1930/2930 Series Optical Power Meter

Operator Manual

Newport®

EU Declaration of Conformity

We declare that the accompanying product, identified with the "ce" mark, complies with requirements of the Electromagnetic Compatibility Directive, 89/336/EEC and the Low Voltage Directive 73/23/EEC.

Model Numbers:

1930F-SL-FC, 1930F-SL-SC, 1930F-IG-FC, 1930F-IG-SC, 1930-C, 1930IS, 2930F-SL-FC, 2930F-SL-SC, 2930F-IG-FC, 2930F-IG-SC & 2930-C.

Year ce mark affixed: 2002

Type of Equipment:

Electrical equipment for measurement, control and laboratory use

Standards Applied:

Compliance was demonstrated to the following standards to the extent applicable:

BS EN61326:1998 "Electrical equipment for measurement, control and laboratory use – EMC requirements"

This equipment meets the CISPR 11 Class A radiated and conducted emission limits.

BS EN 61000-3-2, Harmonic current emissions, Class A

BS EN 61000-3-3, Voltage fluctuations and flicker

BS EN 61010-1 "Safety requirements for electrical equipment for measurement, control and laboratory use"

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Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever first occurs.

Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

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First printing 2002

This manual has been provided for information only and product specifications are subject to change without notice. Any change will be reflected in future printings.

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P/N 8801930001, Rev. B

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Service Information

This section contains information regarding factory service for the Power Meter. The user should not attempt any maintenance or service of the system or optional equipment beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to Newport Corporation.

Technical Support Contacts

North America & Asia

Newport Corporation Service Dept.
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Newport Corporation Calling Procedure

If there are any defects in material or workmanship or a failure to meet specifications, promptly notify Newport's Returns Department by calling 1-800-222-6440 or by visiting our website at www.newport.com/returns within the warranty period to obtain a **Return Material Authorization Number (RMA#)**. Return the product to Newport Corporation, freight prepaid, clearly marked with the RMA# and we will either repair or replace it at our discretion. Newport is not responsible for damage occurring in transit and is not obligated to accept products returned without an RMA#.

E-mail: rma.service@newport.com

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number or original order number
- Description of problem (i.e., hardware or software)

To help our Technical Support Representatives diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?
- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?

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1 General Information

1.1 Scope of the Manual

This manual describes the 1930 and 2930 series optical power meters from Newport Corporation, which are designed to provide continuous wave (CW) measurements that support the testing and production needs of free space measurements, fiber optics manufacturing and other industries.

Instruments in the 1930 and 2930 power meter series are described with the expectation that Newport customers will be able to identify and use any power meter in either series after reading or referring to relevant portions of this manual. The manual addresses the identification, use, calibration, and maintenance of power meter hardware and software.

1.2 Manual Conventions

The following conventions and standards are used in this manual.

1.2.1 Acronyms

A word formed from the initial letters of a name, for example: Read Only Memory (ROM). In this manual acronyms are defined on their first occurrence. Whenever necessary for clarification, acronyms are enclosed in parentheses following their definition.

1.2.2 Keys, Buttons and Icons

Computer keyboard keys, onscreen buttons or icons, and keypad keys are referenced throughout Newport documentation in descriptions of operations performed by product users or operators. The key-top symbol as it appears on the keyboard, onscreen button, or keypad label is represented in **boldface type**.

1.2.3 Key Operation

Some operations may require simultaneous use of two or more keys. Such operations are identified by the use of a plus (+) sign to join relevant key names. For example, in an action controlled from a keyboard, **Ctrl** + **Pause (Break)** means hold down the **Ctrl** key and at the same time press **Pause (Break)**.

2 Safety Precautions

2.1 Definitions and Symbols

Terms and symbols in this section are used throughout the Newport product line.

2.1.1 General Warning or Caution

Figure 1: General Warning or Caution Symbol

The Exclamation Symbol in the figure above appears in Warning and Caution tables throughout this document. This symbol designates an area where personal injury or damage to the equipment is possible.

2.1.2 Grounding

Figure 2: Grounding Symbol

The Grounding Symbol in the figure above appears on a label affixed to the rear panel of the power meter. This symbol identifies a terminal intended for connection to an external (ground) conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode. Any mishandling could result in irreparable damage to the equipment, and personal injury or death.

2.1.3 Electric Shock

Figure 3: Electrical Shock Symbol

The Electrical Shock Symbol in the figure above appears on a label affixed to the rear panel of the power meter. This symbol indicates a hazard arising from dangerous voltage. Any mishandling could result in irreparable damage to the equipment, and personal injury or death.

2.1.4 Fuses

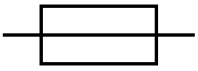


Figure 4: Fuse Symbol

The fuse symbol identifies fuse location.

2.1.5 On/Off

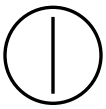


Figure 5: On/Off Symbol

The On/Off symbol indicates connection to or disconnection from AC power source. Each position, “On” or “Off” is a stable position.

2.1.6 Warnings and Cautions

Warnings, Cautions and Notes are used throughout this manual to call your attention to important information regarding your safety, the safety and preservation of your equipment, or important tips.

	**WARNING** **Situation has the potential to cause bodily harm or death.**

	**CAUTION** **Situation has the potential to cause damage to property or equipment.**

2.2 Label Locations

Appropriate warning and caution labels are affixed to the rear panel of the power meter.

WARNING

This instrument is intended for use by qualified personnel who recognize shock and are familiar with the safety precautions required to avoid possible injury. Power meter users are encouraged to read this user's manual before using the instrument to learn about its operation and capabilities.

3 Specifications

3.1 Physical Specifications

3.1.1 Dimensions

13.6 x 8.5 x 5.3in (345x216x39mm)

3.1.2 Weight

8lbs. (2.7kg)

3.1.3 Enclosure

Metal case, powder-coated

3.1.4 Power

~100/120VAC (± 10%) or ~220/240VAC (± 10%); 50/60 Hz, 38VA

3.1.5 Display

Graphical LCD, 240x128 High Contrast Display

3.1.6 Update Rate

10HzGain

3.1.7 Ranges

Up to 7 decades (Detector and Mode dependent)

3.1.8 Operating Environment

Temperature	10°C to 45°C (50° F to 113° F)
Humidity	<85% RH, non-condensing
Operating Altitude	< 2000 meters (6562 feet)
Installation Category	II
Pollution Degree	2

Instrument use, the 1930 & 2930 are intended for indoor use only.

3.1.9 Storage Environment

-20°C to +60°C (-4° F to 140° F); <90% RH, non-condensing

3.1.10 Interface connectors

Detectors – For external detectors, 14 pin DIN-style LEMO® connector.

Analog out – BNC

Trigger In - BNC

RS-232C, GPIB/IEEE 488.2, USB

3.1.11 Electrical Specification

DC Current Measurements (Low Power, Semiconductor Photodiode CAL MODULE)

Signal Range:[1,2]	0	1	2	3	4	5	6	7
Full-Scale Current:	2.51 nA	2.51 nA	25.1 nA	251 nA	2.51 µm	25.1 µA	251 µA	2.50 mA
A/D Resolution: (250,000 Count Precision)	10 fA	10 fA	100 fA	1 pA	10 pA	100 pA	1 µA	10 µA
Display Noise Floor: (Input Open, Anlg+Dig Filter On)	≤20 LSD	≤2 LSD	≤1 LSD	≤1 LSD	≤1 LSD	≤1 LSD	≤1 LSD	≤1 LSD
Half-Scale Accuracy: [3] (Typical)	±0.4%	0.15%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%
Half-Scale Accuracy: [3] (Worst-Case)	±0.56%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%

1 Listed signal ranges specify meter capability.Available signal ranges are detector dependent.
2 Maximum measurable signal is detector dependent.See description of detector saturation message “SATURATED”.
3 After 60 min warm-up,followed by execution of AUTOCAL command.See Section 2.4.4.

3.1.12 Analog Output

Full Scale Voltage:0-5V into 1MΩ, 0-2.5V into 50Ω

4 Product Line Overview

4.1 Power Meter Functionality

Power meters in the 1930/2930 product line are designed to provide continuous wave (CW) measurements that support the testing and production needs of fiber optics manufacturing and other industries. These power meters can react to triggering or store up to 1,000 separate measurements per channel. One-channel configurations have part numbers that begin with 1930, while two-channel configurations have part numbers that begin with 2930.

4.2 C Series Power Meters

The 1930C (one channel) and 2930C (two channel) power meters use circular 14-pin LEMO® connectors and do not have internal detectors. These power meters are compatible with the 918 series and the 818 series (using adapter cable - Newport part number "818-ADAPT-OPM") of external photodetectors.

4.3 F Series Power Meters

The F Series power meters incorporate either a 1 mm Silicon detector or a 1 mm InGaAs detector. Their integrated sensor and connector assembly accommodate either FC (both PC- and APC-style) or SC/PC styles of patch cords connectors.

4.4 IS Series Power Meter

The IS series power meter uses an integrating sphere with an InGaAs and Si detectors covering a range of 400 to 1650nm. The power meter is configured for one-channel support and incorporates Newport's universal port interface.

4.5 Sorting by Sensor and Connector

Optical power meter models in the 1930/2930 product line differ from each other in many ways. Below is a matrix of the different model types and their associated hardware features.

Model	Single Channel	Dual Channel	Si Detector	InGaAs Detector	Integrating Sphere	FC/PC & APC	SC/PC	Newport's Universal Port*
1930-C	X							
2930-C		X						
1930F-SL-FC	X		X			X		
2930F-SL-FC		X	X			X		
1930F-SL-SC	X		X				X	
2930F-SL-SC		X	X				X	
1930F-IG-FC	X			X		X		
2930F-IG-FC		X		X		X		
1930F-IG-SC	X			X			X	
2930F-IG-SC		X		X			X	
1930IS	X		X	X	X			X

Table 1: Model Numbers and the Associated Features

* Newport's "Universal Port" accommodates a variety of patch cord connector styles via the use of various adapters. FC, SC, ST, and bare fiber adapters are supplied with the 1930IS power meter.

4.6 Calibration

Calibration of the power meter is done at the factory by defining a slope and offset, as well as, limiting the measurement of range. Calibration of internal detector assemblies (F and IS models) is done by taking responsivity data at 10 nm increments and electronically stored in the power meter to ensure accurate power measurements across the entire wavelength band.

Newport recommends annual factory re-calibration to ensure the continued accuracy of power meter measurements.

Please refer to the "Maintenance and Troubleshooting" section for contact information for re-calibration of your power meter.

5 System Operation

5.1 Startup Procedure

WARNING

To avoid electrical shock hazard, connect the instrument to properly earth-grounded, 3-pronge receptacles only. Failure to observe this precaution can result in severe injury.

Provided that the power meter has been installed to an appropriate environment and its power cord is connected to a working electrical outlet, power-up the power meter by pressing the power button on the lower left corner of the front panel.

For precise accuracy, 1930/2930 power meters should be allowed to warm up for one hour before being used for measurements.

5.1.1 Understanding the Data Screen

The data screen is displayed on startup. The upper portion of the data screen is a real-time display of power measured in picoamps (pA), and the lower half of the data screen is a row of nine annunciators with labels that collectively reflect current power meter settings (the top to bottom listing in the table below maps left to right on the power meter display):

Annunciator Label	Meaning
Zero	Zeroing mode is on
Dig	Digital filtering is enabled
Alg	Analog filtering is enabled
Auto	Automatic ranging is enabled
Store	Data storage is enabled
ExtTrg	An external trigger has been set
Ucal	User Calibration Enabled
Attn	Attenuator is on

Table 2: Annunciators in the data (startup) screen

When an annunciator label is visible, its function is enabled. If the annunciator appears on the display as an unlabeled key, the function it represents is currently disabled. Annunciators loosely correspond to keypad keys, which are used either alone or in combination with the navigation and selection keys to control annunciator functions.

The data screen is not the main menu.

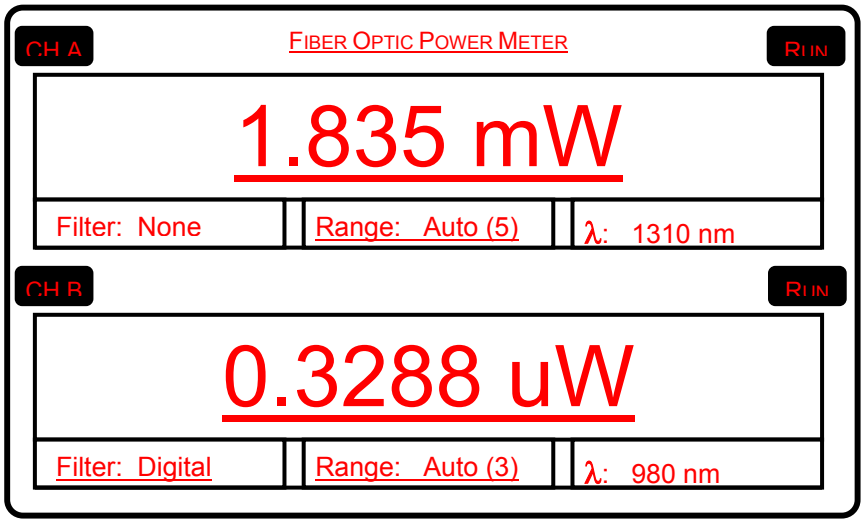


Figure 6: Data Screen (example)

5.2 Front Panel Layout

The front panel is comprised of elements that are common across the 1930/2930-product line and elements unique to certain power meter models in that line.

5.2.1 Common Elements

All power meters in the 1930/2930-product line have the following:

- An aluminum faceplate with a liquid crystal display
- Input and output connectors
- Power, Menu, and Run/Stop buttons
- Rubberized horizontal (left/right) and vertical (up/down) arrow keys
- Eight rubberized switches in a keypad below the display

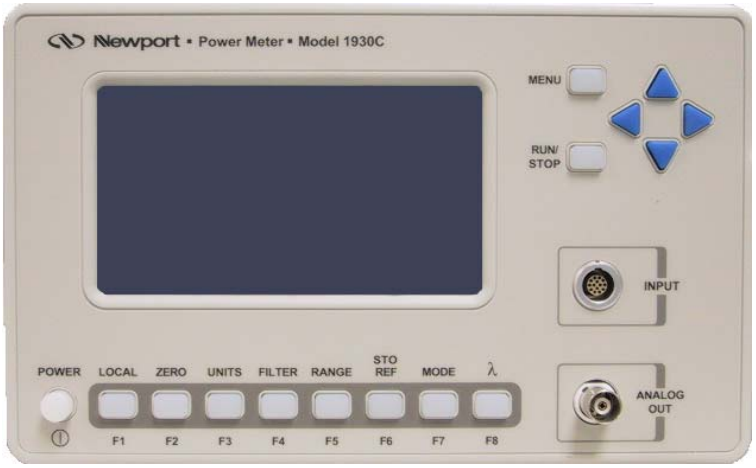


Figure 7: Front Panel Layout (Model 1930C)

5.2.2 Elements That Vary by Model

Single-channel power meters have one input connector and one output connector, while dual-channel power meters have two input connectors and two output connectors.

The two rightmost keys on the keypad function differently in dual-channel power meters than in single-channel power meters.

5.2.2.1 Input Channels

The 1930C and 2930C power meter models support input from external detectors through circular 14-pin LEMO® connectors. Other power meter models support direct fiber optic input.

Input channels on dual-channel power meters are labeled “A” and “B.”

5.2.2.2 Output Channels

Power meters in the 1930 series support one analog output channel. Power meters in the 2930 series support two analog output channels. Analog output enables direct monitoring of a detector through an oscilloscope or voltmeter.

5.2.2.3 Keypad Key Labels

Some keypad labels are standard for every power meter and others are configuration-dependent. Left to right across the keypad row, LOCAL, ZERO, UNITS, FILTER, RANGE, and STO REF are standard labels.

On single-channel power meters, the last two keys are MODE and λ (wavelength). On dual-channel power meters, the last two keys are R/S A and R/S B.

5.3 Rear Panel Layout

5.3.1 Panel Layout

The rear panel is a brushed aluminum plate with a BNC trigger input to support synchronization between instruments, as well as input connectors for the following cable types:

- IEEE 488 (GPIB)
- USB (Universal Serial Bus)
- RS-232

Figure 8: Rear Panel Layout

The rear panel also has an AC input power connector (IPC) with a standard three-prong socket.

Markings on the rear panel identify electrical requirements for the power meter and potential hazards associated with using it.

NOTE

Some units may have a BNC trigger output connector that is non-functional, others will have a cover in place of the connector.

CAUTION

There are no user-serviceable parts inside the power meter. Work performed inside the power meter by persons not authorized by Newport may void the warranty.

CAUTION

Do not exceed 250VAC on the line input. Do not operate with a line voltage that is not within ± 10% of the line setting. Too low of an input voltage may cause excessive ripple on the DC supplies. Too high of an input voltage will cause excessive heating.

WARNING

To avoid electrical shock hazard, connect the instrument to properly earth-grounded, 3-prong receptacles only. Failure to observe this precaution can result in severe injury or death.

5.3.2 Changing Voltage Settings

The 1930/2930 can operate on several different supply voltages. Before powering up the unit, check the facility voltage supply, and select the appropriate according to the procedure below.

Use the following procedure to change the 1930/2930 voltage setting:

1. Ensure that the 1930/2930 is turned OFF and disconnected from the AC power source.
2. Disconnect the power cord from the AC power input connector on the back of the 1930/2930.
3. Using a small screwdriver, insert and press down into the notch at the top of the power entry module to pry the door open.
4. Remove the voltage selector drum.
5. Rotate the voltage selector until the appropriate voltage will be viewed through the voltage window.
6. Reinsert the voltage selector drum.
7. If necessary, change the fuses according to the procedure found in section 13.2.2 Replacing Fuses.

CAUTION

Match the voltage setting to fuse sizing. Failure to do so may result in damage to the power meter. Do not exceed 250VAC on the line input.

8. Close the power entry module.
9. Verify the correct voltage is displayed through the voltage window.
10. Connect the AC power input cord to the AC power input connector on the back of the 1930/2930.

5.4 Universal Key and Button Functions

Universal keys and buttons are those whose purpose and placement is the same throughout the 1930/2930 product line.

5.4.1 Power Button

Figure 9: Power Push Button

The power button is a toggle switch on the bottom left corner of the chassis that turns the unit on or off. The power button is distinguished from other buttons and keys on the front panel by its circular shape. The power to the unit is OFF when the push-button is fully extended and ON when latched.

5.4.2 Menu Button

The menu button is a switch to the right of the display. Press the menu button while any secondary menu is displayed to reset the display to the main menu.

5.4.3 Run/Stop Button

The run/stop button is a toggle switch below the menu button that provides front panel control over data acquisition. In single measurement mode, each RUN/STOP key press causes one reading to be taken. In continuous measurement mode, each RUN/STOP key press toggles continuous data acquisition on and off.

For meters in the dual channel configuration the RUN/STOP button will toggle both channel simultaneously. To activate a single channel on a dual channel power meter the R/S A and R/S B buttons must be used (See section 5.5.2).

5.4.4 Navigation and Selection Keys

Navigation through and selection of data in the display is done with the star-shaped group of four triangular keys in the upper right corner of the front panel. Each of these keys is blue.

Press the up and down arrow keys (▲▼) to navigate through submenu choices. Press the left arrow key (◀) to decrement a selected value by one and the right arrow key (▶) to increment a selected value by one.

5.4.5 Keypad Keys

Keypad keys are arrayed in a row below the display. They vary slightly according to whether a given power meter supports one- or two-channel measurement.

5.4.5.1 Local

Press **LOCAL** to toggle between local and remote measurement.

5.4.5.2 Zero

Press **ZERO** to toggle between enabling or disabling the zero offset function. With Zero displayed, the zero offset is enabled. With nothing displayed, the zero offset is disabled and the power readings are raw, uncalculated values. Offset subtraction enables the removal of ambient DC signal effects by zeroing the display before taking a measurement.

5.4.5.3 Units

Press **UNITS** to select or cycle through any of the five available units of measurement (amps, watts, dBm, db, relative, A+B, and A-B).

5.4.5.4 Filter

Press **FILTER** to select any of the four available filter settings. Press the left and right arrow keys (◀▶) to cycle input signal filtering between `NONE`, `ANALOG`, `DIGITAL`, and `ANLG+DIG`.

