

**Dranetz Power Platform® 4300  
TASKCard® PQLite™**

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**Operational Skills  
Video Program WorkBook**

Presented by:

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**Workbook Modules:**

1. Hardware and Basic Operation
2. Real-Time & EASY START Monitoring
3. Advanced Monitoring
4. Viewing Event Data



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## **WorkBook Instructions**

- View a module on the videotape
- Get out your own 4300
- Review module in workbook
- Perform excercises at end of module
- Answer test questions



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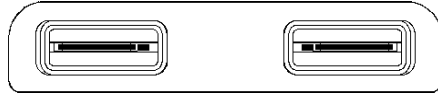
## **(1) Hardware and Basic Operation**

- TASKCard® PQLite™ & 4300 Specs
- Features and Controls
- Standard Accessories
- Optional Accessories
- Current Probes
- Basic Operation



## TASKCard® PQLite™ & 4300 Specs

- 4300 Functionality comes from TASKCard® in the ROM slot  
*(Insert/remove only with power off)*
- Available TASKCards:
  - PQLite™  
(The subject of this program)
  - 808 Demand & Energy



## 4300 Specifications: Memory

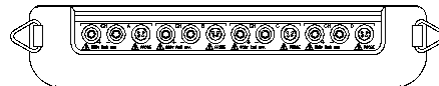
- Internal Memory
  - 280K non-volatile
- Memory Cards
  - Used in right-hand PCMCIA slot
  - Type 1, Series SRAM
  - 512K, 1, 2, 4 Megabyte sizes





## 4300 Specifications: Voltage channels

- 4 Voltage Channels
  - Channels A, B, C, D: 10-600VRMS
  - Channel D Low Range: 0.5-20VRMS

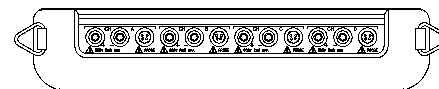


- Transient Voltage Measurement\*
    - Channels A, B, C, D: 50-1000VPk
    - Channel D Low Range: 1-30VPk
- \*Transients >1 $\mu$ S



## 4300 Specifications: Current Channels

- 4 Current Channels
  - Completely independent
  - Range of 10-200% of attached current probe rating





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## 4300 Specifications (continued)

- 60Hertz Resolution
  - 128 Samples/cycle
  - 7.68kHz Sample Rate
  
- Harmonics
  - Averaged over 64 cycles
  - Calculated up to 50th Harmonic



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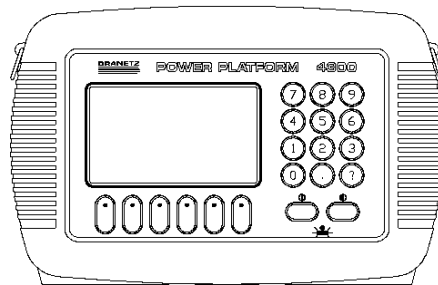
## 4300 Specifications: Calculated Parameters

- Calculated at 1 Second Intervals
  - Watts, VA, VAR, True Power Factor
  
- Other Calculated Parameters
  - Watt-Hours: Calculated from elapsed monitoring time
  - Demand = Average demand calculated over a user-defined interval



## Features and Controls

- 240 x 128 pixel backlit LCD Screen
- Audible Alarm
- Function Keys ("Soft Keys")
- Numeric Keypad, Help Key
- Screen Print (period) Key
- Battery Charge Indicator  
On=charging. Blinking=fully charged
- Weight: 4LBS/1.8KG
- 5-45°C/41-113°F Operating Temperature
- Humidity: 10-90% non-condensing



## Features and Controls (continued)

- AC/Battery Operation
  - 95-264VAC, 50-60Hz External Pwr. Supply
  - 2 hours operation on battery
  - 3-hour charging time
- Serial Data Port
  - Screen Print function
  - Data transfer to PC





## Standard Accessories

- Operator's Manual
- Quick Reference Guide
- Voltage Cable Set, Pouch
- Battery Charger/Eliminator
- Battery
- Easel/Hanger Bracket
- Protective Rubber Boot
- Carrying Strap



## Optional Accessories

- TASKCard® PQLite™
- TASKCard® 808 Demand & Energy
- Memory Cards
- Isolated Communications Module
- Serial Printer
- Secure Monitoring Enclosure
- Carrying, Shipping Cases
- Electrical Energy Mgmt. Field Handbook
- PQ Analysis Field Handbook



## Optional Accessories: Software

- **DranLink™**
  - Included with Isolated Com. Module
- **Dranview™**
  - View & Analyze Event Data
- **Kreiss-Johnson AiPower**
  - Artificial Intelligence data analysis
  - Automated report generation



## PowerCET Monitoring Accessories

- 120 V Load Breakout Cord (A-CY120)
- Alligator Clips (AC8)
- Crocodile Clips (CC8)
- Extended Test Clips (ETC1/ETC4)
- Bus Bar Test Clamps (BBC1/BBC4)
- Red/White/Green Jumper Kits (CJK9)
- Multicolored Test Leads (CTL5)
- Stackable Test Plugs (PK25)
- Test Lead Fuse Kits (TLF-4 M/F)
- MeterMate™ 120 (MM120)



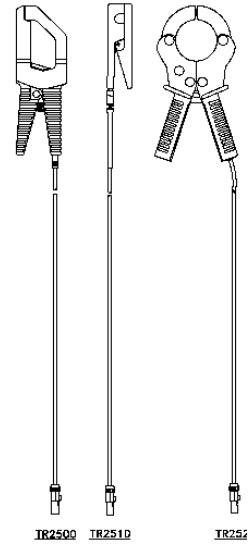
## Current Probes

PP4300 PROBES

### ■ 2500 Series (4300 compat. connector)

- TR2500 (1-500A)\*
- TR2510 "clothespin" (1-10A)
- TR2520 "bus bar" (10-3000A)

\* TR2500 has limited transient measurement capabilities



TR2500 TR2510 TR2520

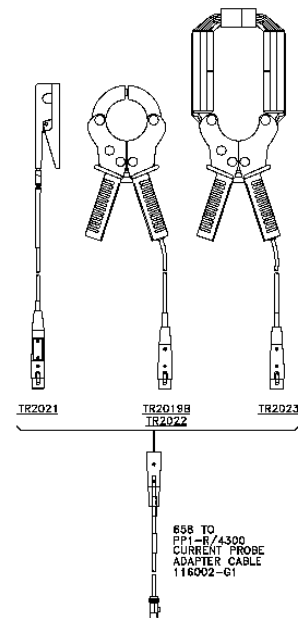


## Current Probes

658 PROBES

### ■ Other Probes (Requiring CA4300 Adapter)

- TR2021 "clothespin" (0-30A)
- TR2019B (1-300A)
- TR2022 (10-1000A)
- TR2023 "bus bar" (10-3000A)
- LEMFLEX flexible current probes



TR2021 TR2019B TR2022 TR2023

658 TO  
PP1-B/4300  
CURRENT PROBE  
ADAPTER CABLE  
116002-61



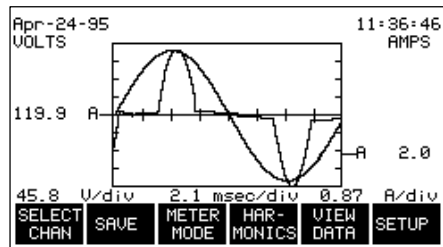
## Basic Operation: Menu Structure

- Scope Mode & Meter Mode
  - Real Time Monitoring
- View Data
  - Event Data Viewing & Evaluation
- Setup
  - System Configuration
  - Monitoring Thresholds



