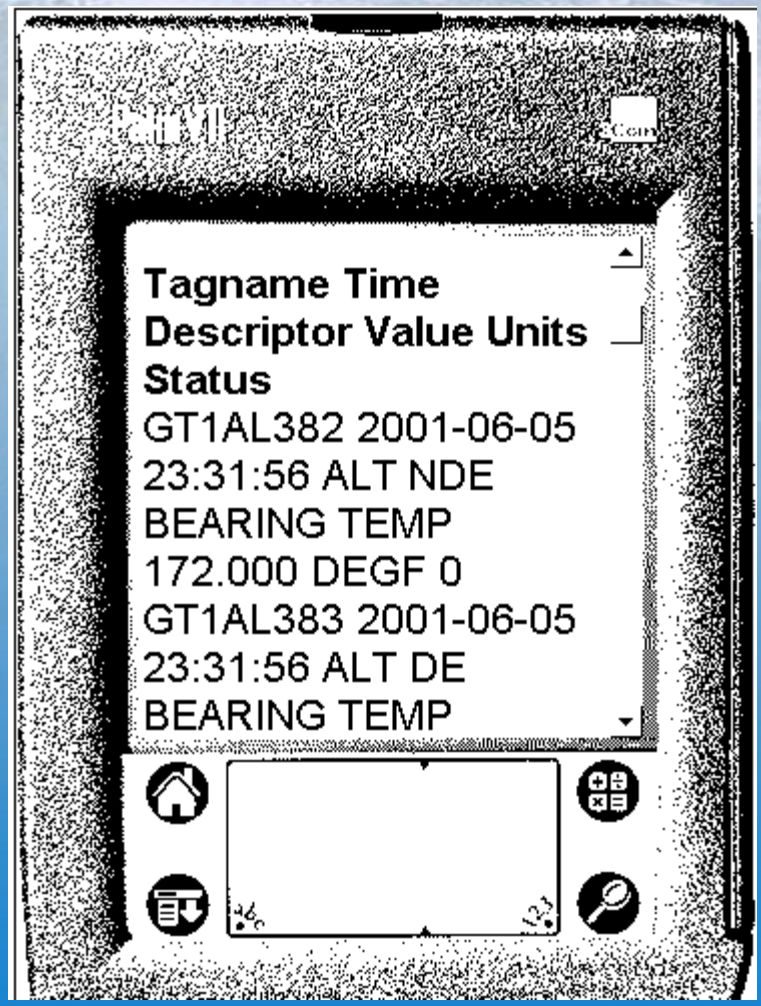
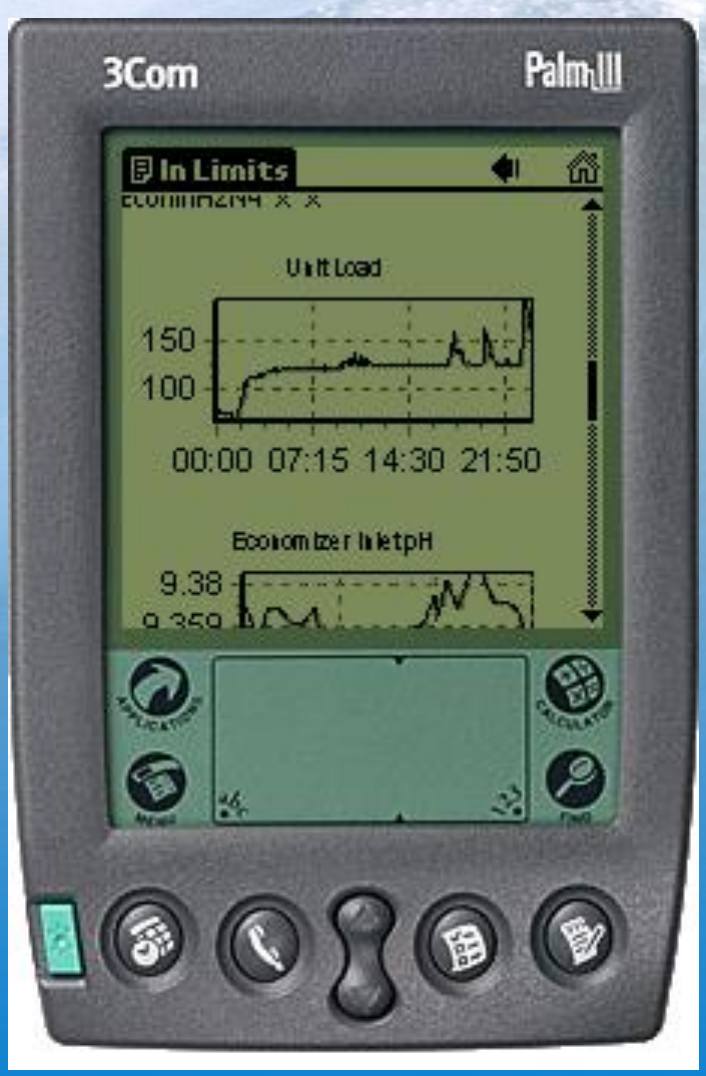
ACTIVE LOAD CALC
18.540
MW
2000-09-
ACTIVE
View Tools


Tagname Time
Descriptor Value Units
Status
GT1AL382 2001-06-05
23:31:56 ALT NDE
BEARING TEMP
172.000 DEGF 0
GT1AL383 2001-06-05
23:31:56 ALT DE
BEARING TEMP

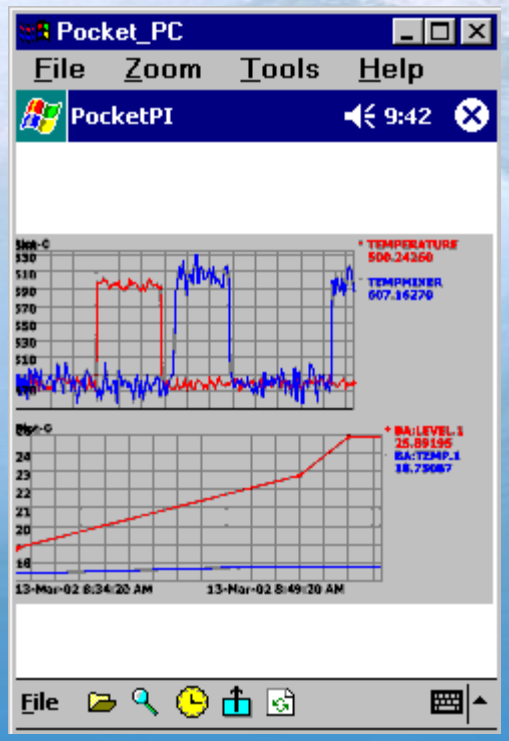
PI Display

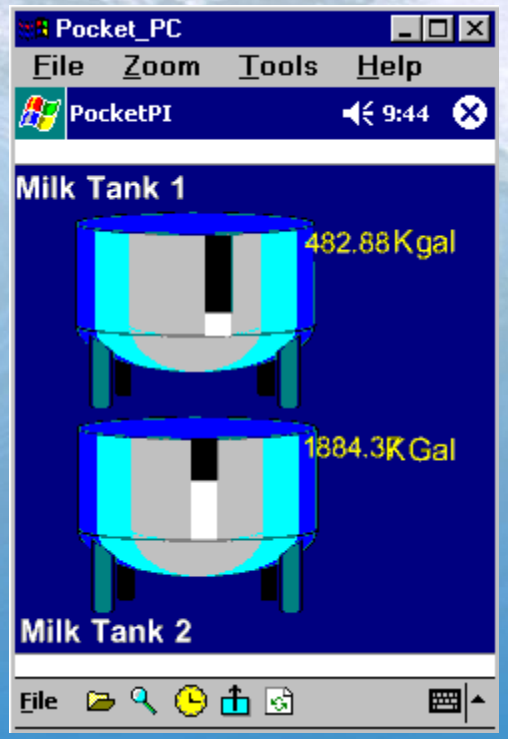


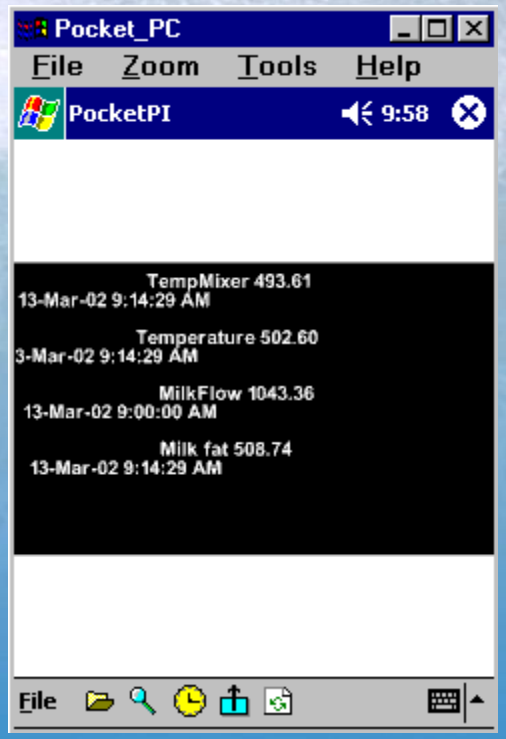
ASP script generated jpeg*

* Extract from Jacksonville Electric Authority UC2001 presentation

PI Display – ICE and PocketPI*







* PocketPI is currently in prototype stage

PI Data Collection : PI-Manual Logger

- Manual input data collection module for PI
  - **PI-ML-PC : PC based module**
  - **PI-ML-HHT : Optional hand-held interface module**

  The hand-held module supports data collection using portable hand-held terminals, including barcode scanners.

  You can also use a Windows based PC (tablet form-factor that are referred to as Mobile Data Terminals) as a handheld device to collect PI data

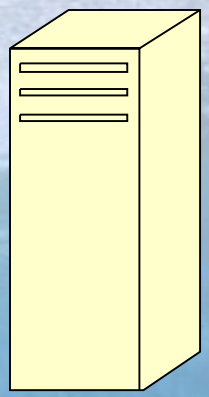
- PI-Manual Logger is a PI client application, similar to PI- ProcessBook and PI-DataLink

PI-ML Topology

PI Server

Handheld device running PIML-HHT

Desktop PC running PIML-PC



Wired LAN or Wireless LAN

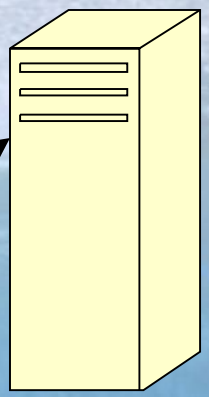
- Docking station with serial port
- Wired LAN or Wireless LAN
- InfraRed

PI-ML Topology (contd.)

