

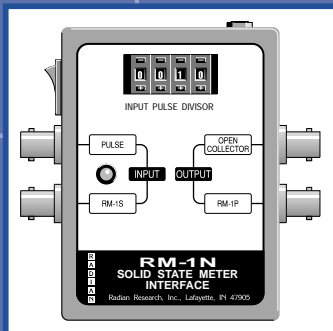
Radian Research, Inc.

RM-1N

Solid State Meter Interface

Operations Manual

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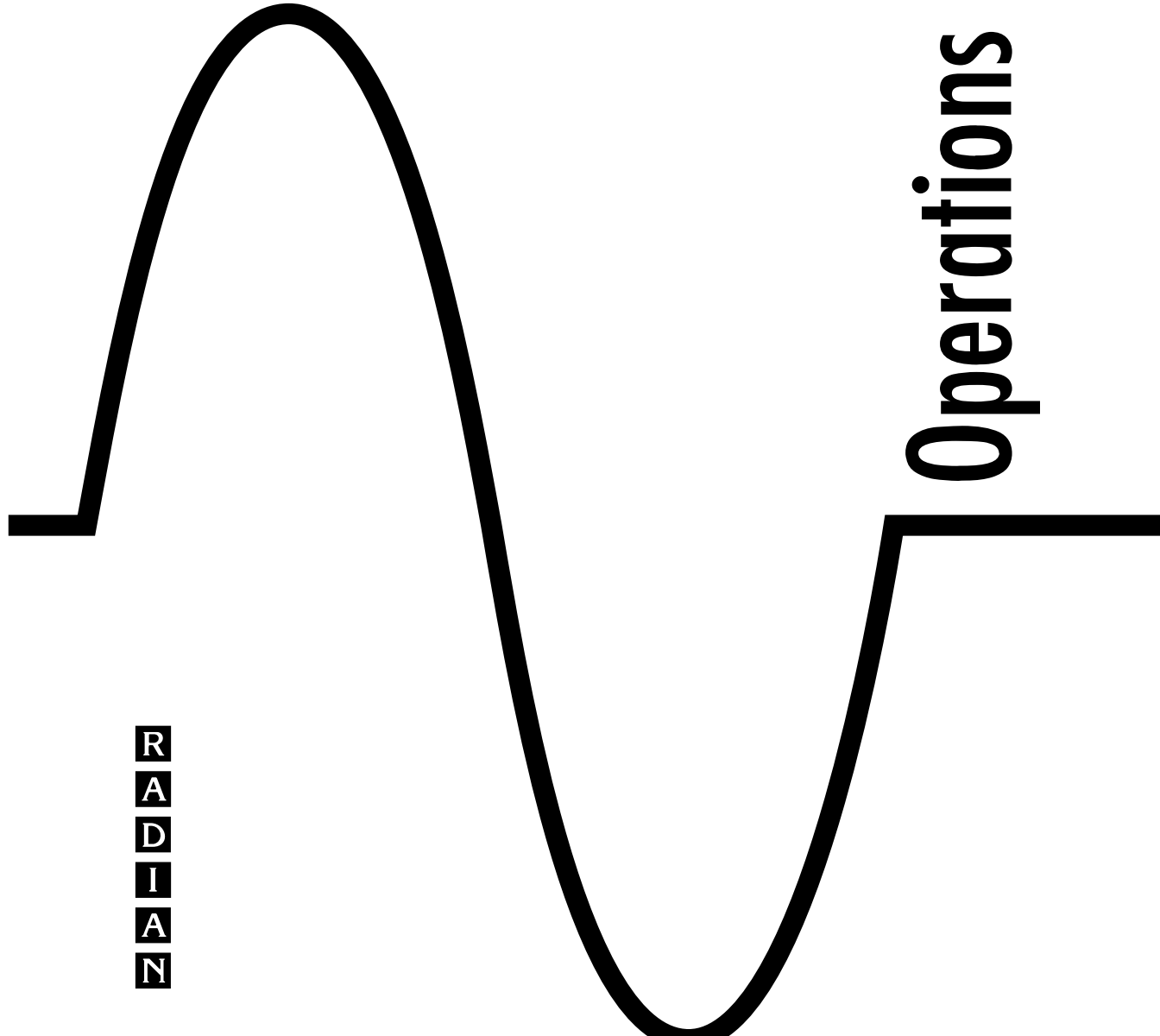
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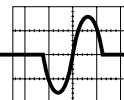
Solid State Meter Interface

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Revision 003-6/96
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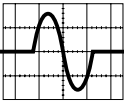
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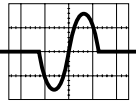
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1.0 Product Introduction

The RM-1N Solid State Meter Interface is a lightweight, compact electronic counter designed to meet numerous field and shop testing applications. In the field, the RM-1N will provide for totally automated testing of both solid state and induction meters. The RM-1N controls the test by automatically starting the display of the Radian standard and then stopping the display after it has counted a specified number of pulses. In the shop, the RM-1N will interface solid state meters with existing calibration equipment.