5.4.5.5 Range

Press **RANGE** to display the current amplifier signal range. Signal ranges step in 1 decade gain increments as the Range is changed to use maximum resolution from the meter's analog-to-digital converters. Press the left and right arrow keys (◀▶) to increase or decrease the signal range. Available signal ranges are detector and mode dependent. Zero (0) through seven (7) can be selected: **0** is the ***minimum*** gain, **7** is the ***maximum*** gain. Toggling beyond range 7 will place the meter in Autorange mode.

5.4.5.6 Sto Ref

Press **STO REF** to store a selected reference point electronically. The reference value is stored in the User Ref field of the Channel menu.

5.5 Model Specific Key and Button Functions

Model specific keys and buttons are those whose purpose and placement is the same throughout the 1930/2930 product line.

5.5.1 1930 Power Meters (Single Channel)

5.5.1.1 Mode

Press the Mode button to select the acquisition mode. Press the left and right arrow keys to select the desired mode (DCCONT for continuous acquisition mode or DCSNGL for single acquisition mode).

5.5.1.2 Wavelength (λ) (Single Channel Configuration)

Press the lambda character (λ) key to edit the calibration wavelength in use. When an entered wavelength falls between two detector calibration points, linear interpolation is used to approximate the responsivity value.

Every power meter model displays light source wavelength (lambda) at all times while powered on.

NOTE

On dual-channel systems in the dual channel main screen, Lambda can be edited or you can use the Channel menu option.

5.5.2 2930 Power Meters (Dual Channel)

5.5.2.1 R/S A

On dual-channel power meters, press **R/S A** to toggle between running or stopping measurement on channel A.

5.5.2.2 R/S B

On dual-channel power meters, press **R/S B** to toggle between running or stopping measurement on channel B.

5.6 Understanding Front Panel Display Elements

The front panel display is menu and event driven. It is the window through which system status and two levels of menus can be accessed.

5.6.1 Static Fields

Static data fields (like wavelength) do not update and cannot be edited.

5.6.2 Dynamic Fields

There are two kinds of dynamic data fields:

- Non-editable fields that simply display measurements in real time
- Editable fields that have properties users can modify through particular menus or keys.

5.7 Power Meter Menus

Power meter data is displayed through a shallow menu system to ensure that individual data points are rarely more than one level below the current screen.

Two separate screens share the upper (primary) level of the power meter information tree: the data screen displayed on startup and the Main Menu.

Power meter menus other than the Main Menu comprise the lower (secondary) level of the power meter information tree.

You can differentiate between local and remote operation at a glance by observing whether field names in secondary menus are underlined. Underlining is on for local operation and off for remote operation.

5.7.1 Main Menu

The Main Menu is the primary menu. It lists and serves as a launch point for each of the available sub-menus.

To access the Main Menu, press the **MENU** button on the front panel. Press the up and down arrow keys (▲▼) to navigate through submenu choices.

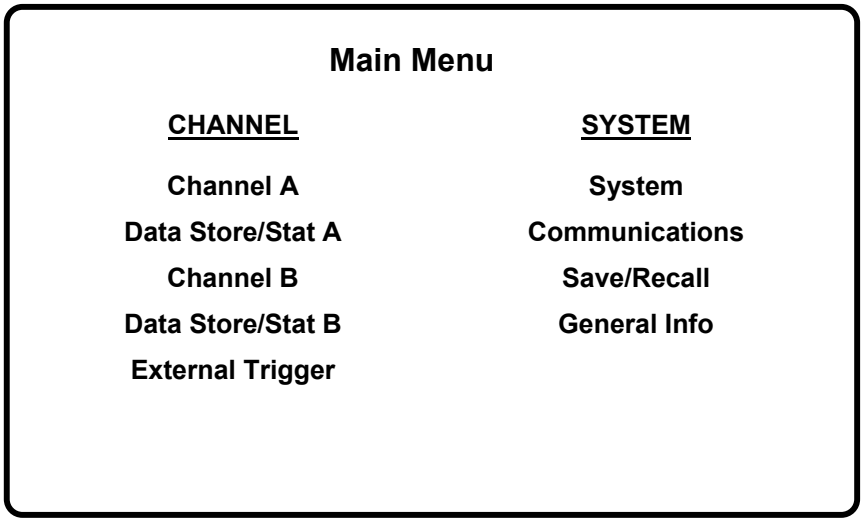


Figure 10: Main Menu

5.7.2 Configure Channel Menu

The Configure Channel Menu controls the settings of each channel in the instrument.

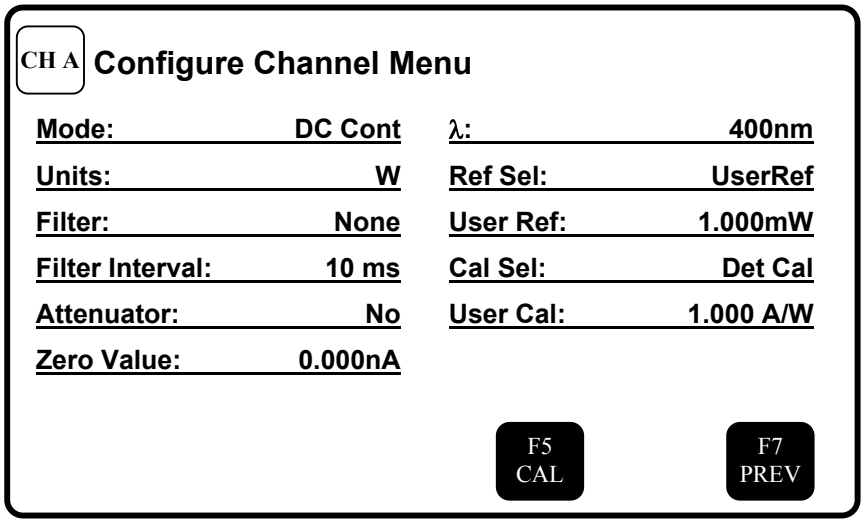


Figure 11: Configure Channel

Mode

The Mode of measurement the power meter is using.

Units

Displays the unit of measurement being used.

Filter

Displays the type of filter being used if any.

Filter Interval

Displays the time interval over which the filter is applied.

Attenuator

CH A

Displays whether any signal attenuator is being used.

Zero Value

Displays baseline from which measurement are made.

λ (Wavelength)

Displays the current wavelength being used.

Ref Sel (Reference Select)

Displays the type of reference that is being used.

User Ref (User Reference)

Displays the value of the user reference.

Cal Sel

Displays type of calibration device.

User Cal

Displays user calibration parameter.

5.7.3 System Configuration Menu

The System Configuration Menu is the place from which to set viewing parameters.

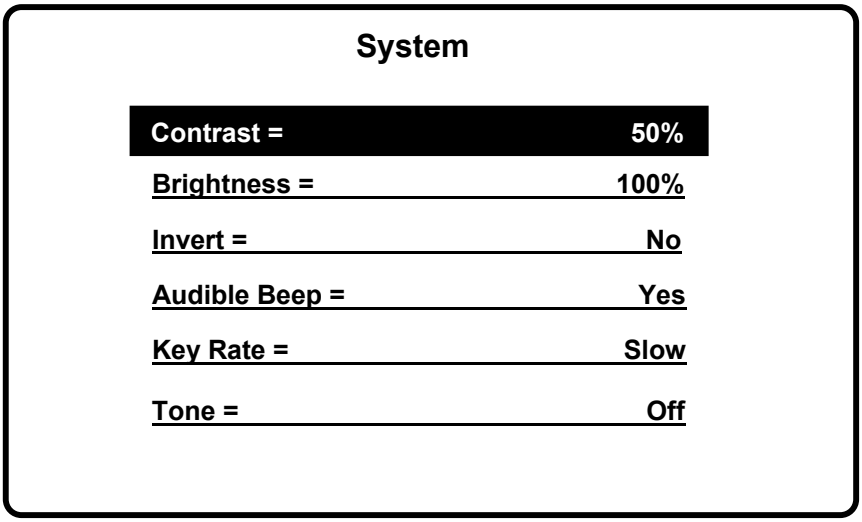


Figure 12: System Configuration (Configure System) Menu

Contrast

Sets the degree of difference between the foreground (text) and the background of the display, on a scale from 0 (no difference) to 100 % (the most vivid setting).

Brightness

Varies the backlighting intensity between 0% (dark: no intensity) and 100 % (bright: full intensity). Its default setting is 100%.

Invert

When on "Yes" reverses display colors by substituting light green for dark blue and vice-versa. Its default setting is "No."

Audible Beep

Controls system sound. A beep indicates errors, invalid data entry, and other situations where the power meter needs to alert the user (YES = beep function ON; NO = beep function OFF).

Key Rate

Controls the repeating speed when a key is held down. SLOW is the default setting, but MEDIUM and FAST settings are also available.

Tone

Enables or disables the tone generator that is relative to the input power signal. With tone enabled, as power increases, the generated tone increases in pitch. This allows manual peak searching without needed to watch the display by simply listening for the peak tone frequency.

5.7.4 Communications Menu

The Configure Communications Menu is the place from which to set parameters for communicating with remote GPIB, RS-232, or USB interfaces.

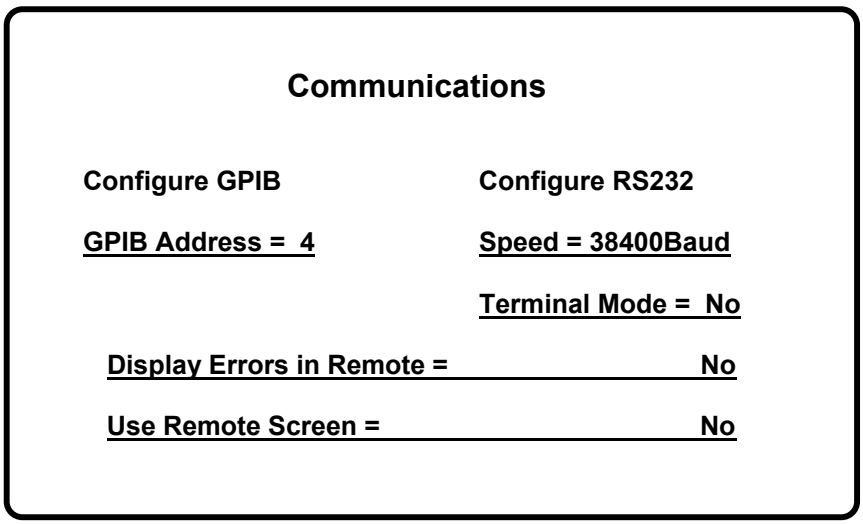


Figure 13: Communications Menu (example)

Display Errors in Remote

Controls the announcement of errors on the display. On setting YES, all errors are displayed, even in Remote mode. On setting NO, no errors are displayed in Remote mode (errors are still displayed in Local mode). Settings here do not affect error logging, only display.

Use Remote Screen

Toggles the LCD display off ("Yes") for improved system performance when in remote mode. The default setting is "No", meaning the display is kept active in when power meter is being run remotely via GPIB, RS-232 or USB interfaces.

GPIB Address

Selects the GPIB address (IEEE-488 device address) assigned to the power meter. Valid addresses range from 1 to 30 and must be unique for each device connected within a system.

Speed

Sets the baud rate of the RS-232 serial port. Available communication speeds are: 300 (min), 1200, 2400, 4800, 9600, 19200, and 38400 (max) baud.

Terminal Mode

Enhances the interface for communicating via the RS-232 in an ANSI/VT100-compatible serial terminal. On setting YES, a > prompt is generated for every new line and the display echoes characters back to the user until its input buffer is full. On setting NO, characters are not echoed back to the user and there are no > prompts. When Terminal Mode is off, normal mode is on.

5.7.5 Save/Recall Menu

The Save/Recall Menu is the place from which to set parameters for the storage and retrieval of power meter configuration information.

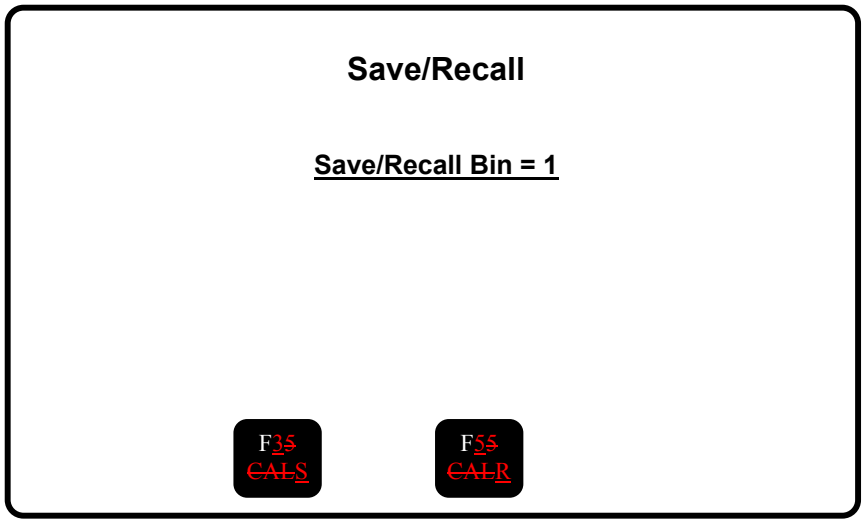


Figure 14: Save/Recall Menu

Non-volatile memory is used for saving parameters. When a Save operation is performed, most of the parameters currently in effect on the power meter are stored under a user-selected “bin” number between 1 and 19. When the user Recalls a bin number, the power meter uses the parameters previously stored in that bin number.

NOTE

A special "bin 0" is reserved for the reset state. Recalling bin 0 resets the power meter to its factory default settings. User defined parameters cannot be saved to bin 0.

A recalled configuration becomes the current configuration of the meter. Any changes to the current configuration must be saved or they will be lost when a new configuration is recalled.

The power meter will not recall a configuration that is not compatible with the current detector calibration module. Configurations using the same model of detector are compatible, while configurations using different models of detectors are incompatible. For a list of defaults and meter configuration options see sections 44 and 45.

5.7.6 Data Store/Statistics Menu

The Data Store/Filter Menu is the place from which to set parameters for data storage and filtering.

Use settings on the menu to save up to 3,000 measurements per channel in an internal buffer for subsequent transmission over a computer interface. The unit of measurement is milliseconds (ms). Data Storage is off by default.

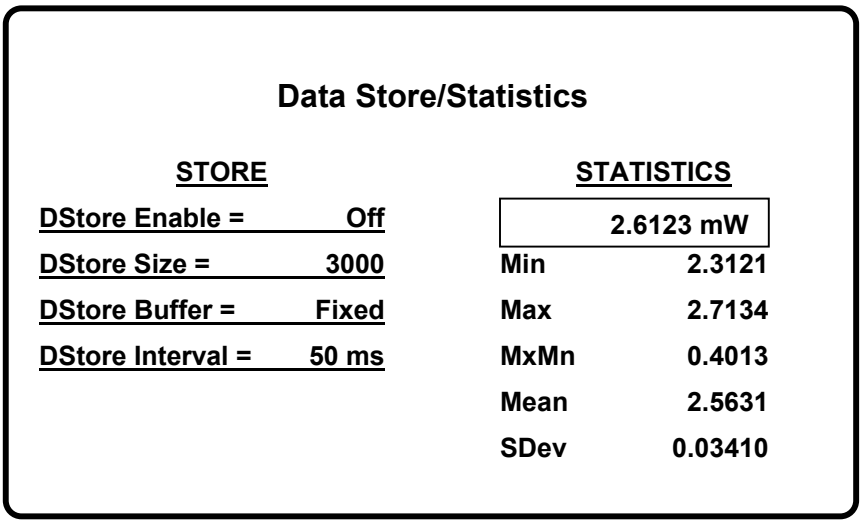


Figure 15: Data Store/Statisics Menu

5.7.7 External Trigger Menu (Trigger IN)

The External Trigger Menu is the place from which to configure rear panel trigger input.

Use this menu to enable or disable external triggering, and to set polarity by selecting a rising (low to high) or falling (high to low) edge trigger for digital input to the TTL/CMOS circuits.

By contrast with an internal trigger, which is a command to stop or start signal acquisition, an external trigger extends the same functionality to external devices and remote interface commands.

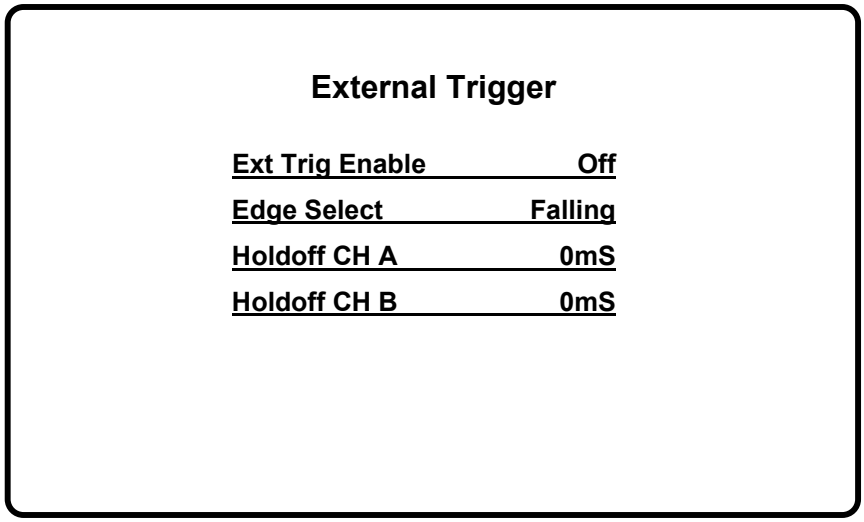


Figure 16: External Trigger Menu

5.7.8 General Information Menu

The General Information Menu displays channel-specific information about the detector model, voltage and temperature measurement within the instrument.

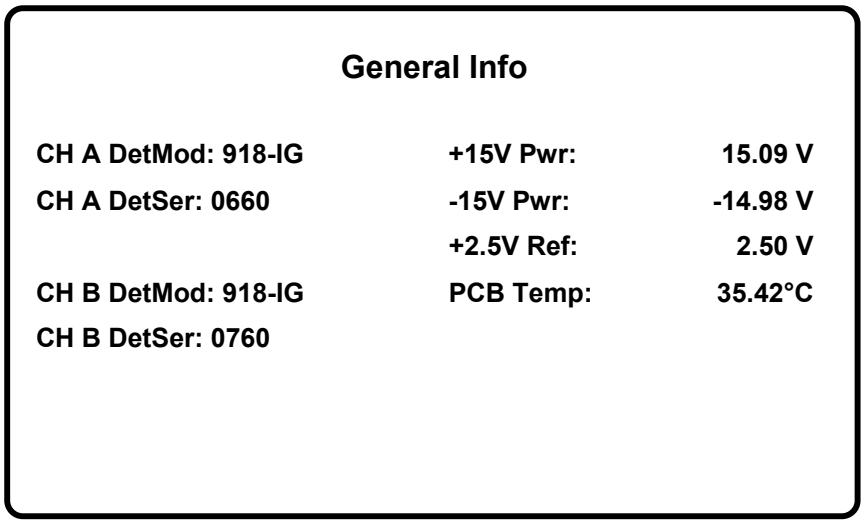


Figure 17: General Information Menu

6 Using the Power Meter

Power meters in the 1930/2930 product line are designed to provide continuous wave (CW) measurements that support the testing and production needs of fiber optics manufacturing and other industries. A calibration module specific to the detector in use is what introduces detector data into the power meter. At power up and reset, the power meter uploads information about the detector from the calibration module. This information includes the operating states available to the detector, any one of which can be selected by power meter users through its front panel controls.

6.1 Changing Field Focus

Use the up and down arrow keys (▲▼) on the front panel to change field focus within the front panel display.

6.2 Single-Channel Operation

Single-channel operation is supported by the 1930C, 1930F-SL, 1930F-IG, and 1930-IS power meters.

6.3 Dual-Channel Operation

Dual-channel operation is supported by the 2930C, 2930-SL, and 2930-IG power meters. Dual-channel capability is indicated on the front panel by the presence of input channels labeled A and B. Measurements can be taken from channel A, channel B, or both.