PI Server

Handheld device running PIML-HHT

Desktop PC running PIML-PC



-Tour configuration
-Data Entry/Data Review
-Send to PI

-Download Tour configuration
-Data Entry
-Upload collected data
-Wireless devices allow a real-time link to a server

Data Entry methods

- Use a PC as a data entry station
  - Keyboard data entry
  - Import data from text files
  - Import data directly from lab instruments which support RS232 serial interface to a PC
- Use a hand-held device for data entry

You should consider PI-Manual Logger whenever manual intervention is required (data review/data validation) BEFORE data are sent to PI

Features

- Route based (also referred to as Tours)
  - A Tour is simply a group of Tags, and within a Tour, Tags can also be grouped by Equipment
- Data from operator logs, lab data, scanners, inspection data
- Data validation (during data-entry)
  - Validation limits can be PI tags AND can also be read from an external specs (targets) database using automation
- Display instructions to the user during data collection (can also be a URL)
- Display history (previous values from PI)

Features (continued)

- Automatic time-stamping of data
- Multi-user - data is visible to authorized users ***even before it goes to PI*** so that it can be reviewed and edited, if necessary
- Data review/edit by another person
- Multiple levels of security, especially writing data to PI

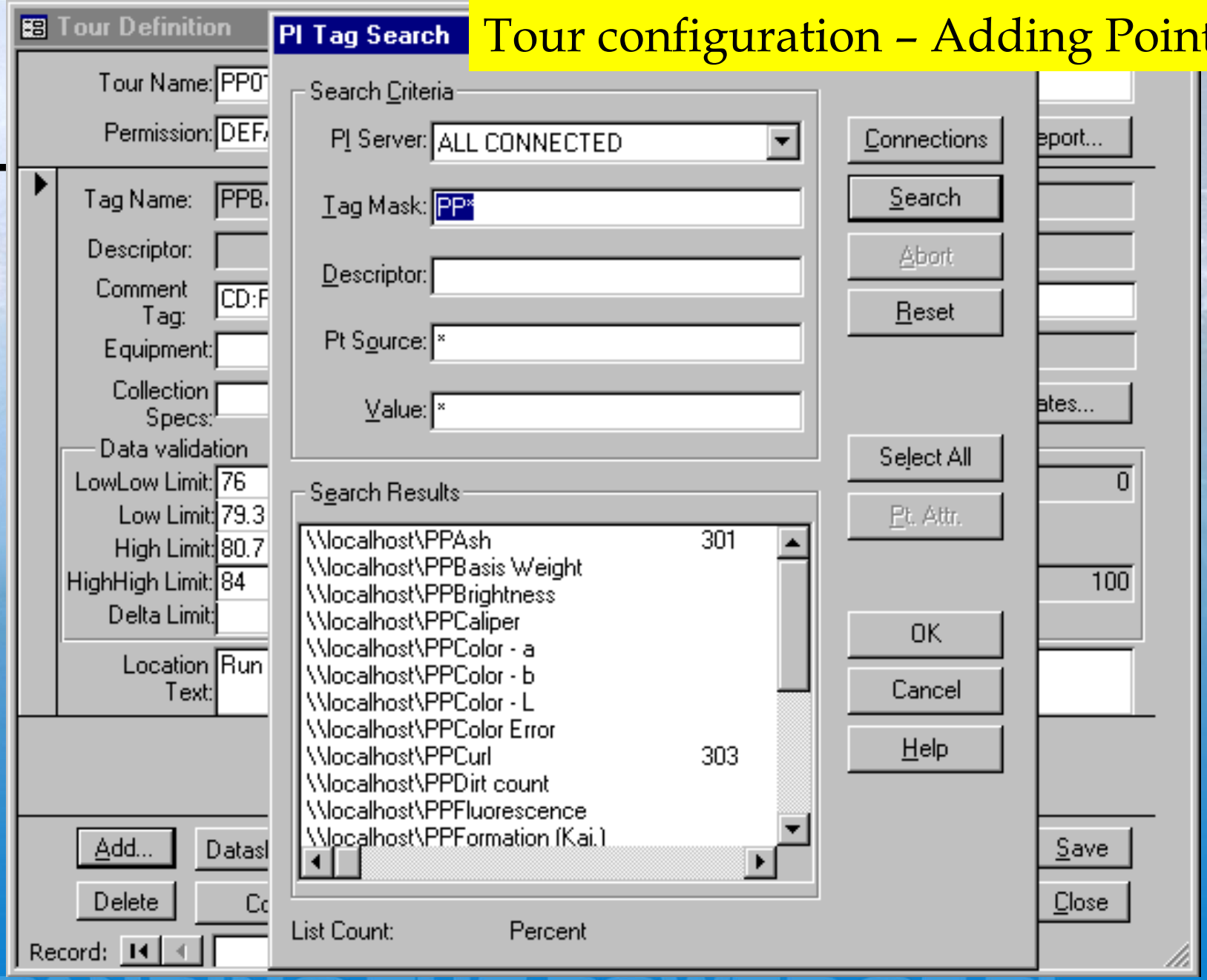
Additional Features – version 1.3

- Capture operator comments
- Built-in Tour management - every point carries with it information regarding when it has to be collected – for example, hourly rounds 9:00 am round, once a day PM shift, once a week Tuesday AM shift etc.
- Ability to group points in a Tour, say, by Equipment
- Ability to additionally use a barcode label for every point
- Use PIML's automation to customize the desktop PC screens for data entry

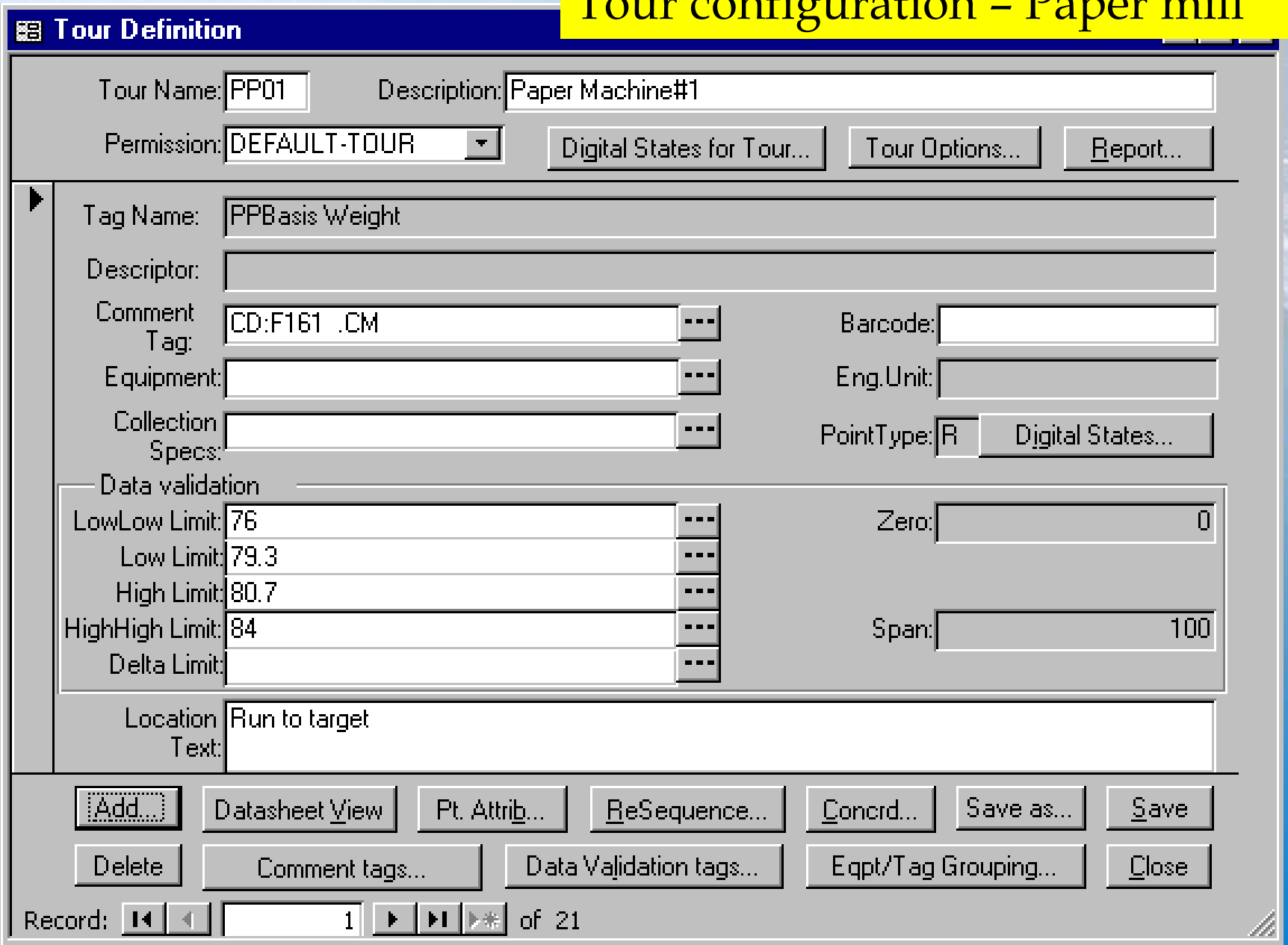
Additional Features – version 1.3 (continued)

- Extended PIML automation interface (Windows PC only)
  - Read validation limits from an external source
  - Customize Data Entry/Review screens
  - Custom data validation logic
  - Calculations using one or more data entries, optionally including data from the PI archive
  - Do as much as you want OR as little as a simple calculation to check that entries add up to 100% for a lab sample

