

BMI Model 4800 PowerScope.

Power line disturbances disrupt and damage today's sophisticated electronic equipment.

The PowerScope is a portable instrument that detects power line disturbances, analyzes them, identifies their cause, and selects a solution.

Wherever electronic equipment reliability is required, the PowerScope's unique graphic reports, patented detection systems, and powerful multi-processor architecture make it an essential tool.

The Key Operator menu lets you control administrative detail, such as the calendar and clock, Centigrade or Fahrenheit temperature scale, etc.

Quick Guide

1. Press the **SETUP MENU** key, then quickly press the up arrow.
2. Use the **VALUE UP/VALUE DOWN** keys or the number letter keypad to answer the questions in the menu.
3. Press the down arrow to go to the next question.
4. Press the **HELP!** key if you want further explanation about the questions.

Help: English

Selections: English
 French

Use the **VALUE UP/VALUE DOWN** keys to select the language you prefer for the **HELP** messages.

(The menus and reports are always printed in English.)

(Press **HELP!** again for general information on the Setup Menu.)

The Setup Menu contains questions that define the operating parameters of your PowerScope. Specifically, it asks you to name the monitoring site, state what type of power each channel will monitor, and specify thresholds for each measurement.

The questions in the Setup Menu change automatically depending on what type of power you assign each channel and if you have probes plugged into the environmental channels.

Wave shp: 0.1 cycles

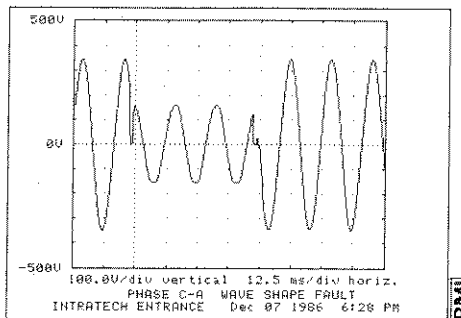
Range: 0.1 cycles to
9.9 cycles

Use the number
keys to enter the
minimum duration
for waveshape faults.

A typical value is 0.2
cycles. The acceptable
range is 0.1 cycles
to 9.9 cycles.

A waveshape fault that is shorter than the minimum duration that you enter here
will not trigger a waveshape fault graph; a waveshape fault that is longer than the
minimum duration will.

INTRATECH ENTRANCE Dec 07 1986
PHASE C-A WAVE SHP FAULT 6:28:13.72PM



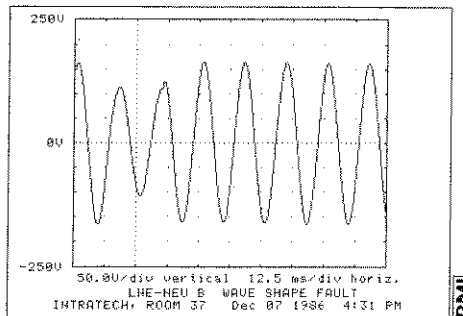
Wave tolerance: 10%

Range: 2% to 99%

Use the number
keys to enter the
minimum amplitude
of waveshape faults
as a percentage
of full scale.

The range is 2% to 99%.
A typical value is 20%.
Waveshape faults are
detected by comparing each sinewave to the one previous.