6.4 Meter Configurations

The Model 1930/2930 provides a method to save the configuration of the entire meter and to recall that configuration for later use even if the meter has been turned off. This is accomplished through configuration buffers maintained in nonvolatile memory. Configuration buffers are numbered 0 to 9 with buffer 0 being a DEFAULT buffer which can only be recalled but not saved to. The reset state of all the buffers except the default buffer is empty. Empty buffers cannot be recalled.

A recalled configuration becomes the current configuration of the meter. Any changes to the current configuration must be saved via SAVE CONFIG or they will be lost when a new configuration is recalled.

The meter will not recall a configuration that is not compatible with either a detector or calibration module currently plugged into the meter. Configurations using the same model of detector are compatible while configurations using different models of detectors are incompatible. The list of configuration parameters stored in a configuration buffer as well as their default values are listed in Table 3: below:

Parameter	Default Condition
MODE	DC CONT
UNITS	W
λ, Lambda	Lowest available
PRESENT RESP	PRESENT RESP
USR CAL	OFF
ATTN	OFF
FILTER	OFF
AUTO	ON
RANGE	Lowest available
ZERO	OFF
Zero Value	0.000
REF SEL	STO REF
Reference Value	0.001
DATA STORE	OFF
DATA STORE BUFFER	SLIDE
DATA STORE BUFFER SIZE	100
Data Store Units	Same as UNITS
EXT	OFF
EXT EDGE	FALLING
BAR GRAPH	OFF
BAR GRAPH	OFF
GPIB ADDR	04
BAUD RATE	9600

Table 3: Configuration Parameters and Default Conditions

These parameters adopt the following default values at power up and are not affected by recalling a configuration or by setting the configuration to default.

RS-232	ECHO OFF
Display Brightness	100%

Table 4: below lists the menu commands effecting the saving and recalling of meter configurations.

Menu Operation	Keypad Commands	Associated Remote Commands
SAVE CONFIG	Adjust Save/Recall Bin, and ENTER	*SAV
RECALL CONFIG	Adjust Save/Recall Bin, and ENTER	*RCL, *RST

Table 4: Meter Configuration Operations

6.5 CAL: A/D Offset Calibration

The CAL command causes the 1930/2930 to perform A/D conversions of amplifier offset voltages (zero errors) arising from aging and temperature effects. These conversions are then used in subtracting the appropriate error voltage from each reading during normal operation. The 1930/2930 automatically performs this procedure every time it powers up (or is reset). To achieve stable reading at the specified accuracy, CAL should be executed for each channel after a minimum 60 minute warm-up period from power-up.

To perform calibration, from the Configure Channel menu, press the F5 CAL button. The system will then walk you through the calibration process with on-screen instructions. Detectors do not have to be connected to the 1930/2930 or removed from the radiation source to effectively execute CAL.

6.6 Performing Basic Measurements

Basic measurement techniques for using the 1930/2930 are covered in the following sections. The following instructions assume familiarity with the meters functions. They also include steps to incorporate background correction and assume that the experimental setup underfills and does not saturate or damage the detector.

6.6.1 Making DC Power Measurements

The following process describes the procedure for making basic optical power measurements while properly removing the influence of ambient light and other drift effects.

1. Plug in a Newport Low-Power detector via its associated calibration module and then turn the meter on. Set MODE to DC CONT, set AUTO on and set the measurement wavelength to the desired value.
2. Cover or otherwise block the source that you will be measuring and then turn ZERO on.
3. Uncover the source so it illuminates the detector and note the display value. This reading is the optical power observed by the detector due to the source.

NOTE

The process as detailed assumes that the ambient signal is not changing between when you zero the display and when you make your measurement. Remember, if you can see your detector as you move around, then your detector can see you as a changing ambient DC signal!

6.7 Using the Integrating Sphere

There are a few variables to be taken into consideration when user the 1930-IS series power meter with built-in integrating sphere

6.7.1 Saturation

The Integrating Sphere is designed to accurately measure photocurrents only up to the rated saturation current. Beyond this level, measured power will become nonlinear due to voltages generated by the photocurrent as it passes through the series resistances of the detectors. The saturation current is not a function of wavelength, but the maximum power measurable before saturation occurs is, since the responsivity (ratio of photocurrent generated to optical power applied) of the detector system is a function of wavelength. The maximum power specification given in the detector specifications table is a worst-case value, and is guaranteed at any wavelength. The integrating sphere can be used to measure pulsed light sources, but precautions must be taken to ensure accurate results. The pulsed saturation level ($\geq$1 J at 10 15 ns pulse) of the detector must not be exceeded. Also, since it is difficult to make accurate energy measurements of single pulses with semiconductor detectors, continuous pulse trains should be used. The average pulse energy may be obtained by dividing the power reading by the pulse repetition rate.

6.7.2 Ambient Light and Electrical Offsets

Good measurement technique dictates that the effects of ambient light should be reduced as much as practical when using photodiodes. Although the photocurrent generated by ambient light can be easily zeroed out, the shot

noise associated with the photocurrent will not be zeroed, nor will any changes in the ambient light levels, which might be caused by people moving around in the room. The integrating sphere is much less sensitive to ambient light than most detectors because of the small port size. Ambient light will be blocked from the port in use by the adapter itself.

A small electronic offset will always be present with semiconductor detectors, caused by an interaction of the detector shunt resistance with voltage offsets in the amplifier circuitry. Because the intergrating sphere uses very high quality detectors, this off-set will be quite small (less than 250 fA of equivalent photocurrent is typical with Newport power meters). This offset can be removed by use of the power meter's zero function. Please note, however, that the offset is a function of the temperature of both the photodiode and the amplifier inside the power meter. So, when measuring very low light levels, it is best to re-zero the meter whenever you think that the temperature of the detector or the power meter may have changed. For instance, it is good practice to re-zero the meter after a warm-up period of about 30 minutes.

6.8 External Trigger

The unit has the capability of triggering off of an external edge trigger as applied to the SYNC INPUT connector on the back panel of the instrument. The trigger can be either a rising or falling edge, as configured in the External Trigger Menu (see section 5.7.7). Some considerations need to be taken when using the external trigger. First, what is the latency from the time of the trigger to actual point at when the measurement should be made? This is called the hold-off, and can also be configured in the trigger menu. The hold-off allows the instrument to coordinate the measurement with the trigger in setups where the trigger occurs before the actual measurement should be made. When the trigger value is 0ms, the instrument will take the measurement as soon as possible after the trigger event, which is typically 250μs to 750μs after the trigger event.

When the external trigger is enabled and the channel is in SINGLE mode, the digital filter cannot be employed.

6.9 Filtering Data

Filtering lowers the noise observed in the measurement data, and the analog filter will also reduce noise on the analog output. Filtering is off (at setting None) by default. When filtering is on, three types of filters (analog, digital, or both) are available.

Analog filtering uses a 5Hz low pass filter to lower the noise floor by attenuating high frequency components, and affects both measurements made by the instrument as well as the signal on the channel's analog output BNC.

Digital filtering passes measurements through a moving window buffer before they are further processed, stored, or communicated to the display.

The digital filter buffer is sixteen elements wide, with a user-configurable sample internal (Filter Interval in the Channel Menu). With digital filtering selected, all observable values represent digitally averaged results relative to the original A/D conversions.

Analog plus Digital (ANLG+DIG) uses the filtering elements from both Analog and Digital filtering.

NOTE

There is temporary degradation of signal amplitudes at the analog output when this product is exposed to interference stipulated by BS EN61326:1998, the applicable international standard for electromagnetic immunity. This degradation is self-recovering in accord with the standard set by Performance Criterion B

To filter data, the set Filter value in the Channel Menu to either Analog, Digital, or Anlg+Dig. If digital filter is enabled, also set the Filter Interval value as appropriate to the application.

6.10 Saving Data

The Model 1930/2930 allows a user to save up to 3,000 measurements for each channel. These measurements are stored in an internal buffer for subsequent viewing or transmission over a computer interface. A separate buffer is maintained and configured for each channel. Data is lost after a power down, when a new configuration is loaded, when the buffer is cleared via the CLR DATA BUFFER command, or when a new data store process is started.

The data store buffer operates in two ways: Slide or Fixed. In Slide configuration, the buffer slides along storing the most recent measurements up to the size of the buffer. Beyond this, as data enters the buffer, the oldest data is pushed out and lost. In Fixed configuration, data storing continues until the data buffer is full. After this, data acquisition stops and no additional data is stored.

The size of the buffer is set by the DStore Size value in the State Store Menu (see section 5.7.6, above). Set the value to establish the number of data points that the buffer will hold before dropping old data or stopping data storage.

Data storing is enabled by the user via the DStore Enable menu function. Edit the ***ON, OFF*** condition to enable or disable data storing. The associated STORE annunciator will light while the instrument is performing data store.

When in CONT mode, data acquisition and storage is started immediately. When in SNGL mode, data acquisition and storage requires an initiating R/S key press, external trigger or a remote RUN command.

NOTE

When DATA STORE is off, CONT acquisition mode behavior defaults to the condition where data acquisition is begun without the requirement of a starting trigger. SNGL acquisition modes always require a trigger for each acquisition.

Menu Operation	Keypad Commands	Associated Remote Commands
Dstore Enable **ON, OFF**	Edit **On, Off** status.	DSE_n,DSE_n?
Dstore Buffer **Slide, Fixed**	Edit **Slide, Fix**	DSBUF_n,DSBUF_n?
Dstore Size **dddd**	Edit **dddd**	DSSZ_n,DSSZ_n?

Table 5: Data Store Operations

NOTE

N would be replaced by A (channel A) or B (channel B) in the Remote Commands.

6.11 Shutting Down the Power Meter

When the power meter is on, you can shut it down by pressing the Power button on the lower left corner of the front panel.

7 Principles of Operation

7.1 Introduction

Detector data is introduced to the Model 1930/2930 by way of a calibration module specific to the detector in use. At power up and when detectors are changed, the 1930/2930 uploads information about the detector from the calibration module which describes the set of operating states available to the detector. A user then selects among the available operating states when using the meter. Front panel control and the operating states of the Model 1930/2930 are discussed in Sections 5.

7.2 Analog Signal Flow

The analog signal flow is independent of whether SNGL or CONT measurements are made, and is primarily determined by the signal range and the filter setting. A block diagram of the analog signal flow is shown in Figure 18:.

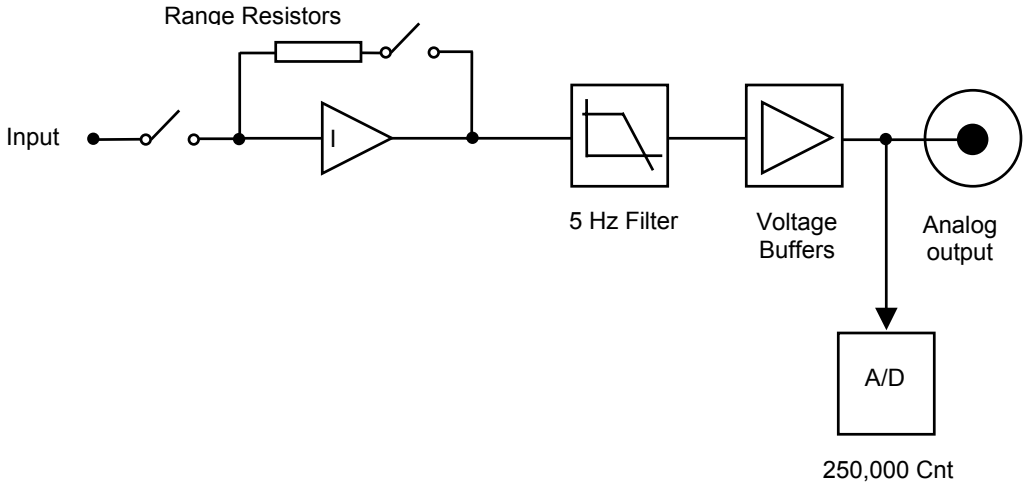


Figure 18: 1930/2930 Analog Signal Flow Diagram

7.3 Digitized Signal Flow

Signals that are captured by one of the analog-to-digital converters are further processed as illustrated in the signal flow block diagram of Figure 19:. Raw signals are acquired by the analog-to-digital converters and have the units of current. These digitized signals move through a number of process steps which may or may not alter the digitized value depending upon the operating state of the meter. Each of these possible processing steps is discussed in their order of occurrence.

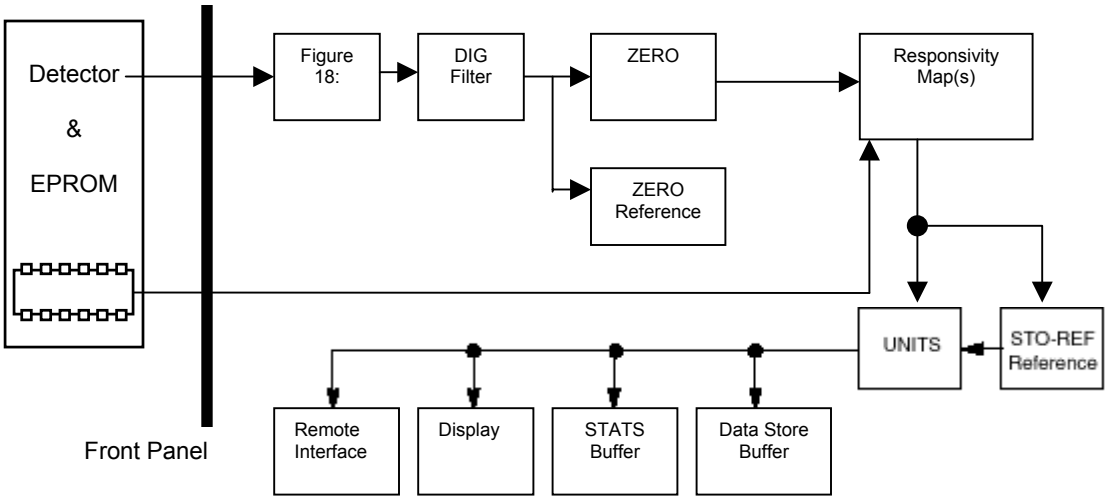


Figure 19: 1930/2930 Digitized Signal Flow Block Diagram

7.3.1 Digital Filter

If the digital filter annunciator DIG is on, the filter output is the average of the most recent 16 digitized values. When less than 16 values have been acquired since the last reset of the digital filter, the output is the average of all the values received. The digital filter is reset when the Model 1930/2930 is turned on and whenever the UNITS or the range changes or when the MODE key is pressed.

NOTE

When using the digital filter in SNGL acquisition mode, each measurement is the average of the last 10 acquisitions independent of how old any of the measurements are.

7.3.2 Zero Offset

Zero offset is active whenever the ZERO annunciator is lit. The zero offset output is equal to the input value less the zero reference value, $S - S_0$.

7.3.3 Responsivity Map(s)

This process scales the input value in accordance with current calibration wavelength and the responsivity map downloaded from the detector calibration module. The output of this process, i.e. the measurement value, is the digitized input value divided by the responsivity associated with the current calibration wavelength or the user defined calibration value. Different responsivities are used depending upon if the attenuator, ATTN, annunciator is lit.

7.3.4 Units Correction

Units correction adjusts a measurement value to account for the display units selected. When the display units are equal to the detector signal units, i.e. equal to the numerator of the responsivity units, the measurement value is not adjusted. Otherwise the digitized value is adjusted to account for detector responsivity and/or additional unit conversions such as W to W/cm^2.

7.4 Typical Detector Signals

The flexibility of the Model 1930/2930 analog signal flow is required in order that it may properly measure the signals that various types of detectors make. Basic optical power measurements are related to a measured detector signal, S in the following way:

$$P = S / R_{\lambda}$$

Where: R_{λ}= Detector responsivity at λ .

S =Detector signal

Newport Low-Power semiconductor detectors provide a current signal. The 1930/2930 is capable of 100fA resolution in order to provide the highest sensitivity performance with these detectors.

7.5 Analog Output

The Model 1930/2930 provides a 0 to 2.5 volt, into 50Ω, BNC analog output for signal monitoring. The analog output is the actual amplified detector signal and is uncorrected for the effects of the detector's responsivity, CAL, and ZERO.

7.6 Measurement Considerations

This section describes detector characteristics, optical and electrical considerations, and environmental influences on optical measurements. In general, measurement accuracy is limited by the accuracy of the detector calibration. Accurate measurements, however, are also dependent upon proper set-up, control of temperature and illumination conditions and understanding the factors that affect optical measurements.

7.6.1 Detector Calibration and Accuracy

Newport Corporation calibrates its detectors using secondary standards directly traceable to the United States National Institute of Science and Technology (NIST) or to Great Britain's National Physical Laboratory (NPL). The details and accuracy of the calibration procedure vary with each detector model but a detailed description of the calibration results is supplied with each individually calibrated detector. In general, detector calibration accuracy varies from 2% to 5%in absolute terms and varies with wavelength. Each detector will also have some variation in response over its surface. Therefore, for the most reproducible measurements, light should illuminate the detector as uniformly as possible over as large an area as practical.

CAUTION

Avoid focusing a light source onto the detector surface. Inaccurate readings and possible detector damage may result. Consult the detector manual for saturation or damage thresholds.

NIST trace-ability requires that detectors be recalibrated on one-year intervals. As individual detector responses change with time, especially in the ultraviolet, recalibration is necessary to assure confidence in the accuracy of the measurement. For the most reproducible measurements, the same detector should always be used for measurements that are to be directly compared.

7.6.2 Quantum Detector Temperature Effects

Newport Low-Power semiconductor detectors are affected by temperature. At long wavelengths, quantum detectors typically lose sensitivity with increasing temperature. Additionally, detector dark current increases exponentially with temperature.

Observed dark current is often dominated by the interaction between the detector and a meter's amplifier and is typically larger than the theoretical dark current limit. Silicon detectors are inherently quieter than germanium detectors due to their higher internal resistance and lower capacitance. The noise or drift in the dark current sets a lower bound on the measurement resolution which can be achieved with any given detector. Cooling a detector significantly lowers its dark current and dark current noise.

The observed dark currents can also be zeroed at any moment via the ZERO function. Since dark currents drift with temperature, the ZERO should be adjusted just prior to taking any measurements. If the detector temperature is constant, sensitivity changes and dark current drifts are significantly reduced.

7.6.3 Ambient and Stray Light

Ambient and stray light striking the detector should be considered when making a measurement. Ambient light can be distinguished from dark current (or the detector/meter noise floor) by either turning off or blocking the source and covering the detector face with opaque material such as a piece of black rubber.

Using the human hand to cover the detector is not advised because it emits a significant amount of infrared radiation and radiates a temperature significantly different from ambient. With the detector covered, a reading of the dark current may be made. Next, remove the material which is covering the detector and take another reading. The difference is the ambient light level.

NOTE

Changes in ambient light levels can occur from such factors as turning room lights on or off, or by moving people or equipment. Remember, if you can see your detector element, then your detector can see the light bouncing off you.

The effects of ambient light are greatly reduced when using a fiber-connectorized signal input to the detector. If free-space beam measurements are desired, using an attenuator will often improve the signal to ambient signal noise level. Wavelength-specific filters, such as optical cutoff, bandpass, or spike filters can be used if the signal wavelength spectrum permits. Other techniques to reduce stray light include using apertures, placing the detector in a box or other housing to shield the surface from light (or air currents) and turning off room and other polluting light sources.

7.6.4 Common Measurement Errors

The most common sources of optical measurement error are listed in Table 6: below. Other common errors are discussed in the preceding subsections of Section 3.10, Measurement Considerations.

Type of Error	What should be done?
Radiometry	Check that all of the light is actually hitting the detector.
Ambient	Light Check that any ambient light was ZEROed before the measurement was made.
Wavelength	Calibration Check that the Calibration Factor for the measurement wavelength is properly set.
Detector Saturation or Damage	Check that the optical power density remains below the detector's saturation or damage threshold.

Table 6: Sources for Measurement Error

NOTE

The Model 1930/2930 will indicate when a detector is being operated above its saturation or damage threshold by displaying "Saturated" in the measurement display area. Be aware that detectors often experience local saturation or damage without ever exceeding an overall saturation or damage threshold. This only applies to semiconductor photodiodes used above maximum intermittent power. Detector damage can still arise even when "Saturated" is not displayed. Be sure to follow your detector manual's user guidelines.