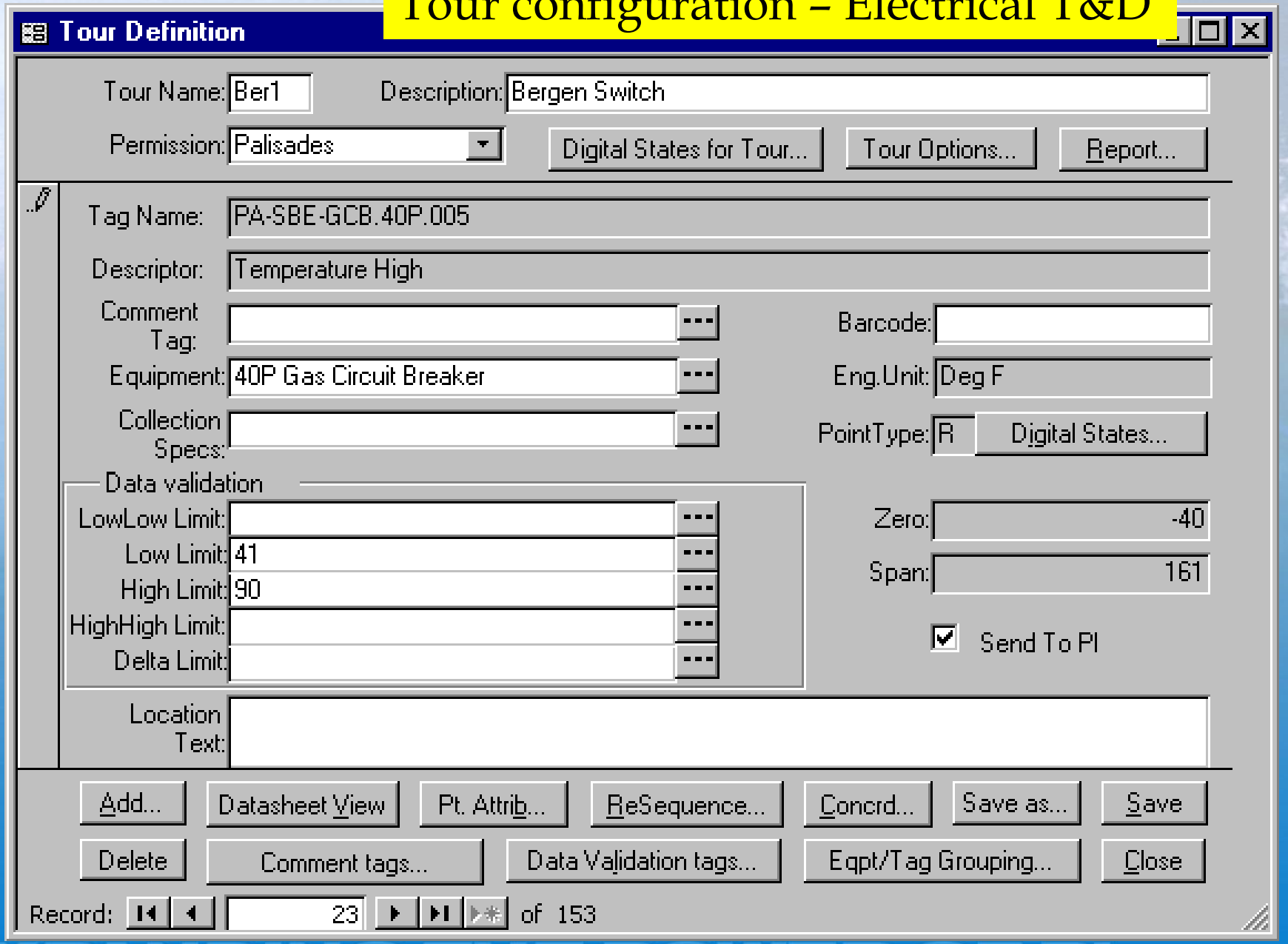
Tour configuration – Adding Points



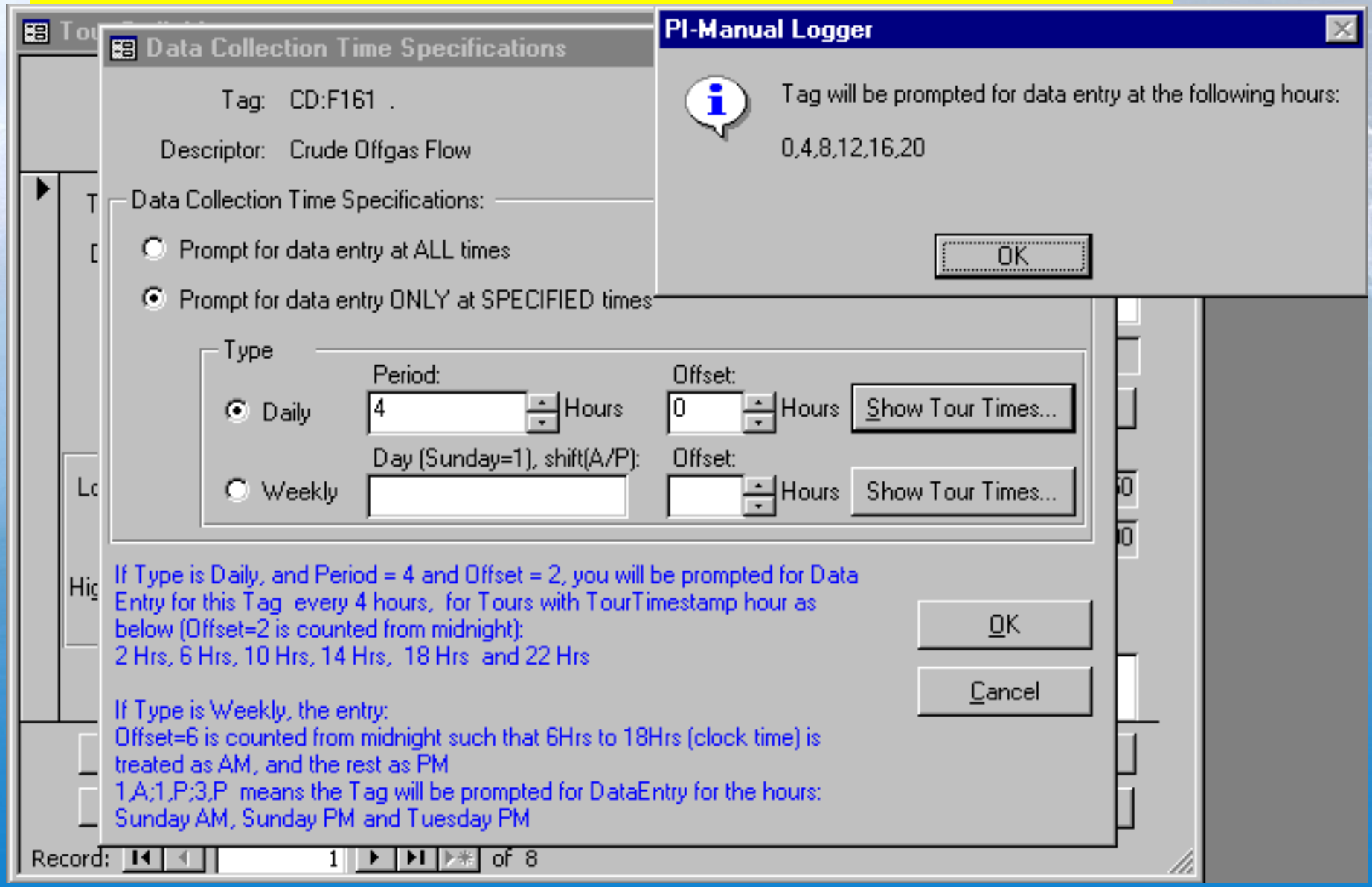
Tour configuration – Paper mill



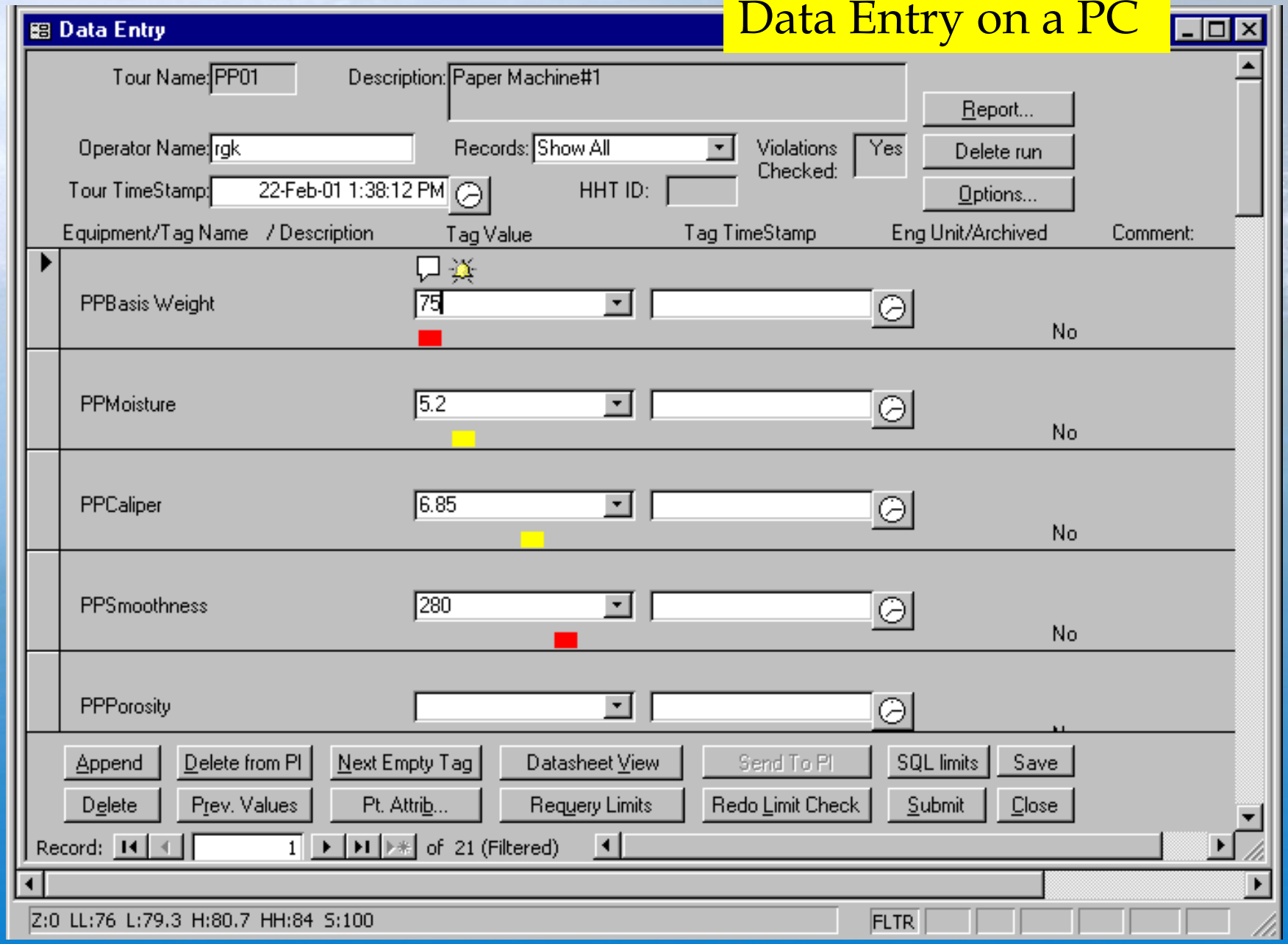
Tour configuration – Electrical T&D

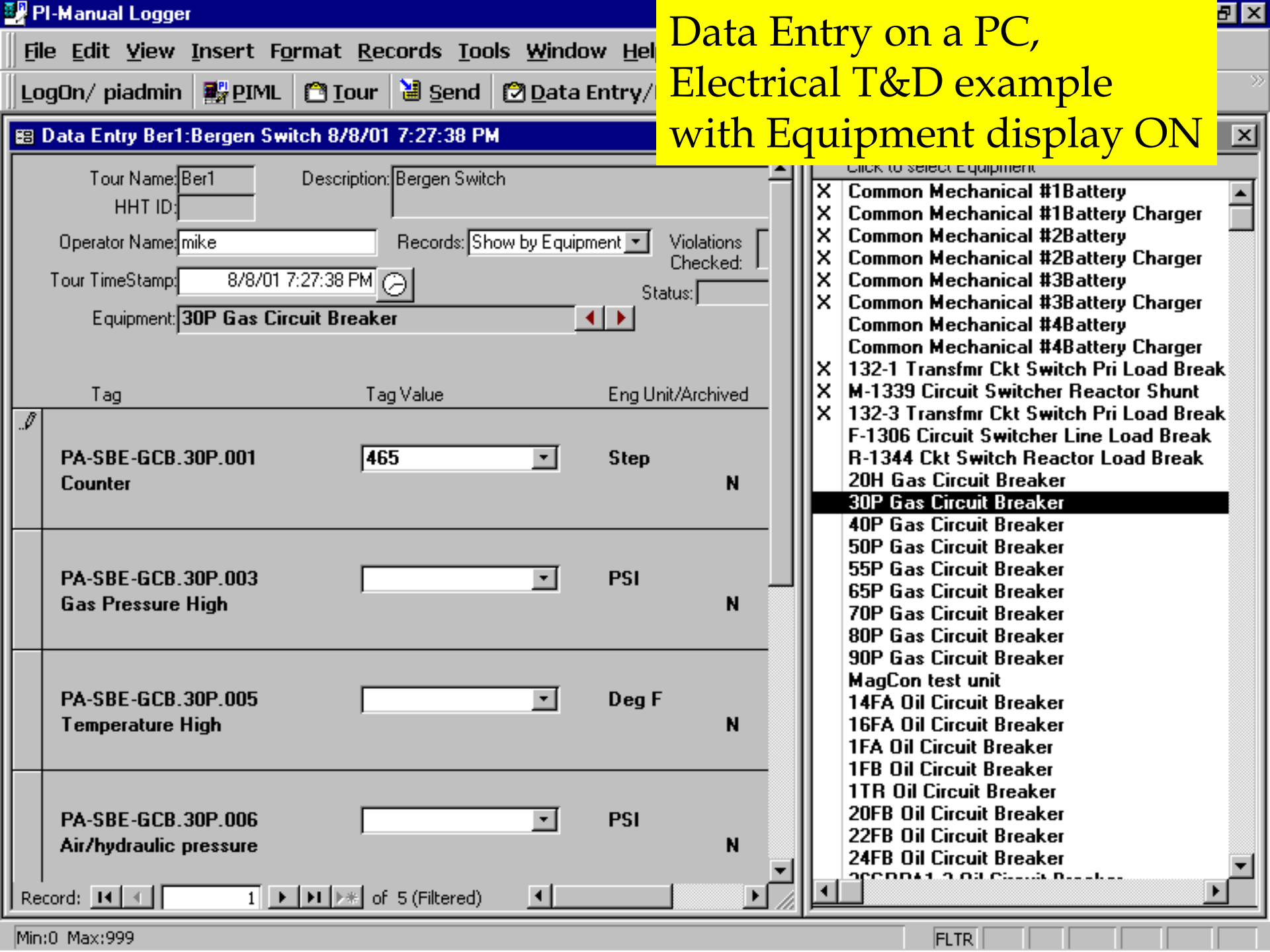


Tour configuration – Collection time specification

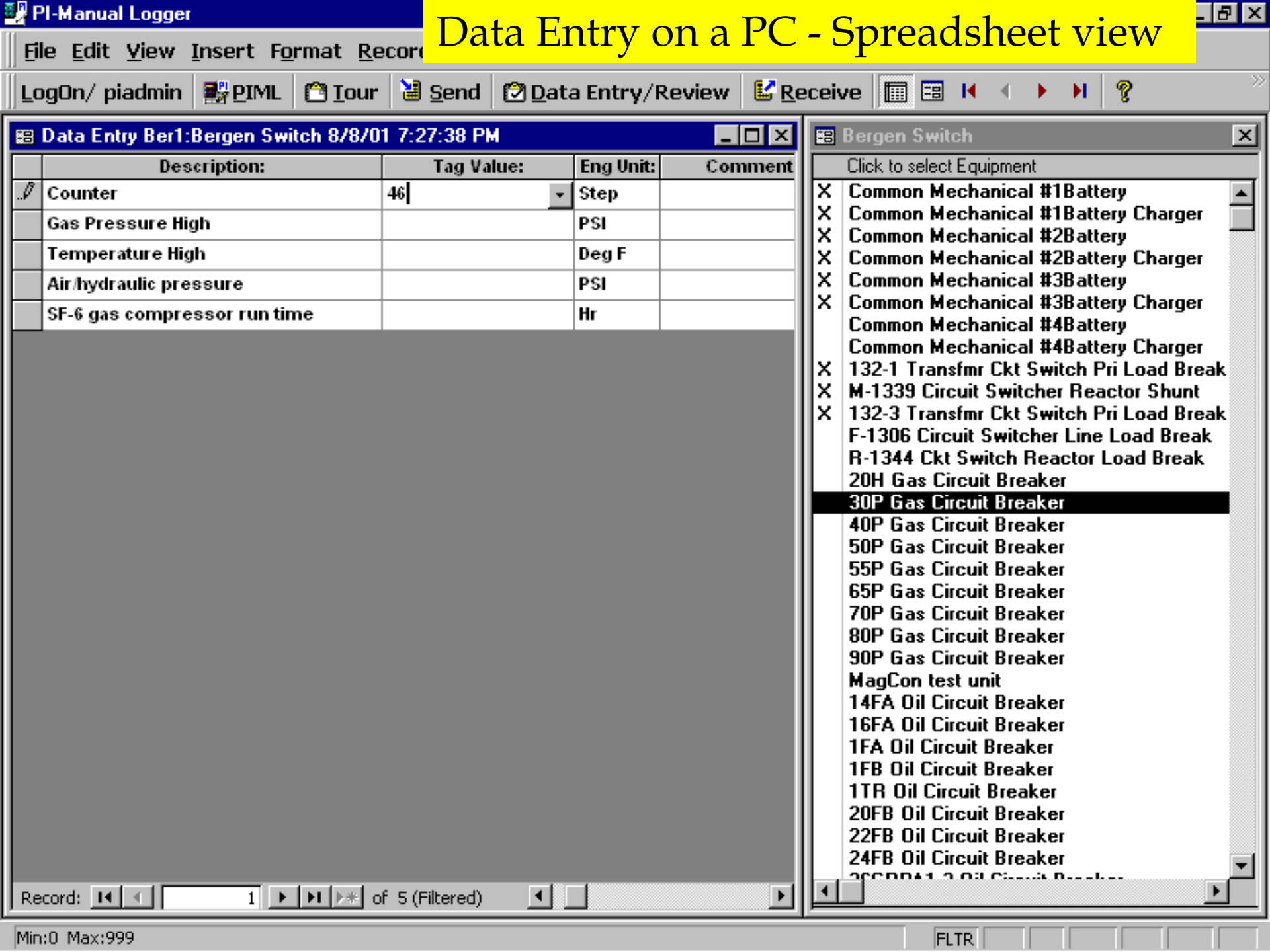


Data Entry on a PC



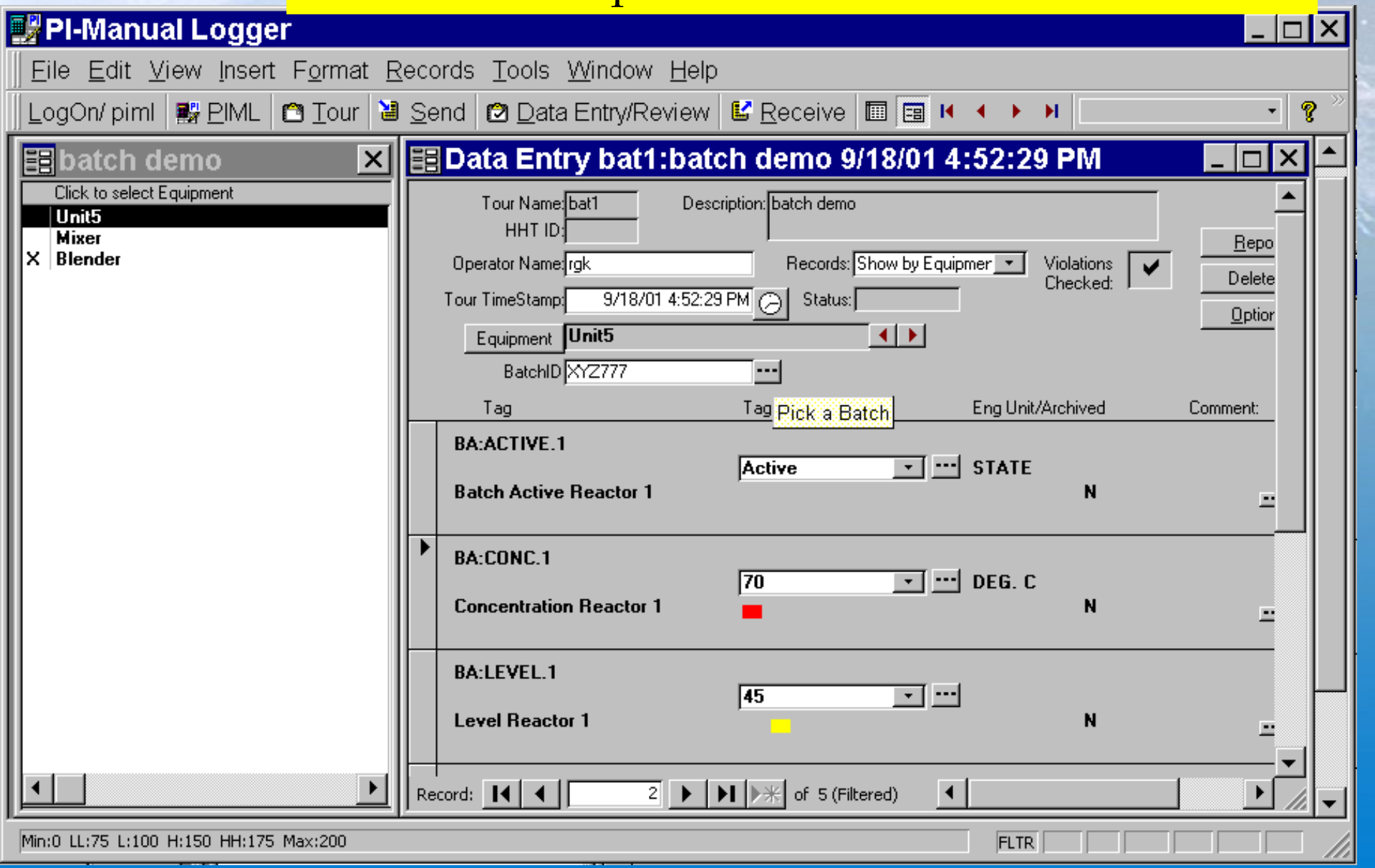


Data Entry on a PC, Electrical T&D example with Equipment display ON

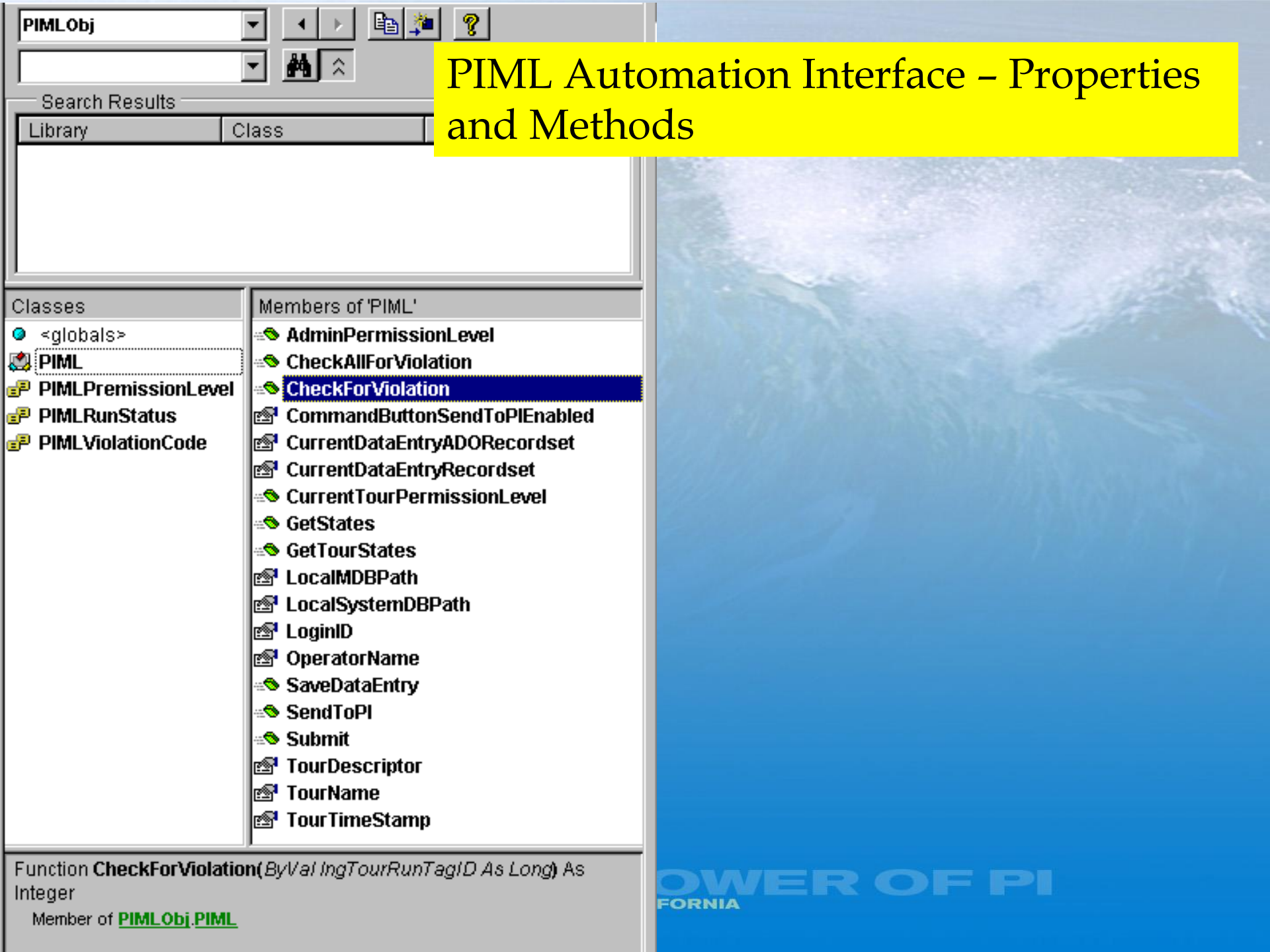

PI-Manual Logger
Data Entry on a PC - Spreadsheet view
File Edit View Insert Format Record
LogOn/ piadmin
PIML
Tour
Send
Data Entry/Review
Receive
Data Entry Ber1:Bergen Switch 8/8/01 7:27:38 PM
Description:
Tag Value:
Eng Unit:
Comment
Counter
46
Step
Gas Pressure High
PSI
Temperature High
Deg F
Air/hydraulic pressure
PSI
SF-6 gas compressor run time
Hr
Record:
1
of 5 (Filtered)