## Basic Operation: Screen

- Common Screen Elements
  - Current Date and Time (Top Left & Right)
  - Sys Info and Error Messages, (Top Middle)
  - Middle Area changes with each screen
  - Menu Bar changes with each screen (Bottom)





## Basic Operation: Housekeeping

- Check Site Status
  - Summarizes current setup
- Check 4300 Status
  - Firmware Version information
- Self Test
  - Same as Start-up Self Test
- Reset to Factory Defaults



## Basic Operation: Housekeeping

- Set Time and Date
  - Critical for accurate monitoring
- LCD Backlight Shutoff
  - Saves Battery Energy
- Audible Alarm Enable/Disable
  - Shutoff to avoid tampering

```

Jun-27-95                                09:24:12
      SET PROGRAMMABLE FEATURES
1. SET TIME & DATE
2. ENTER SITE/FILE NAME
3. LCD DISPLAY MODE=: NORMAL
4. LCD BACKLIGHT AUTO-SHUTOFF=: ENABLED
5. AUDIBLE ALARM ON/OFF=: ON
EXIT
  
```



## **Basic Operation: Monitoring Prep**

- Turning Monitoring Off
  - Stops pre-monitoring data collection
- Clearing Memory
  - Eliminates unwanted data
- Formatting a Memory Card
  - Clears unwanted data from memory card



## **(1) Hardware and Basic Operation: Exercises**

- Inventory your accessories
- Turn on Dranetz 4300, charge battery
- Check the system status screen
- Reset unit to factory defaults
- Set date and time
- Format a memory card



## **(1) Hardware and Basic Operation: Test questions**

1. How many voltage & current channels does the 4300 have?
2. Which voltage channel has a high and low range?
3. When is it safe to insert/remove TASKCard@s?
4. Which slot do memory cards go into?
5. How do you know if the battery is fully charged?
6. How much internal memory does the 4300 have?
7. What is the maximum voltage the 4300 can safely measure?
8. Which current probes are suitable for transient measurement?
9. Name two ways to move 4300 data to a PC.
10. What is the "special" function of the period key?



## **(1) Hardware and Basic Operation: Test Answers**

1. The 4300 has 4 voltage & 4 current channels.
2. The D voltage channel has a high and low range.
3. Insert/remove TASKCard@s only with power off.
4. Memory cards go into the right-hand slot.
5. The battery charge indicator blinks when the battery is fully charged.
6. The 4300 has 280K of internal non-volatile memory.
7. The 4300 should never be connected to circuits carrying over 600 volts.
8. All Dranetz current probes are recommended for transient measurements, except the TR2500.
9. You can move 4300 data to a PC via the serial data port or using memory cards.
10. The period key triggers the screen print function when a printer is connected to the 4300.



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2. Real-Time & EASY START Monitoring
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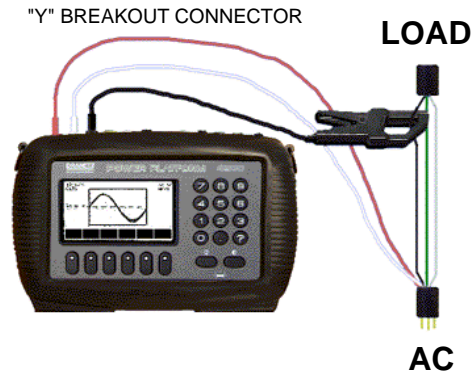
## **(2) Real-Time and EASY START Monitoring**

- Real-Time Monitoring
  - Hookup
  - Scope Mode
  - Meter Mode
  - Phasors
  - Harmonics
- Long-Term Monitoring
  - Event Data Storage
  - Setups
- EASY START



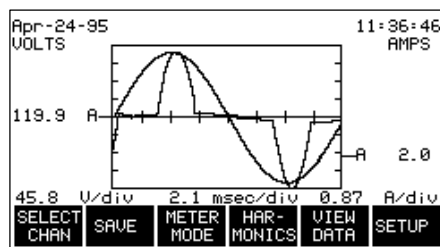
## Single-Phase Load Hookup & Startup

1. Disconnect Load
2. Connect load to AC through "Y" breakout connector
3. Choose current probe
4. Turn OFF 4300
5. Connect voltage probes & current probe to 4300
6. Clamp current probe on "Y" connector's black line conductor, arrow towards the load
7. Check connections carefully
8. Turn ON 4300 (auto syncs to circuit)
9. Select Probe from Menu



## Scope Mode

- Real-time voltage & current waveforms for up to 8 channels
- Voltage scale is on left side, Amps on right.
- Zero crossing at left side indicates ext. sync acquired
- Select channels
  - Turn off volts and Amps for unused channels (B, C,D)



CHANNEL	VOLTS	AMPS
A	ON	ON
B	OFF	OFF
C	OFF	OFF
D	OFF	OFF



## Meter Mode

- Select Meter Mode
  
- Select Circuit Type
  - Choose correct circuit type to ensure proper calculation of VA, VAR, PF, %V unbalance

Jun-16-95		METER MODE			10:37:07
CHAN	VOLT	AMP	WATT	VA	
A	114.5	1.368k	143.6k	156.7k	
B	114.7	1.478k	160.3k	169.5k	
C	118.2	1.411k	155.1k	166.8k	
D	0.000	0.000	0.000	0.000	
ABC	115.8	4.258k	459.0k	492.7k	
NEXT SCREEN		NEXT METER		CKT TYPE	SAVE EXIT



Jun-16-95		CIRCUIT TYPE			10:26:56
SINGLE PHASE					
SINGLE PHASE	SPLIT PHASE	3PHASE DELTA	3PHASE WYE		EXIT



## Meter Mode: 4 Meter Displays

- All channels, all parameters
  - Next screen cycles through all parameters
  
- One channel, all parameters
  - Next channel cycles through channels
  - Next screen cycles through all parameters

Jun-16-95		METER MODE			10:37:07
CHAN	VOLT	AMP	WATT	VA	
A	114.5	1.368k	143.6k	156.7k	
B	114.7	1.478k	160.3k	169.5k	
C	118.2	1.411k	155.1k	166.8k	
D	0.000	0.000	0.000	0.000	
ABC	115.8	4.258k	459.0k	492.7k	
NEXT SCREEN		NEXT METER		CKT TYPE	SAVE EXIT



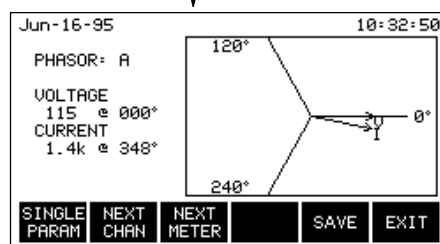
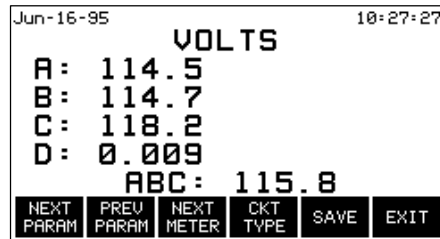
Jun-16-95		CHANNEL : A			10:26:56
114.5 V					
1.368kI					
143.6kW					
156.7kVA					
NEXT CHAN	NEXT SCREEN	NEXT METER	CKT TYPE	SAVE	EXIT