8 Computer Interfacing

8.1 General Guidelines

The 1930 and 2930 power meters have three computer interface ports: GPIB, USB and RS-232C. The GPIB port conforms to the IEEE Standard 488.1 hardware standard and the IEEE 488.2 software standard. The protocol for the RS-232C and USB ports conform as much as possible to the IEEE 488.2 software standard.

As specified by the IEEE 488.2 standard, there are two command types: device independent commands and device dependent commands. The device independent commands have the same meaning to all devices and are defined as part of the IEEE 488.2 standard. All device independent commands start with an asterisk (*). Device dependent commands do not start with an asterisk and have meanings unique to the 1930 and 2930 power meters. A query is a command that invokes a response from the meter. All queries are terminated by a question mark (?). It is recommended that when a query is made, that the response to that query be read before other commands are issued. When a query is made to the GPIB interface, the message available (MAV) bit in the status byte should be checked by means of a serial poll to make sure the data is available before reading the response (See Section 12.4).

8.2 Computer Interface Terminology

Listed below are the key abbreviations and concepts used in the command reference section (See section 9)of this manual.

8.2.1 <…> Delimiting Punctuation

For the purposes of this manual, any string enclosed by <…> is considered to be a command, a string or numerical argument. The punctuation <…> is used to symbolize the typographic limits of the command, string or argument in question.

8.2.2 <EOI> End or Identify

An IEEE 488.1 signal sometimes sent with the end-of-string character.

8.2.3 <IST> Individual Status

This status is generated by the status byte and parallel poll enable register. It is used in responding to parallel polls.

8.2.4 <CR> Carriage Return

The ASCII encoded byte 13 in decimal. (0D hex)

8.2.5 <LF> Line Feed

The ASCII encoded byte 10 in decimal. (0A hex)

8.2.6 <NL> New Line

Defined in the IEEE 488.2 standard as the ASCII encoded byte 10 in decimal. (0A hex)

8.2.7 (;) Semicolons

Semicolons are used to separate commands within a single transmission (concatenation).

8.2.8 <number> Numerical Types

Numerical parameters are passed and returned as the actual ASCII characters in the string representation of the number. See section 10.2 for a detailed description of <number>.

8.2.9 <string> String Types

See the section 10.1 for a detailed description of <string>.

8.2.10 RS-232C Command Termination

When a command is received from the RS-232C port, either a <CR> or a <LF> is treated as the command terminator.

8.2.11 GPIB Command Termination

When a command is received from the GPIB port, either an <EOI> with a data byte, <NL>, or <CR> is treated as the command terminator. The recommended form of the termination is an <EOI> sent with an <NL> denoted as <END> in this manual.

8.2.12 USB Command Termination

USB provides built-in mechanisms for command termination, so no additional termination is required in the command string.

8.2.13 RS-232C Response Termination

In RS-232C echo mode responses are terminated by a <CR><LF> sequence. In RS-232C normal mode the <NL> character terminates the response.

8.2.14 GPIB Response Termination

All responses from the 1930 or 2930 GPIB port are terminated by an <END> sequence. Which is the concurrent transmission of <EOI> with an <NL> data byte.

8.2.15 USB Response Termination

USB provides built-in mechanisms for response termination, so no additional termination is added to the response string.

8.3 Entering Remote Computer Interface Mode

When a command or query is received through the GPIB USB or RS232 interface ports, the 1930/2930 will automatically go into remote interface mode. When the meter is in remote mode all editable values on screen will no longer be editable, as denoted by the loss of underlining, and the LOCAL indicator in the single channel display. While in remote mode you will not be allowed to make operational changes to the meter, although navigation through the menus is allowed, with settings viewable in a read-only mode. To get out of remote mode press the LOCAL key.

8.4 RS-232C Communication

Before communicating with the 1930/2930 through the RS-232 port, proper cable connections must be made. Figure 20: and Figure 21: shows the cable connection for the communicating with the RS-232C port on the 1930/2930.

Once cable connections are made, the baud rate and echo mode need to be set. Valid baud rates are 300, 1200, 2400, 4800, 9600, 19200, and 38400. The parity, data bit, and stop bits are fixed at no parity, 8 data bits, and 1 stop bits.

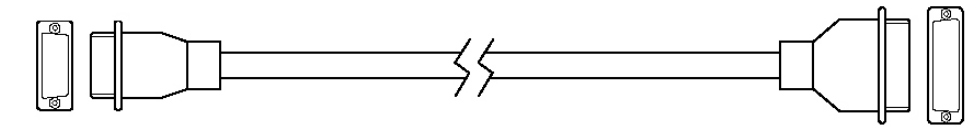
RS-232C Parameters

Baud Rate	300, 1200, 2400, 4800, 9600, 19200, and 38400
Parity	None
Data bits	8
Stop bits	1

When the echo mode is enabled the 1930/2930 generates a '>' prompt for every new line and all characters sent to the 1930/2930 are echoed back over the interface. As the user is entering commands the line may be edited by using the backspace key (sending an ASCII decimal 08 code).

In echo mode the RS-232C port is interactive and especially useful when a dumb terminal type of device is used to communicate with the 1930/2930.

When echo mode is disabled (normal mode) the 1930/2930 does not generate a prompt or echo character back over the interface. This is the default state of the echo mode.

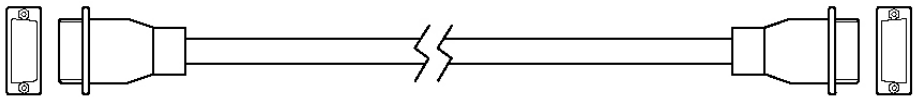


TO 1930/2930 TO COMPUTER

CABLE TERMINATORS (RS-232)
9 pin to 25 pin

9 PIN PIN NO.	CODE	DESCRIPTION	25 PIN PIN NO.
1	DCD	CARRIER DETECT	8
2	RXD	RECEIVE DATA	3
3	TXD	TRANSMIT DATA	2
4	DTR	DATA TERM. READY	20
5	GND	SIGNAL GROUND	7
6	DSR	DATA SET READY	6
7	RTS	REQUEST TO SEND	4
8	CTS	CLEAR TO SEND	5
9	RI	RING IND.	22

Figure 20: RS-232 9 Pin to 25 Pin Cable Connection



TO 1930/2930 TO COMPUTER

CABLE TERMINATORS (RS-232)
9 pin to 9 pin

9 PIN PIN NO.	CODE	DESCRIPTION	9 PIN PIN NO.
1	DCD	CARRIER DETECT	1
2	RXD	RECEIVE DATA	2
3	TXD	TRANSMIT DATA	3
4	DTR	DATA TERM. READY	4
5	GND	SIGNAL GROUND	5
6	DSR	DATA SET READY	6
7	RTS	REQUEST TO SEND	7
8	CTS	CLEAR TO SEND	8
9	RI	RING IND.	9

Figure 21: RS-232 9 Pin to 9Pin Cable Connections

8.4.1 Setting Baud Rate and Echo Mode From the Keypad

The baud rate and echo mode are set from within the menu structure. To set the baud rate, select the SPEED option from the COMMUNICATIONS menu. To set the echo mode select the TERMINAL option from the COMMUNICATIONS menu.

8.4.2 Setting Baud Rate and Echo Mode via Remote Interface

The baud rate cannot be set from the remote interface. To set the echo mode use the TERMINAL command. Use the TERMINAL? to see if the echo mode is enabled or disabled.

8.5 GPIB Communication

A variety of third party GPIB communication hardware and software, such as plug-in GPIB computer boards and Lab View software from National Instruments exists. The 1930/2930 should work with any of these as long as they adhere to the IEEE 488.1 standard. This manual assumes the user is familiar with one of these third party hardware/software packages. The table below summarizes the IEEE 488.1 capabilities supported by the 1930/2930.

Description	Command	Level of Capability
Source of Handshake	SH1	complete capability
Acceptor Handshake	AH1	complete capability
Talker	T6	basic talker, serial poll, unaddress if MLA
Extended Talker	TE0	no capability
Listener	L4	basic listener, unaddress if MTA
Extended Listener	LE0	no capability
Service Request	SR1	complete capability
Remote Local	RL1	remote mode
Parallel Poll	PP1	remote configuration
Device Clear	DC1	complete capability
Device Trigger	DT1	external device trigger
Controller	C0	no capability

Table 7: IEEE 488.1 Capabilities Supported by the 1930/2930

NOTE

In order to better handle the RS-232C interface the 1930/2930 automatically goes into remote mode when a command is received from any of the remote computer interfaces.

8.5.1 Setting the GPIB Address

Before communicating with the 1930/2930 GPIB port the 1930/2930 GPIB address must be set. The address can be between 1 and 30. The address can be set by changing the GPIB ADDRESS in the COMMUNICATIONS menu. The Model 1930/2930 GPIB is factory set to 4. (See Section 5.7.4)

8.6 USB Communication

The instrument is designed to communicate with standard USB interfaces. When the instrument is first connected, the computer will ask to install software drivers, which are included in the accompanying drives CD. Communications can be done through various tools, include LabVIEW, Visual Basic, and Visual C++.

9 Remote Communications

9.1 Model 1930/2930 Remote Interface Commands

The model 1930/2930 remote commands can be divided into two groups:

1. Device Independent Commands, Section 9.2 on page 67.

2. Device Dependent Commands, Section 9.3 on page 78.

Section 8.1.1 lists the Device Independent Commands supported by the 1930/2930. Section 8.1.2 lists the Device Dependent Commands.

9.1.1 Device Independent Commands

Command	Command Name
*CAL?	Calibration Query
*CLS	Clear Status
*ERR?	Error Query
*ESE	Event Status Enable
*ESE?	Event Status Enable Query
*ESR?	Event Status Register Query
*IDN?	Identification Query
*IST?	Individual Status Query
*OPC	Signal When Operation Complete
*OPC?	Operation Complete Query
*PRE	Parallel Poll Enable
*PRE?	Parallel Poll Enable Query
*RCL	Recall Device Configuration
*RST	Software Reset
*SAV	Save Device Configuration
*SRE	Service Request Enabled
*SRE?	Service Request Enable Query
*STB?	Status Byte

*TST?	System Test
*WAI	Wait To Continue

9.1.2 Device Dependent Commands

NOTE

Commands that end in "_n" signify .a channel (A or B) must specified in place of the "n".

Command	Command Name
ATTN_n	Attenuator Calibration Data Enabled
ATTN_n?	Attenuator Calibration Data Enabled Query
ATTNSN_n?	Attenuator Serial Number Query
AUTO_n	Auto Ranging Enabled
BEEP	Beep Enable Command
BEEP?	Beep Enable Query
BRIGHT	Brightness Command
BRIGHT?	Brightness Query
BUILD?	Firmare Build Number Query
CALDATE_n?	Calibration Date Query
CALTEMP?	Calibration Temperature Query
CH?	Available Channel Query
CONTRAST	Display Contrast Command
CONTRAST?	Display Contrast Query
DELAY	Delay Command
DETMODEL_n?	Detector Mode Query
DETSN_n?	Detector Serial Number Query
DISP	Display Brightness Select
DISP?	Display Brightness Query
DISPCH	Display Channel Select
DISPCH?	Display Channel Query
DS_n?	Data Store Value Query
DSBUF_n	Data Store Buffer Behavior Select
DSBUF_n?	Data Store Buffer Behavior Query

DSCLR_n	Data Store Clear
DSCNT_n?	Data Store Value Count Query
DSE_n	Data Store Enable
DSE_n?	Data Store Enable Query
DSSIZE_n	Data Store Buffer Size Select
DSSIZE_n?	Data Store Buffer Size Query
DSUNITS_n?	Data Store Units Query
DSINT_n,	Data Store Interval Command
DSINT_n?,	Data Store Interval Query
EVENT?	Device Event Register Query
EVENTEN	Device Event Enable Register
EVENTEN?	Device Event Enable Register Query
EXT	External Trigger Enable
EXT?	External Trigger Enabled Query
EXTEDGE	External Trigger Edge Select
EXTEDGE?	External Trigger Edge Query
EXTHOLDOFF	External Trigger Holdoff Time Command
EXTHOLDOFF?	External Trigger Holdoff Time Query
FILTER_n	Filter Select
FILTER_n?	Filter Query
FILTINTerval?	Filter Interval Query
FILTINTerval	Filter Interval Command
INVERT	Display Invert Command
INVERT?	Display Invert Query
LAMBDA_n	Lambda Select
LAMBDA_n?	Lambda Query
LOCAL	RS232 Local Command
MODE_n	Acquisition Mode Select
MODE_n?	Acquisition Mode Query
R?	Read Both Channel Measurements Query
R_n?	Read Single Channel Measurement Query
RADix	Radix Command

RADix?	Radix Query
RANGE_n	Manual Range Level Select
RANGE_n?	Manual Range Level Query
REFSEL_n	Reference Source Select
REFSEL_n?	Reference Source Query
REFVAL_n	User Reference Value Command
REFVAL_n?	User Reference Value Query
REMERR	Error Window While Remote Command},
REMERR?	Error Window WhileRemote Query},
RESP_n?	Responsivity Query
RUN	Start Duel Channel Acquisition
RUN_n	Start Single Channel Acquisition
RWS?	Read Both Measurements with Status Query
RWS_n?	Read Single Measurement with Status Query
STMAX_n?	Statistics Buffer Maximum Value Query
STMEAN_n?	Statistics Buffer Mean Value Query
STMIN_n?	Statistics Buffer Minimum Value Query
STMXMN_n?	Statistics Buffer Max-Min Value Query
STSDEV_n?	Statistics Buffer Standard Deviation Query
STOP	Stop Both Channel Acquisition
STOP_n	Stop Single Channel Acquisition
STOREF_n	Store Reference Reading
STOREF_n?	Store Reference Query Reading
STOZERO_n	Store Zero Sgnal
TERM	GPIB Terminator Command
TERM?	GPIB Terminator Query
TERMINAL	Terminal Mode Command
TERMINAL?	Terminal Mode Query
TONE	Enable Tone Command
TONE?	Enable Tone Query
UNITS_n	Units Select
UNITS_n?	Units Query

USRCAL_n	User Calibration Enable
USRCAL_n?	User Calibration Enable Query
USRREF_n	User Defined Reference Value Select
USRREF_n?	User Defined Reference Value Query
USRRESP_n	User Responsivity Factor Select
USRRESP_n?	User Responsivity Factor Query
ZERO_n	Signal Zeroing Enable
ZERO_n?	Signal Zeroing Enable Query
ZEROVAL_n	Zero Value Command
ZEROVAL_n?	Zero Signal Query

9.2 Device Independent Command Description

9.2.1 *CAL?--Calibration Query

Syntax: *CAL?

Parameters: None

Function:

This return value for this command indicates the completion of the auto calibration sequence on startup.

Returns: <number>

<number> represents the integer 0. This return value is generated when auto calibration is complete.

Related Commands: None

9.2.2 *CLS--Clear Status

Syntax: *CLS

Parameters: None

Function:

This command clears the Standard Event Status register, device event register, and the error queue. As a result of the command the status byte is cleared except for the message available bit (bit 4). Because the command does not clear the input and output buffers the MAV bit will not be affected. The *CLS command also cancels any outstanding *OPC and OPC? commands.

Related Commands: *ESR?, EVENT?, *IST?, *STB?

9.2.3 *ERR?--Error Query

Syntax: *ERR?

Parameters: None

Function:

Returns (and removes) oldest error message from the error queue. The error message is made up of an error code and a text description of the error. A maximum of 10 errors can be stored in the queue. If no errors are stored in the queue, 0, "No Error" will be returned.

Returns: <errno>, <description>

<errno> is of type <number> and represent a negative integer error code. <description> is of type <string> in double quote format, and describes the error.

Related Commands: *CLS, *STB?

9.2.4 *ESE—Event Status Enabled

Syntax: *ESE<mask>

Parameters:

<mask> is an integer in the range 0 to 255 inclusive.

<mask> is written to the Event Status Enable register.

Function:

The Event Status Enable register is AND'ed with the Event Status register. If any bit is set in the result of this AND'ing operation the ESB bit (bit 5) of the Status Byte will be set. The Status Byte can be used in conjunction with the Service Request Enable register to generate a service request.

The Event Status Enable register is an 8 bit, bit mapped register. Any bit set to 1 in the Event Status Enable Resgister allows the corresponding bit in the Event Status Resister to set the ESB bit (bit 5) in the Status Byte. Any bit set to 0 disables the corresponding bit on the Event Status Register from setting the ESB bit. The Event Status Enable register is set to 0 upon power-up.

The significance of each bit in the Event Status Enable register is shown below:

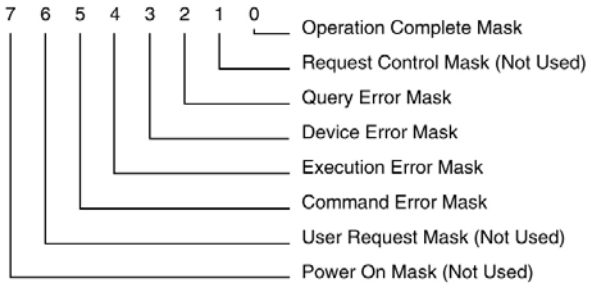


Figure 22: Event Status Enable Register

Related Commands: *CLS, *ESE?, *ESR?, EVENT?, EVENTEN, EVENTEN?, *IST?, *PRE, *PRE?, *SRE, *SRE?, *STB?

9.2.5 *ESE?—Event Status Enable Query

Syntax: *ESE?

Parameters: None

Function:

This query returns the contents of the Event Status Enable register. See the *ESE command for a description for a the Event Status Enable register

Returns: <mask>

<mask> is of type <number> and represents an unsigned integer in the range 0 to 255.

Related Commands: *CLS, *ESE, *ESR? EVENT?, EVENTEN, EVENTEN?, *IST?, *PRE, *PRE?, *SRE, *SRE?, *STB?

9.2.6 *ESR?—Event Status Register Query

Syntax: *ESR?

Parameters: None

Function:

This query returns the contents of the Event Status Register and clears the Event Status Register except for bit 3. Bit 3 is determined by the state of the Device Event and Device Event Enable register. The *CLS command will also set this register to 0.

The Event Status register is AND'ed with the Event Status Enable register. If any bit is set in the result of this AND'ing operation the ESB bit (bit 5) of the Status Byte will be set. The Status Byte can be used in conjunction with the Service Request Enable register to generate a service request.

The Event Status Register is an 8 bit, bit mapped register, with each signifying a different condition. The bit are listed below, most significant bit first:

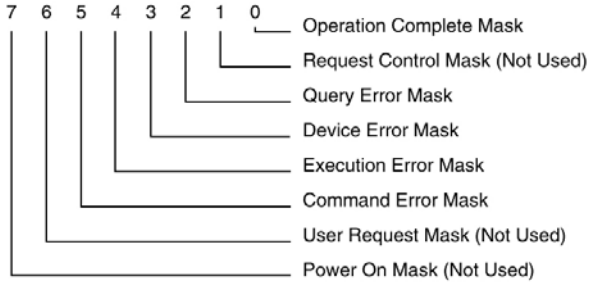


Figure 23: Event Status Register

Returns: <value>

<value> is of type <number> and represents an unsigned integer in the range 0 to 255.

Related Commands: *CLS, *ESE, *ESR? EVENT?, EVENTEN, EVENTEN?, *IST?, *PRE, *PRE?, *SRE, *SRE?, *STB?

9.2.7 *IDN?—Identification Query

Syntax: *IDN?

Parameters: None

Function:

This query causes the 1930/2930 to return device identification information. The information return is manufacturer, model, and firmware version.

Returns: <manufacture>, <model>, <version>

<manufacture> is of type <string> using the no quotes format. The1930/2930 always returns Newport Corp.

<model> is of type <string> using the no quotes format.

<version> is of type <string> using the no quote format. This text identifies the internal firmware version of the 1930/2930. this text consists of two sections, separated by two underscores. The first section is the revision level, and the second is the revision date.

Related Commands: None

9.2.8 *IST? — Individual Status Query

Syntax: *IST?

Parameters: None

Function:

This query returns the current state if the IEEE 488.1 <IST> local message.