Bergen Switch
Click to select Equipment
Common Mechanical #1Battery
Common Mechanical #1Battery Charger
Common Mechanical #2Battery
Common Mechanical #2Battery Charger
Common Mechanical #3Battery
Common Mechanical #3Battery Charger
Common Mechanical #4Battery
Common Mechanical #4Battery Charger
132-1 Transfmr Ckt Switch Pri Load Break
M-1339 Circuit Switcher Reactor Shunt
132-3 Transfmr Ckt Switch Pri Load Break
F-1306 Circuit Switcher Line Load Break
R-1344 Ckt Switch Reactor Load Break
20H Gas Circuit Breaker
30P Gas Circuit Breaker
40P Gas Circuit Breaker
50P Gas Circuit Breaker
55P Gas Circuit Breaker
65P Gas Circuit Breaker
70P Gas Circuit Breaker
80P Gas Circuit Breaker
90P Gas Circuit Breaker
MagCon test unit
14FA Oil Circuit Breaker
16FA Oil Circuit Breaker
1FA Oil Circuit Breaker
1FB Oil Circuit Breaker
1TR Oil Circuit Breaker
20FB Oil Circuit Breaker
22FB Oil Circuit Breaker
24FB Oil Circuit Breaker
Min:0 Max:999
FLTR