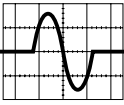
In field testing applications the output of the RM-1N is used to gate the display of any Radian standard. The rate of output to input pulses can be set by selecting the appropriate input pulse divisor. The RM-1S Remote Reset Switch is used to reset the Radian standard's display and rearm the RM-1N's counter. The RM-1N can operate either on battery or AC power. These plus other features allow for convenient and cost effective field testing of solid state and induction meters.

When testing solid state meters, the input pulses to the RM-1N are received via the RM-1H Infrared Optical Pickup (or the RM-1H/v for those meters that use a visible calibration pulse). The RM-1H senses pulses from the infrared calibration LED found on most solid state meter designs. These infrared pulses are then sent to the pulse input of the RM-1N's electronic counter.

When testing induction meters, the RM-DS Meter Disk Sensor is used to reflectively sense disk rotations. The RM-DS will sense disk rotation and send pulses to be counted to the pulse input of the RM-1N's electronic counter.

Both solid state and induction meters can be tested from the KYZ output with the RM-KYZ Pulse Input Adapter. The RM-KYZ will sense the meter's KYZ pulses and send pulses to be counted to the pulse input of the RM-1N's electronic counter.

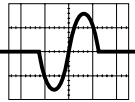
The RM-1N can also be used to interface a solid state meter to existing shop calibration equipment. The input pulses are received via the RM-1H (or RM-1H/v) Optical Pickup. The output pulses of the RM-1N are fed into the optics assembly of the calibration test board. This interface to the test board's optics is done via the RM-1P Electronic Light Valve. The output of the RM-1N can also be interfaced directly to a test board's open collector input (if available).



Product Introduction

As depicted in Figure 1.0a, the RM-1N is divided into two basic sections consisting of the Input where it receives pulses and the Output where it emits pulses. The specific components of each section are detailed below and illustrated in Figure 1.0a.

1. **Power Switch:** Used to turn the power to the RM-1N ON or OFF.
2. **AC Power Adapter Input:** The input for the AC Power Adapter. This adapter may be used in place of a 9 volt battery to power the RM-1N.
3. **Battery Compartment:** Location for a 9 volt battery. A nine volt battery may be used to power the RM-1N instead of the AC Power Adapter. This compartment is located on the back of the device.
4. **Pulse Input:** This input receives pulses from the device under test when using one of the various Radian pickups (RM-1H, RM-1H/v, RM-DS/f, RM-DS/s, RM-DS/sm, RM-KYZ).
5. **RM-1S Input:** This input receives pulses from the Radian RM-1S Remote Reset Switch.
6. **Open Collector Output:** This output emits pulses to the input of a Radian standard or to the open collector input of a test board.
7. **RM-1P Output:** This output emits pulses to the Radian RM-1P Electronic Light Valve.
8. **Visual Pulse Indicator:** This is an LED which will flash each time the RM-1N receives a pulse on its input. Also, it will flash upon depressing the ON/OFF Switch and it will stay illuminated upon power-up if the 9 volt battery is low.
9. **Input Pulse Divisor:** Used to specify the pulse duration of the test. The value set on the Input Pulse Divisor will determine the quantity of pulses received on the RM-1N's input before one pulse is emitted from the RM-1N's output.



Additional accessories are available which operate in conjunction with the RM-1N; such as: RM-1H, RM-1H/v, RM-DS/f, RM-DS/s, RM-DS/sm, RM-KYZ, RM-1P, RM-PCA, RM-OA and RM-1S. These devices, with the RM-1N, will provide the ability to test meters via infrared calibration pulses, visible calibration pulses, disk sensing optics, or KYZ outputs.

This document will explain the various testing situations where the RM-1N and associated accessories can be applied. Connection diagrams for each application are provided as visual references.