INTRATECH, ROOM 37 Dec 07 1986
LHE-NEU B WAVE SHP FAULT 4:31:05.37PM

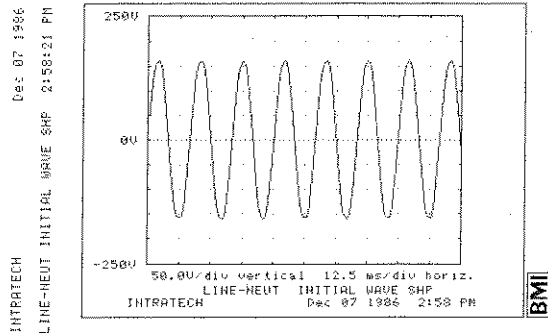


Wave Res: 5.0 ms/div

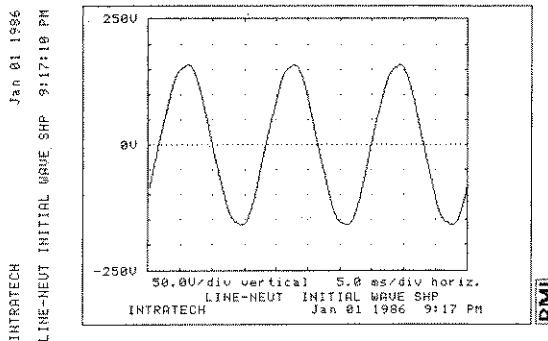
Selections: 5.0 ms/div
12.5 ms/div

Use the **VALUE UP/VALUE DOWN** keys to select either **high** or **normal** resolution for waveshape fault graphs and initial waveshape graphs.

High resolution prints 5.0 ms/division and normal resolution prints 12.5 ms/division. The difference between the two are shown here.



12.5 ms/division resolution.



5.0 ms/division resolution.

Hysteresis: 1.0%

Range: 0.0% to 5.0%

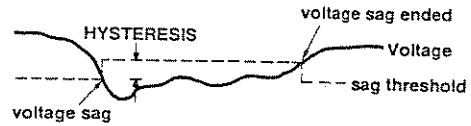
Use the number keys to enter the hysteresis as a percentage of full scale.

The acceptable range is 0.0% to 5.0%. A typical value is 1.0%.

Hysteresis is an amount by which a threshold is altered in order to suppress disturbance graphs that would otherwise be triggered by small fluctuations in the measured signal.

If hysteresis is used, the threshold is altered by the specified percentage after an initial disturbance is triggered until the signal crosses the altered threshold. At this time, the threshold is restored to its original level. If you don't want hysteresis, enter 0.0% for the threshold.

Hysteresis is applied to thresholds set for probes, voltage, and high-frequency noise.



When using hysteresis, the thresholds are altered as indicated by the dashed line (- - -).

Impulse range: Auto

Selections: Auto
Manual

Use the VALUE UP/
VALUE DOWN
keys to choose
automatic or manual
impulse ranging.

If you choose automatic
impulse ranging, your
Power Scope automatically uses your impulse threshold to
choose a full-scale range.

Automatic
Impulse
Ranging
Table

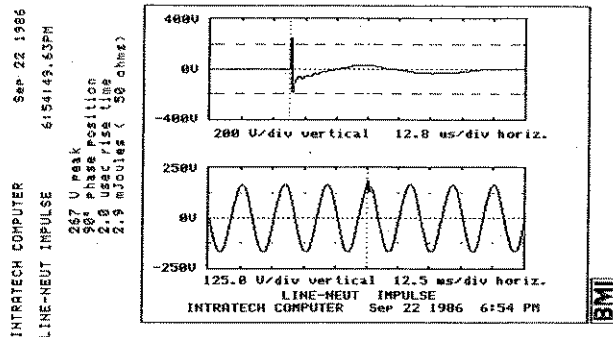
| If Impulse Threshold selected in previous question is between... | The Impulse Range will set automatically to... |
|--|--|
| 20 - 50 volts | +/- 100 volts |
| 51 - 100 volts | +/- 200 volts |
| 101 - 200 volts | +/- 400 volts |
| 201 - 400 volts | +/- 800 volts |
| 401 - 800 volts | +/- 1600 volts |
| 801 - 1600 volts | +/- 3200 volts |
| 1601- 6000 volts | +/- 6400 volts |

However, if you choose manual impulse ranging, your PowerScope will ask you to choose a full-scale range. The choices offered you depend on the selected impulse threshold as follows:

Manual
Impulse
Ranging
Table

| Impulse Threshold | Available Full-Scale Ranges |
|-------------------|---|
| 20-24 Vpk | +/-100 or 200 volts full-scale |
| 24-49 Vpk | +/-100, 200 or 400 volts full-scale |
| 50 Vpk | +/-100, 200, 400 or 800 volts full-scale |
| 51-99 Vpk | +/-200, 400 or 800 volts full-scale |
| 100 Vpk | +/-200, 400, 800 or 1600 volts full-scale |
| 101-199 Vpk | +/-400, 800 or 1600 volts full-scale |
| 200 Vpk | +/-400, 800, 1600 or 3200 volts full-scale |
| 201-399 Vpk | +/-800, 1600 or 3200 volts full-scale |
| 400 Vpk | +/-800, 1600, 3200 or 6400 volts full-scale |
| 401-800 Vpk | +/-1600, 3200 or 6400 volts full-scale |

In applications where you know the size of impulses that disrupt equipment, it makes sense to choose automatic impulse ranging. In applications where you're trying to characterize a power line, it may make more sense to choose manual impulse ranging, then select the largest full-scale range available.



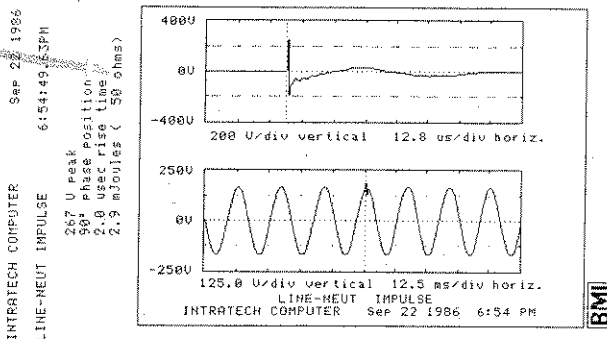
Line imp: 50 ohms

Range: 1 ohms to 9,999 ohms

Use the number keys to enter the estimated impedance of the power line at impulse frequencies.

The acceptable range is 1 ohm to 9,999 ohms. Fifty ohms is a reasonable value, unless you are measuring downstream from a power conditioner, where a value of a few hundred ohms is more typical.

The impedance is used in the calculation of approximate impulse energy. It has a second-order effect (the calculation is dominated by the integral of the voltage, which is squared). For a discussion of typical values, see J.H. Bull, "Impedance of the Mains Supply at Radio Frequencies", Proceedings of the 1st Symposium on EMC, MONTREUX, 75CH1012-4, pp. 357-362, May 1975.

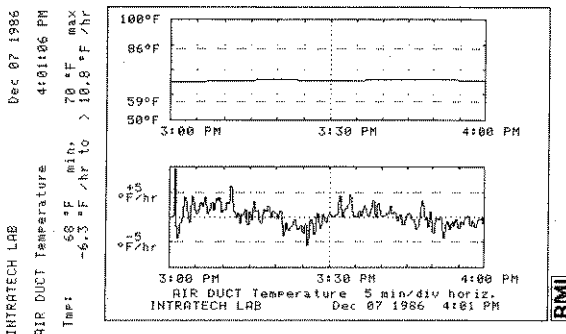


Temp units: F

Selections: C
F

Use the VALUE UP/VALUE DOWN keys to select temperature readings in Centigrade or Fahrenheit.

This controls both temperature probes and temperature/humidity probes.



Internal UPS: 5 min

Range: 0 min to 15 min

Use the number keys to enter the length of time the internal batteries should support the PowerScope if power fails.

The range is 0 to 15 minutes with fully charged batteries. A typical value is 5 minutes (to capture most disturbances associated with a power failure, yet not consume all battery power during the first power failure that occurs).

The PowerScope uses its batteries only while it's monitoring; a power failure while you're setting up your PowerScope will cause a simple power-down procedure.

Current month: Sep

Range: Jan to Dec

Use the VALUE UP/VALUE DOWN keys to select the current month.