Dat

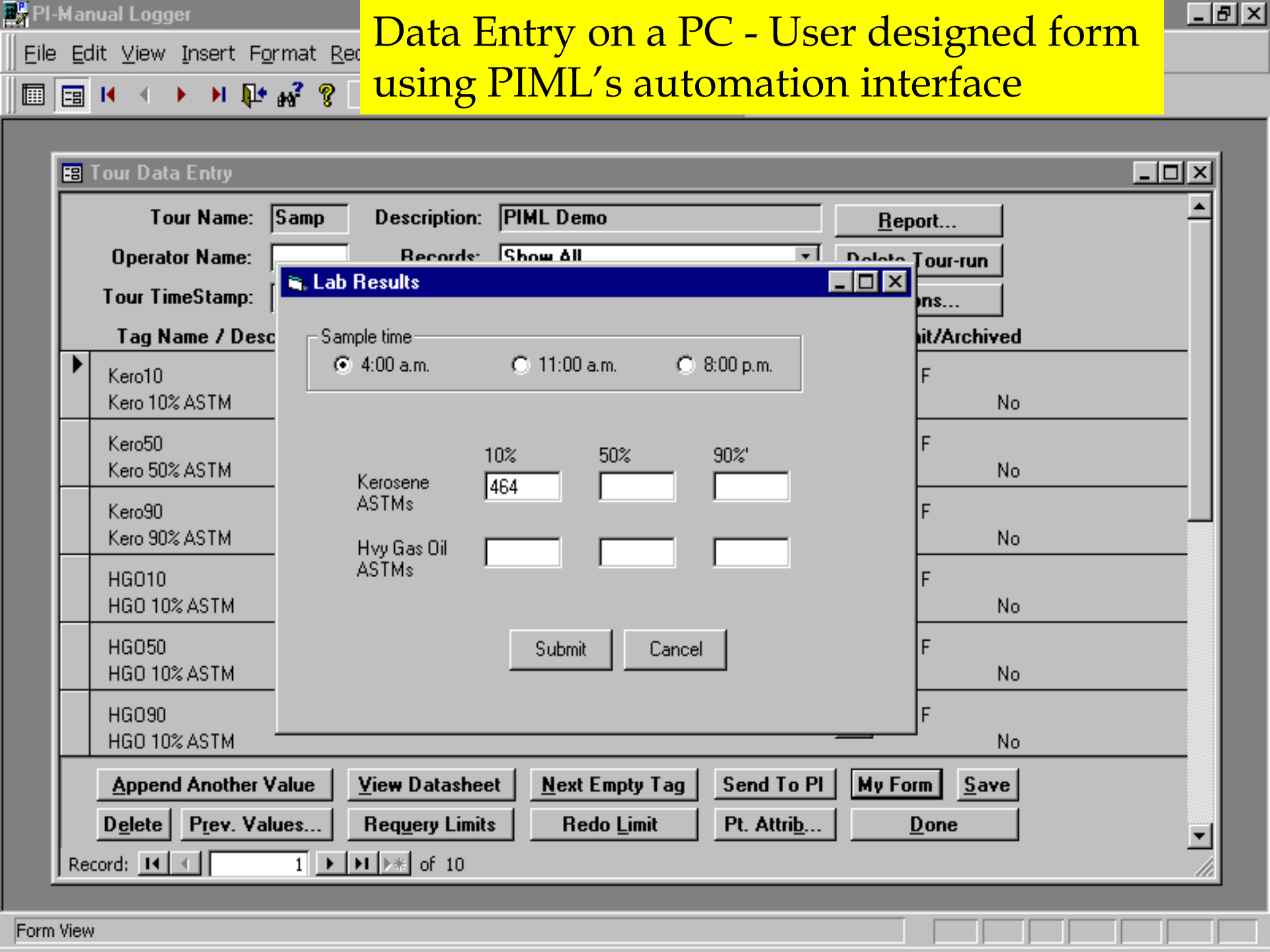
Associate a BatchID and Batch start/end time with manual inputs



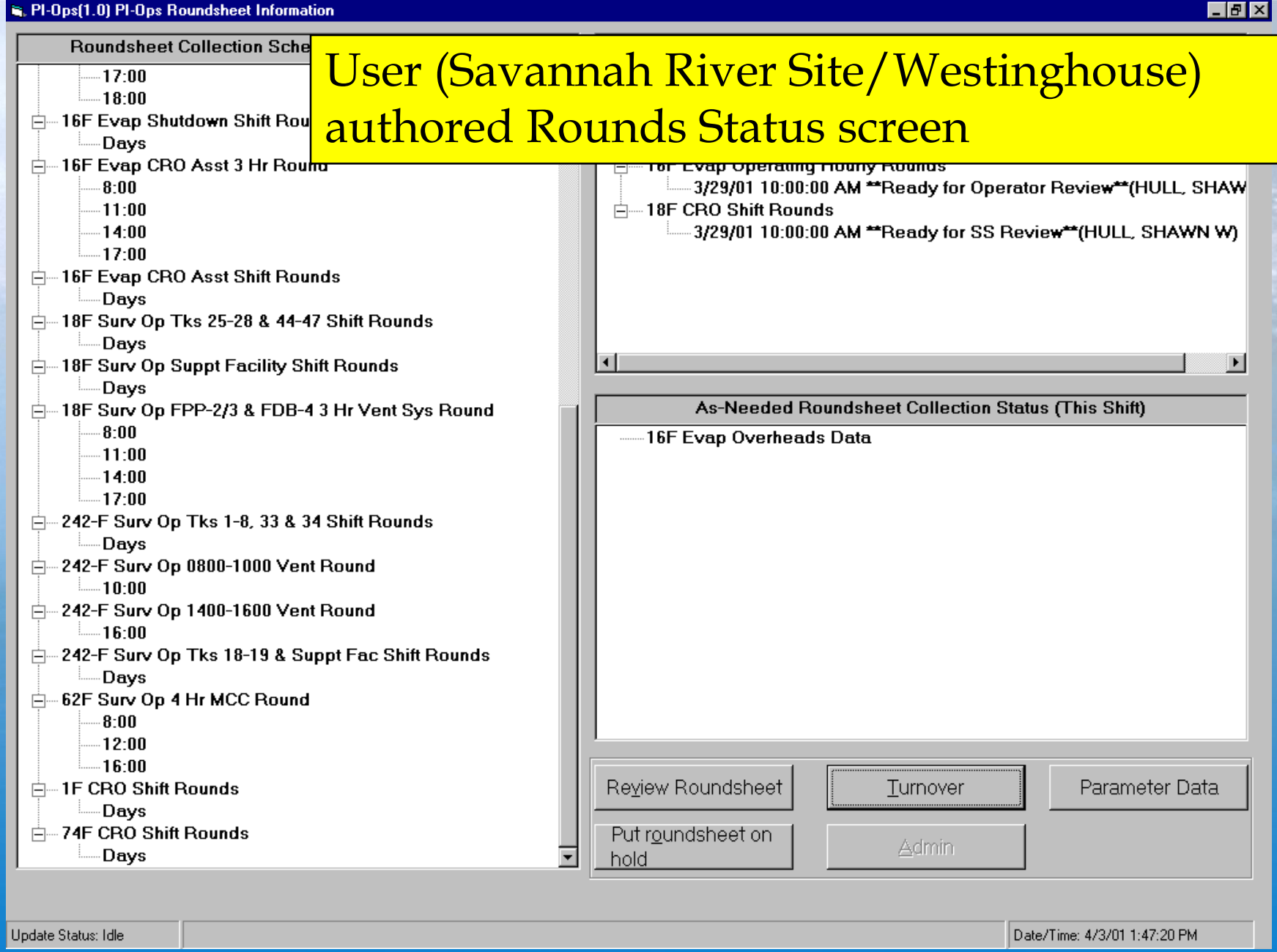
PIML Automation Interface – Properties and Methods



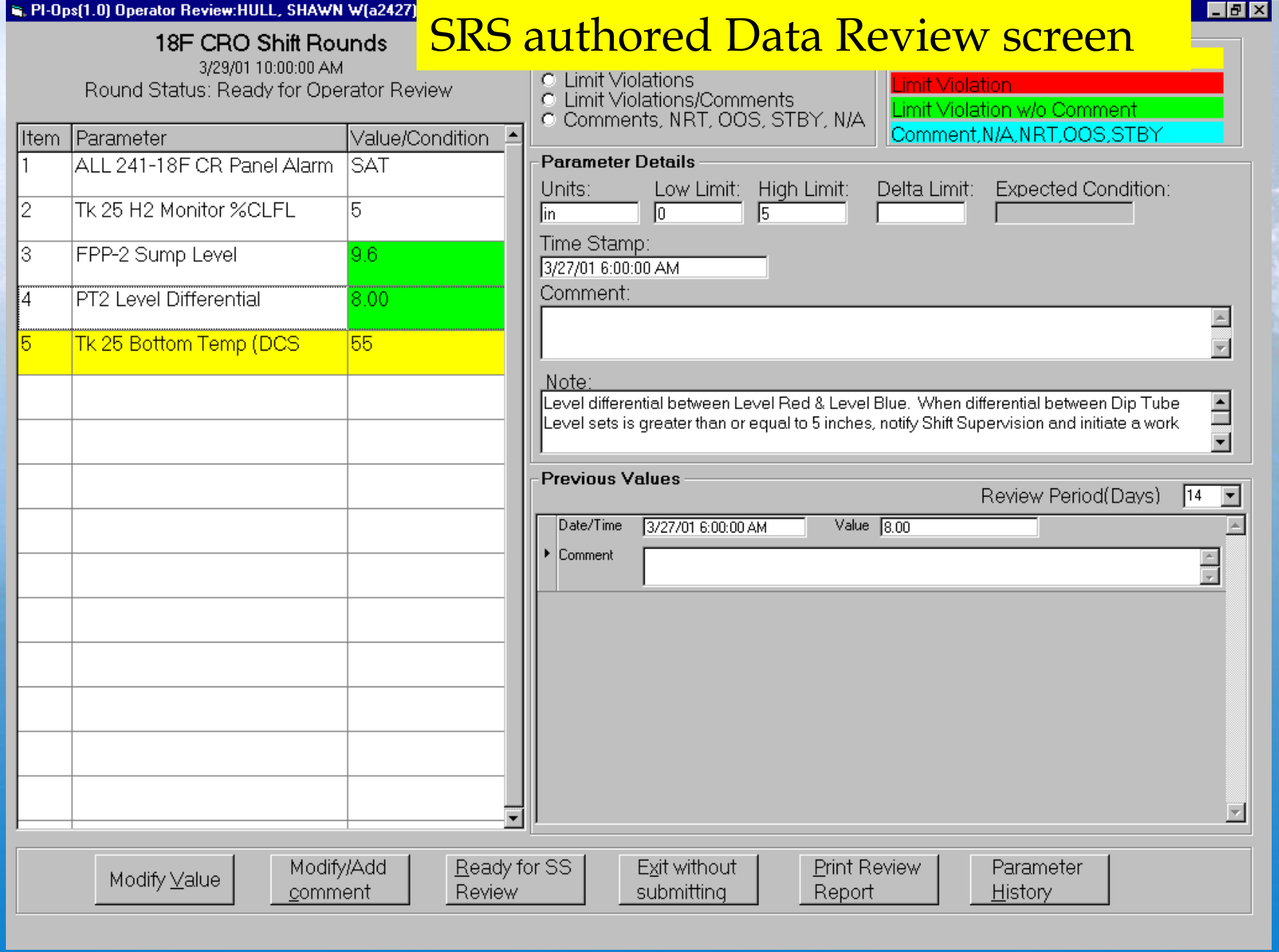
Data Entry on a PC - User designed form using PIML's automation interface