The <IST> message is generated by the parallel poll status system. If any bit is set the Status Byte and it's corresponding bit is set in the Parallel Poll Enable register, then the <IST> message is set true (a value of 1). Otherwise the <IST> message is set false (a value of 0).

When a parallel poll is conducted with the 1930/2930 configured to respond to it, the <IST> message is compared to the <S BIT> (sense bit). If they are the same then the configure data line will be drive true in response to the parallel poll.

Both the <S BIT> and the data line driven during a parallel poll can be selected by the IEEE 488.1 parallel poll remote configuration command.

Returns: <sbit>

<sbit> is of type <number> which represent the integer 0 or 1.

Related Commands: *PRE, *PRE?, *STB?

9.2.9 *OPC – Signal When Operation Complete

Syntax: *OPC

Parameters: None

Function:

This command provides a means of synchronizing between the 1930/2930 and the host. This command sets the Operation Complete bit (bit 0) of the Event Status register to 1 when all pending operations have completed. This bit will remain 1 until cleared by the *CLS command or the *ESR? Query.

This command can be used in conjunction with the *ESE and *SRE commands to cause a Service Request on the GPIB bus when all pending operations are complete. Once the *OPC command is receivec, it will not set the operation complete bit to 1 while any of the following operations are in progress:

Single acquisition in progress

Data store enabled with fixed data store buffer

The meter is ranging

Related Commands:, *ESE, *ESE? *ESR? *OPC? *?, *SRE, *SRE?, *STB?, *WAI

9.2.10 *OCP? – Operation Complete Query

Syntax: *OCP?

Parameters: None

Function:

This query provides a means of synchronizing operations between the 1930/2930 and the host. This command generates a response when all pending operations have completed.

When all pending operation are complete, this query will cause the Message Available bit (bit 4) of the Status Byte to be set because of the response generated. By enabling bit 4 of the Service Request Enable register (see *SRE), the *OPC? query can be used to cause a Service Request on the GPIB bus when all pending operations are complete.

Once the *OPC? query is received, the response will not be generated while any of the following operations are in progress:

Single acquisition in progress

Data store enable with fixed data store buffer

The meter is ranging

The *CLS or *RST command, as well as a GPIB interface device clear, will cancel the operation complete query.

Returns: 1

The response is generated when all pending operations are complete.

Related Commands: *OPC, *SRE, *SRE?, *STB? *WAI

9.2.11 *PRE – Parallel Poll Enable

Syntax: *PRE<mask>

Parameters:

<mask> is an integer in the range 0 to 255 inclusive. The value of this number is written into the Parallel Poll Enable register.

Function:

This command sets the Parallel Poll Enable register bits. The Parallel Poll Enable register is used in conjunction with the Status Byte to generate the IST (Individual Status) message.

The Parallel Poll Enable Register is set to 0 at power-on. The Parallel Poll Enable Register is an 8-bit, bit mapped register, with each bit signifying a different condition. The bits and their significance are detailed below:

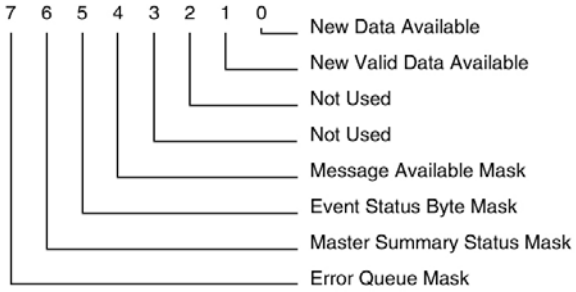


Figure 24: Parallel Poll Enabled Register

Related Commands: *IST, *PRE, *PRE?, *STB?

9.2.12 *PRE? – Parallel Poll Enable Query

Syntax: *PRE?

Parameters: None

Function:

This query returns the contents of the Parallel Poll Enable register. See the *PRE command for the description of the Parallel Poll Enable register.

Returns: <mask>

<mask> is of type <number> and represents an unsigned integer in the range 0 to 255.

Related Commands: *IST, *PRE, *STB?

9.2.13 *RCL – Recall Meter Configuration

Syntax: *RCL<config>

Parameters:

<config> is of type <number> which rounds to an integer in the range 0 to 19. This number specifies a configuration storage buffer. The number 0 stands for the default configuration buffer.

Function:

This command configures the meter to a configuration previously stored in non-volatile memory (see *SAV), or to the default configuration for the attached detector. This command will fail if the requested configuration is incompatible with the detector attached to the meter or empty.

Returns: None

Related Commands: *RST, *SAV

9.2.14 *RST – Reset

Syntax: *RST

Parameters: None

Function:

This sets the meter to the default configuration for the detector attached to it. It also cancels any outstanding *OPC or *OPC? commands.

Related Commands: *RCT, *SAV

9.2.15 *SAV – Save Meter Configuration

Syntax: *SAV<config>

Parameters:

<config> is of type <number> which rounds to an integer in the range 1 to 19. This number specifies a configuration storage buffer.

Function:

This command saves the configuration of the meter to the configuration specified by the parameter. The parameters saved by this command are listed in Table 3:.

Related Commands: *RCL, *RST

9.2.16 *SRE – Service Request Enable

Syntax: *SRE<mask>

Parameters:

<mask> is an integer in the range 0 to 255 inclusive. The value of this number is written into the Service Request Enable register.

Function:

The Service Request Enable Register is used in conjunction with the Status Byte to generate service requests on the GPIB bus.

If a bit is set in the Service Request Enable register and it's corresponding bit is set in the Status Byte Register, then a service request will be generated once for the for the given event. When service is being requested, bit 6 is set in the byte returned by a serial poll of the 1930/2930.

The Service Request Enable Register is an 8-bit, bit mapped register, with each bit signifying a different condition. The bits are listed below, most significant bit first:

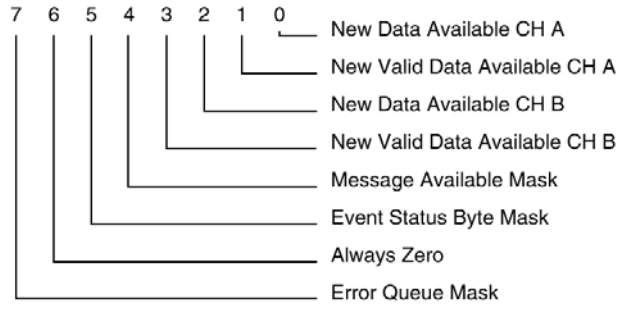


Figure 25: Service Request Enable Register

Related Commands: *SRE?, *STB?

9.2.17 *SRE? – Service Request Enable Query

Syntax: *SRE?

Parameters: None

Function:

This query returns the contents of the Service Request Enable register. See the *SRE command for a description of the Service Request Enabled register.

Returns: <mask>

<mask> is an integer in the range 0 to 255 inclusive, except the bit 6 is always a zero.

Related Commands: *SRE, *STB?

9.2.18 *STB? – Status Byte Query

Syntax: *STB?

Parameters: None

Function:

This query returns the contents of the Status Byte which records current system conditions.

If a bit is set in the Status Byte Register and it's corresponding bit set in the Service Request Enable Register, then a service request will be generated once for the given event. When service is being requested, bit 6 is set in the byte returned by a serial poll of the 1930/2930.

The Status Byte Register is an 8-bit, bit mapped register, with each bit signifying a different condition. When a bit is set, or has a value of one, then the condition is true. The bits are listed below, most significant bit first:

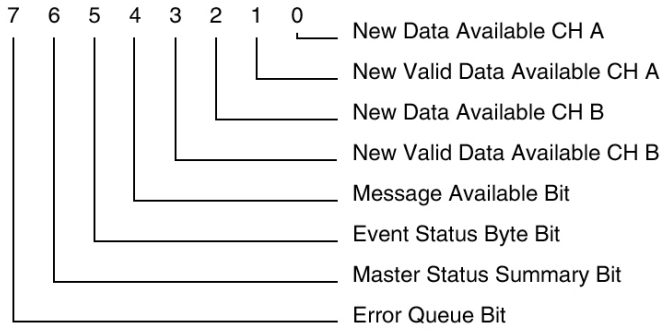


Figure 26: Status Byte Register

NOTE

The *CLS common command clears most of the bits in the Status Byte

Returns: <value>

<value> is an integer in the range 0 to 255 inclusive.

Related Commands: *SRE, *STB?

9.2.19 *TST? -- Self Test Query

Syntax: *TST?

Parameters: None

Function:

As defined in the IEEE 488.2 standard, the *TST? command causes the device to return a result of a self-test, indicating whether or not the unit completed the self-test without any errors. The self test is only administered upon reset or power up. The query does not initiate the self test and only returns a 0 indicating that the system passed its earlier self test.

Returns: 0

Related Commands: None

9.2.20 *WAI -- Wait to continue

Syntax: *WAI

Parameters: None

Function:

The *WAI command causes the device to wait until all pending operations are complete before processing any commands waiting in the input queue. Care should be taken when using this command since it is possible to overflow the input queue by continuing to write commands to the 1930/2930 while the *WAI command is in effect.

NOTE

The *WAI command will essentially "lock out " the remote interfaces until all pending operations are complete.

The *OPC command and *OPC? query differ from *WAI in this area, as they allow other commands to be processed while they are waiting for pending operations to complete.

Once the *WAI command is received, it will be in effect while any of the following operations are in progress:

Single acquisition in progress

Data store in progress with fixed data store buffer

The meter is ranging

The *WAI command can only be canceled by a GPIB interface device clear or by turning the meter off and on.

Related Commands: *OPC,*OPC?

9.3 Device Dependent Command Descriptions

9.3.1 ATTN_n -- Attenuator Calibration Data Enable

Syntax: ATTN_n <state> where n is either A or B

Parameters:

The parameter <state>is either 0 or 1.If <state>is 0,then detector responsivity data is used to calculate readings. If <state>is 1,then the detector +attenuator responsivity data is used to calculate readings.

Function:

This command enables or disables the use of attenuator responsivity data when user calibration is disabled. If enabled, responsivity data collected with the attenuator attached to the detector is used in data calculations. If disabled, responsivity data collected with the detector alone is used in data calculations.

This command will generate an error if the attached detector does not support an attenuator.

Related Commands: ATTN_n?,ATTNSN_n?,LAMBDA_n, LAMBDA_n?, RESP_n?, USRCAL_n, USRCAL_n?, USRRESP_n, USRRESP_n?

9.3.2 ATTN_n? -- Attenuator Calibration Data Enable Query

Syntax: ATTN_n? where n is either A or B

Parameters: None

Function:

This query returns a value showing whether or not attenuator responsivity data will be used when user calibration is disabled.

Returns: <state>

<state>is of type <number>which represents the integer 0 if detector responsivity data is being used or 1 if detector + attenuator responsivity data is being used.

Related Commands: ATTN_n, ATTNSN_n?, LAMBDA_n, LAMBDA_n?, RESP_n?, USRCAL_n, USRCAL_n?, USRRESP_n, USRRESP_n?

9.3.3 ATTNSN_n? -- Attenuator Serial Number Query

Syntax: ATTNSN_n? where n is either A or B

Parameters: None

Function:

This query returns the serial number of the attenuator that was calibrated with the attached detector. When using an attenuator this serial number must

match the serial number of the attenuator being used or data calculations will be inaccurate.

Returns: <attnSN>

<attnSN>is of type <string>in the double quote format.

If no attenuator serial number is available, the query returns an empty double quoted string,“”.

Related Commands: CALDATE_n?, DETMODEL_n?, DETSN_n?

9.3.4 AUTO_n -- Auto Ranging Enable

Syntax: AUTO_n <state> where n is either A or B

Parameters:

The parameter <state>is either 0 or 1.If <state>is 0 then manual ranging is enabled. If <state>is 1 then auto ranging is enabled.

Function:

This command enables or disables auto ranging. If enabled and in a continuous acquisition mode, a signal range is automatically selected to suit the input signal. If disabled, the meter needs to be manually ranged.

Related Commands: AUTO_n?, RANGE_n, RANGE_n?

9.3.5 AUTO_n? -- Auto Ranging Enable Query

Syntax: AUTO_n? where n is either A or B

Parameters: None

Function:

This query returns a value showing whether the auto ranging feature is enabled or disabled.

Returns: <state>

<state>is of type <number>which represents the integer 0 if auto ranging is disabled or 1 if auto ranging is enabled. If enabled, the meter will auto range when in continuous acquisition modes.

Related Commands: AUTO_n, RANGE_n, RANGE_n?

9.3.6 BRIGHT -- Display Brightness Command

Syntax: BRIGHT <bright>

Parameters: <bright> is of type integer

Function: This command sets brightness, in percentage (%), from 0% to 100%

Returns: None

Related Commands: DISP, DISP?

9.3.7 BRIGHT? -- Display Brightness Query

Syntax: BRIGHT ?

Parameters: None

Function: This query returns brightness, in percentage (%), from 0% to 100%

Returns: <bright> is of type <number>

Related Commands: DISP, DISP?

9.3.8 CALDATE_n? -- Calibration Date Query

Syntax: CALDATE_n? where n is either A or B

Parameters: None

Function:

This query returns the calibration date of the detector as read from the memory module attached to the 1930/2930.

Returns: <date>

<date>is of type <string>in the double quote format.

Related Commands: ATTNSN_n?, DETMODEL_n?, DETSN_n?

9.3.9 CALTEMP? -- Calibration Temperature Query

Syntax: CALTEMP_n? where n is either A or B

Parameters: None

Function:

This query returns the temperature (degrees Celsius) at which the detector was calibrated. When no detector is present, "no detector" is returned..

Returns: <temperature>

<temperature>is of type <number>in the decimal format.

9.3.10 CH? -- Available Channel Query

Syntax: CH?

Parameters: None

Function:

This query is used to see which channels are available in the meter. A channel is available if a calibration module was plugged into that channel on powerup and passed the self test.

Returns: <channels>

<channels>is of type <string>in the double quote format. The possible values of <string>are:

“A ” --only channel A is available

“B ” --only channel B is available

“AB ” --Both channel A and B are available

Related Commands: None

9.3.11 CONTRAST -- Display Contrast Command

Syntax: CONTRAST <contrast>

Parameters: <contrast> is of type integer

Function: This commans sets contrast, in percentage (%), from 0% to 100%

Returns: None

Related Commands: BRIGHT, BRIGHT?, CONTRAST?

9.3.12 CONTRAST? -- Display Contrast Query

Syntax: CONTRAST ?

Parameters: None

Function: This query returns contrast, in percentage (%), from 0% to 100%

Returns: <contrast> is of type <number>

Related Commands: BRIGHT, BRIGHT?, CONTRAST, DISP, DISP?

9.3.13 DELAY -- Delay Command

Syntax: DELAY <time>

Parameters: <time> is of type <number> an interger in milliseconds.

Function: This command causes the execution of commands to be delayed by a user-defined time. Note that the subsequent command is delayed. The Operation-Complete flag is held false until the delay period elapses, and the ***OPC?** query will not execute until the delay period has elapsed.

Returns: None

Related Commands: *OPC, *OPC?**,** *WAI

9.3.14 DETMODEL_n? -- Detector Model Query

Syntax: DETMODEL_n? where n is either A or B

Parameters: None

Function:

This query returns the model number of the detector that belongs to the memory module attached to the specified channel.

Returns: <model>

<model>is of type <string>in the double quote format.

Related Commands: ATTNSN_n?, CALDATE_n?, DETSN_n?

9.3.15 DETSN_n?-- Detector Serial Number Query

Syntax: DETSN_n? where n is either A or B

Parameter: None

Function:

This query returns the serial number of the detector that belongs to the memory module attached to the specified channel.

This serial number must match the serial number of the detector attached to the 1930/2930.

Returns: <detSN>

<detSN>is of type <string>in the double quote format.

Related Commands: ATTNSN_n?, CALDATE_n?, DETMODEL_n?

9.3.16 DISP -- Display Brightness

Syntax: DISP <level>

Parameters:

The parameter <level>is of type <number>which rounds to an integer in the range 0 to 3.0 corresponds to off,1 to 50%, 2 to 75%, and 3 to 100%.

Function:

This command sets the brightness of the display to a desired level. The valid levels are off, dim, normal, and bright. This command is proved only for compatibility with older Newport power meters. The use of CONTRAST and BRIGHT are recommended.

Returns: None

Related Commands: DISP?, BRIGHT, BRIGHT?, CONTRAST, CONTRAST?

9.3.17 DISP? -- Display Brightness Query

Syntax: DISP?

Parameters: None

Function:

This query returns the brightness level of the display. This command is provided for compatibility with older Newport power meters. The use of CONTRAST and BRIGHT are recommended.

Returns: <level>

<level>is of type <number>where 0 corresponds to off,1 to 50%, 2 to 75%, and 3 to 100%.

Related Commands: DISP, BRIGHT, BRIGHT?, CONTRAST, CONTRAST?

9.3.18 DISPCH -- Display Channel Select

Syntax: DISPCH <channel>

Parameters:

<channel>is of type <string>in a double quoted format.

The possible values of <channel>are “A ” for channel A and “B ” for channel B.

Function:

This command is used to select the channel that is displayed in the primary display area of the meter. If the requested channel is not available then this command will cause an error.

Returns: None

Related Commands: CH?, DISPCH?

9.3.19 DISPCH? -- Display Channel Query

Syntax: DISPCH?

Parameters: None

Function:

This command is used to see which channel is currently selected as the display channel.

Returns: <channel>

<channel>is of type <string>in a double quoted format. The possible values of <channel>are “A ” for channel A and “B ” for channel B, or “AB” for both channels if in dual channel view. If any window other than A, B or AB is on top then zero is returned.

Related Commands: CH?,DISPCH

9.3.20 DS_n? -- Data Store Value Query

Syntax: DS_n?<number> where n is either A or B

Parameters:

The parameter <number>rounds to an integer and represents the data store value that is being queried. The range of <number>is 1 to n; where n is the number of values stored in the data store buffer (see DSCNT_n?). A parameter of 1 represents the oldest data value in the data store, 2 the second oldest and so on.

Function:

This query is used to query an individual data value from the data store buffer. If the parameter is out of range then an execution error message will be generated and nothing will be returned. It is recommended to use the

DSCNT_n? query to determine how many values have been stored in the data buffer.

Returns: <status>, <number>

<status>is an integer that represents the status of the returned value. <status>will be 0 for ok, 1 for over range, 2 for detector saturated, 3 for data error and 4 for ranging.

<number>is a floating point number in the exponential format.

Related Commands: DSCLR_n, DSCNT_n?, DSE_n, DSE_n?, DSSIZE_n, DSSIZE_n?, DSUNITS_n?, DSBUF_n, DSBUF_n?

9.3.21 DSBUF_n -- Data Store Buffer Behavior Select

Syntax: DSBUF_n <state> where n is either A or B

Parameters:

The parameter <state>is of type <number>.If the number rounds to 0 then data store FIXED BUFFER behavior is enabled. Otherwise, data store SLIDE BUFFER behavior is enabled.

Function:

This command selects data store FIXED BUFFER or SLIDE BUFFER behavior.

Related Commands: DS_n?, DSCLR_n, DSCNT_n?, DSE_n, DSE_n?, DSSIZE_n, DSSIZE_n?, DSUNITS_n?, DSBUF_n?, DS_n

9.3.22 DSBUF_n? -- Data Store Buffer Behavior Query

Syntax: DSBUF_n? where n is either A or B

Parameters: None

Function:

This query returns a value showing whether data store FIXED BUFFER or SLIDE BUFFER behavior is enabled.

Returns: <state>

<state>is of type <number>and represents an integer 0,if FIXED BUFFER behavior is enabled, or 1,if data store SLIDE BUFFER behavior is enabled.

Related Commands: DS_n?, DSCLR_n, DSCNT_n?, DSE_n, DSE_n?, DSSIZE_n, DSSIZE_n?, DSUNITS_n?, DSBUF_n, DS_n

9.3.23 DSCLR_n -- Data Store Clear

Syntax: DSCLR_n where n is either A or B

Parameters: None

Function:

This command is used to clear the data store buffer.

Related Commands: DS_n?, DSCNT_n?, DSE_n, DSE_n?, DSSIZE_n, DSSIZE_n?, DSUNITS_n?, DSBUF_n, DSBUF_n?