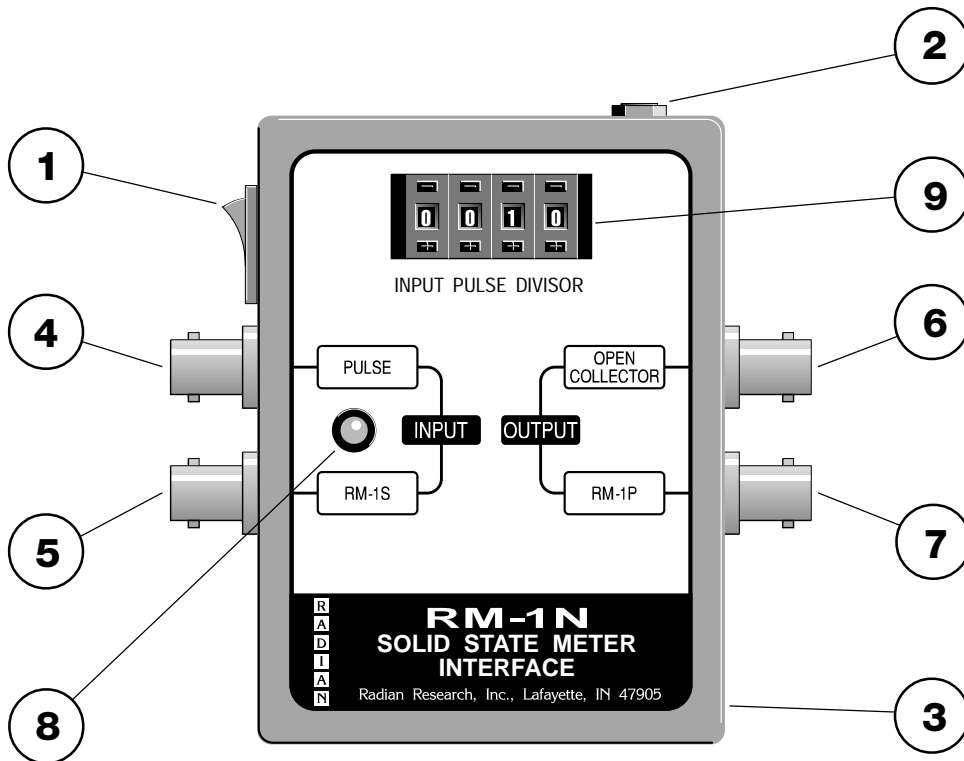
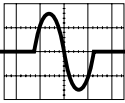


Figure 1.0a Components Of The RM-1N



Product Introduction

RM-1N Specifications

- Inputs: *Pulse Input; for RM-1H, RM-1H/v, RM-DS/f, RM-DS/s, RM-DS/sm, or RM-KYZ
RM-IS Input; to reset RM-1N and Radian standard*
- Max. Input Freq.: *50 pulses per second*
- Outputs: *Open Collector Output; for interface to Radian standard or open collector input of test board
RM-IP Output; for connection to RM-IP Electronic Light Valve*
- Accuracy: *.0001% transfer error for life*
- Input Power: *Internal 9V battery or 120V AC adapter (provided with unit)*
- Size: *111.8 mm (4.40") H x 82.6 mm (3.25") W x 38.4 mm (1.51") D
(dimensions of housing only)*
- Weight: *.26 kg (.57 lbs); .9 kg (2 lbs) shipping weight*
- Counter: *4 digit (pushwheel type)*
- Battery Type: *9V alkaline*
- Battery Life: *Use Radian #800001, Duracell MN16004B2 or Eveready 522BP-2
Approximately 400-500 hours of operation*

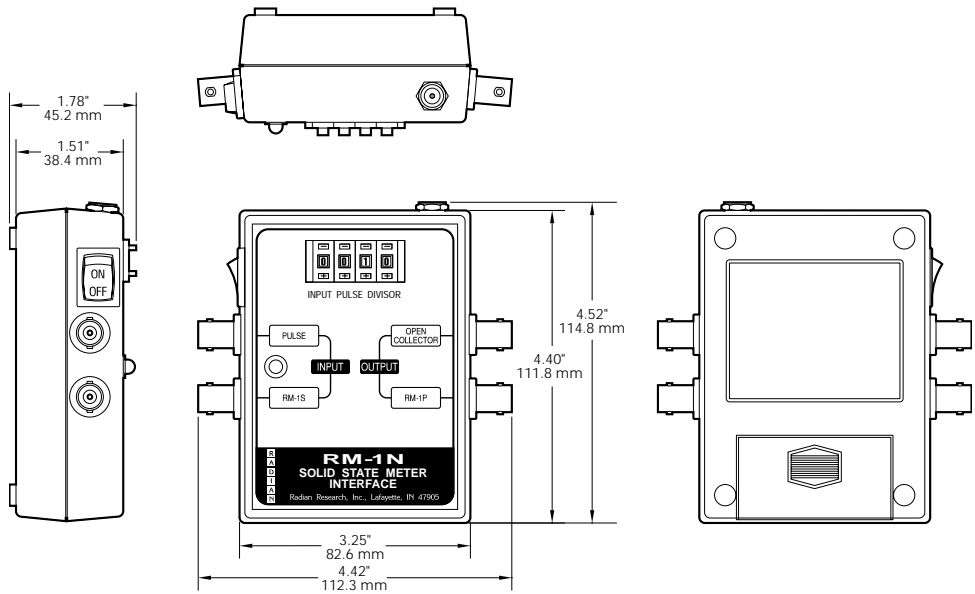
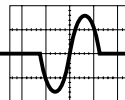
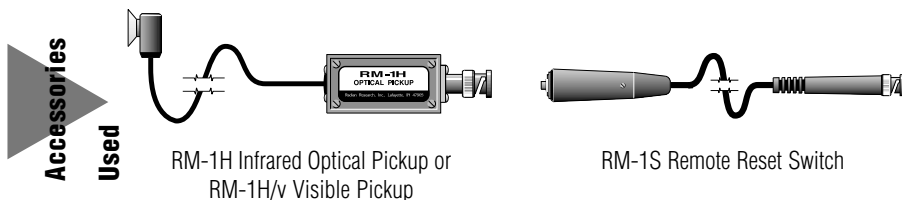


