

## New Features in Firmware 7700V210 (or later)

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This addendum supplements the *7700 Installation & Basic Setup Instructions* and the *7700 ION User's Guide*. It contains information about the enhancements in the firmware (version 7700V210 or later ) of the 7700 ION power meter. Specifically,

- ◆ The new firmware supports the internal modem option, 7700 ION -MDM(C), as well as Power Measurement's ModemGate™ feature.
- ◆ 10 Calibration Pulser modules have been added to the 7700 ION. Calibration Pulser modules allow you to generate high accuracy energy pulses for calibration testing purposes. This document shows you how to implement calibration pulsing on the 7700 ION's expansion I/O boards. Instructions for configuring these modules with PEGASYS ION Designer are also included.

## Download the Latest Firmware

Your new meter ships with the latest firmware version. Existing meters can be upgraded with the PEGASYS Firmware Upgrade Utility. Refer to your ION User's Guide for instructions on using the utility.

New firmware versions can be downloaded from Power Measurement's worldwide website, [www.pml.com](http://www.pml.com).



*For further information or technical assistance, please contact your local Power Measurement representative, or Customer Service at one of the following locations:*

**Worldwide Web** [www.pml.com](http://www.pml.com)

**E-mail** [support@pml.com](mailto:support@pml.com)

### **Worldwide Headquarters**

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## Internal Modem Options (-MDM or -MDMC)

Firmware version 7700V210 (or later) supports the optional internal modem for the 7700 ION. The internal modem is obtained by specifying one of the following two options when ordering the 7700 ION:

- ◆ 7700 ION -MDM contains an RJ-11 connector on its modem port
- ◆ 7700 ION -MDMC contains a captured wire connector on its modem port

The internal modem is capable of using all standard modem protocols at data rates from 300 bps to 33600 bps.

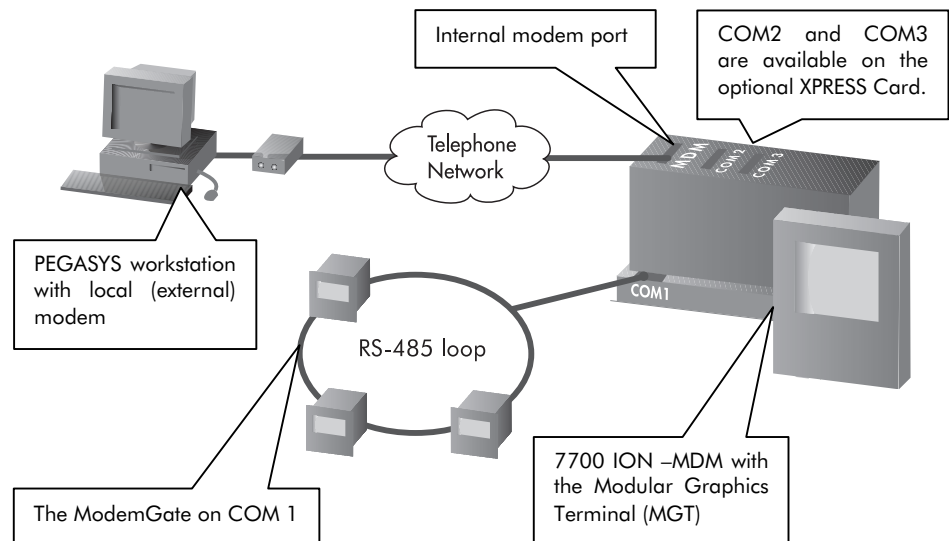
### ModemGate Functionality

The internal modem of the 7700 ION comes with ModemGate™. The ModemGate feature creates a communications connection between the telephone network and an RS-485 loop of devices connected to COM 1 of the 7700 ION. All data received by the internal modem is automatically transferred to the RS-485 loop.



#### NOTE

A PEGASYS workstation (or other master device) cannot be connected to the 7700 ION-MDM's COM 1 port.