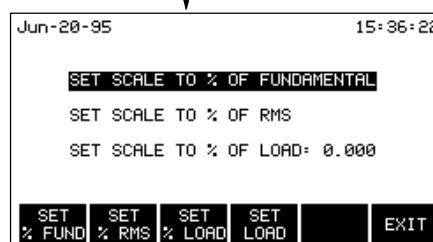
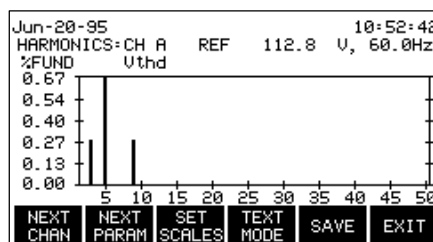
## Meter Mode: 4 Meter Displays

- All channels, one parameter
  - Next/previous parameter selects viewed parameter
- Phasors
  - Displays voltage or current phase angles between channels, or between voltage and current for a single channel



## Harmonics

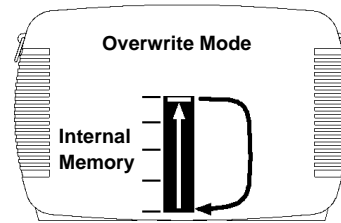
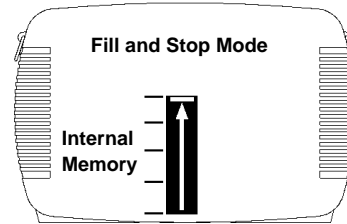
- Averaged over 64 cycles
- Calculated up to 50th Harmonic
- Next Channel cycles through channels
- Next Parameter cycles through Volts, Amps and Watts
- Text/Graph switches between tabular and bar graph displays
- Set Scale to choose harmonic calculation method





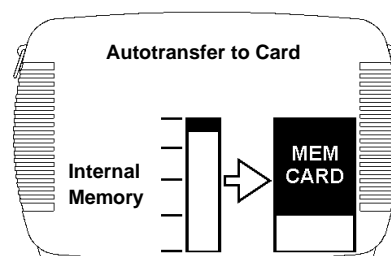
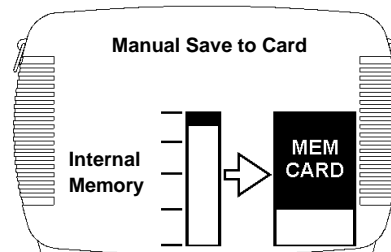
## Long Term Monitoring: (Internal) Memory Storage Mode

- "Fill and Stop" Mode
  - Monitoring stops when internal memory is full
  
- "Overwrite" Mode
  - Continuous Monitoring
  - Newest data overwrites oldest data after memory is filled



## Long Term Monitoring: Memory Card Storage

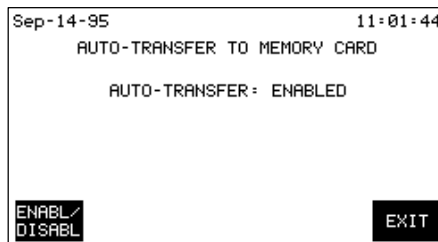
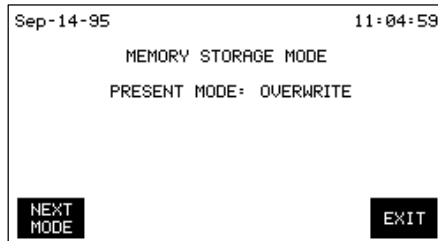
- Manual save to card
  - Creates FILENAME.EVT (events) and/or FILENAME.SET (setup) on card
  
- Autotransfer to card
  - Enabling Autotransfer automatically creates FILENAME.MDB on any inserted memory card and copies internal event memory to it
  - Set internal memory mode to OVERWRITE when autotransfer is enabled





## Long Term Monitoring: Setting Up Autosave to Memory Card

- Set Memory Storage mode
  - Press: Scope Mode > Setup > Memory Functions > Set Mem Storage Mode
  - Select Overwrite
  
- Enable Autotransfer\*
  - Press: Scope Mode > Setup > Memory Functions > Set Autotransfer
  - Enable Autotransfer



\*Tip: Enable Autotransfer as a last step before turning on monitoring to avoid placing unwanted pre-monitoring event data into the autotransfer file



## Monitoring Terminology

- **PARAMETER THRESHOLD:** A user-defined measurement limit beyond which an event is triggered
- **EVENT:** An instantaneous snapshot of circuit data triggered by a parameter threshold crossing
- **WAVEFORM CAPTURE:** The saving of one or more cycles from the time of an event
- **SETUP:** A collection of parameter thresholds, waveform capture settings, and input configuration info that determine what will constitute an event and how much data will be saved when events occur.



## Setup Information\*

- Input Channel Configuration
- Circuit Type
- Scale Factors
- Parameter Thresholds
- Waveform Capture Settings
- Interval for Timed Readings
- Site/FileName
- Auto-Transfer Setting
- Memory Storage Mode Setting

\*Note: The 4300 can only hold one setup at a time



## Setup Methods

- Easy Start Setups
  - Parameter thresholds selected automatically
  - Waveform captures selected automatically
  - Simple Q&A process
  - Fast
- Custom Setups
  - Parameter thresholds selected manually
  - Waveform captures selected manually
  - Total control



## Easy Start: Step by Step

- Press Setup > Easy Start
- Select Circuit Type
  - Single Phase
  - Split Phase
  - Three Phase Delta
  - Three Phase Wye
- Describe Application
  - Nominal Line Voltage (120)
  - Monitoring Current (ON)
  - Nominal Line Current (30)
  - Neutral - Ground Measurements (OFF)

```

Sep-14-95                               11:50:47
                                     EASY START
PRESS '1' FOR SINGLE PHASE
PRESS '2' FOR SPLIT PHASE
PRESS '3' FOR THREE PHASE DELTA
PRESS '4' FOR THREE PHASE WYE
                                     EXIT
  
```

```

Sep-13-95                               16:08:51
                                     DESCRIBE APPLICATION:
                                     SINGLE PHASE
NOMINAL LINE VOLTAGE: 0
MONITOR CURRENT? ON
NOMINAL LINE CURRENT: 0
NEUTRAL-TO-GROUND: ON
NEXT ENTER ON/OFF PREV NEXT EXIT
LINE VALUE SCREEN SCREEN
  
```



## Easy Start: Step by Step (continued)

- Proposed wiring scheme (check your hookup)
- Enter a new (unique) Site/FileName\*
- Clear Memory (end EASY START)
- Insert a clean memory card or format card
- Turn monitoring on when ready to start

```

May-27-95                               13:29:23
                                     ENTER SITE/FILE NAME
PRESENT SITE/FILE NAME:
                                     4300 SITE # 1
NOTE: THE FIRST 8 CHARACTERS OF THIS
NAME WILL BE USED TO NAME FILES
STORED ON THE MEMORY CARD.
ENTER EXIT
NAME
  