Figure 1.0b Dimensions Of The RM-1N



2.0 Field Testing A Solid State Meter

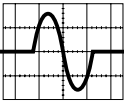
When field testing a solid state meter, the RM-1H will sense the infrared calibration pulse from the solid state meter and send a signal to the RM-1N. The RM-1S will be used to reset the display of the Radian standard and rearm the RM-1N. The RM-1N will count pulses as well as start and stop the Radian standard's display. Note that if the solid state meter has a visible calibration LED, the RM-1H/v should be used in place of the RM-1H.



2.1 Test Steps

1. Make the appropriate connections so that the meter under test and the standard are powered from the same source.
2. Make accessory connections between the meter, standard and RM-1N as specified in Figure 2.1.
3. Specify the duration of the test by dialing in the desired number of pulses on the RM-1N's Input Pulse Divisor.
4. Turn power on to the RM-1N by using the ON/OFF Power Switch. The Visual Pulse Indicator will flash one time.
5. Depress the push switch of the RM-1S to reset the display of the Radian standard to zero and rearm the RM-1N. The RM-1H will sense the infrared calibration pulse from the solid state meter. The RM-1N will acknowledge the pulse and start the standard's display. After the RM-1N has counted the number of pulses specified on the Input Pulse Divisor, it will stop the standard's display.

Note that it will be apparent when the RM-1N is counting calibration pulses because the Visual Pulse Indicator will flash upon receiving the pulse. If the Visual Pulse Indicator is not periodically flashing, then



Application 1

confirm that the RM-1H's pickup is properly affixed to the meter cover in close proximity to the calibration LED output. Also confirm that power to the RM-1N has been turned on.

The % Registration of the meter under test can be determined by using the formula listed below. Note that the duration of the test will be dependent upon the load, the number of pulses specified on the Input Pulse Divisor and the quantity of infrared calibration pulses that are output by the meter (the watt-hour constant of the infrared calibration pulses).

$$\% \text{ Registration} = \frac{K \times (\# \text{ of pulses}) \times (\# \text{ of standard current inputs})}{(\text{display of standard}) \times (\# \text{ of meter elements})} \times 100$$

where:

100 = used to convert to a percentage

K = constant which can be the K_h , K_e , etc., depending upon the test and the meter

of pulses = value specified on the Input Pulse Divisor

of standard current inputs = how many current inputs are being used on the standard