Any MGT ordered with the 7700 ION -MDM(C) is enhanced (with MGT firmware versions 2.0.1.0 or later) to support the internal modem option. You can configure the necessary communication settings, including the modem initialization string, with this interface.

# Calibration Pulser Modules and Calibration Testing

Firmware version 7700V210 (or later) includes support for 10 Calibration Pulser modules. This ION module permits you to accurately test the calibration of the 7700 ION when the meter is used in revenue applications. This section provides some guidelines for installing and configuring calibration pulsing.

## General Requirements

To obtain accurate testing results, ensure that the following conditions are met:

### ◆ Test Jig

If you are using a test jig or mounting device, ensure that your meter is wired according to the diagrams presented in the *Installation & Basic Setup Instructions*. If you use current and voltage transformers, they must be accurately rated, and must be able to perform within specifications to provide accurate results. Erroneous results can occur if the connected current or potential transformers are not operating within specifications.

The power provided to energize the meter from the jig must be constant. The power source must deliver the rated voltage to the meter. When testing Wh accuracy, best results will be achieved when operating between -0.5 pF to -1.0 pF and from +0.5 pF to +1.0 pF. When testing VARh accuracy, best results will be achieved when operating between -0.5 pF to -0.0 pF and from +0.5 pF to +0.0 pF. The power factor of the test load must remain stable.

### ◆ Testing Environment

The 7700 ION should be tested at the same temperature as the testing equipment. The ideal temperature is about 22°C (72°F).

### ◆ Test Loads

Your test load device or other loading circuit must be set to within the current capacity ranges for the meter.

### ◆ Control Equipment

Control equipment is required for counting and timing the pulse outputs from Grayhill modules on the 7700 ION's I/O expansion board(s). Ensure the accuracy and precision of any measurement equipment (ie, voltmeters, ammeters, power factor meters, etc) that you use. Setting up control equipment is discussed in the next section.

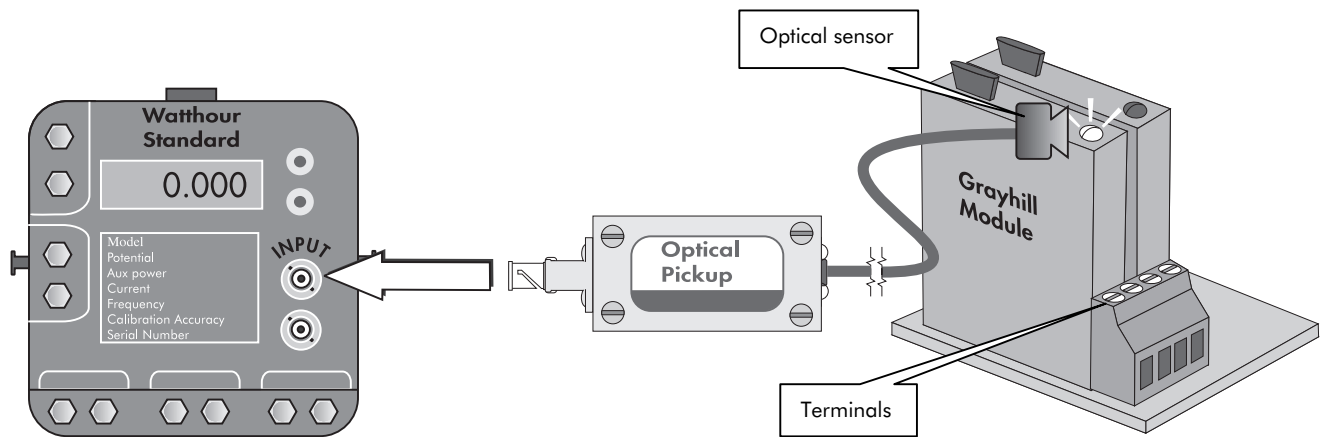
## Installing the Calibration Testing Equipment

You can implement calibration pulsing with a Grayhill module on one of the 7700 ION's expansion I/O boards. The Grayhill expansion boards are separate ordering options for the meter. Refer the *7700 ION Installation & Basic Setup Instructions* for details on wiring up the expansion boards.