```

```

Sep-14-95                               11:03:14
                                     CLEAR EVENT MEMORY
                                     CAUTION!
                                     ALL EVENTS IN INTERNAL MEMORY
                                     WILL BE DELETED.
PRESS EXIT TO ABORT.
CLEAR EXIT
MEMORY
  
```

\*The first 8 characters of your Site/FileName must be unique to avoid overwriting (erasing) other files on the memory card



## Easy Start: Automatic Input Channel Configuration

Your choices | Voltage and current channels activated

Monitor Current	Neutral to Ground	Single Phase	Split Phase	3 Phase (Wye or Delta)
ON	ON	Va, Vd, Ia, Id	Va, Vb, Vd, Ia, Ib, Id	Va, Vb, Vc, Vd, Ia, Ib, Ic, Id
<u>ON</u>	<u>OFF</u>	<u>Va, Ia</u>	Va, Vb, Ia, Ib	Va, Vb, Vc, Ia, Ib, Ic
OFF	ON	Va, Vd	Va, Vb, Vd	Va, Vb, Vc, Vd
OFF	OFF	Va	Va, Vb	Va, Vb, Vc



## Easy Start: Automatic Parameter Settings

Parameter	Setting
V HI LIM	+10% from nominal
V LO LIM	-10% from normal
V TRANS	150% of normal
V THD%	10%
V FREQ SENS	2.0 Hz
I HI LIM	+10% from normal
PF LO LIM	0.85
V SENS OUT	5
V TRANS%	50%
I TRANS%	50%

***(All other Parameter Thresholds turned off)***



## Easy Start: Automatic Waveform Capture Settings

Parameter	Waveform Capture	Record all Channels
V LO LIM	ON	ON
V TRANS	ON	ON
V THD%	ON	OFF
#nth V HARM%	ON	OFF
#nth I HARM%	ON	OFF

*(All other Waveform Captures OFF)*



## (2) Real Time and EASY START Monitoring Exercises

- Connect the 4300 to a single phase load and turn it on
- Select current probe and input channels
- View waveforms in Scope Mode
- View data and phasors in Meter Mode
- Set Memory Mode to Overwrite
- Clear Memory
- Set Autotransfer to Enable
- Follow Easy Start steps



## **(2) Real-Time and EASY START Monitoring Test Questions**

1. Why should probes be connected before turning on the 4300?
2. In which direction should the arrow on the current probe point?
3. What is the highest number harmonic the 4300 can display?
4. What happens to your monitoring session when internal memory is filled if you have selected the "FILL AND STOP" storage mode?
5. What are the three types of files that can be saved on a memory card?
6. Why would you want to enable autotransfer as a last step before turning on monitoring?
7. When autotransfer is enabled, how should memory storage mode be set?
8. How many setups can the 4300 hold in internal memory?
9. Why must the first 8 characters of your Site/FileName be unique?
10. How many parameter thresholds are turned on by EASY START?



## **(2) Real-Time and EASY START Monitoring Test Answers**

1. Connecting Probes before turning on the 4300 allows it to automatically sync to the circuit being monitored.
2. The arrow on the current probe should point to the load.
3. The 4300 can display harmonics up to the 50th.
4. If you have selected the "FILL AND STOP" storage mode, your monitoring session will stop when internal memory is full, even if you have a memory card and autotransfer enabled!
5. FILENAME.EVT, FILENAME .SET and FILENAME.MDB.
6. Enabling autotransfer as a last step before turning on monitoring avoids filling the memory card with unwanted pre monitoring session data.
7. When autotransfer is enabled, memory storage mode should be set to OVERWRITE, to avoid the situation in answer 4.
8. The 4300 can only hold one setup at a time in internal memory.
9. The first 8 characters of your Site/FileName must be unique to avoid overwriting (erasing) other files on the memory card
10. Only ten out of 22 available parameter thresholds are turned on by EASY START.



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## **(3) Advanced Monitoring**

- Input Configuration
- Parameter Thresholds
- Waveform Capture
- Saving Setups
- 3-Phase Wye Hookup
- Loading Setups
- Starting Monitoring



## Setup Information

- Input Channel Configuration
- Circuit Type
- Scale Factors
- Parameter Thresholds
- Waveform Capture Settings
- Interval for Timed Readings
- Site/FileName
- Auto-Transfer Setting
- Memory Storage Mode Setting

The 4300 can only hold one setup at a time. Changing any setup items will immediately affect any monitoring in progress and overwrite the existing setup. Any Monitoring in progress and setups should be halted and saved before continuing.



## Input Configuration: Circuit Type, Active Channels

- Press Setup > Adv. Setup Options > Set Input Config. > Set Circuit Type
- Select Circuit Type
  - Single Phase
  - Split Phase
  - Three Phase Delta
  - Three Phase Wye
- Set Active Channels\*
  - Sets active channels for long-term monitoring...not the same as real time monitoring channel selection function
  - Turn on Volts and Amps for channels A, B, C, D
  - Set channel D volts to low range

```

Sep-14-95                               11:50:47
                                EASY START
PRESS '1' FOR SINGLE PHASE
PRESS '2' FOR SPLIT PHASE
PRESS '3' FOR THREE PHASE DELTA
PRESS '4' FOR THREE PHASE WYE
                                EXIT
  
```

```

Apr-24-95                               08:19:38
                                CHANNEL SELECTION
CHANNEL  VOLTS  AMPS
A        ON    ON
B        OFF   OFF
C        OFF   OFF
D        OFF   OFF
NEXT    VOLTS  AMPS
CHAN   ON/OFF ON/OFF  EXIT
  
```

\* You will not be able to enable parameter thresholds for any channels that are not activated here first.





## Parameter Thresholds

- V High Lim
- V Low Lim
- V Transient
- V THD %
- V Freq Sens
- I High Lim
- I Low Lim
- I Peak
- I THD %
- I Transient
- Watts Hi Lim
- VA Hi Lim
- VAR Hi Lim
- PF Low Lim
- V Sens Out Lim
- V Sens In Lim
- I Sens Out Lim
- I Sens In Lim
- V Trans %
- I Trans %
- # 3 V Harm
- # 3 I Harm



## Parameter Thresholds

- 22 Parameter Thresholds available
- Press Next/Previous group to view current settings
- "XXX" = Disabled
- "OFF" indicates that channel is not active, and cannot be enabled\*
- Press Edit Setup
- Edit Setup
  - Choose "Set identical 3-phase thresholds" for our 3-phase wye setup.