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INTRATECH, ROOM 35          Dec 07 1986
THRESHOLD REPORT           2:58 PM
Type:      Single Phase

LINE-NEUT THRESHOLDS (Channel 1)
Surge voltage: 125.0 Urms
Sag voltage:  105.0 Urms
Impulse:      200 Upk
High freq noise: 5.0 Upk
High frequency: 61.2 Hz
Low frequency: 58.8 Hz
Wave shape:   20% variation
Minimal duration: 0.1 cycles
Line impedance: 50 ohms
Hysteresis:   1.0%

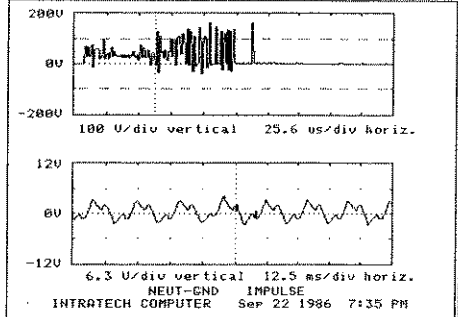
NEUT-GND THRESHOLDS (Channel 2)
Surge voltage: 5.0 Urms
Impulse:      100 Upk
High freq noise: 5.0 Upk
Line impedance: 50 ohms
Hysteresis:   1.0%

SUMMARY REPORT INTERVAL: 1Hr
1 HOUR STRIP CHARTS
LINE-NEUT Rms Voltage
LINE-NEUT Hi Freq Noise
LINE-NEUT Frequency
NEUT-GND Rms Voltage
NEUT-GND Hi Freq Noise

Internal UPS time: 5 minutes.
    
```

```

INTRATECH COMPUTER      Sep 22 1986
NEUT-GND IMPULSE       7:35:19.24PM
171 U peak
180 U phase position
3.0 us/rise time
12 mJoules ( 50 ohms)
    