9.3.24 DSCNT_n? -- Data Store Value Count Query

Syntax: DSCNT_n?<number> where n is either A or B

Parameters: None

Function:

This query returns the number of data values stored in the data store buffer.

Returns: <count>

<count>is of type <number>and represents an integer in the range of 1 to the size of the data store buffer.

Related Commands: DS_n?, DSCLR_n, DSE_n, DSE_n?, DSSIZE_n, DSSIZE_n?, DSUNITS_n?, DSBUF_n, DSBUF_n?

9.3.25 DSE_n -- Data Store Enable

Syntax: DSE_n <state> where n is either A or B

Parameters:

The parameter <state>is a <number>which is either 0 or 1.If the number is 0, data storing is disabled. If the number is 1, data storing is enabled.

Function:

This command enables or disables data storing. If the data store buffer is full and FIXED BUFFER behavior is enabled, this command will automatically clear the buffer and store new data. Previous data will be lost.

Related Commands: DS_n?, DSCLR_n, DSCNT_n?, DSE_n?, DSSIZE_n, DSSIZE_n?, DSUNITS_n?, DSBUF_n, DSBUF_n? DS_n

9.3.26 DSE_n? -- Data Store Enable Query

Syntax: DSE_n? where n is either A or B

Parameters: None

Function:

This query returns a value showing whether or not data storing is enabled or disabled.

Returns: <state>

<state>is of type <number>and represents an integer 0,if data storing is disabled, or 1,if data storing is enabled.

Related Commands: DS_n?, DSCLR_n, DSCNT_n?, DSE_n, DSSIZE_n, DSSIZE_n?, DSUNITS_n?, DSBUF_n, DSBUF_n?, DS_n

9.3.27 DSINT_n -- Data Store Interval Command

Syntax: DSINT_n <interval> where n is either A or B

Parameters:

The parameter <interval>is of type <number>which is an integer and must be: 1, 10, 20, 50, 100, or 1000. The parameter represents the interval in milliseconds for storing one measurement in the data buffer.

Function:

This command sets the interval in milliseconds to be used for data storing. For example if DSINT = 100 and DSSIZE = 100 it will take 100 x 100ms to fill the buffer.

Related Commands: DS_n?, DSCLR_n, DSCNT_n?, DSE_n, DSINT_n?, DSSIZE_n, DSSIZE_n?, DSUNITS_n?, DSBUF_n, DSBUF_n?, DS_n

DSINT_n? -- Data Store Interval Query

Syntax: DSINT_n ?

Parameters:

None

Function:

This query returns the interval in milliseconds currently used for data storing. Return values are: 1, 10, 20, 50, 100, or 1000.

Related Commands: DS_n?, DSCLR_n, DSCNT_n?, DSE_n, DSINT_n, DSSIZE_n, DSSIZE_n?, DSUNITS_n?, DSBUF_n, DSBUF_n?, DS_n

9.3.28 DSSIZE_n -- Data Store Buffer Size Select

Syntax: DSSIZE_n <size> where n is either A or B

Parameters:

The parameter <size>is of type <number>which rounds to an integer in the range 1 to 3000.The parameter represents the size of the data buffer to be used for data storing.

Function:

This command sets the size of the buffer used for data storing.

NOTE

The data buffer is cleared automatically when this command is used and all previously stored data will be gone.

Related Commands: DS_n?,DSCNT_n?,DSE_n,DSE_n?,DSSIZE_n?, DSUNITS_n?, DSBUF_n, DSBUF_n?, DS_n,

9.3.29 DSSIZE_n? -- Data Store Buffer Size Query

Syntax: DSSIZE_n? where n is either A or B

Parameters: None

Function:

This query returns the data store buffer size.

Returns: <size>

<size>is of type <number>and represents an integer of the range 1 to 3000.

Related Commands: DS_n?, DSCLR_n, DSCNT_n?, DSE_n, DSE_n?, DSSIZE_n, DSUNITS_n?, DSBUF_n, DSBUF_n?, DS_n

9.3.30 DSUNITS_n? -- Data Store Buffer Units Query

Syntax: DSUNITS_n? where n is either A or B

Parameters: None

Function:

This query is provided for compatibility with older Newport power meters. Data is stored as raw data bits and units are not selected until readback. The same data buffer can be readback using different units. This query simply returns the currently selected units identical to the UNITS commnd command).

Returns: <units>

<units>is of type <string>in the double quote format.

The possible values of units are: “A ”, “W ”, “dBm ”, “dB ” or “REL” depending on the detector and acquisition mode.

Related Commands: DS_n?, DSCLR_n, DSCNT_n?, DSE_n, DSE_n?, DSSIZE_n, DSSIZE_n?, DSBUF_n, DSBUF_n?, UNITS_n, UNITS_n?

9.3.31 EVENT? -- Device Event Register Query

Syntax: EVENT?

Parameters: None

Function:

This query returns the contents of the Device Event register and sets the Device Event register to 0.The *CLS command will also set this register to 0.

The Device Event register is AND ’ed with the Device Event Enable register. If any bit is set in the result of this AND ’ing operation then Device Error bit (bit 3) in the Standard Event Status register will be set.

The Device Event register is an 8 bit, bit mapped register, with each bit signifying a different condition. The bits are listed below, most significant bit first:

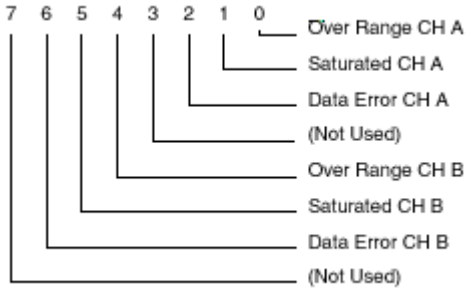


Figure 27: Device Event Register

Returns: <event>

<event>is an integer in the range from 0 to 255 inclusive.

Related Commands: *ESE, *ESE?, *ESR?, EVENTEN, EVENTEN?

9.3.32 EVENTEN -- Device Event Enable Register

Syntax: EVENTEN <mask>

Parameters:

<mask>is an integer in the range 0 to 255 inclusive. The value of this number is written into the Device Event Enable register.

Function:

The Device Event Enable register is AND'ed with the Device Event register. If any bit is set in the result of this AND'ing operation then Device Error bit (bit 3) in the Standard Event Status register will be set.

The Device Event Enable register is an 8 bit, bit mapped register. Any bit set to 1 in the Device Event Enable register allows the corresponding bit in the Device Event register to set the Device Error bit (bit 3) in the Standard Event Status register. Any bit set to 0 disables the corresponding bit in the Device Event register from setting the Device Error bit.

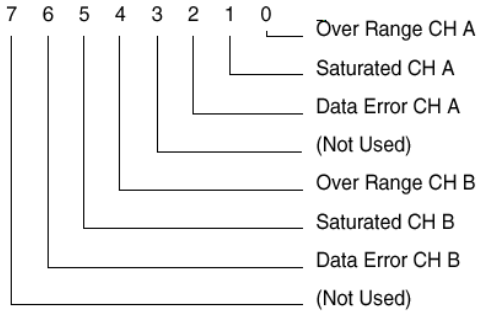


Figure 28: Device Event Register

Related Commands: EVENT?, EVENTEN?, *ESE, *ESE?, *ESR?

9.3.33 EVENTEN? -- Device Event Enable Register Query

Syntax: EVENTEN?

Parameters: None

Function:

This query returns the contents of the Device Event Enable register. See the EVENTEN command for a description of the Device Event Enable register.

Returns: <mask>

<mask>is of type <number>and represents an unsigned decimal integer in the range from 0 to 255.

Related Commands: EVENT?, EVENTEN, *ESE, *ESE?, *ESR?

9.3.34 EXT -- External Trigger Enable

Syntax: EXT <enable>

Parameters:

The parameter <state>is either 0, 1, 2, or 3. If <state>is 0 then the external trigger is disabled. If <state>is 1 then the external trigger is enabled on channel A. If <state>is 2 then the external trigger is enabled on channel B. If <state>is 3 then the external trigger is enabled on both channels.

Function:

This command enables or disables the external trigger input on the back panel.

Related Commands: EXT?, EXTEDGE, EXTEDGE? , EXTHOLDOFF_n, EXTHOLDOFF_n?

9.3.35 EXT? -- External Trigger Enable Query

Syntax: EXT?

Parameters: None

Function:

This query returns a value showing whether the external trigger input is enabled or disabled.

Returns: <state>

<state>is of type <number>that represents the integer 0,if the external trigger input is disabled. If <state> is 1, 2, or 3, the external trigger is enabled on channel A, channel B, or both respectively.

Related Commands: EXT, EXTEDGE, EXTEDGE?, EXTHOLDOFF_n, EXTHOLDOFF_n?

9.3.36 EXTEDGE -- External Trigger Edge Select

Syntax: EXTEDGE <edge>

Parameters:

The parameter <edge>is either 0 or 1.If <edge>is 0 then the external trigger is defined as a falling edge. If <edge>is 1 then the external trigger is defined as a rising edge.

Function:

This command defines whether the external trigger input on the back panel is falling edge or rising edge active.

Related Commands: EXT, EXT?, EXTEDGE

9.3.37 EXTEDGE? -- External Trigger Edge Query

Syntax: EXTEDGE?

Parameters: None

Function:

This query returns a value showing which external trigger edge is the active edge.

Returns: <edge>

<edge>is of type <number>and represents 0,if the external trigger is defined as a falling edge, or 1,if the external trigger is defined as a rising edge.

Related Commands: EXT, EXT?, EXTEDGE

9.3.38 EXTHOLDOFF_n -- External Trigger Holdoff Time Command

Syntax: EXTHOLDOFF_n <time>

Parameters:

The parameter <time>is of type <number> and is an integer from 0 to 1000. <time> is the delay in milliseconds for the trigger to take effect.

Function:

This command sets the delay interval before the trigger takes effect.

Related Commands: EXT, EXT?, EXTEDGE, EXTHOLDOFF_n?

9.3.39 EXTHOLDOFF_n? -- External Trigger Holdoff Time Query

Syntax: EXTHOLDOFF_n?

Parameters: None

Function:

This query returns the delay in milliseconds before the trigger takes effect.

Related Commands: EXT, EXT?, EXTEDGE, EXTHOLDOFF_n?

9.3.40 FILTER_n -- Filter Select

Syntax: FILTER_n <filter> where n is either A or B

Parameters:

The parameter <filter>is an integer in the range 0 to 3 inclusive.0 corresponds to no filtering,1 to analog filter only,2 to digital averaging filter only, and 3 to analog and digital filters combined.

Function:

This command selects a filter combination to be used to condition readings taken from the detector. The choices are to have no filter at all, an analog filter, digital averaging filter, and both the analog and digital filters. The

digital filter processes every signal reading by averaging it with the last 16 readings taken, as determined by the FILTINTerval command..

All detectors signals are filtered to some extent even without the analog filter feature. By enabling the analog filter the signal is filtered by a 5 Hz low pass instead of the standard filter.

If an attempt is made to enable the analog filter for a detector that does not support it, an execution error will occur.

Related Commands: FILTER_n?

9.3.41 FILTER_n? -- Filter Query

Syntax: FILTER_n? where n is either A or B

Parameters: None

Function:

This query returns a value that represents the filter combination currently being used to condition readings.

Returns: <filter>

<filter>is of type <number>in a range of 0 to 3 with 0 corresponding to no filter,1 to analog filter only,2 to digital averaging filter only,and 3 to analog and digital filters combined.

Related Commands: FILTER_n

9.3.42 FILTINTerval_n -- Filter Interval Command

Syntax: FILTINTerval_n <interval> where n is either A or B

Parameters:

The parameter <interval>is of type <number>which is an integer and must be: 1, 10, 20, 50, 100, or 1000. The parameter represents the interval in milliseconds for storing one measurement in the digital filter buffer.

Function:

This command sets the interval in milliseconds to be used for digital filtering. For example if FILTINT = 100 ms, it will take 100ms x 16 = 1600 ms to fill the filter buffer the first time. After that the filter will recalculate the moving average every 100ms (as set by FILTINT).

Related Commands: FILTER_n, FILTERINTerval_n?

9.3.43 FILTINTerval_n? -- Filter Interval Query

Syntax: FILTINTerval_n ?

Parameters:

None.The parameter <interval>is of type <number>which is an integer and must be: 1, 10, 20, 50, 100, or 1000. The parameter represents the interval in milliseconds for storing one measurement in the digital filter buffer.

Function:

This query returns 1, 10, 20, 50, 100, or 1000, the interval in milliseconds used for digital filtering.

Related Commands: FILTER_n, FILTERINTerval_n

9.3.44 INVERT -- Display Invert Command

Syntax: INVERT <state>

Parameters:

The parameter <state>is of type <number>which is an integer and must be 0 or 1

Function:

This command sets the power meter LCD display to inverted mode. 0 = Normal display operation, 1 = Inverted display operation.

Related Commands: BRIGHT, CONTRAST, DISP

9.3.45 INVERT? -- Display Invert Query

Syntax: INVERT ?

Parameters: None

Function:

This query returns the power meter LCD display mode. 0 = Normal display operation, 1 = Inverted display operation.

Related Commands: BRIGHT, CONTRAST, DISP

9.3.46 LAMBDA_n -- Lambda Select

Syntax: LAMBDA_n <wavelength> where n is either A or B

Parameters:

The parameter <wavelength>is of type <number>which rounds to an integer with a range that depends on the detector being used.The units of <wavelength>are nanometers and should correspond to the wavelength of the light source being measured.

Function:

This command is used to specify the wavelength of light being measured. This will insure that the proper responsivity calibration point will be used when the 1930/2930 calculates measurement values.

Related Commands: ATTN_n, ATTN_n?, LAMBDA_n?, RESP_n?, USRCAL_n, USRCAL_n?, USRRESP_n, USRRESP_n?

9.3.47 LAMBDA_n? -- Lambda Query

Syntax: LAMBDA_n? where n is either A or B

Parameters: None

Function:

This query returns the wavelength that corresponds to the responsivity calibration point currently being used by the 1930/2930 in measurement calculation.

Returns: <wavelength>

<wavelength> is of type <number>and represents an integer. The units of <wavelength> are nanometers.

Related Commands: ATTN_n, ATTN_n?, LAMBDA_n, RESP_n?, USRCAL_n, USRCAL_n?, USRRESP_n, USRRESP_n?

9.3.48 MODE_n -- Acquisition Mode Select

Syntax: MODE_n <mode> where n is either A or B

Parameters:

The parameter <mode>is of type <string>.Its range depends on the detector attached to the meter. The valid values for this parameter are listed below.

"DCSNGL" specifies DC single mode

"DCCONT" specifies DC continuous mode

Function:

This command sets the mode to be used to acquiring subsequent readings.

Related Commands: MODE_n?, UNITS_n, UNITS_n?

9.3.49 MODE_n? -- Acquisition Mode Query

Syntax: MODE_n? where n is either A or B

Parameters: None

Function:

This query returns the acquisition mode currently being used by the meter.

Returns: <mode>

<mode> is of type <string>in the double quote format.

Related Commands: MODE_n, UNITS_n, UNITS_n?

9.3.50 R? -- Read Both Channels Measurement Query

Syntax: R?

Parameters: None

Function:

This query returns the last valid measurements taken from both channels.

The units of the measurements are the units defined at the time the readings were made. Because it is possible to make this query faster than measurements are actually being taken, the values returned by successive queries may be multiple reports of a single measurements.

Returns: <number>, <number> or <number>

<number>is a floating point number in the exponential format.

If two channels are running simultaneously then, both are returned separated by a comma.

Related Commands: *STB?, MODE_n, MODE_n?, R_n?, RWS?, RWS_n?, UNITS_n, UNITS_n?

9.3.51 R_n? -- Read Single Channel Measurement Query

Syntax: R_n? where n is either A or B

Parameters: None

Function:

This query returns the last valid measurements taken from the specified channel.

The units of the measurements are the units defined at the time the reading was made. Because it is possible to make this query faster than measurements are actually being taken, the values returned by successive queries may be multiple reports of a single measurements.

Returns: <number>

<number>is a floating point number in the exponential format.

Related Commands: *STB?, MODE_n, MODE_n?, R?,RWS?, RWS_n?, UNITS_n, UNITS_n?

9.3.52 RADix -- Radix Command

Syntax: RADix

Parameters: <radix>

<radix> is of type <string> and must be: DEC, HEX, BIN, or OCT.

Function: This command allows the programmer to select the radix type for status, condition, and event query response data. Decimal, binary, hexadecimal, and octal are allowed. Default is decimal.

All of the above radixes may be used to enter program data at any time, without the need for issuing the **RADix** command. The proper prefix must also be used with Hex (#H), binary (#B), or octal (#O).

9.3.53 RADix? -- Radix Query

Syntax: RADix?

Parameters: None

Function:

This query returns the active radix as selected by the RADix command. Return values are: DEC, HEX, BIN, or OCT.

Returns: <radix>

Return values are: DEC, HEX, BIN, or OCT.

9.3.54 RANGE_n -- Signal Range Select

Syntax: RANGE_n <range> where n is either A or B

Parameters:

The parameter <range>is of type <number>.The range of this parameter will depend on the detector and mode being used to acquire data. See the section entitled “Electrical Specifications ” at the beginning of this manual for the signal range that corresponds to the current setting of <range>.

Function:

This command is used to select a new manual signal range. This command will disable the auto ranging feature.

Related Commands: AUTO_n, AUTO_n?, RANGE_n?

9.3.55 RANGE_n? -- Signal Range Query

Syntax: RANGE_n? where n is either A or B

Parameters: None

Function:

This query returns a value that represents the current signal range setting being used whether the meter is auto ranging or in manual ranging mode.

Returns: <range>

<range>is of type <number>and represents the gain level currently being used for either auto or manual ranging. See the section entitled “Electrical Specifications ” at the beginning of this manual for the signal range that corresponds to <range>.

Related Commands: AUTO_n, AUTO_n?, RANGE_n

9.3.56 REFSEL_n -- Reference Source Select

Syntax: REFSEL_n <source>

Parameters:

<source>is of type <string>in the double quote format. The possible values of <source> are: “OTHERCH ” -The other channel, or “USRREF ” -User defined reference value

Function:

This command is used to select a reference source to be used in linear and logarithmic (dB) relative measurements. This command will cause an error if an attempt is made to select the other channel as a reference if it is not available or if the command is executed on the single channel meter.

Returns: None

Related Commands: REFSEL_n?, STOREF_n, USRREF_n, USRREF_n?

9.3.57 REFSEL_n? -- Reference Source Query

Syntax: REFSEL_n?

Parameters: None

Function:

This query returns the current reference source that will be used in linear and logarithmic (dB) relative measurements.

Returns: <source>

<source>is of type <string>in the double quote format. The possible values of <source>are:

“OTHERCH ” --The other channel

“USRREF ” --User defined reference value

Related Commands: REFSEL_n, STOREF_n, USRREF_n, USRREF_n?

9.3.58 REMERR -- Error Window While Remote Command

Syntax: REMERR <state>

Parameters:

The parameter <state>is of type <number>which is an integer and must be 0 or 1

0 = Disable the display of errors when in remote mode

1 = Enable the display of errors when in remote mode

Function:

This command controls the displaying of errors while in remote mode. If enabled, then errors generated while in remote mode will be displayed on the unit's screen.

Related Commands: TERMINAL

9.3.59 REMERR? -- Error Window WhileRemote Query

Syntax: REMERR ?

Parameters:

None

Function:

This query returns the state of displaying of errors while in remote mode.
Returns:

0 = Display of errors when in remote mode is disabled

1 = Display of errors when in remote mode is enabled
Related Commands: TERMINAL

9.3.60 RESP_n? -- Responsivity Query

Syntax: RESP_n? where n is either A or B

Parameters: None

Function:

This query returns the responsivity value currently being used by the 1930/2930 in measurement calculation.

Returns: <val>

<val>is of type <number>and represents a floating point number. The units of the responsivity <val>depends upon the type of detector family of the detector in use.

Related Commands: ATTN_n, ATTN_n?, LAMBDA_n, LAMBDA_n?, USRCAL_n, USRCAL_n?, USRRESP_n, USRRESP_n?