Sep-14-95		120 VOLT SINGLE PHASE			09:21:45
THRESHOLD	CH.A	CH.B	CH.C	CH.D	
V HI LIM	128.0	XXX	XXX	XXX	
V LO LIM	108.0	XXX	XXX	XXX	
V TRANS	100.0	XXX	XXX	XXX	
V THD %	5.0	XXX	XXX	XXX	
V FREQ SENS	0.5	XXX	XXX	XXX	

↓

Jan-21-95		15:07:51		
EDIT SETUP MENU				
120 VOLT SINGLE PHASE				
1.	SET IDENTICAL 3-PHASE THRESHOLDS			
2.	SET INDIVIDUAL THRESHOLDS			
3.	SET WAVEFORM CAPTURE			

**EXIT**

\*Return to Set Active Channels to activate channels



## Editing Parameter Thresholds

- Press Next Limit, Next Group to select parameters
- Disabled parameters (XXX) must be enabled before a value can be entered
- Enable key enters the default value
- Enter key accepts a new value, Exit rejects it
- Press Exit when done with last group

Sep-24-95 17:43:34

120 VOLT SINGLE PHASE

THRESHOLD	CH.A	CH.B	CH.C	CH.D
V HI LIM	128.0	XXX	XXX	XXX
V LO LIM	108.0	XXX	XXX	XXX
V TRANS	100.0	XXX	XXX	XXX
V THD %	5.0	XXX	XXX	XXX
V FREQ SENS	0.5	XXX	XXX	XXX

NEXT LIMIT	NEXT GROUP	ENABL	ENTER VALUE	EDIT NAME	EXIT
------------	------------	-------	-------------	-----------	------



## Waveform Capture

- Press Set Waveform Capture
- Wave Capture must be turned on for a threshold before Record All Channels can be turned on
- Record All Channels must be turned off for a threshold before Wave Capture can be turned off
- When done, Press Exit, Press 1 to return to the Parameter Thresholds Menu

Jan-21-95 15:07:51

EDIT SETUP MENU

120 VOLT SINGLE PHASE

1. SET IDENTICAL 3-PHASE THRESHOLDS
2. SET INDIVIDUAL THRESHOLDS
3. SET WAVEFORM CAPTURE

EXIT

Sep-29-95 17:08:57

120 VOLT SINGLE PHASE

THRESHOLD	WAVE CAPTURE	RECORD ALL CHANNELS
V. HIGH LIM	OFF	OFF
V. LOW LIM	OFF	OFF
V. TRANSIENT	OFF	OFF
V. THD %	OFF	OFF
V. FREQ HI	OFF	OFF

NEXT LIMIT	NEXT GROUP	WAVE ON/OFF	CHANS ON/OFF	EXIT
------------	------------	-------------	--------------	------



## Parameter Thresholds and Waveform Captures: Notes

- The majority of Parameter Thresholds and waveform captures should left disabled unless you have an application that specifically calls for them
- V HI LIM must be set at least .1V higher than V LO LIM for each active channel or the entered value won't be accepted. This applies even if one or the other is disabled (XXX), so you may have to enable both in order to see what they are. The same applies to I HI LIM and I LO LIM
- Enabling waveform capture for V LO LIM and V SENS OUT captures critical information at the start of power loss to the measured circuit
- If you will be using Kreiss Johnson's AiPower software to analyze your event data, see the second set of Threshold and waveform capture recommendations



## Recommended Thresholds for Max Duration

PARAMETER	CH A, B, C	CH D	WAVE	ALL CHAN
V HI LIM	(110% of nominal)	(5% of nominal)	On	Off
V LO LIM	(90% of nominal)	XXX	On	Off
V TRANS	(50% of peak)	025	On	Off
V THD %	005	XXX	Off	Off
V FREQ SENS	00.5	XXX	Off	Off
I HI LIM	XXX	XXX	Off	Off
I LO LIM	XXX	XXX	Off	Off
I PEAK	XXX	XXX	Off	Off
I THD %	XXX	XXX	Off	Off
I TRANS	(2 x RMS)	(10% of CT Range)	On	Off
WATTS LIM	XXX	XXX	Off	Off
VA HI LIM	XXX	XXX	Off	Off
VAR HI LIM	XXX	XXX	Off	Off
PF LO LIM	0.85	XXX	Off	Off
V SENS OUT	(5% of nominal)	002	On	Off
V SENS IN	XXX	XXX	Off	Off
I SENS OUT	XXX	XXX	Off	Off
I SENS IN	XXX	XXX	Off	Off
V TRANS %	150	150	ON	Off
I TRANS %	150	150	ON	Off
# V HARM	XXX	XXX	Off	Off
# I HARM	XXX	XXX	Off	Off



## Recommended Thresholds for AiPower

PARAMETER	CH A, B, C	CH D	WAVE	ALL CHAN
V HI LIM	(110% of nominal)	(5% of nominal)	ON	ON
V LO LIM	(90% of nominal)	XXX	ON	ON
V TRANS	(50% of peak)	025	ON	ON
V THD %	XXX	XXX	Off	Off
V FREQ SENS	XXX	XXX	Off	Off
I HI LIM	XXX	XXX	Off	Off
I LO LIM	XXX	XXX	Off	Off
I PEAK	(6 x RMS)	XXX	ON	ON
I THD %	XXX	XXX	Off	Off
I TRANS	(2 x RMS)	(10% of CT Range)	ON	ON
WATTS LIM	XXX	XXX	Off	Off
VA HI LIM	XXX	XXX	Off	Off
VAR HI LIM	XXX	XXX	Off	Off
PF LO LIM	XXX	XXX	Off	Off
V SENS OUT	(5% of nominal)	XXX	ON	ON
V SENS IN	XXX	XXX	Off	Off
I SENS OUT	XXX	XXX	Off	Off
I SENS IN	XXX	XXX	Off	Off
V TRANS %	200	XXX	ON	ON
I TRANS %	200	XXX	ON	ON
# V HARM	XXX	XXX	Off	Off
# I HARM	XXX	XXX	Off	Off



## Setup Description

- Press Edit Name
- Despite the name, this is a *description* of the setup that is saved with it, and *not* the setup's filename
- The setup's name is the same as the Site/FileName with the .SET extension
- Enter a description
- Press Exit, Press Exit again to exit edit mode
- STOP! You must activate your setup now.

```

Sep-24-95                               17:43:34
120 VOLT SINGLE PHASE
THRESHOLD  CH.A  CH.B  CH.C  CH.D
U HI LIM   128.0  XXX   XXX   XXX
V LO LIM   108.0  XXX   XXX   XXX
V TRANS    100.0  XXX   XXX   XXX
V THD %     5.0   XXX   XXX   XXX
V FREQ SENS 0.5   XXX   XXX   XXX
NEXT  NEXT  ENABL/  ENTER  EDIT  EXIT
LIMIT GROUP DISABL VALUE NAME
    
```

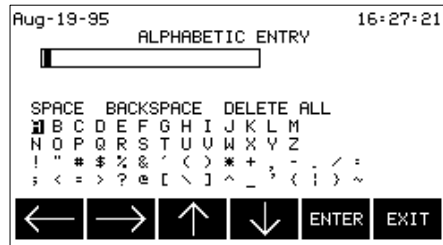
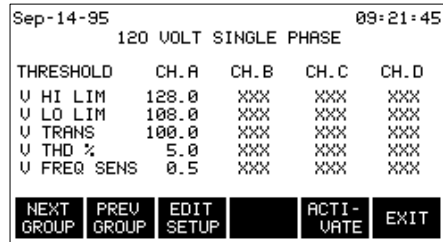
```

Aug-19-95                               16:27:21
ALPHABETIC ENTRY
[ ]
SPACE  BACKSPACE  DELETE  ALL
[ ] B C D E F G H I J K L M
N O P Q R S T U V W X Y Z
! " # $ % & ' ( ) * + , - . / :
; < = > ? @ [ \ ] ^ _ ` { | } ~
← → ↑ ↓ ENTER EXIT
    
```