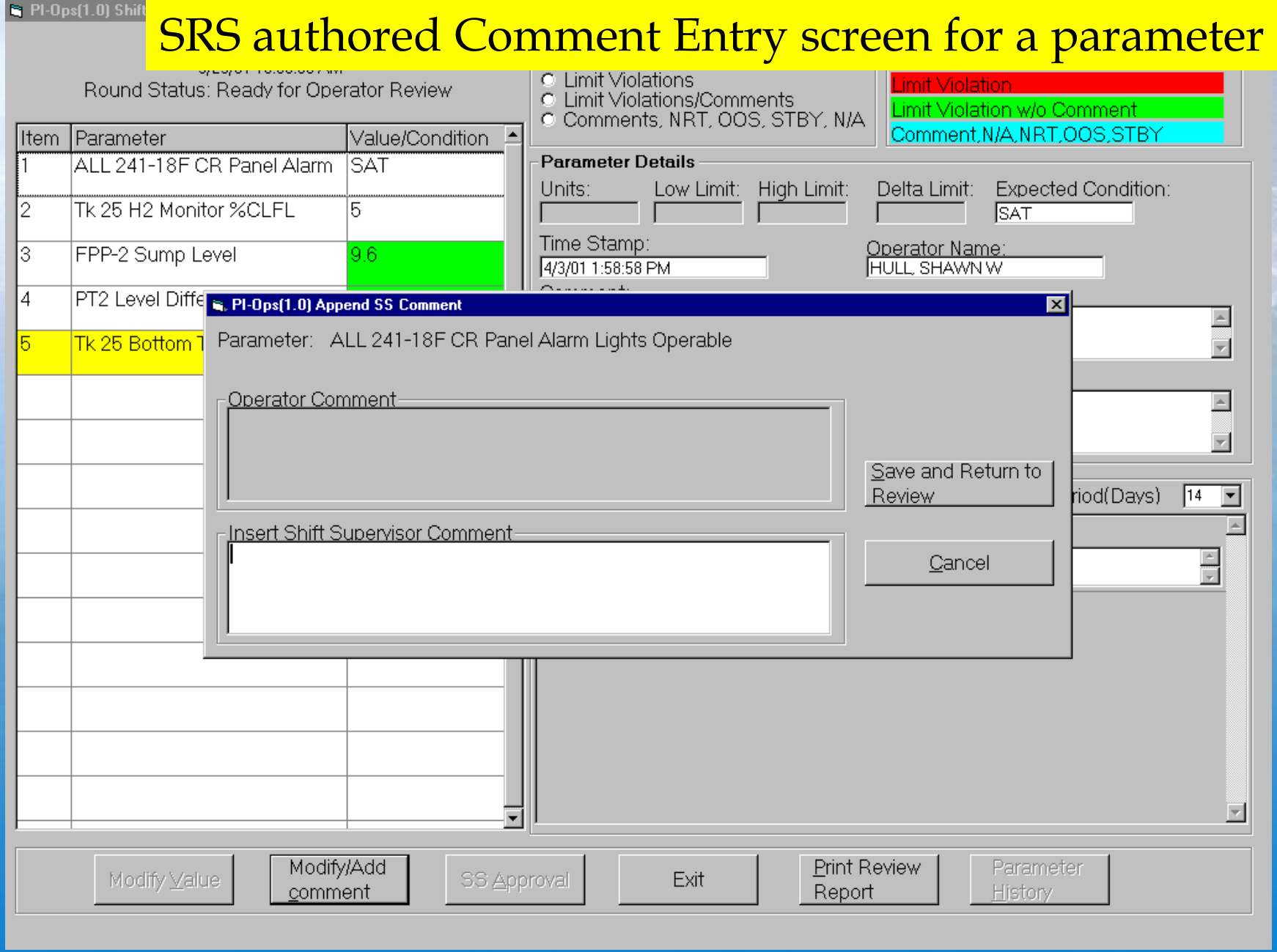
User (Savannah River Site/Westinghouse) authored Rounds Status screen



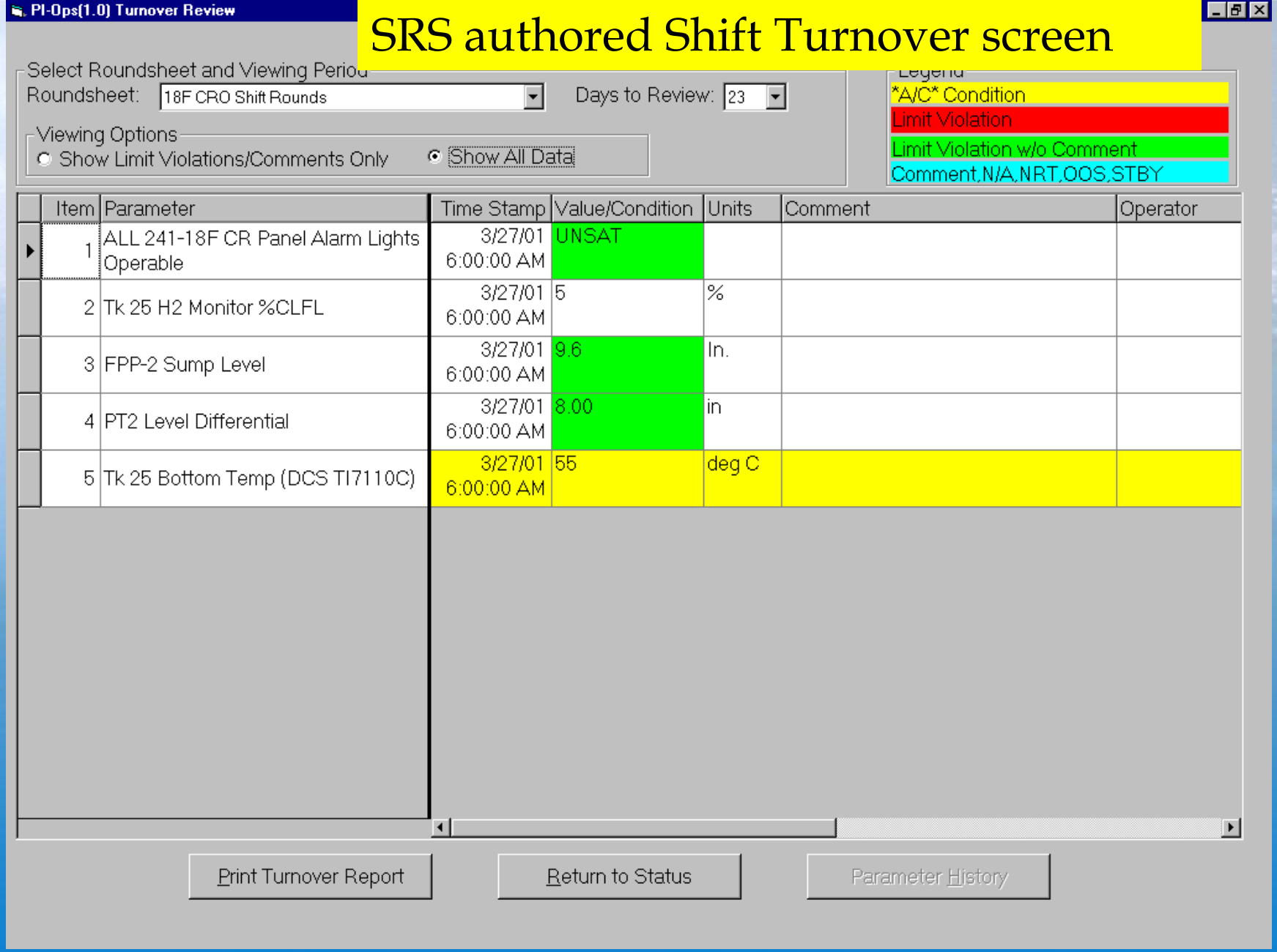
SRS authored Data Review screen



SRS authored Comment Entry screen for a parameter



SRS authored Shift Turnover screen



Hardware – Handheld devices and Portable terminals

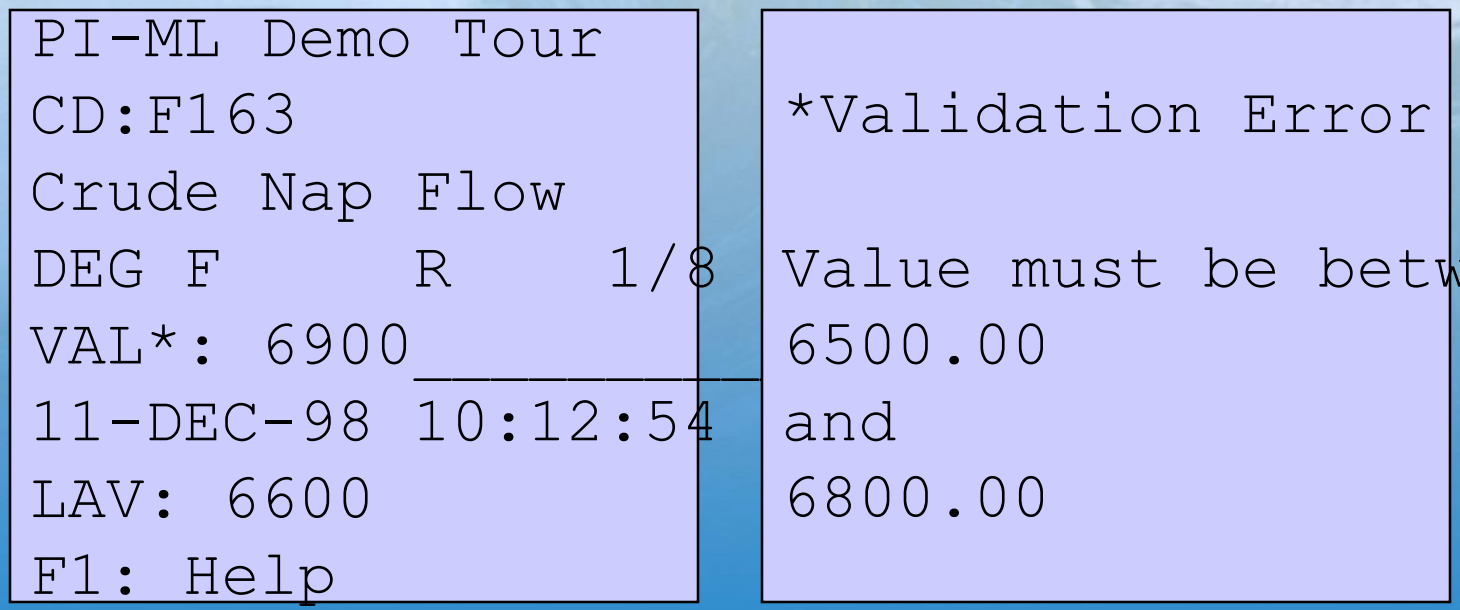
- Symbol 3000 terminals - text based 8x20 screens, optional barcode scanner, models PDT3100, PDT6100, Intrinsically Safe models are available
- PocketPCs - consumer units (Casio, Compaq etc.), rugged units (Symbol PDT8100 , Casio IT700)
- Mobile Data Terminals – typically Win2000 tablet form factor with/without keyboards – Pansonic Toughbook, Walkabout Hammerhead

PDT-6100

PDT-3100 (less rugged)

PDT-6800 (Intrinsically Safe version)

Data Entry on a hand-held (Symbol Series 3000 models)



Hardware – Ruggedized Industrial PocketPCs

Symbol PPT-2800 with integrated scanner

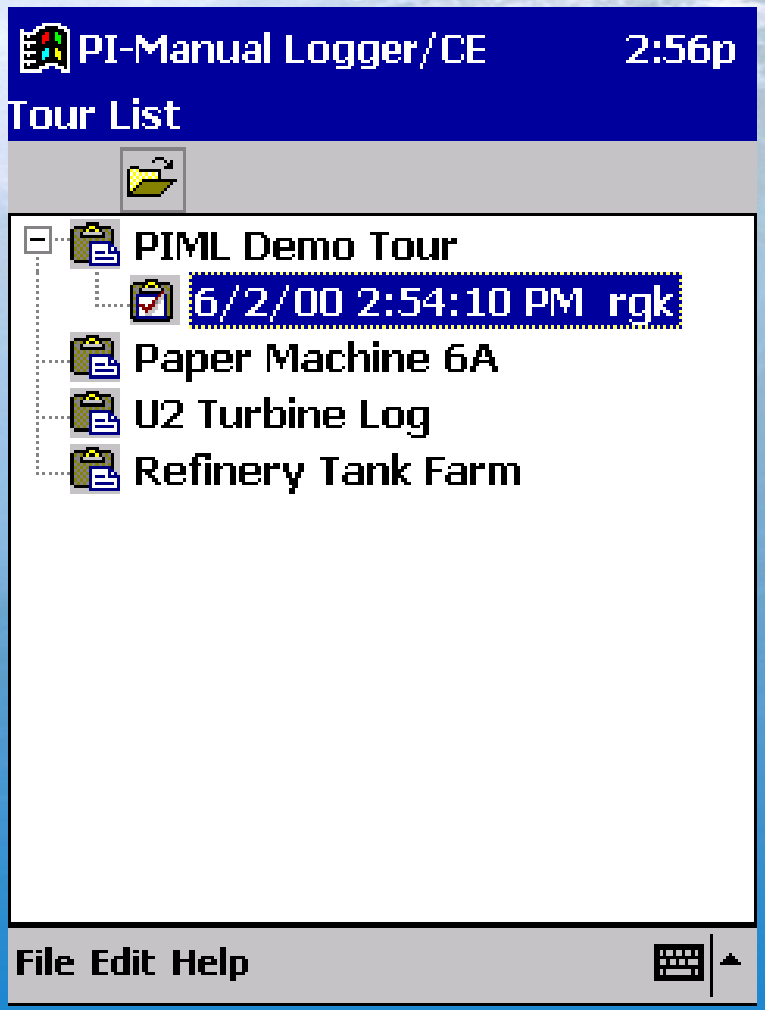
Casio IT-700 PocketPC (optional Scanner and Wireless card)