```

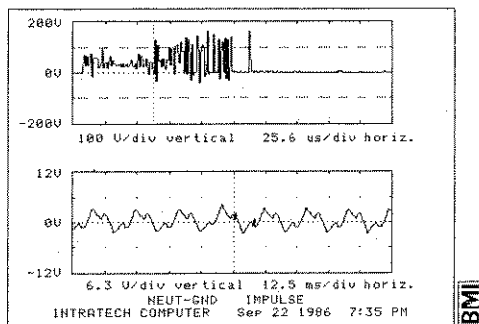


Day of month: 22

Range: 1 to 31

Use the number keys to enter the current date.

INTRATECH COMPUTER Sep 22 1986
 NEUT-GND IMPULSE 7:35:19.24PM
 171 U peak
 180° phase position
 3.0 usec rise time
 12 mJoules (50 ohms)



BMI

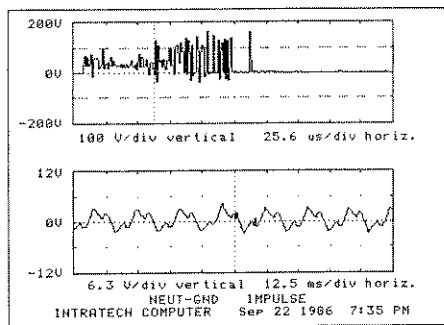
Current year: 1986

Range: 1986 to 2099

Use the number keys to enter the current year.

Acceptable values are 1986 to 2099.

INTRATECH COMPUTER Sep 22 1986
 NEUT-GND IMPULSE 7:35:19.24PM
 171 U peak
 180° phase position
 3.0 usec rise time
 12 mJoules (50 ohms)



BMI

Date: U.S. standard

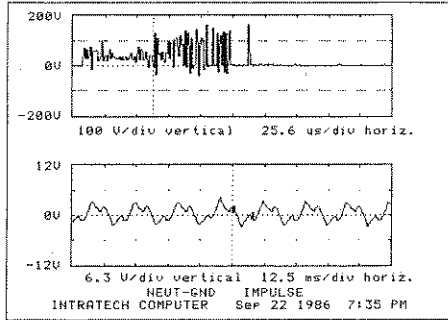
Selections: U.S. standard
Eur. standard

Use the **VALUE UP/VALUE DOWN** keys to select the date format you prefer.

The U.S. standard form is January 12, 1987; the European standard for the same date is 12 January, 1987.

INTRATECH COMPUTER
NEUT-GND IMPULSE
Sep 22 1986 7:35:19.24PM

171 V peak
180° phase position
3.0 usec rise time
12 mJoules (50 ohms)



Current hour: 7

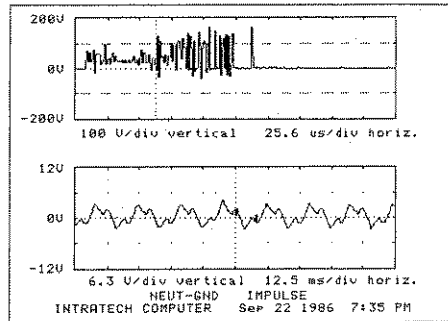
Range: 0 to 23

Use the number keys to enter the current hour on a 24 hour clock.

For example, if it is 6:00 in the evening, you must enter 18 here. The acceptable range is 0 to 23.

INTRATECH COMPUTER
NEUT-GND IMPULSE
Sep 22 1986 7:35:19.24PM

171 V peak
180° phase position
3.0 usec rise time
12 mJoules (50 ohms)



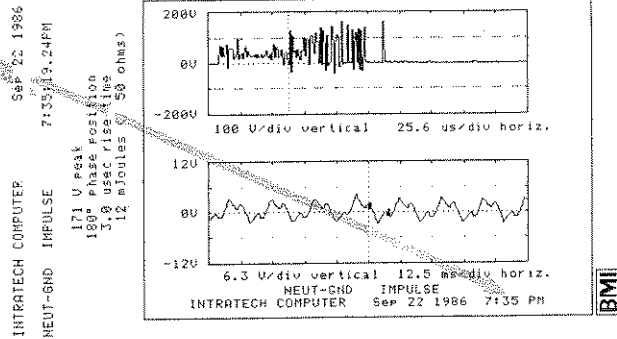
Current minute: 35

Range: 1 to 59

Use the number keys to enter the current minute.

The clock will be set when you step off this question, with the seconds set to zero.

(If you haven't changed the clock, the seconds won't be disturbed.)

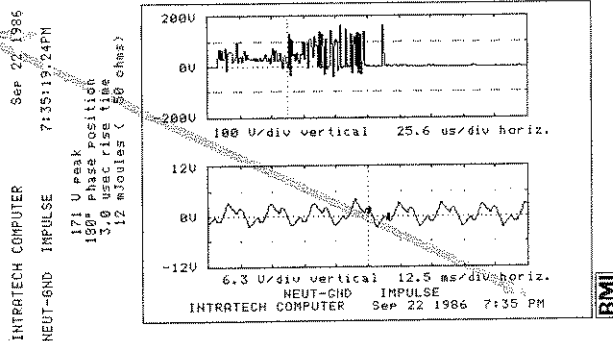


Time: AM/PM

Selections: 24 hour
AM/PM

Use the VALUE UP/VALUE DOWN keys to select A.M./P.M. or military time display.

A.M./P.M. time display would read 7:35PM.
Military time display would read 19:35.



MEM#1 Name: MEMORY#1

Use the number/letter keypad to name this memory slot.