display of standard = the reading of the standard display

of meter elements = the number of elements used on the meter under test

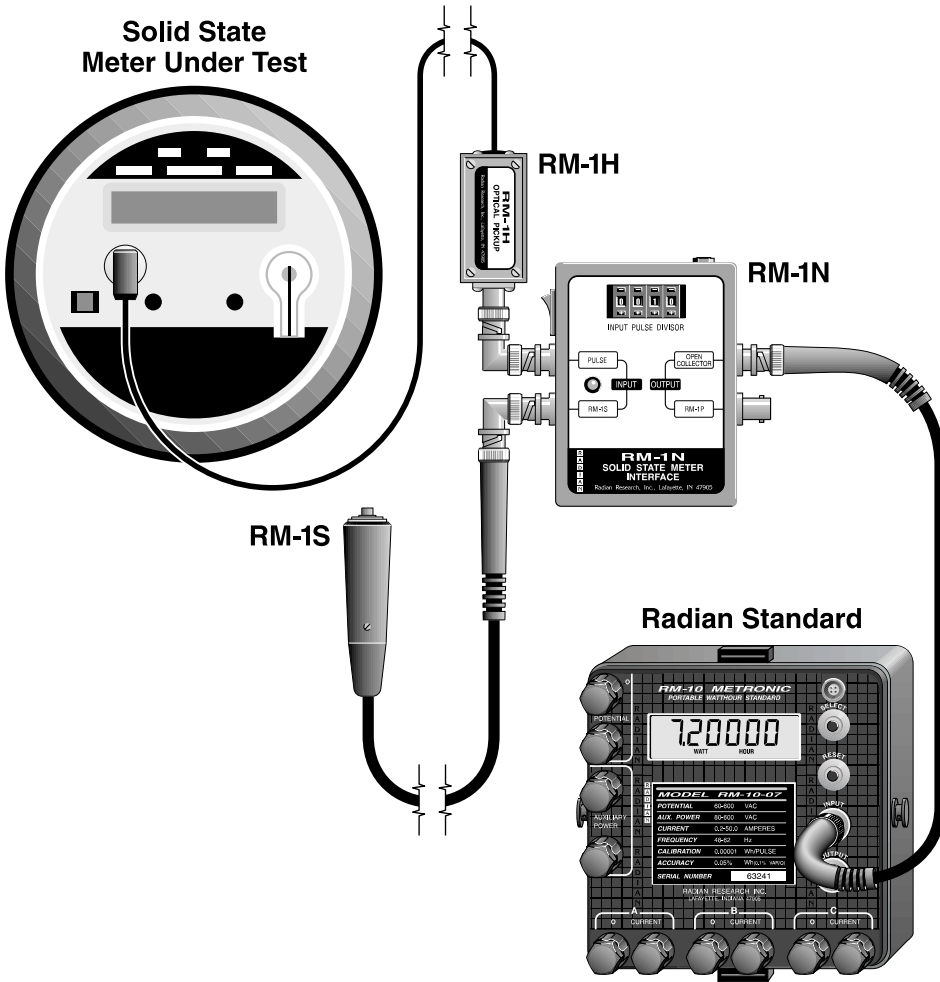
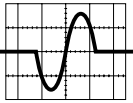
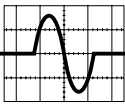


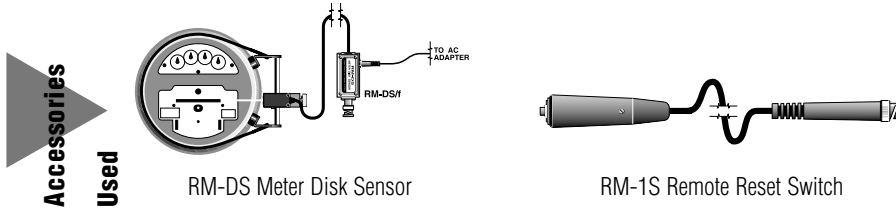
Figure 2.1 Field Testing A Solid State Meter



Application 2

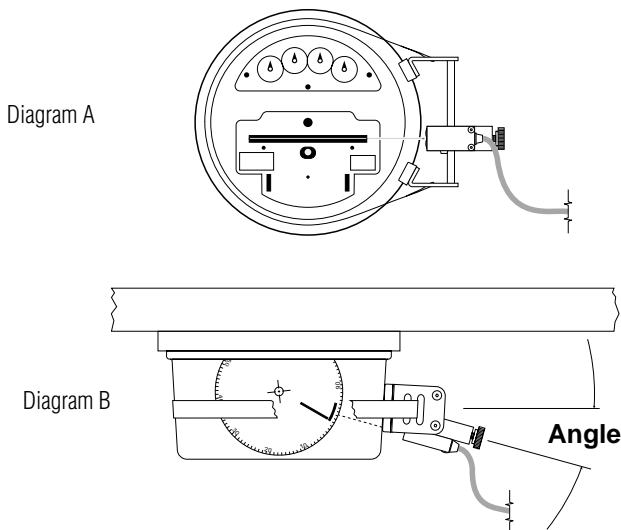
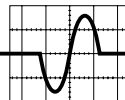
3.0 Field Testing An Induction Meter

The RM-DS will be used to sense meter disk rotation and send pulses to the RM-1N. The RM-1N will count pulses as well as start and stop the Radian standard's display. The RM-1S resets the Radian standard's display and rearms the RM-1N.