9.3.61 RUN -- Start Both Channel Acquisition

Syntax: RUN

Parameters: None

Function:

This command initiates data acquisition on both channels using the currently defined acquisition mode. In single type acquisition modes this command will cause one reading to be acquired. In continuous type acquisition modes this command will initiate the continuous acquisition of readings. The STOP command will terminate acquisition.

Related Commands: STOP, STOP_n, RUN_n

9.3.62 RUN_n -- Start Single Channel Acquisition

Syntax: RUN_n

Parameters: None

Function:

This command initiates data acquisition on the specified channel using the currently defined acquisition mode. In single type acquisition modes this command will cause one reading to be acquired. In continuous type acquisition modes this command will initiate the continuous acquisition of readings. The STOP command will terminate acquisition.

Related Commands: STOP, STOP_n, RUN

9.3.63 RWS? -- Read Both Channel Measurements With Status Query

Syntax: RWS?

Parameters: None

Function:

This query returns the last measurements taken from both channels. The units of these measurements are the units defined at the time the readings were made. Because it is possible to make this query faster than measurements are actually being taken, the values returned by successive queries may be multiple reports of the same measurement.

Returns: <status>, <number> or <status>, <status>, <number>, <number>

<status> is an integer that represents the status of the returned value. <status> will be 0 for ok,1 for over range,2 for saturated and 3 for data error, and 4 for ranging.

If more than one channel is available,then the first two numbers represent the status of CHA and CHB respectively.

<number> is a floating point number in the exponential format.

Related Commands: *STB?, MODE_n, MODE_n?, R?,R_n?, RWS_n?

9.3.64 RWS_n? -- Read Single Channel Measurement With Status Query

Syntax: RWS_n?

Parameters: None

Function:

This query returns the last measurement taken from the specified channel. The units of this measurement are the units defined at the time the reading was made. Because it is possible to make this query faster than measurements are actually being taken, the values returned by successive queries may be multiple reports of the same measurement.

Returns: <status>, <number>

<status>is an integer that represents the status of the returned value. <status>will be 0 for ok,1 for over range,2 for saturated and 3 for data error, and 4 for ranging.

<number>is a floating point number in the exponential format.

Related Commands: *STB?, MODE_n, MODE_n?, R?, R_n?, RWS?UNITS_n, UNITS_n?

9.3.65 STMAX_n? -- Statistics Buffer Maximum Value Query

Syntax: STMAX_n? where n is either A or B

Parameters: None

Function:

This query returns the maximum value in the statistics buffer of the specified channel.

NOTE: Data Store must be disabled before statistics calculationas are valid. This applies to both DSBUF = FIXED and DSBUF = SLIDE.

Returns: <max>

<max>is of type <number>in exponent notation.

Related Commands: STMEAN_n?, STMIN_n?, STMXMN_n?, STSDEV_n?

9.3.66 STMEAN_n? -- Statistics Buffer Mean Value Query

Syntax: STMEAN_n? where n is either A or B

Parameters: None

Function:

This query returns the mean or average of all the values in the statistics buffer of the specified channel.

NOTE: Data Store must be disabled before statistics calculationas are valid. This applies to both DSBUF = FIXED and DSBUF = SLIDE.

Returns: <mean>

<mean>is of type <number>in exponent notation.

Related Commands: STMAX_n?, STMIN_n?, STSDEV_n?, STMXMN_n?, STSIZE_n?

9.3.67 STMIN_n? -- Statistics Buffer Minimum Value Query

Syntax: STMIN_n? where n is either A or B

Parameters: None

Function:

This query returns the minimum value in the statistics buffer of the specified channel.

NOTE: Data Store must be disabled before statistics calculationas are valid. This applies to both DSBUF = FIXED and DSBUF = SLIDE.

Returns: <min>

<min>is of type <number>in exponent notation.

Related Commands: STMAX_n?, STMEAN_n?, STSDEV_n?, STMXMN_n?, STSIZE_n?

9.3.68 STMXMN_n? -- Statistics Buffer Max-Min Query

Syntax: STMXMN_n? where n is either A or B

Parameters: None

Function:

This query returns the difference between the maximum and minimum readings in the statistics buffer of the specified channel.

NOTE: Data Store must be disabled before statistics calculationas are valid. This applies to both DSBUF = FIXED and DSBUF = SLIDE.

Returns: <mxmn>

<mxmn>is of type <number>in exponent notation.

Related Commands: STMAX_n?, STMEAN_n?, STMIN_n?, STMXMN_n, STSIZE_n?

9.3.69 STSDEV_n? -- Statistics Buffer Standard Deviation Query

Syntax: STSDEV_n? where n is either A or B

Parameters: None

Function:

This query returns the standard deviation of the readings in the statistics buffer of the specified channel.

NOTE: Data Store must be disabled before statistics calculationas are valid. This applies to both DSBUF = FIXED and DSBUF = SLIDE.

Returns: <stddev>

<stddev>is of type <number>in exponent notation.

Related Commands: STMAX_n?, STMEAN_n?, STMIN_n?, STMXMN_n, STSIZE_n?

9.3.70 STOP -- Stop Both Channel Acquisition

Syntax: STOP

Parameters: None

Function:

This command terminates any acquisition of data currently in progress on both channels. If data is not being acquired on a channel then this command has no effect.

Related Commands: RUN, RUN_n, STOP_n

9.3.71 STOP_n -- Stop Single Channel Acquisition

Syntax: STOP_n where n is either A or B

Parameters: None

Function:

This command terminates any acquisition of data currently in progress on the specified channel. If data is not being acquired on that channel the command has no effect.

Related Commands: RUN, RUN_n, STOP

9.3.72 STOREF_n -- Store Reference Reading

Syntax: STOREF_n where n is either A or B

Parameters: None

Function:

This command takes the latest reading and stores it as a reference reading to be used when making relative linear and dB measurements. The units of the reference reading defaults to Watts. The reference reading is stored in the USRREF field.

Related Commands: REFSEL_n, REFSEL_n?, USRREF_n, USRREF_n?, STOREF_n?

9.3.73 STOREF_n? -- Store Reference Reading Query

Syntax: STOREF_n? where n is either A or B

Parameters: None

Function:

This query returns the latest reading stored as a reference reading. The units of the reference reading defaults to Watts.

Returns: <number>

<number> is a floating point number in the exponential format.

Related Commands: REFSEL_n, REFSEL_n?, USRREF_n, USRREF_n?, STOREF_n

9.3.74 STOZERO_n -- Store Zero Signal

Syntax: STOZERO_n where n is either A or B

Parameters: None

Function:

This command takes the latest reading and stores it as a zero signal reference value to be used when zeroing is enabled. The units of the zero reference defaults to Amperes. The zero reference is stored in the ZERO VALUE field.

Related Commands: ZERO_n, ZERO_n?, ZEROVAL_n?

9.3.75 TERM -- GPIB Terminator Command

Syntax: TERM <terminator>

Parameters: <terminator>

<terminator> is of type <number> which is an integerand must be: 0 through 7.

Value	GPIB Description	RS-232 Description
0	<CR> <NL> with END	<CR> <NL>
1	<CR> <NL>	<CR> <NL>
2	<CR> with END	<CR>
3	<CR>	<CR>
4	<NL> with END	<NL>
5	<NL>	<NL>
6	END with last byte	no terminator
7	no terminator	no terminator

Function:

The **TERM** command allows the programmer to select the message terminator type for GPIB and RS-232 messages sent by the controller. <CR> (carriage return), <NL> (new line), and <END> (for GPIB) are allowed. <CR><NL><^END> (0) is the default type. END means assert EOI line with last byte.

9.3.76 TERM? -- GPIB Terminator Query

Syntax: TERM ?

Parameters: None.

Value	GPIB Description	RS-232 Description
0	<CR> <NL> with END	<CR> <NL>
1	<CR> <NL>	<CR> <NL>
2	<CR> with END	<CR>
3	<CR>	<CR>
4	<NL> with END	<NL>
5	<NL>	<NL>
6	END with last byte	no terminator
7	no terminator	no terminator

Function:

This query returns the selected the message terminator type for GPIB and RS-232 messages sent by the controller. <CR> (carriage return), <NL> (new line), and <END> (for GPIB) are allowed. <CR><NL><^END> (0) is the default type. END means assert EOI line with last byte.

9.3.77 TERMINAL -- Terminal Mode Command

Syntax **TERMINAL** <state>

Parameters: <state>.

The parameter <state>is of type <number>which is an integer and must be 0 or 1

0 = Disable terminal mode

1 = Enable terminal mode

Function: This command controls whether the RS-232C interface generates prompts and echoes characters sent from the computer.

9.3.78 TERMINAL? -- Terminal Mode Query

Syntax **TERMINAL** ?

Parameters: None

Function: This query returns whether the RS-232C Terminal Mode is enabled or disabled.

Returns: 0 = Terminal mode disabled, 1 = Terminal mode enabled

9.3.79 TONE -- Enable Tone Command

Syntax **TONE** <state>

Parameters: <state>.

The parameter <state>is of type <number>which is an integer and must be 0, 1, or 2.

0 = TONE Disabled

1 = Enable TONE on channel A

2 = Enable TONE on channel B

Function: This command enables the test tone generator. The test tone frequency is proportional to the input optical power.

9.3.80 TONE? -- Enable Tone Query

Syntax **TONE**?

Parameters: None

Function: This command returns the enabled state of test tone generator. The test tone frequency is proportional to the input optical power.

Returns: 0 = TONE Disabled, 1 = TONE enabled on channel A

2 = TONE enabled on channel B.

9.3.81 UNITS_n -- Units Select

Syntax: UNITS_n <units> where n is either A or B

Parameters:

<units> is of type <string>.All possible values of units are listed below:

"A "specifies amps

"W "specifies watts

"dBm "specifies dBm

"dB "specifies dB

"REL "specifies linear ratio

A subset of these units will be valid for a particular detector and acquisition mode.

Function:

Sets the units to be used for subsequent measurements. Once the units have been set, all new readings are given in the new units.

Related Commands: MODE_n, MODE_n?, UNITS_n?

9.3.82 UNITS_n? -- Units Query

Syntax: UNITS_n? where n is either A or B

Parameters: None

Function:

This query returns the units of readings currently being taken.

Returns: <units>

<units> is of type <string>in the double quote format. The possible values of units are: “A”, “W”, “dBm”, “dB” or “REL” depending on the detector and acquisition mode.

Related Commands: MODE_n, MODE_n?, UNITS_n

9.3.83 USRCAL_n -- User Calibration Enable

Syntax: USRCAL_n <state> where n is either A or B

Parameters:

The parameter <state>is a <number> which can be 0 or 1. If the number is 0, then user calibration is disabled. If the number is 1,then user calibration is enabled.

Function:

This command enables or disables the use of a user defined calibration point.

Related Commands: ATTN_n, ATTN_n?, LAMBDA_n, LAMBDA_n?, RESP_n?, USRCAL_n?, USRRESP_n, USRRESP_n?

9.3.84 USRCAL_n? -- User Calibration Enable Query

Syntax: USRCAL_n? where n is either A or B

Parameters: None

Function:

This query returns a value showing whether or not user calibration is enabled or disabled.

Returns: <state>

<state>is of type <number>and represents an integer 0,if user calibration is disabled, or 1,if user calibration is enabled.

Related Commands: ATTN_n, ATTN_n?, LAMBDA_n,, LAMBDA_n?, RESP_n?, USRCAL_n, USRRESP_n, USRRESP_n?

9.3.85 USRREF_n -- User Defined Reference Value Select

Syntax: USRREF_n <val> where n is either A or B

Parameters:

The parameter <val>is of type <number>.

Function:

This command provides a means of directly storing a reference value to be used in linear and logarithmic (dB) relative measurements. The units of this value are Watts.

Related Commands: REFSEL_n, REFSEL_n?, STOREF_n, USRREF_n?

9.3.86 USRREF_n? -- User Defined Reference Value Query

Syntax: USRREF_n? where n is either A or B

Parameters: None

Function:

This query returns the user defined reference value. This value will be in Watts.

Returns: <refval>

<refval> is of type <number> in exponential notation.

Related Commands: REFSEL_n, REFSEL_n?, STOREF_n, USRREF_n

9.3.87 USRRESP_n -- User Responsivity Factor Select

Syntax: USRRESP_n <val> where n is either A or B

Parameters:

The parameter <val> is of type <number>.The units of this parameter match the responsivity units of the detector in use.

Function:

This command is used to define a responsivity factor that will be used by the 1930/2930 in measurement calculation when user calibration is enabled.

Related Commands: ATTN_n, ATTN_n?, LAMBDA_n, LAMBDA_n?, RESP_n?, USRCAL_n, USRCAL_n?, USRRESP_n?

9.3.88 USRRESP_n? -- User Responsivity Factor Query

Syntax: USRRESP_n? where n is either A or B

Parameters: None

Function:

This query returns the user defined responsivity factor that will be used by the 1930/2930 in measurement calculation when user calibration is enabled.

Returns: <val>

<val> is of type <number>and represents a floating point number. The units of <val> match the responsivity units of detector in use.

Related Commands: ATTN_n, ATTN_n?, LAMBDA_n, LAMBDA_n?, RESP_n?, USRCAL_n, USRCAL_n?, USRRESP_n

9.3.89 ZERO_n -- Signal Zeroing Enable

Syntax: ZERO_n <state> where n is either A or B

Parameters:

The parameter <state>is a <number> which can be 0 or 1. If the number is 0, then readings are not adjusted by the stored zero reference. If the number is 1, then readings are adjusted by the stored zero reference.

Function:

This command enables or disables the zeroing feature. Zeroing causes the stored zero reference (see STOZERO_n command)to be subtracted from incoming signal readings before the incoming signal is used in measurement calculations.

Related Commands: STOZERO_n, ZERO_n?, ZEROVAL_n

9.3.90 ZERO_n? -- Signal Zeroing Enable Query

Syntax: ZERO_n? where n is either A or B

Parameters: None

Function:

This query returns a value showing whether or not zeroing is enabled or disabled.

Returns: <state>

<state> is of type <number> and represents the integer 0,if zeroing is enabled, or 1,if zeroing is disabled.

Related Commands: STOZERO_n, ZERO_n, ZEROVAL_n

9.3.91 ZEROVAL_n -- Zero Value Command

Syntax: ZEROVAL_n <val> where n is either A or B

Parameters:

The parameter <val> is of type <number>. The units of this parameter defaults to amps.

Function:

This command is used to define a zero reference value that will be used by the 1930/2930 in measurement when zeroing is enabled.

Related Commands: STOZERO_n, ZERO_n, ZEROVAL_n

9.3.92 ZEROVAL_n? -- Zero Signal Query

Syntax: ZEROVAL_n? where n is either A or B

Parameters: None

Function:

This query returns the current value being used for zeroing, which is stored in the Zero Value field.

Returns: <zeroval>

<zeroval> is of type <number>in exponential notation. The units of this value are the numerator of the detector's responsivity, i.e. amps.

Related Commands: STOZERO_n,ZERO_n,ZERO_n?

10 Syntax and Definitions

10.1 Definition of <string>

The IEEE 488.2 standard defines two types of string data. These strings are either single or double quoted. For convenience, the 1930/2930 also recognizes an unquoted string with certain restrictions as detailed below. Any of these forms may be used where a <*string*> parameter is required.

1. <*string*>,using double quotes **“this is a string”**
2. <*string*>,using single quotes. **‘this is a string’**
3. <*string*>,using no quotes. **thisisastring**

A description of each type of <*string*> follows:

1. <*string*> defined using double quotes.

   A double quote indicates that a string follows, and the string is terminated by another double quote. A double quote may be embedded within the string by using two double quotes together:

   Example: “this string contains a “”double quote”

   All characters within the two outer double quotes are considered part of the string. It is an error if the string does not terminate with a double quote. The string cannot contain the <CR>(ASCII decimal 13), <LF>(ASCII decimal 10), or End or Identify characters.

2. <*string*> defined using single quotes.

   This form is similar to double quoted string. A single quote indicates that a string follows, and the string is terminated by another single quote. A single quote may be embedded within the string by using two single quotes together:

   Example: ‘this string contains a‘’single quote’

   All characters within the two outer single quotes are considered part of the string. It is an error if the string does not terminate with a single quote. The string cannot contain the <CR>(ASCII decimal 13), <LF>(ASCII decimal 10), or End or Identify characters.

3. <*string*> defined using no quotes.

   All strings using this format must start with an alphabetic character (A through Z, a through z). All other characters must be either alphabetic, digit (0 through 9)or the '_' character. Any other character will delimit the string.

Some examples are shown below:

Sent:	this is a string	
Interpreted:	this	(1st string)
	is	(2nd string)
	a	(3rd string)
	string	(4th string)
Sent:	this,isastring	
Interpreted:	this	(1st string)
	,	(separator character)
	isastring	(2nd string)
Sent:	w/cm	
Interpreted:	w	(1st string)
	ERROR	(unrecognized character)
	cm	(2nd string)

10.2 Definition of <number>

The IEEE 488.2 standard defines four different types of numeric data. The 1930/2930 recognizes all four types as <number> ,thus any format may be used.

1. <*numbe*r> defined as floating point.
2. <*numbe*r> defined as binary.
3. <*numbe*r> defined as octal.
4. <*numbe*r> defined as hexadecimal.

Where necessary, integers are converted to floating point numbers. In all cases, a number is terminated by any of the below characters:

<NL> <EOI> <SPACE>

Any non-valid characters detected in any number received are considered an error in format, and an error condition will be generated in the system. There

are no differences between the 1930/2930 and IEEE-488.2 standard for number definition.

A description of each type of <*numbe*r> follows:

1. <number> defined as floating point.

Any of the following characters, as the first character of an ASCII sequence, indicates that a number is being defined:

+-.0 1 2 3 4 5 6 7 8 9

A floating point number is defined as follows:

1. Optional +-sign. This defines the sign of the number. If missing, positive is assumed.

2. Optional 0-9 digits. These digits define the integer portion of the mantissa.

3. Optional . decimal point. This defines the end of the integer portion of the mantissa, and indicates that the fractional portion of the mantissa follows.

4. Optional 0 -9 digits. These digits define the fractional portion of the mantissa.

5. Optional exponent indicator, an ASCII ‘E ’ or ‘e ’,followed by a ‘+’ or ‘-’ (optional), followed by decimal digits.

Examples:

The numbers below all represent the value “1.2 ”

1.2

1.2e0

+01.2E+00000

120E-2

.12e1

The numbers below all represent the value “-1.2 ”

-1.2

-1.2e+00

-0001.2e+0

-120e-2

.12E1

2. <number>defined as binary.

The 1930/2930 recognizes unsigned binary numbers in the range of 0 to 65535, decimal, or 0 to 1111111111111111 binary. Binary numbers are

represented using only the digits 0 and 1.A binary number has the following format:

#B<*binary*>

Where

#B = mandatory binary number header

<*binary*> = binary digits (0's or 1's)

Example:

All numbers below represent the decimal value 129.

#B10000001

#b010000001

#b10000001

3. <*numbe*r> defined as octal.

The 1930/2930 recognizes unsigned octal numbers in the range 0 to 65535 decimal, or 0 to 177777 octal. Octal numbers are represented using digits from 0 to 7.An octal number has the following format:

#Q<octal>

Where

#Q =mandatory octal number header

<*octal*> =octal digits (0 to 7)

Example:

All numbers below represent the decimal value 129.

#Q201

#q0201

#q201

4. <number>defined as hexadecimal.

The 1930/2930 recognizes unsigned hexadecimal numbers in the range 0 to 65535 decimal, or 0 to FFFF hexadecimal. Hexadecimal numbers are represented using the digits 0 -9 and the characters A -F.A hexadecimal number has the following format:

#H<*hexadecima*l>

Where

#H =mandatory octal number header

<*hexadecimal*> =hexadecimal digits (0 -9 and A -F)

Example:

All numbers below represent the decimal value 127.

#H7f

#H007F

#h7f

11 Error Messages

The IEEE 488.2 standard defines certain bits in the status registers as error condition flags. When an error occurs, one of the error bits is set in the status registers. The bit enable masks and the service request enable allow the 1930/2930 to alert the remote controller that an error has occurred. The standard allows error numbers that range from-100 to-499.

When using the RS-232C port the RS-232 Echo Mode controls when errors are returned. When the Echo Mode is enabled the errors are returned immediately. When the Echo Mode is disabled the errors are not returned immediately and the *ERR? command must be used to retrieve the errors.