Calibration Pulses can be generated from the LEDs, or the output contacts of solid-state Grayhill modules. The two possible schemes are discussed below.

### Calibration Pulsing from the LEDs

Take care to select a Grayhill modules and optical pickups that are compatible with one another. For example, the Grayhill 70G-ODCxx series of digital output modules typically has green status indicating LEDs, so an optical pickup that is sensitive to green light must be used. A typical setup is shown below.



### Calibration Pulsing from the Terminals

You can also implement calibration pulsing from the terminals of the Grayhill rack. Solid state Grayhill modules are recommended over the dry contact (mechanical) variety because there is no danger of contact bounce. Positive (+) terminals always have an odd number. Negative terminals (-) always have an even number.

If your calibration testing equipment requires positive pulses, an intermediary relay (or other device) may have to be installed to invert the low pulses generated by most Grayhill modules.

## Configuring the 7700 ION for Calibration Pulsing



### NOTE

Configuring the 7700 ION to generate calibration pulses requires knowledge of the ION architecture. Refer to Chapter 4: "Using Advanced Features" of your 7700 ION User's Guide for information on using the expansion I/O capabilities of the meter.



Calibration Pulser icon in PEGASYS ION Designer

The Calibration Pulser module serves as an intermediary between the power (kW, kVAR or kVA) outputs of the Meter Units Power Meter module and the 7700 ION's expansion I/O boards. The module integrates the instantaneous power inputs and then outputs pulses. More details about the module can be found in the *ION Reference*.

To take advantage of the Calibration Pulser modules added in firmware 7700V210, create and configure these ION modules with PEGASYS ION Designer software. Specifically,

- ◆ Create a Calibration Pulser module and link its *Source* input to an output register of the Meter Units (MU) Power Meter module. Details on creating ION modules and links between ION modules are provided in the *7700 ION User's Guide* as well as the *ION Designer online Help*.
- ◆ Specify the rate at which pulses will be generated, the outputted pulse width, and the hardware port where the pulses will appear, by modifying the setup registers of the Calibration Pulser module. Refer to the following table:

Setup Register	Range or Options	Creation Default	Function
Pulse Width	0.010 to 1.0	0.050	This numeric bounded register specifies the width, in seconds, of the pulses sent to the hardware channel. The Calibration Pulser module maintains a minimum duty cycle of 50% on the output pulse train.
Kt	0.010 to 1000000000.000	1.8	The numeric bounded register defines how much energy the module accumulates before a pulse is sent to the hardware channel. An industry standard for kWh energy pulsing is 1.8 Watt-hours per pulse. See "Accuracy Considerations," below.
Port*	Not Used, PortA-0 to Port A-14 (Expansion Board A), PortB-0 to Port B-14 (Expansion Board B)	Not Used	This register specifies which hardware port the output appears on. Only those hardware channels that are still available appear when you access this setting. See "Advanced Communications and I/O" Chapter 4 for more details.

\* Once a port is used, it will no longer appear as an option when modifying the port registers of other modules.

### Accuracy Considerations

The Calibration Pulser module has a maximum resolution of 10 ms. To maintain 0.1% accuracy in your calibration measurements, keep the period between consecutive pulses at 10 seconds or longer. This can be accomplished by adjusting either the Kt value, or the energy from the test source. Use the following formula:



### NOTE

Once the calibration setup is changed, the module will require a few periods of settling time before generating accurate results.

$$Kt = \left[ \text{Test Load (in Watts, VAR, or VA)} \right] \frac{\text{period (in seconds)}}{3600 \text{ seconds}}$$

For example, to generate one pulse every 10 seconds for test load of 360 Watts..

$$Kt = [360] 10/3600 = 1.00$$

Kt should be 1.00 or greater. The larger Kt (and the smaller the load), the longer the period between pulses will be.