3.1 Test Steps

1. Make the appropriate connections so that the meter under test and the standard are powered from the same source.
2. Make accessory connections between the meter, standard and RM-1N as specified in Figure 3.1.
3. Specify the duration of the test by dialing in the number of pulses on the RM-1N's Input Pulse Divisor.
4. Turn power on to the RM-1N by using the ON/OFF Power Switch. The Visual Pulse Indicator will flash one time.
5. Align the RM-DS so that it is triggering from the edge of the disk (See diagram A). The target beam of the RM-DS should break the glass at an angle for the reflective circuitry to operate correctly (See diagram B). Note that there is one red and one green LED on the RM-DS. When both the red and green flash it signifies that the device is operating at its optimum level. Most importantly, make sure that the RM-1N's pulse input LED is flashing each time the disk makes one revolution. This will confirm that the RM-1N is receiving pulses from the RM-DS. The gain adjustment screw on the RM-DS can be used to adjust the signal strength. Its is recommended that the supplied screwdriver be used in order not to damage the adjustment screw. Note that in many cases once the gain adjustment has been set to its optimum level, it may not be necessary to make further adjustments when testing each additional meter. Instead of further adjustments to the gain setting try changing the positioning of the sensor assembly.



- Depress the push switch on the RM-1S to reset the display of the Radian standard and rearm the RM-1N. As the disk's black flag is sensed by the RM-DS, it sends a pulse to the RM-1N. The RM-1N will acknowledge the pulse and start the standard's display. After the RM-1N has counted the number of pulses specified on the Input Pulse Divisor, it will stop the standard's display. Note that it will be apparent when the RM-1N is counting pulses from the RM-DS because the Visual Pulse Indicator will flash upon receiving each pulse.

The % Registration of the meter under test can be determined with the following formula:

$$\% \text{ Registration} = \frac{K \times (\# \text{ of pulses}) \times (\# \text{ of standard current inputs})}{(\text{display of standard}) \times (\# \text{ of meter elements})} \times 100$$

where:

100 = used to convert to a percentage

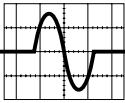
K = constant which can be the Kh, Ke, etc., depending upon the test and the meter

of pulses = value specified on the Input Pulse Divisor

of standard current inputs = how many current inputs are being used on the standard

display of standard = the reading of the standard display

of meter elements = the number of elements used on the meter under test



Application 2

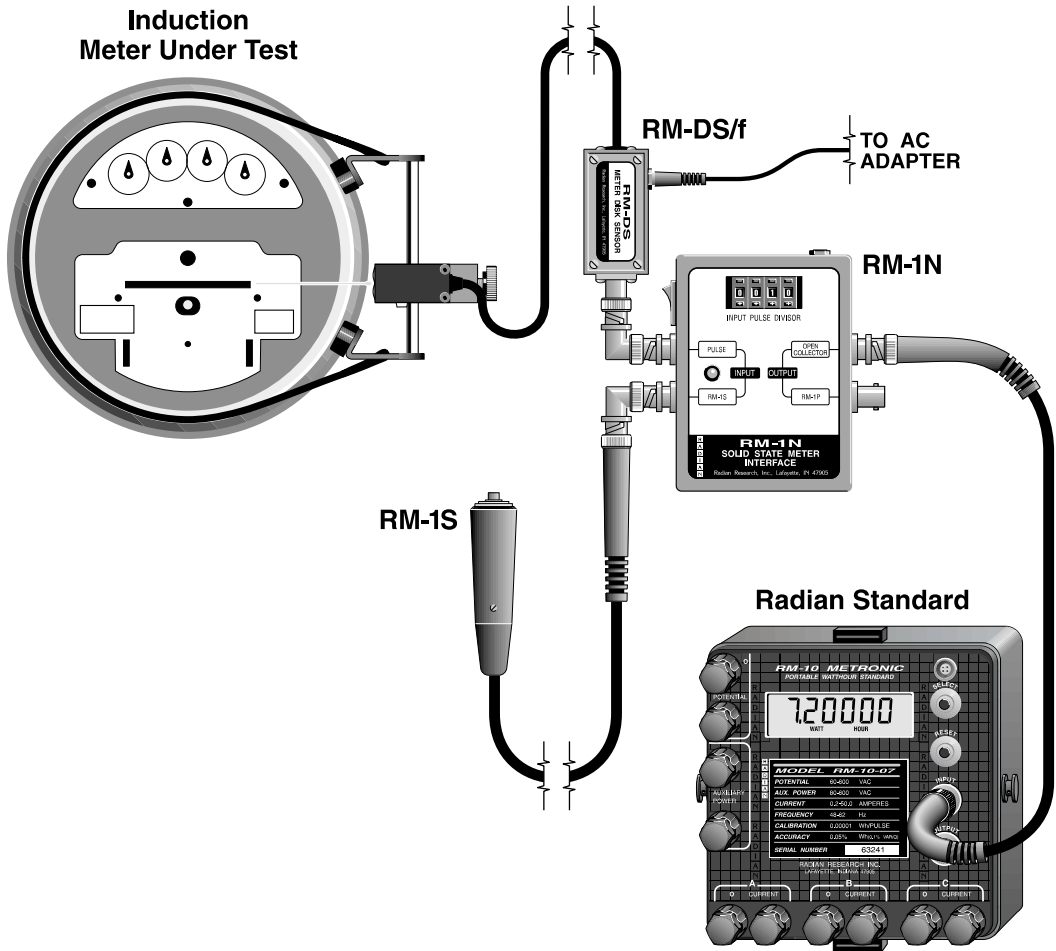
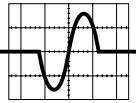