11.1 Command Errors

Command Errors are associated with the conversion of the data received into the commands and their parameters (parsing). Incorrect syntax, incorrect parameters, and improper command format will generate these errors. Any command error will cause the Command Error bit (bit 5) in the Standard Event Status Byte to be set.

104, Numeric Type Not Defined

Generated during the parsing of a number and an undefined number type is encountered.

106, Digit Expected

Generated during the parsing of a number and the parser encounters a non-number when a number is expected.

107, Digit Not Expected

Generated during the parsing of a number and the parser encounters a number when a different character is expected.

115, Identifier Not Valid

Generated when a parameter is not valid or not properly formed.

116, Syntax Error

Occurs when an error in command structure or parameter type is detected. Some typical causes are:

Using a number as a command mnemonic.
Using the wrong parameter type.
Using ASCII characters outside of a string constant that are not defined by the command language syntax.
Missing or too many parameters.

The above list in not exhaustive but does give the basic idea of what to look for.

126, Too Many Or Few Arguments

Generated when command arguments are missing or too many.

11.2 Execution Errors

Execution Errors are associated with the interpretation of the converted commands and parameters received. Incorrect parameter values and numerical range errors are types of execution errors. Any execution error will cause the Execution Error bit (bit 4) in the Standard Event Status Byte to be set.

1, Out of memory

This error is caused by an internal program fault, and may be followed by an automatic instrument reset.

201, Value Out Of Range

This error will occur if a parameter is out of a valid range or not in the set of valid parameters for a given command.

214, Exceeds Maximum Length

Generated when the command exceeds the maximum command length. Try shortening the command string.

217, No saved information in recalled bin

Generated when the user attempts to recall a bin which has no previous stored data.

301, Query Error

The Query Error occurs when the instrument is in the midst of transmitting a message over GPIB and the instrument exits remote mode.

303, Input Buffer Overflow

Error generated when the system parser runs out of space during reception of command. It may occur if commands are not terminated correctly. Input buffer is 1,024 characters long.

304, Output Buffer Overflow

Error generated when the system parser runs out of space for query results. It may occur if query results in too much data to be returned in a single

response, or if multiple command queries are issued but not read. Output buffer is 4,096 characters long.

305, Parser Buffer Overflow

Error generated when the system parser runs out of space for commands. A command is received into the input buffer then transferred to the parser buffer. This error is generated if the command in the input buffer is too large to fit into the available space in the parser buffer. It is usually generated when commands are sent to the instrument faster than it can process. Parser buffer is 2,048 characters long.

11.3 Device Errors

Device Errors are associated with some system condition that affects the operation of the meter. Errors associated with data reading will set the appropriate bit but will not generate an error message to avoid jamming the error queue or the interface.

701, Detector Calibration Read or Write Failed.

An error was encountered during a read/write operation to the calibration EPROM in the detector. If problem persists, contact the factory.

703, Power Meter set to defaults due to Firmware update

After upgrading the firmware, in some cases the changes are significant enough to require resetting the instrument to factory defaults.

704, User reference cannot be changed/stored while you are in units of Watts or dBm. Change to dB or Rel to set the user reference value.

User reference can only be stored in dB or Rel mode.

705, Illegal data store parameter change. Queue cleared.

An action that effects the data store caused the data store queue to be cleared.

706, Digital Filter Interval changed, must not be greater than Data Store interval.

The digital filter interval cannot be greater than the data store interval.

707, Digital Filter Disabled with External Trigger.

Digital filter must be disabled during external trigger mode.

708, There is no new data for a statistics update.

No new data has been stored in the data store since the last statistics update.

709, Statistics are not calculated while Data Store is running.

User attempted to compute statistics while data store was active. Turn off data store and compute.

12 Status Reporting System

The figure below (Figure 29:) is a graphical representation of the status reporting system for the GPIB and RS-232 port communications. Following is a detailed description of each register and how the bits are set and reset. The interactions between registers is discussed as well as the generation of a GPIB Service Requests.

12.1 Status Reporting System Flowchart

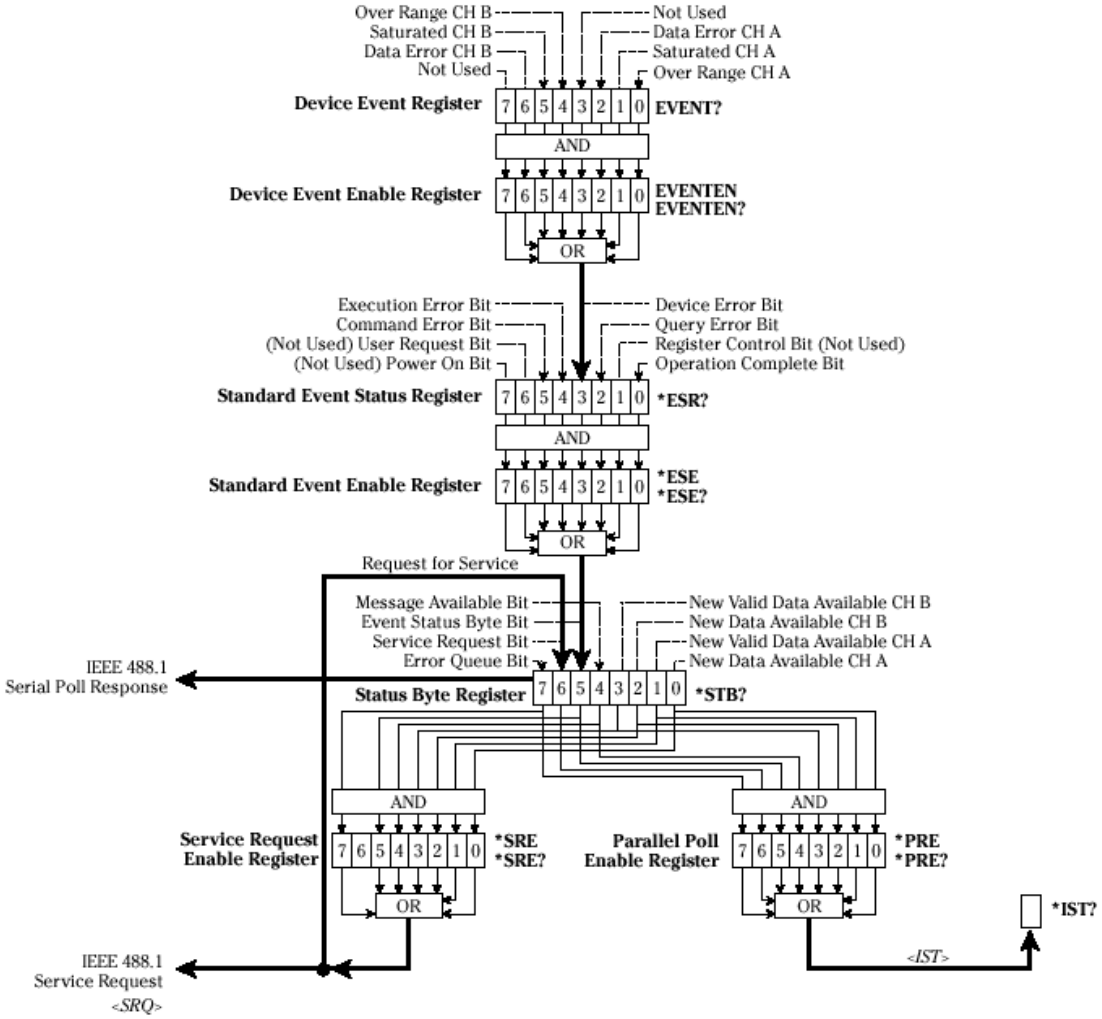


Figure 29: Status System Reporting Flow Chart

12.2 Device Event Register

The Device Event Register is used to record device errors associated with some system condition that affects the operation of the meter. When a bit is set (has a value of one) then the condition is true. The bit remains set until cleared by the EVENT? query or *CLS command.

The Device Event Enable Register is used to define the conditions that will set the Device Error bit in the Standard Event Status register. If a bit is set in the Device Event Register and its corresponding bit is set in the Device Event Enable Register, then the Device Error bit in the Standard Event register will be set.

The Device Event Enable Register is configured by using the EVENTEN command. The Device Event Register is described below. The register is bit mapped, with each bit representing the described condition. The bits are listed most significant bit first.

Device Event Register

bit 7 Not Currently Used.

bit 6:Data Error Channel B

A one in this bit indicates that a data error occurred on channel B during reading calculations. These errors will include such conditions as divide by zero or taking the log of a negative number.

bit 5:Saturated Channel B

Many detectors contain information in their CAL MODULE that indicates when the detector saturates or is otherwise over driven. A one in this bit indicates that a reading on channel B was taken at or above this saturation level.

bit 4:Overrange Error Channel B

A one in this bit indicates that an over-range condition on channel B occurs when taking a reading.

bit 3:Not Currently Used

bit 2:Data Error Channel A

A one in this bit indicates that a data error occurred on channel A during reading calculations. These errors will include such conditions as divide by zero or taking the log of a negative number.

bit 1:Saturated Channel A

Many detectors contain information in their CAL MODULE that indicates when the detector saturates or is otherwise over driven. A one in this bit indicates that a reading was taken on channel A at or above this saturation level.

bit 0:Overrange Error Channel A

A one in this bit indicates that an overrange condition on channel A occurs when taking a reading.

12.3 Standard Event Status Register

The Standard Event Status Register is used to record general system event conditions for the status reporting system. The register is bit mapped, meaning that each condition is represented by a bit. When a bit is set (has a value of 1), then the condition is true. The bit remains set until cleared by the *ESR? query or the *CLS command.

The Standard Event Enable Register is used to define the conditions that will set the Event Status Byte bit (bit 5) in the Status Byte. If a bit is set in the Standard Event Status register and its corresponding bit is set in the Standard Event Enable Register, then the Event Status Byte bit (bit 5)in the Standard Event Register will be set. The Standard Event Enable Register is configured by using the *ESE common command.

Each of the bits in the Standard Event Status Register is described below.

Standard Event Status Register

bit 7:Power On Not used by the 1930/2930.

bit 6:User Request Not used by the 1930/2930.

bit 5:Command Error

A 1 in this bit indicates that the 1930/2930 has received a remote command that generated a command error.

bit 4:Execution Error

A 1 in this bit indicates that the 1930/2930 has received a remote command that generated an execution error.

bit 3:Device Error

A 1 in this bit indicates that an unmasked device error has occurred.

bit 2:Query Error

A 1 in this bit indicates that a query error has occurred.

bit 1:Request Control.

This bit is always 0.

bit 0:Operation Complete

This bit is controlled by the *OPC command. If the *OPC command is in effect, then this bit will be set to 1 when all pending operations have completed. To operate correctly, this bit should be cleared by the *CLS command or *ESR? query before the *OPC command is issued again.

12.4 Status Byte

The Status Byte register is used to record a summary of current system conditions for the status reporting system. It is returned to the controller when a serial poll of the 1930/2930 is conducted or when the *STB? query is issued. The register is bit mapped, meaning that each condition is represented by a bit. When a bit is set, or has a value of 1,then the condition is true. The bits are cleared based on the conditions described for each bit.

The Service Request Enable register is used to define the conditions that will generate a IEEE 488.1 <SRQ>. When an event occurs that causes a bit to be set in the Status Byte register and it's corresponding bit is set in the Service Request Enable register, then a <SRQ>will be generated.

The Service Request Enable Register is configured by using the *SRE common command.

The Parallel Poll Enable Register is used with the Status Byte to generate the <IST> message. If any bit is set in the Status Byte and it 's corresponding bit is set in the Parallel Poll Enable Register, then the <IST> message is set true (a value of one). Otherwise the <IST> message is set false (a value of zero).

When a parallel poll is conducted with the 1930/2930 configured to respond to it, the <IST> message is compared to the <S BIT> (sense bit). If they are the same then the configured data line will be driven true in response to the parallel poll.

Both the <S BIT> and the data line driven during a parallel poll can be selected by the IEEE 488.1 parallel poll remote configuration command.

The Parallel Poll Enable Register is configured by using the *PRE command. The Status Byte Register is described below.

Status Byte

bit 7:Error Queue

A one in this bit indicates that the error queue is not empty (see the *ERR? query). The *CLS command will empty the error queue and, as a result, this bit.

bit 6:Service Request/Master Summary Status

When the status byte is read by means of a serial poll, this bit is set when the 1930/2930 is requesting service.

When the status byte is read by means of the *STB? query, this bit will be set if any bit in the status byte is set and its corresponding bit is set in the Service Request Enable Register.

bit 5:Event Status Byte

The Event Status Byte bit is set when a bit in the Standard Event Status register is set and its corresponding bit in the Standard Event Enable

register is set. The *CLS command or *ESR? query will clear the Standard Event Status register and, as a result, this bit.

bit 4:Message Available

The Message Available MAV bit becomes set when any message is ready to be transmitted over the GPIB interface (not the RS-232 interface). Once the message is sent, the MAV bit is cleared. A GPIB device clear command will clear the output queue and, as a result, this bit.

NOTE

After a query is issued over the GPIB interface this bit should be checked by means of a serial poll before attempting to read the query response.

bit 3:New Valid Data Available

The New Valid Data Available Channel B (NVDA) bit becomes set when a new reading has been taken on channel B that is not overrange, did not saturate the detector, did not cause a data error and was not taken while ranging. It is cleared by the R?, R_A?, RWS? or RWS_A? queries.

bit 2:New Data Available

The New Data Available Channel B (NDA) bit becomes set when a new reading has been taken on channel B. It is cleared by the R?, R_A?, RWS? or RWS_A? queries.

bit 1:New Valid Data Available

The New Valid Data Available Channel A (NVDA) bit becomes set when a new reading has been taken on channel A that is not overrange, did not saturate the detector, did not cause a data error and was not taken while ranging. It is cleared by the R?, R_A?, RWS? or RWS_A? queries.

bit 0:New Data Available

The New Data Available Channel A (NDA) bit becomes set when a new reading has been taken on channel A. It is cleared by the R?, R_A?, RWS? or RWS_A? queries.

13 Maintenance and Trouble-Shooting

13.1 Cleaning

WARNING

The power meter should be disconnected from AC power source before cleaning.

Once a month the system should be wiped down with damp towel to avoid excessive dust from collecting.

13.2 Other Procedures

13.2.1 Shipping the Power Meter

To package the power meter for shipment, follow this procedure:

1. Use original packaging material, if possible. Packaging materials are available from Newport Corporation for customers who need do not have the original packaging material.
2. Wrap the power meter in a plastic bag or sheet.
3. Pack the power meter in its form-fit foam.
4. Place the foam-encased power meter in its box.
5. Seal the box with tape.

13.2.2 Replacing Fuses

WARNING

To reduce the risk of electric shock or damage to the instrument, turn power off and disconnect the power cord before replacing a fuse.

Fuses are accessible through the back panel of the power meter. Before replacing a fuse, turn power off and disconnect the line cord. Using only the fuses indicated below, replace the necessary fuse(s).

Voltage	Fuse Rating
100VAC / 120VAC	1.0A(T), 250VAC, 3AG
220VAC / 240VAC	0.5A(T), 250VAC, 3AG

Table 8: Fuse Replacement Information

Use the following procedure to access and change the 1930/2930 fuses:

1. Turn the instrument OFF by pushing the ON/OFF button on the front instrument panel if required.
2. Disconnect the AC power cord from the rear of the instrument.
3. Use a small screwdriver, insert and press down into the notch at the top of the power entry module cover to pry the door open.
4. Using a small screwdriver, carefully pry out and remove the voltage selector drum.
5. Using a pair of needle nose pliers (if necessary), remove the fuse(s) by pulling the light gray fuse holder straight out of the back of the instrument.
6. Remove the fuse from the holder and check the condition of the fuse.

NOTE

The fuse element should be continuous and unbroken. Refer to Figure 29 – *Continuous Unbroken Fuse Example*. If the element is broken or the condition is questionable, replace the fuse

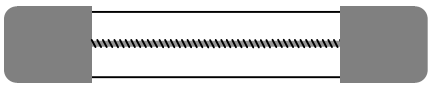


Figure 30: – Continuous Unbroken Fuse Example

7. Verify that the fuse that will be placed in the instrument is appropriate for the amperage selected.
8. Place the new or acceptable fuse in the fuse holder.

9. Slide the fuse holder in the fuse socket so that the arrow on the fuse holder faces out (is visible) and point in the same direction as the arrows on the power entry module cover.
10. Replace the voltage selector drum, ensuring that the proper voltage will be displayed through the power entry module cover.
11. Close the power entry module cover until the lid click and locks.
12. Connect the AC power cord to the instrument.
13. Turn the instrument ON by pushing the ON/OFF button on the front instrument panel to ensure that the instrument works properly.

13.3 Troubleshooting Guide

The following troubleshooting guide is intended to isolate and solve problems with the power meter so that, to the greatest extent possible, the return of the power meter/detector system to Newport will be unnecessary. For the problems that cannot be resolved with information in this manual,or for other situations that are not covered in this section, please see Section 7 for details on returning your entire system to Newport for service.

Symptom	**Possible Fault/Correction**
Blank display.	Power switch OFF. Turn switch ON. Power cord connection is absent. Check power cord connection.
Display shows “Over Range”	Indicates that the signal is too large for the selected signal range. Select a higher RANGE or use an attenuator if one is available.
Display shows “Saturated”	Indicates that the signal exceeds the detector saturation or damage threshold. Select a detector with higher power or energy handling capability or use an attenuator if one is available.
Display shows “Ranging”	Indicates that the meter is in the middle of a range change or that the current units don’t match the units of the last reading.
RS-232 communication does not seem to work	Check the RS-232 cable connection and cable pinouts. Make sure that the device talking to the meter is setup for 8 data bits, no parity, and 1 stop bit. Also check the echo mode state.

No listener error when attempting GPIB communications	Check the GPIB cable connections and the GPIB address.
Display value does not change.	Press the R/S,R/S A, or R/S B key.
Reading is different than expected.	See Section 7.6.4 on Common Measurement Error.

Table 9: Symptom/Fault Troubleshooting Guide

14 Factory Service

This section contains information regarding obtaining factory service for the Model 1930/2930. The user should not attempt any maintenance or service of this instrument and/or accessories beyond the procedures given in Section 13:Maintenance, and Troubleshooting. Any problems which cannot be resolved using the guidelines listed in Table 9: should be referred to Newport Corporation factory service personnel. Contact Newport Corporation or your Newport representative for assistance. The Model 1930/2930 contains no user serviceable parts. Its calibration accuracy is warranted for a period of 1 year. After 1 year, the unit should be returned to Newport Corporation for recalibration and NIST traceability re-certification.

14.1 Obtaining Service

14.1.1 Newport Corporation RMA Procedures

To obtain information concerning factory service, contact Newport Corporation or your Newport representative. Please have the following information available:

1. Instrument model number (On front panel)
2. Instrument serial number (On rear panel)
3. Description of the problem.

NOTE

Each defective part must have an RMA (return material authorization) number assigned by a CUSTOMER CARE REPRESENTATIVE. The serial number of the defective or damaged component must be provided to the CUSTOMER CARE REPRESENTATIVE.

14.1.2 Technical Support Contacts

The Newport Corporation Service Department (Irvine, California, U.S.A.) is the appropriate contact for technical support issues involving power meters.

North America

Industrial and Scientific Technology Division
1791 Deere Avenue
Irvine, CA 92606, U.S.A.
Telephone: (800) 222-6440 Ext. 31694
Telephone: (949) 253-1694
Fax: (949) 253-1479
istd.service@newport.com

Europe

Newport/Micro-Controle S.A.
Zone Industrielle
45340 Beaune la Rolande, FRANCE
Telephone: (33) 02 38 40 51 49

Asia

Newport Opto-Electronics Technologies
中国 上海市 爱都路 253号 第3号楼 3层
C部位, 邮编 200131
253 Aidu Road, Bld #3, Flr 3, Sec C, Shanghai 200131, China
Telephone: +86-21-5046 2300
Fax: +86-21-5046 2323

14.1.3 Newport Corporation Calling Procedure

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number
- Description of problem (i.e., hardware or software)
- Log files (if applicable)

To help our Technical Support Representatives diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?
- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?