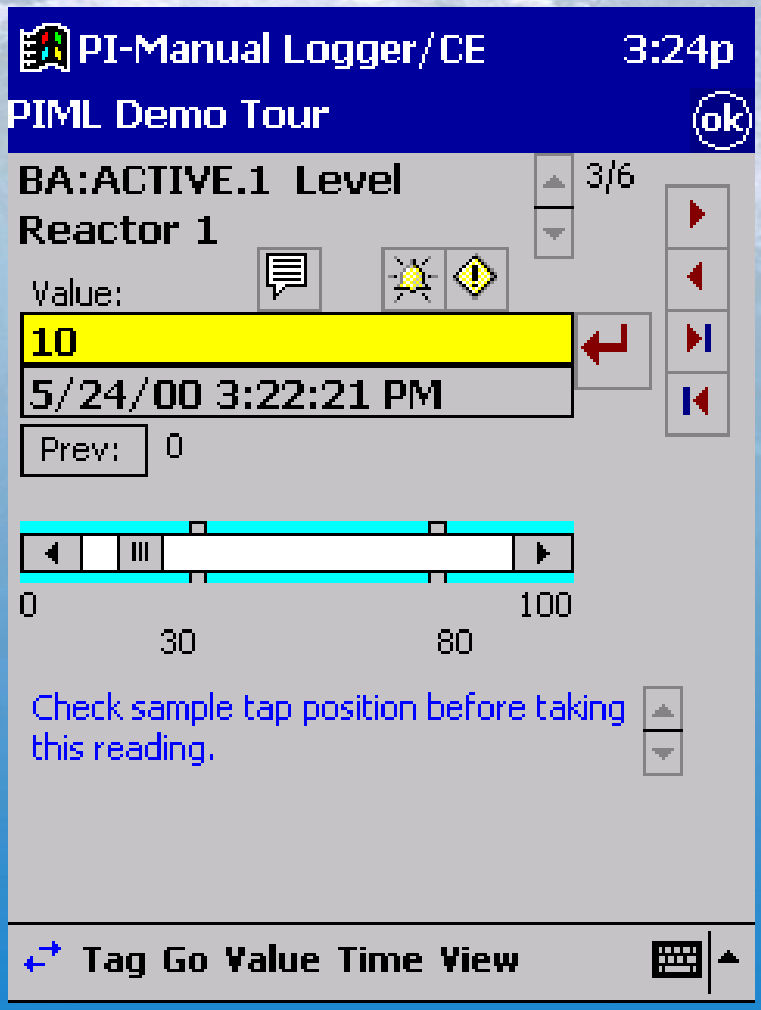
Hardware – Ruggedized Industrial PocketPCs

Symbol PPT-8100 with integrated scanner

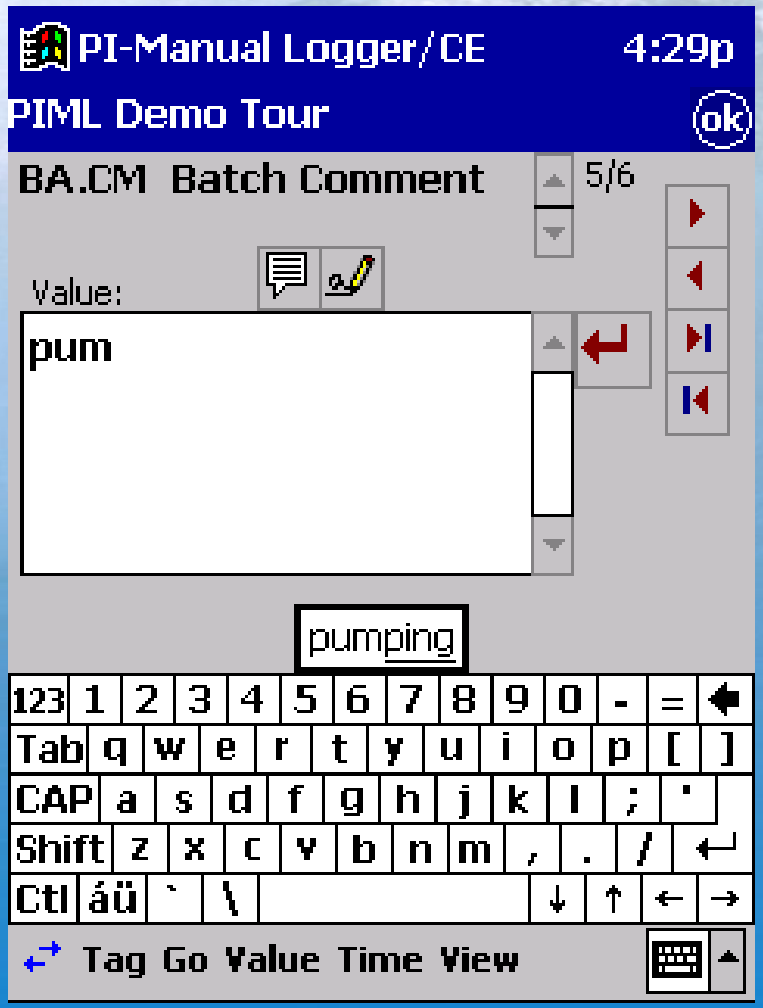
Non-incendive Class I Div 2 certified units shipping since 4Q 2001

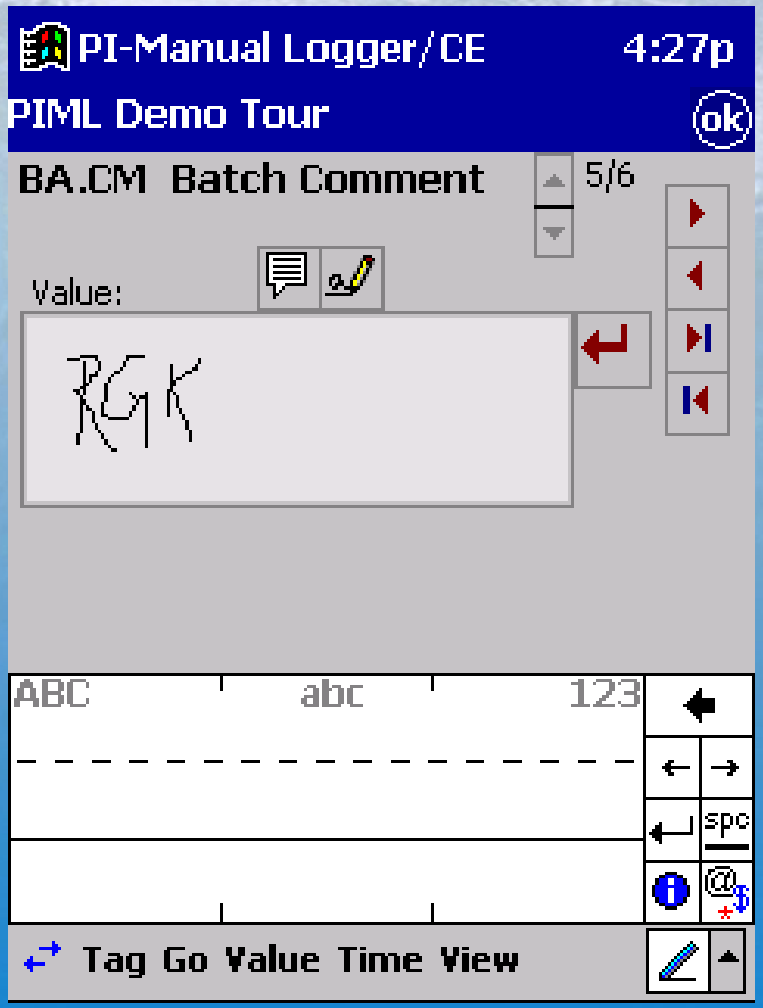
PocketPC Data Entry





PocketPC Data Entry

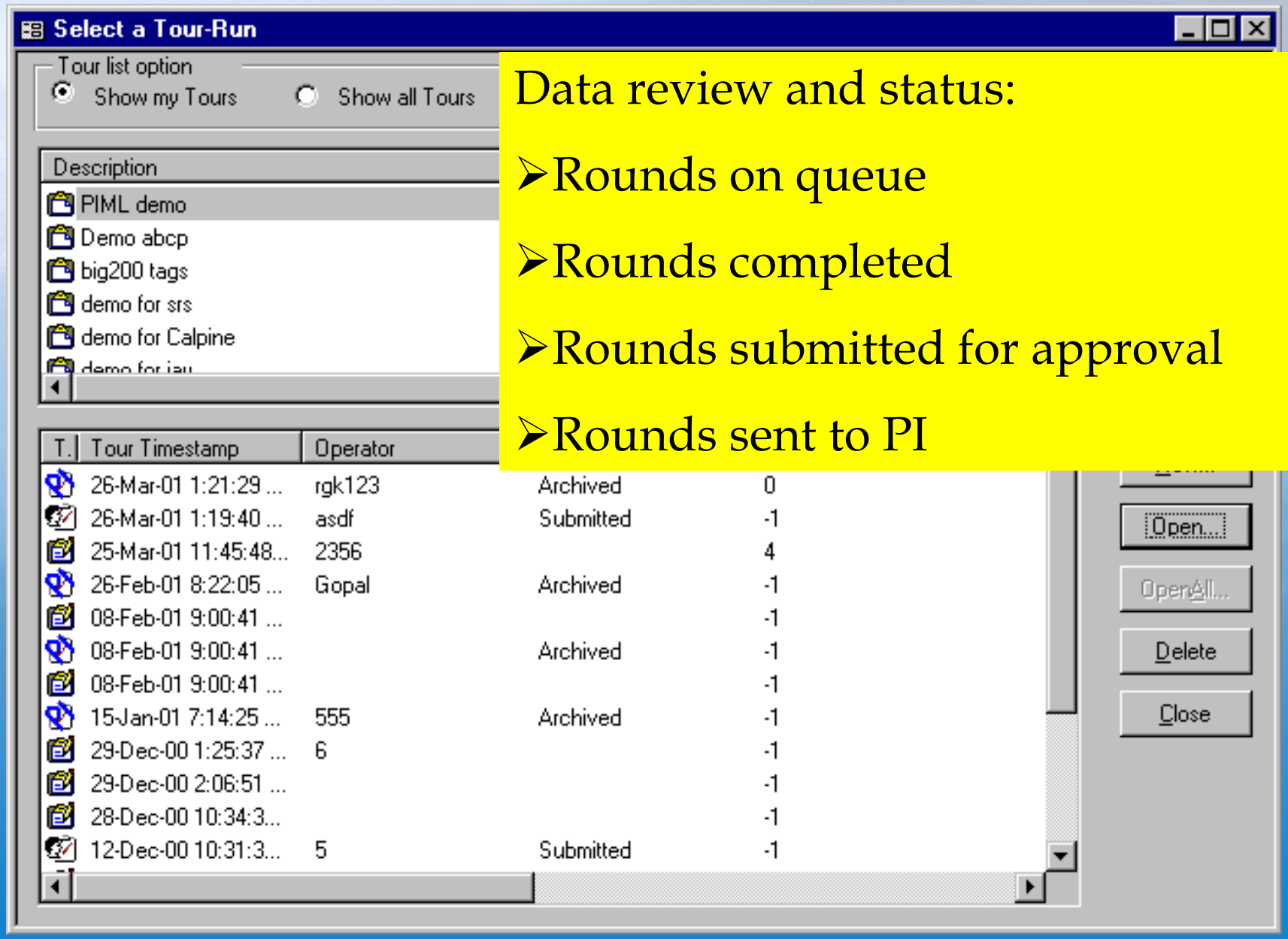




Hardware – Mobile Data Terminals
Windows 98/2000 based portable PCs

Panasonic Toughbook, wireless CDPD

Walkabout, Hammerhead



Data review and status:

- Rounds on queue
- Rounds completed
- Rounds submitted for approval
- Rounds sent to PI