Figure 3.1 Field Testing An Induction Meter



3.2 Testing An Induction Meter Using The Shop Mount Assembly

The RM-DS is also available with a shop mount assembly (RM-DS/s). The shop mount assembly consists of an 18 inch flexible armature. The base of the armature can be mounted with the use of four screws. The Disk Sensor mounts at the tip of the armature with two screws. The operator can easily maneuver the armature to the proper location for optimum disk sensing.

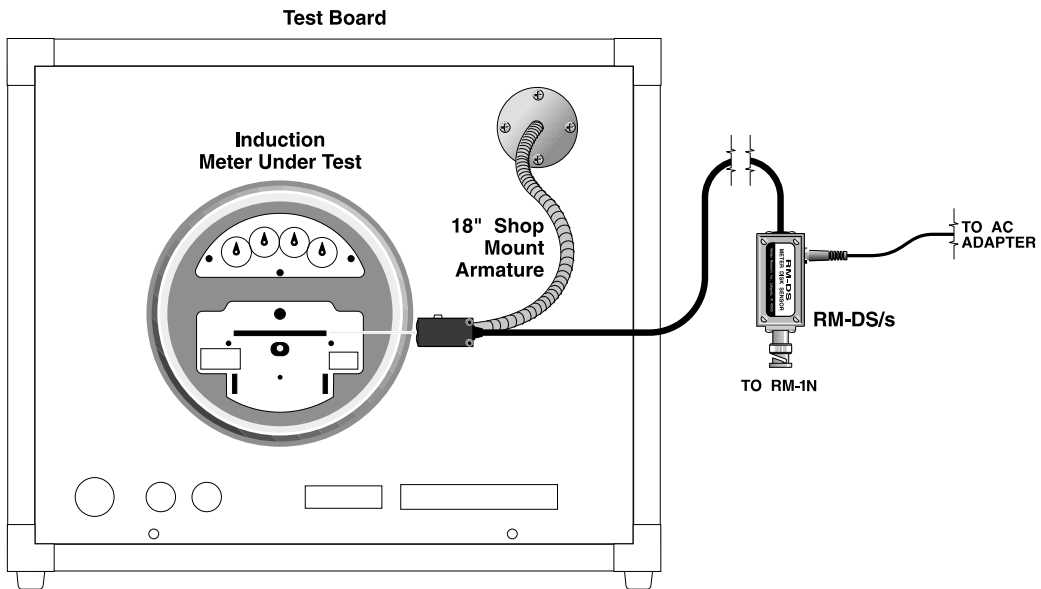
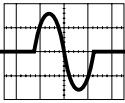


Figure 3.2 Testing An Induction Meter Using The Shop Mount Assembly

3.3 Testing An Induction Meter Using The Suction Mount Assembly

The RM-DS is also available with a suction mount assembly (RM-DS/sm). The suction mount assembly adheres to the meter cover with a suction cup. This assembly is useful when testing induction switch-board meters.