Usually, you'll want to name it for the type of equipment the setup is used for, e.g. VAX 11/80.

To enter the letter "M", press the 6MNO key twice. On the first press a 6 will appear, on the second press an M will appear.

Move the flashing cursor to the next position by pressing the right arrow key. Press the 0 SPACE key twice to enter a space.

MEMORY#1: Read/Write

Selections: Read/Write
Read Only

Use the VALUE UP/VALUE DOWN keys to control access to this memory slot.

If you want to ensure the contents of this memory will not change, position Read Only in the display. If you want to be free to store other setups in this memory slot, position Read/Write in the display. Press the down arrow to go on to the next question.

NOTE: The questions on this page are repeated for MEMORY #2 and MEMORY #3.

This chapter describes the operational functions of the PowerScope.

Refer to page x for an overview of how to monitor power with the PowerScope.

If your PowerScope starts printing graphs right after you plug it in:

These graphs are summary strip charts from the previous monitoring session.

To cancel these reports, press:

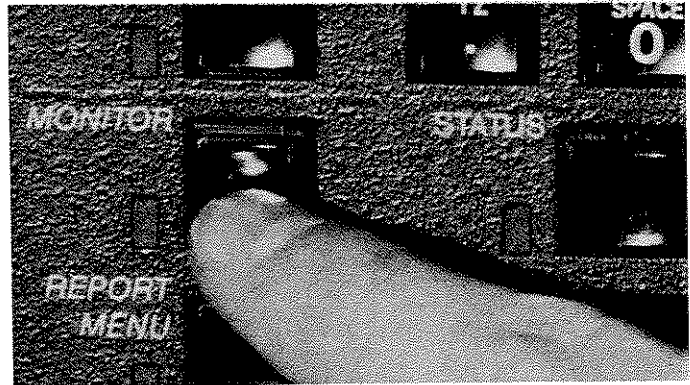
- CANCEL PRINTER
- up arrow, and
- any other function key, such as SETUP MENU.

The MONITOR Key

Press the MONITOR key to start monitoring the power line.

Pressing this key will cause the PowerScope to print a Threshold Report and initial waveshape graphs.

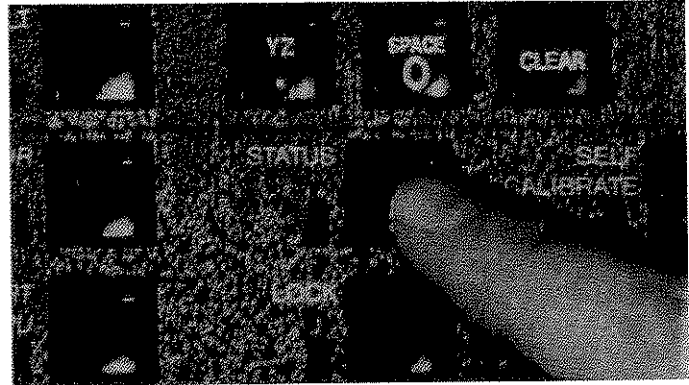
Then whenever there's a disturbance, your PowerScope will print a graph of it: impulse graphs, waveshape fault graphs, and summary strip charts. These disturbance graphs are explained on page E-1.



The STATUS Key

Press the STATUS key after you've connected to the power line and before you start monitoring to get a print-out of present voltages and frequencies.

Use the Status Report to determine if the power is live, if you've connected correctly, and to get an idea of how to set your thresholds.