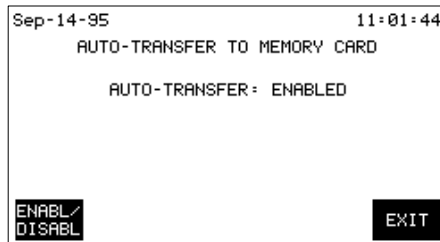
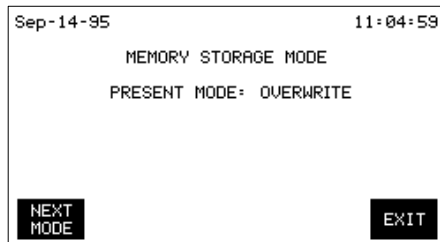
## Setup: Activation and New Site/File Name

- Press Activate
- The new setup information replaces the old setup
- From Setup Menu, press Set Program. Features > Enter Site/File Name
- Enter a unique, 8-character name for the new setup.
- Press exit twice to return to the Setup screen



## Setup: Memory and storage settings

- Set Memory Storage mode
  - From Setup: Press Memory Functions > Set Mem Storage Mode
  - Select Overwrite
- Disable Autotransfer\*
  - Press: Scope Mode > Setup > Memory Functions > Set Autotransfer
  - Disable Autotransfer



\*Tip: Enable Autotransfer as a last step before turning on monitoring to avoid placing unwanted pre-monitoring event data into the autotransfer file, or to avoid putting an autotransfer file on your setups storage card.



## Setups: Saving setups on a "Setup" Card

- Format a memory card to use as your "setups" card
- Press: Setup > Memory Functions > Mem. Card Functions > Format Card
- Press: Write Card > Write Setups
- Your setup info is saved on the memory card
- Backing up cards to a PC is recommended

```

Jan-21-95 13:41:26
YOU HAVE SELECTED FORMAT.
ALL DATA ON MEMORY CARD
WILL BE DESTROYED.

PRESS "YES" TO FORMAT CARD OR
PRESS "NO" TO CANCEL.
  
```

YES NO

```

Jan-21-95 13:41:26
WRITE DATA TO MEMORY CARD

CARD SIZE: 512K
CARD FREE SPACE: 105K
INTERNAL EVENT MEMORY USED: 90K
  
```

WRITE WRITE WRITE EXIT  
EVENTS SETUPS BOTH



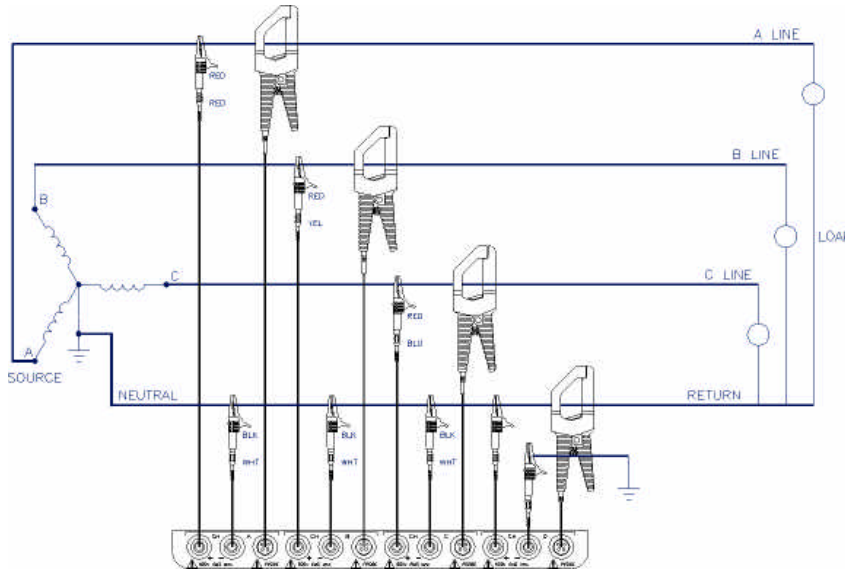
## 3-Phase Wye Hookup: Steps

- Use appropriate safety gear
- Connect Probes to unpowered 4300 first
- Deactivate AC circuit
- Don't connect to circuits >600VRMS!
- Make ground connections first
- Connect voltage probes and clamp on current probes
- Use jumpers to avoid multiple neutral connections
- Double check connections are correct and secure
- Tag area with safety markers
- Reactivate AC circuit
- Turn on 4300
- Check that it acquires sync on channel A



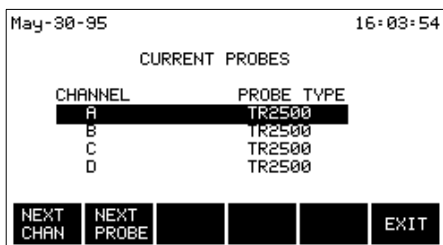
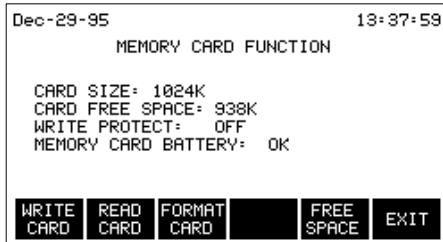


## 3-Phase Wye Hookup: Connections



## Load Setup from Memory Card

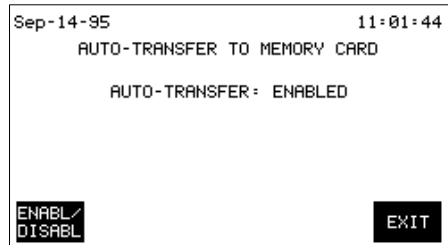
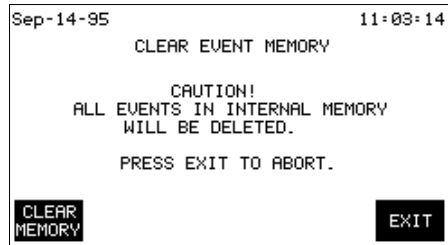
- From Scope Mode, Press:  
Setup > Memory Functions >  
Mem. Card Functions > Read  
Card > Read Setups
- Select your 3-phase Wye setup
  
- When asked, verify that the  
current probes are what you are  
using in your hookup
- Remove "setups" mem card  
and insert a mem card for a  
monitoring session





## Start Monitoring

- Clear internal memory
  - Press: Exit > Exit > Clear Memory
  - Clear Memory
  
- Format memory card
  - To clear old .MDB files
- Enable Autotransfer
  - Press Set Autotransfer
  - Enable Autotransfer
  - Filename.MDB is created on the memory card, ready to accept event data
  
- Start Monitoring
  - Press: Exit > Turn Monitoring On > Yes



## Keep an Activity Log to help analyze event data later

ERRORS, EVENTS & ACTIVITIES LOG				
DATE	DAY	TIME	DESCRIPTION	UNUSUAL EVENTS
7/6/97	Monday	9:00AM	System Reset	Water Pump started
7/6/97	Monday	10:15AM	Communications to host lost	None noted
7/7/97	Tuesday	9:00AM	System Reset	Water Pump started
7/7/97	Tuesday	9:07AM	System hung	Water Pump stopped



### (3) Advanced Monitoring: Exercises

- Turn on the 4300 and go to advanced setup options
- Change the 3-phase wye *EASY START* setup to the recommendations in this workbook
- Insert and format a memory card to store your setups on. Save your new 3-ph-wye setup
- Review safety practices. Hookup 4300 to a 3-phase wye circuit. Turn on 4300
- Load your new 3-ph-wye setup. Switch to a formatted memory card for monitoring
- Clear memory, enable autotransfer, turn monitoring on.
- Monitor for a few days, stop and disconnect from circuit
- Save your monitoring data for use in Module 4



### (3) Advanced Monitoring Test Questions

1. What happens if you change input configuration or thresholds (the setup) when monitoring is on?
2. If your current probe is not listed on the selection menu, what should you do?
3. How many parameter thresholds does the 4300 have?
4. Why can't you enable a parameter threshold that says OFF?
5. Why should waveform capture be used sparingly?
6. Why might you have difficulty getting the 4300 to accept a new value for: V HI LIM, V LO LIM, I HI LIM, and I LO LIM?
7. When you change the name using EDIT NAME on the EDIT PARAMETER THRESHOLD screen, does this change the setups' Site/File Name?
8. Why should a disabled autotransfer be a part of any setup you save?
9. What is the first connection you should make to a circuit to be measured?
10. What 3 steps before starting monitoring avoid unwanted data?