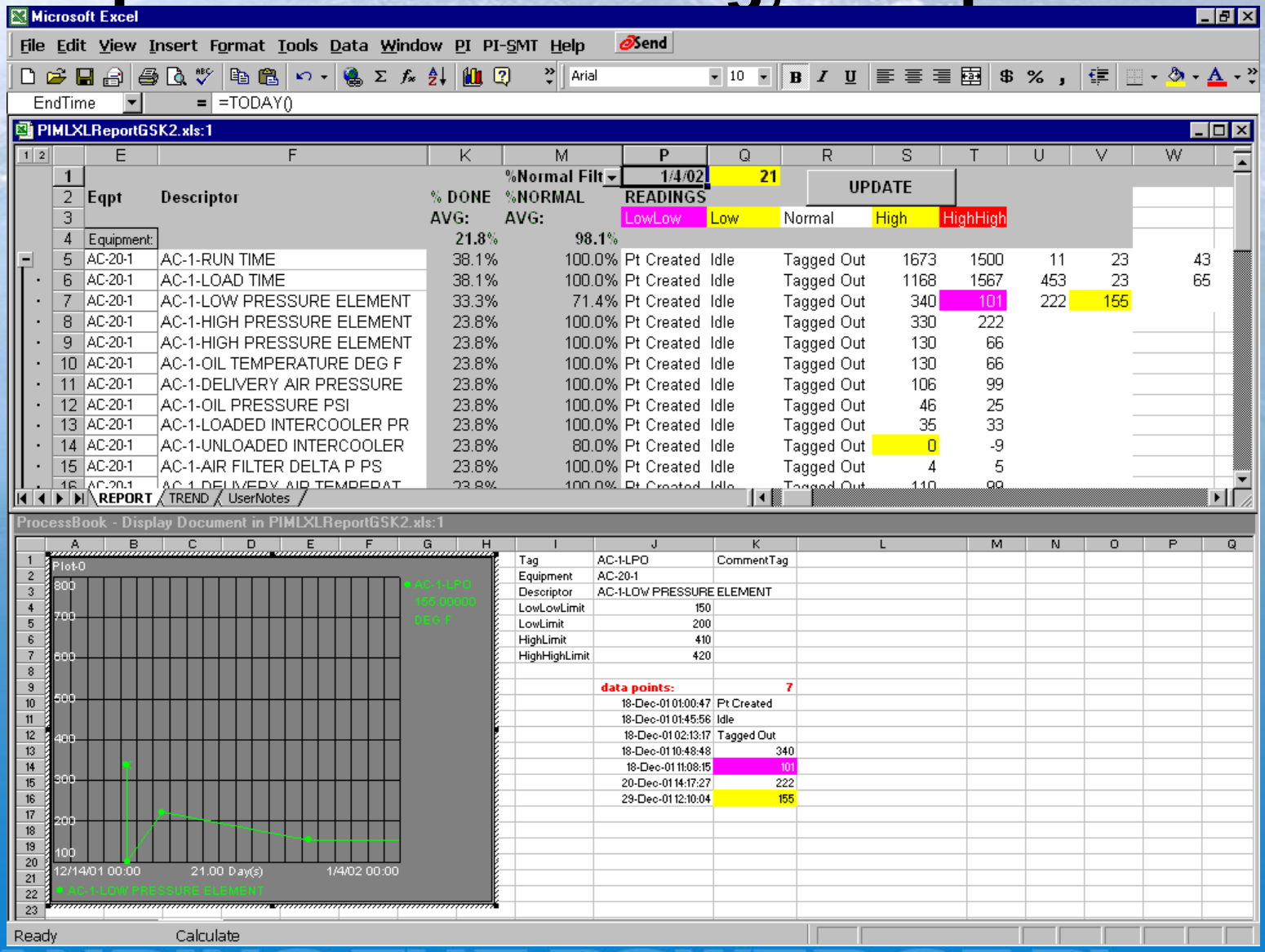
PI Tag set up – Excel sheet

Tag WorkbookPITags.xls

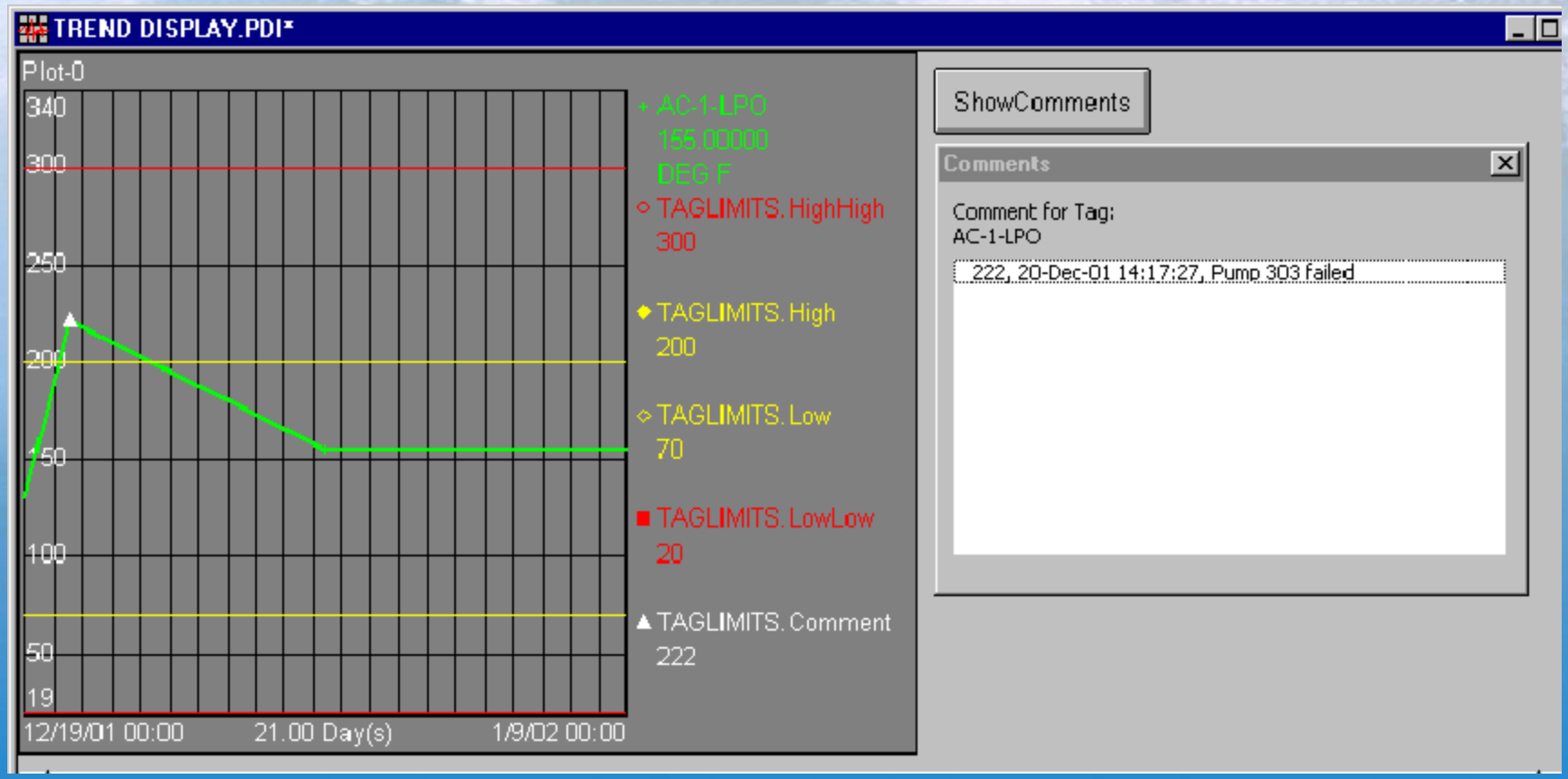
	C	D	E	F	G	H	I	K	L	M	N
1	Equipment Groupi	TagDescriptor	Zero	Span	PointT	Units	DigitalSet	LowLow	Low	High	HighHigh
2	A Well Pump	A Well Disch Press	0	150	Real	PSIG		10	15	90	100
3	A Well Pump	A Well Lubricator Level	0	6"	Digital	Level		1"	2"	6"	8"
4	B Well Pump	B Well Disch Press	0	150	Real	PSIG		10	15	90	100
5	B Well Pump	B Well Lubricator Level	0	6"	Digital	Level		1"	2"	6"	8"
6	RIVER INTAKE	River Intake PP A Disch Press	0	50	Real	PSIG		15	20	40	50
7	RIVER INTAKE	River Intake PP B Disch Press	0	50	Real	PSIG		15	20	40	50
8	RIVER INTAKE	River Intake PP A Lube Press	0	50	Real	PSIG		5	8	10	12
9	RIVER INTAKE	River Intake PP B Lube Press	0	50	Real	PSIG		5	8	10	12
10	RIVER INTAKE	River Intake Screen B Diff	0	10	Real	INWC		0	0	4	4
11	RIVER INTAKE	River Intake Screen A Diff	0	10	Real	INWC		0	0	4	4
12	LPSW PPs	LP Serv Water PP A Disch Press	0	100	Real	PSIG		10	20	70	80
13	LPSW PPs	LP Serv. Water PPB Disch Press	0	100	Real	PSIG		10	20	70	80
14	LPSW PPs	LP Serv Water PP A Screen Diff	0	10	Real	INWC		0	0	4	5
15	LPSW PPs	LP Serv. Water PP B Screen Diff	0	10	Real	INWC		0	0	4	5
16	LPAW PPs	PB 1A LPAW PP Disch Press	0	250	Real	PSIG		70	80	190	200
17	LPAW PPs	PB 1B LPAW PP Disch Press	0	250	Real	PSIG		70	80	190	200
18	LPAW PPs	PB 1C LPAW PP Disch Press	0	250	Real	PSIG		70	80	190	200
19	LPAW PPs	PB 2A LPAW PP Disch Press	0	250	Real	PSIG		70	80	190	200
20	LPAW PPs	PB 2B LPAW PP Disch Press	0	250	Real	PSIG		70	80	190	200
21	LPAW PPs	PB 2C LPAW PP Disch Press	0	250	Real	PSIG		70	80	190	200
22	LPAW PPs	LPAW PP Seal Water Strainer Diff	0	25	Real	PSIG		0	0	15	20
23	SURGE POND PPs	Surge Pond PP A Disch Press	0	50	Real	PSIG		0	0	20	30
24	SURGE POND PPs	Surge Pond PP A Oil Level	0	6"	Digital	Level	OK_NOTOK	1"	2"	5"	6"
25	SURGE POND PPs	Surge Pond PP B Disch Press	0	50	Real	PSIG		0	0	20	30
26	SURGE POND PPs	Surge Pond PP B Oil Level	0	6"	Digital	Level		1"	2"	5"	6"
27	SURGE POND PPs	Surge Pond PP #3 Disch Press	0	50	Real	PSIG		8	10	25	30
28	SURGE POND PPs	Surge Pond PP #3 Oil Level	0	6"	Digital	Level		1"	2"	5"	6"
29	CIRC WATER PPs	Circ Water PP 1A Disch Press	0	50	Real	PSIG		10	12	45	50
30	CIRC WATER PPs	Circ Water 1A Lube Press	0	100	Real	PSIG		40	50	90	100

Outside Tags | Inside Tags | Coal Yard

Report – Task tracking, exceptions



Task reports - Comments



Key Benefits

- Off-the-shelf solution
- Scalable - Expand and grow as you need
- Kesler/OSI can supply all the hardware and software, and provide assistance in turn-key implementation and project execution

Partial listing of PI sites using "Intrinsically Safe" models

- BP Oil, Alliance and Toledo
- Mobil Oil, Beaumont, TX
- UOP, Des Plaines, IL
- Eastman Chemicals (about 150 devices, 300 users at the Longview, TX site)

==========

- Over 100 PI sites use the hand-held interface in various Paper & Pulp, Power, Chemicals, Minerals and Mining etc.

Selected sites in Power Generation (Symbol hand-helds)

- Midwest Generation (previously ComEd), IL (3 sites)
- Virginia Power, VA (3 sites)
- Potomac Electric , MD (6 sites)
- Florida Power, FL(15 sites)
- Northern Power (Sherco Station), MN
- Kiwaunee (Nuclear)
- Alliant Gas & Electric (Nuclear)
- Several other sites in Pulp & Paper, Mining, Oil & Gas, Chemicals etc.

PocketPC PI sites

- Nuclear

  - Savannah River/Westinghouse (deployment in Feb 2002, serial link to a PC with a docking station)

- Power Generation

  - Entergy, White Bluff, AR

  - Jeffery Energy Center (deployment 2Q 2002, evaluation RF based wireless link to PI)

Oil & Gas

  - Tesoro Petroleum, Salt Lake City Refinery

  - Shell Canada, Caroline Gas Complex, Calgary – Pilot and Evaluation

Win32 PC sites

- Numerous PI sites – Lab entry

Mobile Win32 PC sites

- **Panasonic Toughbook – PSE&G Electrical T&D, full deployment 1Q 2002**
  - **70 devices, 300 substations, 100 inspection points per station, once a week**
  - **Wireless remote entry using CDPD modem link to PI**

Hands-on demo

- Need 2 volunteers
  - PC - put together a Tour
  - Hand-held, Symbol 8100 or Casio IT-700 rugged PocketPC – collect some data and then upload to PI