```

INTRATECH ENTRANCE      Dec 07 1986
STATUS REPORT           6:31 PM

PHASE A-B (Channel 1)
Voltage: 234.2 - 237.1 Urms
Frequency: 60.0 - 60.0 Hz
Hi freq noise: 0.0 - 0.0 Upk

PHASE B-C (Channel 2)
Voltage: 234.7 - 237.0 Urms
Frequency: 60.0 - 60.0 Hz
Hi freq noise: 0.2 - 1.6 Upk

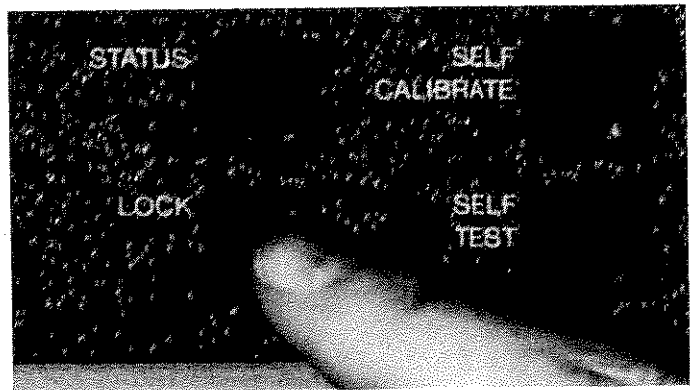
PHASE C-A (Channel 3)
Voltage: 234.5 - 236.5 Urms
Frequency: 60.0 - 60.0 Hz
Hi freq noise: 1.5 - 2.7 Upk