### (3) Advanced Monitoring Test Answers

1. Since the 4300 can only hold one setup at a time, any setup changes will overwrite the existing setup. The change will be written as an event in the ongoing monitoring session.
2. If your probe is not on the menu, select NO PROBE on the selection menu and then enter the probe's scale factor on the scale factor screen.
3. The 4300 has 22 different parameter thresholds.
4. You must turn on a channel on the SET ACTIVE CHANNELS selection screen before you can enable any parameter thresholds for that channel.
5. Waveform capture should be used sparingly because it uses large amounts of memory, especially when RECORD ALL CHANNELS is on.
6. V HI LIM must be set at least .1V higher than V LO LIM for each active channel or the entered value won't be accepted. This applies even if one or the other is disabled (XXX), so you may have to enable both in order to see what they are. The same applies to I HI LIM and I LO LIM
7. No, this name is only a *description* of the setup that is saved with it, and *not* the setup's filename. The setup's file name will be the same as the Site/FileName with the .SET extension
8. Enable Autotransfer as a last step before turning on monitoring to avoid placing unwanted pre-monitoring event data into the autotransfer file, or to avoid putting an autotransfer file on your setups storage card.
9. Make your ground connection first from the circuit to the 4300.
10. To avoid unwanted data, Clear memory, format a memory card, and then enable autotransfer.



## **Workbook Modules:**

1. Hardware and Basic Operation
2. Real-Time & EASY START Monitoring
3. Advanced Monitoring
4. Viewing Event Data



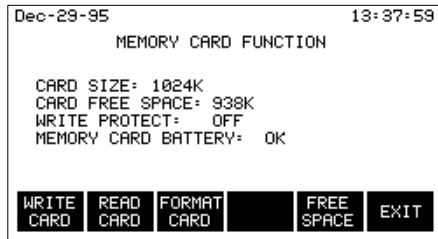
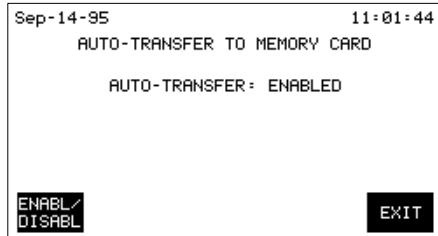
## **(4) Viewing Event Data**

- Manual Event Data Save
- Loading Autotransfer Files
- Worst Case Events
- Time Plots
- Event Activity Plot
- Wave and Detail Screens
- Data Screens

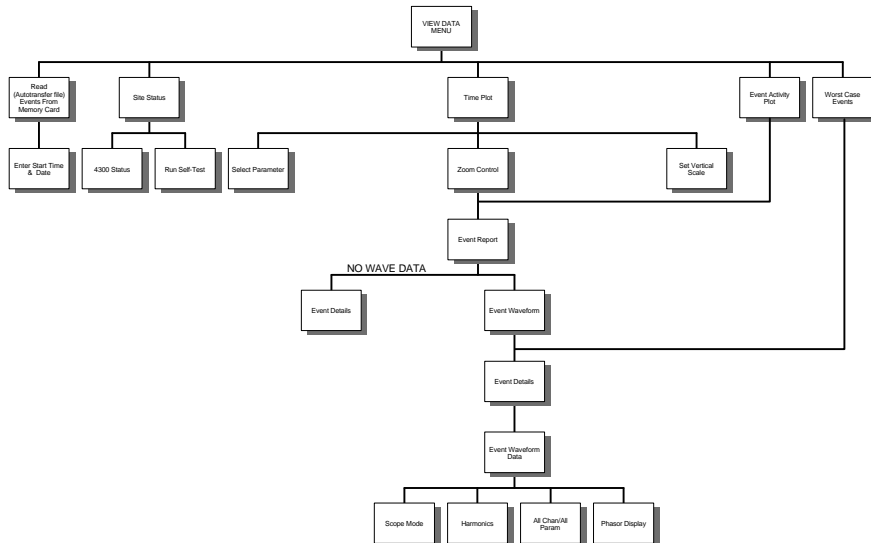


## Manual Event Data Save

- Loading Event Data overwrites internal Memory (Save data first)
  - Disable Autotransfer first
    - From Scope Mode, Press Setup > Memory Functions > Disable Autotransfer
  - Save Event Data
    - Press: Mem Card Functions > Write Card > Write Both



## View Data Menu Structure





## Loading Autotransfer Files

- Requires several loads when FILENAME.MDB is larger than internal memory
- The current Site/File Name must match the FILENAME.MDB you are trying to load from the card or the loading will fail
- From Scope Mode, press View Data > Read Events From Mem Card > Transfer > Enter Time/Date > Read Events

```

Sep-14-95          08:25:18
  READ EVENTS FROM MEMORY CARD
          CAUTION!
EVENTS PRESENTLY IN MEMORY WILL BE
DELETED WHEN EVENTS FROM THE CARD ARE
COPIED INTO MEMORY.
*PRESS EXIT TO CANCEL.
*PRESS TRANSFER TO CONTINUE.
TRANSFER          EXIT
  
```

```

Sep-14-95          08:17:06
  STARTING DATE AND TIME

STARTING DATE (mmm-dd-yy): Sep-14-93
STARTING TIME (hh:mm:ss.ms): 09:20:04.00
ENTER DATE  ENTER TIME  READ EVENTS  EXIT
  
```



## Worst Case Events

- Shows up to 4 worst out-of-limits values recorded for each parameter
- Press Next Type to cycle through parameters
- Press Detail to see detailed info for each event.
- Remember this is only worst case for events currently in internal memory, there may be worse events in the rest of the FILENAME.MDB file.