BATTERY CONDITION
Voltage: 11.1 Vdc
State: Charged
    
```

The LOCK Key

Press the LOCK key if you want to disable the keyboard to guard against casual tampering.

Press the LOCK key then the CLEAR key to unlock the keyboard.

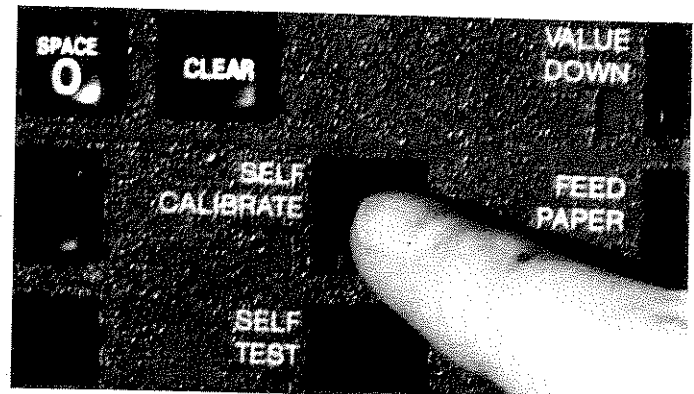


The
SELF
CALIBRATE
Key

Press the **SELF CALIBRATE** key to get a report indicating the status of the range, noise, offset, stability, and gain for each of the acquisition boards.

Pressing this key causes the internal calibration module to correct the PowerScope's readings to conform to a very accurate secondary reference voltage source. You must disconnect the monitoring cables before pressing the **SELF CALIBRATE** key.

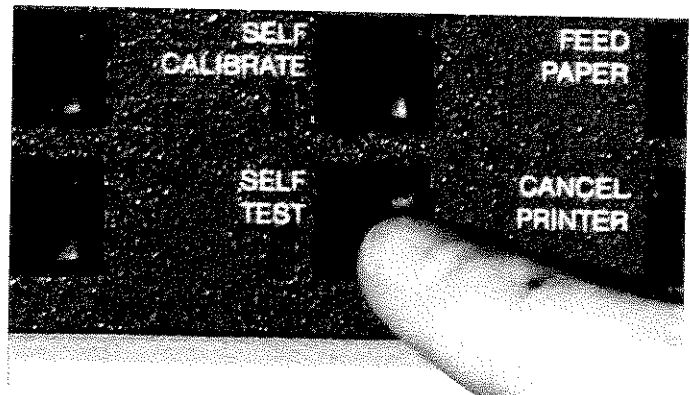
If a "BAD" status appears on the Calibration Report, refer to Chapter 10, Troubleshooting, Page 334. If calibration has expired, contact BMI's Customer Service Department at (415) 570-5355.



The
SELF
TEST
Key

Press the **SELF TEST** key to get a report verifying the revision level of the software, what boards and probes are installed, and if there is an internal connection problem.

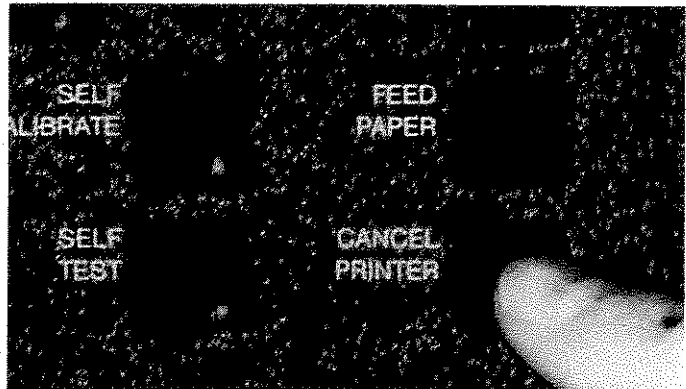
If an unexpected "not installed" message appears on the Self Test Report, refer to Chapter 10, Troubleshooting, Page 334.



**The
CANCEL
PRINTER
Key**

Press the **CANCEL PRINTER** key to cancel the report that is printing right now.

To cancel all pending reports, press the **CANCEL PRINTER** key, then immediately press the up arrow.

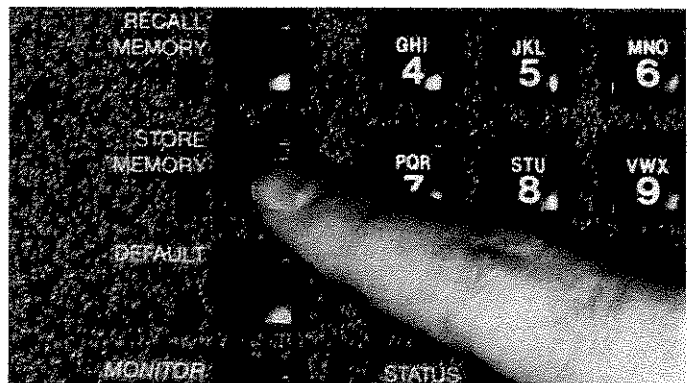


**The
STORE
MEMORY
Key**

Store mem: **MEMORY #1**

Selections: MEMORY #1
MEMORY #2
MEMORY #3
QUIT

Press the **STORE MEMORY** key to store the Setup, Report, and Key Operator Menu settings in one of the PowerScope's memories.



This way, you can be ready to monitor for your most common applications with just a few keystrokes.

Use the **VALUE UP/VALUE DOWN** keys to select which memory the setup will be stored in, then press the down arrow.

If you select **QUIT** nothing will be stored. If one or all of the memories is missing from the selections, it's because they are protected with a Read Only setting in the Key Operator Menu. (See page 318.) Naming the memories is also a function available in the Key Operator Menu.

Memories are protected even when power is removed.

The
RECALL
MEMORY
Key

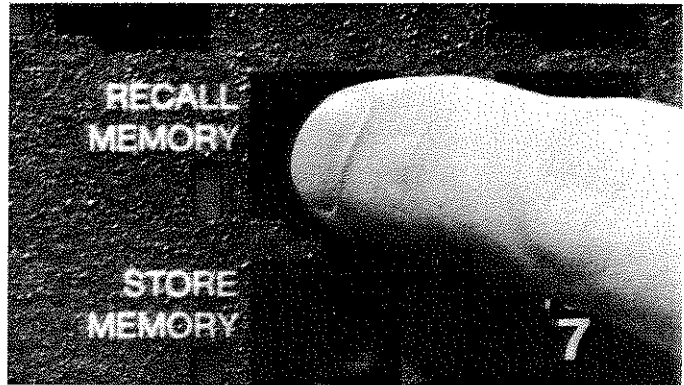
Press the **RECALL
MEMORY** key to
recall a setup from
memory.

When you do this, all the current menu settings are replaced with the settings in memory. When you press the **RECALL MEMORY** key, the display will light with:

Recall mem: MEMORY #1

Selections: DEFAULT
MEMORY #1
MEMORY #2
MEMORY #3
QUIT

Use the **VALUE UP/
VALUE DOWN** keys
to select the memory
you want recalled,
then press the
down arrow.



If you choose **DEFAULT**, all default settings for 120 VAC , 60 Hz single-phase power will be restored. If you choose **QUIT**, nothing will be recalled and your present setup won't be disturbed.