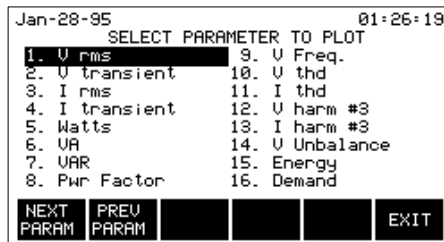
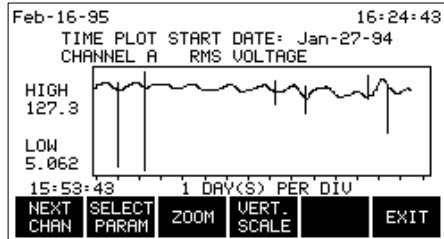
```

Sep-14-95          08:35:01
          VOLTAGE TRANSIENTS
EV.#  DATE      TIME      CHAN.  VALUE
003  01-04-93  10:27:35  C      139 UPK
012  03-07-93  07:14:15  B      135 UPK
015  03-26-93  14:27:35  A      245 UPK
002  12-31-92  07:14:15  D      117 UPK
NEXT  NEXT  DETAIL  EXIT
EVENT TYPE
  
```



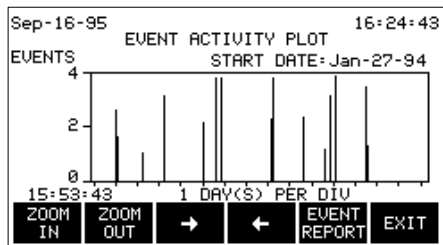
## Time Plots

- Time Plot graphs events for one parameter threshold and one channel over time
- Screen is redrawn every 10 seconds
- Use arrow keys to narrow focus and Zoom key for more detail
- Press Select Parameter for a list of parameters
- 16 parameters to choose from, on A, B, C, D, or ABC combined



## Event Activity Plots

- Event Activity Plots graphs *all* events in memory
- Screen is redrawn every 10 seconds
- Use arrow keys to narrow focus and Zoom key for more detail
- Press Event Report for a list of plotted events
- Page Up and Down through events



EVENT REPORT			
EV.#	DATE	TIME	DESCRIPTION
0301	11-17-93	16:13:55.00	A WATTS NORMAL
0302	11-17-93	16:13:56.00	A WATTS LIMIT
0303	11-17-93	16:13:57.00	A WATTS NORMAL
0304	11-17-93	16:13:58.00	B RMS SEN OUT
0305	11-17-93	16:13:58.00	C I TRANSIENT
0306	11-17-93	16:13:58.00	A WATTS LIMIT



## Correlate your Event Report to your Activity Log

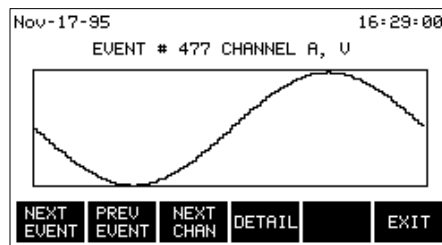
### ERRORS, EVENTS & ACTIVITIES LOG

DATE	DAY	TIME	DESCRIPTION	UNUSUAL EVENTS
7/6/97	Monday	9:00AM	System Reset	Water Pump started
7/6/97	Monday	10:15AM	Communications to host lost	None noted
7/7/97	Tuesday	9:00AM	System Reset	Water Pump started
7/7/97	Tuesday	9:07AM	System hung	Water Pump stopped



## Wave Screen

- From Event Report screen, Press Wave/Detail
- If waveform capture was enabled for this parameter, the waveform is displayed
- A one-cycle composite or 3-cycles are displayed
- If no waveform was captured, you will go straight to the Detail screen



- One-Cycle composite display of last 60 cycles:
  - Watts
  - VA
  - VAR
  - Power Factor
  - Vthd
  - Ithd
  - Vharm#
  - Iharm#
  - V-Unbalance
  - K-factor
- 3-Cycle Display:
  - Vrms
  - Vtransient
  - Irms
  - Itransient
  - Frequency
  - Ipeak
  - Vsens
  - Isens



## Detail Screen

- Press Detail
- Press Next/Previous event for details on other events
- If there is waveform data associated with the event the Data key will be visible

```

Nov-17-95                               16:38:35
      EVENT DETAILS FOR EVENT # 326
EVENT TIME: 11-17-93 16:14:18.00
EVENT TYPE: CH A V RMS HIGH TO NORM
THRESHOLD CROSSED: 120.00 V
CATEGORY: MOMENTARY SWELL
OUT OF LIMIT MAX/MIN: 132.9 V
DURATION OUT OF LIMITS: 1.2 SEC
NEXT  PREV  DATA  [ ]  [ ]  EXIT
EVENT EVENT
  
```



## Data Screens: Event Waveform Data

- Press Data, Choose Pre Fault, Fault or Post Fault waveform to be displayed
- Choose a display mode.
- Item (3), All Channels, All Parameters, and Item (4), Voltage and Current Phasors are only available if waveforms were saved for all channels

```

Nov-17-95                               17:11:44
      EVENT WAVEFORM DATA
CYCLE TO ANALYZE : FAULT CYCLE
1. SCOPE MODE
2. HARMONICS - V, I & W
3. ALL CHANNELS, ALL PARAMETERS
4. VOLTAGE & CURRENT PHASORS
SELECT SELECT SELECT  EXIT
PRE  FAULT  POST
  
```



## Loading Additional Autotransfer File Data

- Exit all the way back to Scope Mode
- Press: View Data > Read Events From Mem Card > Transfer > Enter Time/Date > *(enter time and date of last event from first load)* > Read Events

```

Sep-14-95 08:25:18
  READ EVENTS FROM MEMORY CARD
          CAUTION!
EVENTS PRESENTLY IN MEMORY WILL BE
DELETED WHEN EVENTS FROM THE CARD ARE
COPIED INTO MEMORY.
*PRESS EXIT TO CANCEL.
*PRESS TRANSFER TO CONTINUE.
TRANSFER EXIT
  
```

```

Sep-14-95 08:17:06
  STARTING DATE AND TIME

STARTING DATE (mmm-dd-yy): Sep-14-93
STARTING TIME (hh:mm:ss.ms): 09:20:04.00
ENTER DATE ENTER TIME READ EVENTS EXIT
  
```



## (4) Viewing Event Data: Exercises

- Use event data from monitoring session in Module 3, or copy supplied sample event files to a memory card
- Read the autotransfer file from the memory card into internal memory
- View the Worst Case events for each parameter
- View Time Plots for several different parameters
- View Event Activity plots, zoom in on interesting data
- View the Event Report
- View the Wave/Detail report
- View the data for the event
- View PreFault, Fault and Post Fault waveforms for the event if available
- View Voltage and current Phasors if available



#### (4) Viewing Event Data Test Questions

1. If you are unable to load the autotransfer file (read events from card), what is the likely cause?
2. Why are the worst case events displayed not necessarily the worst case events of your monitoring session?
3. What is the difference between *Time Plots* and *Event Activity Plots*?
4. On the Wave screen, is power factor displayed as 3 cycles or as a one-cycle composite of the last 60 cycles?
5. On the Event Waveform Data Screen, if item (3), All Channels, All Parameters, and item (4), Voltage and Current Phasors are missing, what is the reason?
6. What information do you need to load event data from an autotransfer file beyond the first 280K?



#### (4) Viewing Event Data Test Answers

1. The current Site/File Name must match the FILENAME.MDB you are trying to load from the card, or the loading will fail.
2. Since the 4300 can only hold 280K of event data at one time, there may be worse events on the memory card that haven't been loaded yet..
3. Both are graphic summaries, but *Time Plots* graphs events associated with one parameter and channel over time, and *Event Activity Plots* graphs *all* events over time.
4. Power factor is displayed as a one-cycle composite of the last 60 cycles.
5. Item (3), All Channels, All Parameters, and item (4), Voltage and Current Phasors are only available if waveforms were saved for all channels.
6. You need the time and date of the last event from the previous load in order to tell the 4300 where to start the next load.