Application 2

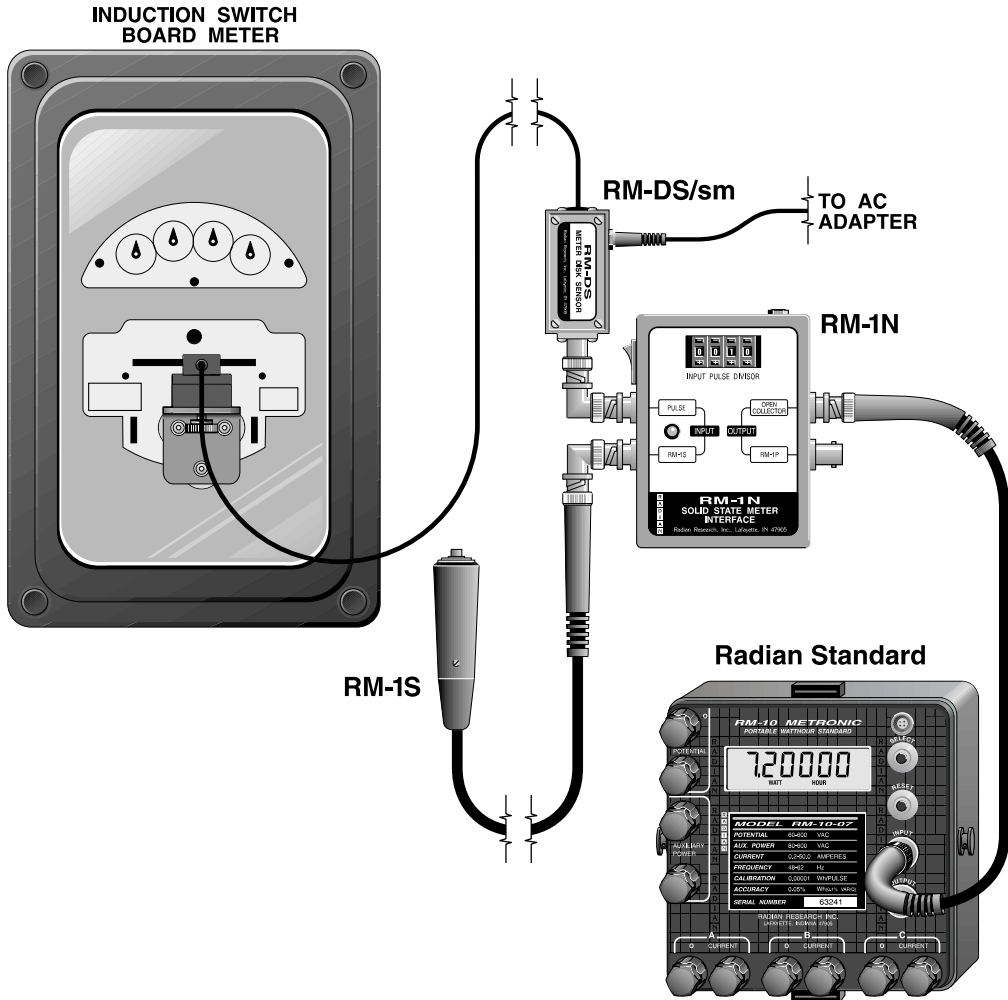
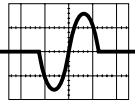


Figure 3.3 Testing An Induction Meter Using The Suction Mount Assembly



4.0 Testing A Meter From Its KYZ Output

In this application, the RM-KYZ senses the meter's KYZ output. The RM-1N counts pulses received from the RM-KYZ as well as starts and stops the Radian standard's display. The RM-1S resets the display of the Radian standard and rearms the RM-1N.

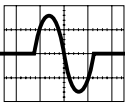
This application can also be used with multifunction meters that provide KYZ outputs for VARhours and Qhours. A Radian multifunction standard should be used which can display watthours, VARhours or Qhours.



4.1 Test Steps

1. Make appropriate connections so that the meter under test and the standard are powered from the same source.
2. Make accessory connections between the meter, standard and RM-1N as specified in Figure 4.1.
3. Specify the duration of the test by dialing in the number of pulses on the RM-1N's Input Pulse Divisor.
4. Turn power on to the RM-1N by using the ON/OFF Power Switch. The Visual Pulse Indicator will flash one time.
5. Depress the push switch of the RM-1S in order to reset the display of the Radian standard and rearm the RM-1N. The RM-KYZ will sense the meter's KYZ output and send a pulse to the RM-1N. The RM-1N counts the pulse and starts the standard's display. As the RM-1N counts the next pulse, depending upon what value is specified on the Input Pulse Divisor, it will stop the standard's display.

Note that it will be apparent when the RM-1N is receiving pulses from the meter's output because the Visual Pulse Indicator will flash upon sensing the pulse. If the Visual Pulse Indicator is not periodically flashing then confirm that all three of the RM-KYZ's wires are properly connected.



Application 3

Also confirm that power to the RM-1N has been turned on.

In order to calculate percent registration it is necessary to know the value of each KYZ pulse being output from the meter. For example, if a given meter had the following constants:

$$M_p = 1/1 = 1 \text{ revolution per 1 pulse}$$

$$K_h = 7.2 \text{ watthours per 1 revolution}$$

Therefore: 1 rev/1 pulse and 7.2 watthours/1 rev; thus, each pulse (or KYZ contact closure) counted will represent 7.2 watthours for this example. Note that some meters refer to this as “Ke” and have it printed on the nameplate. In addition, on most new solid state meters this value is programmable. The percent registration can be calculated with the following formula:

$$\% \text{ Registration} = \frac{K \times (\# \text{ of pulses}) \times (\# \text{ of standard current inputs})}{(\text{display of standard}) \times (\# \text{ of meter elements})} \times 100$$

where:

100 = used to convert to a percentage

K = constant which can be the K_h , K_e , etc., depending upon the test and the meter

of pulses = value specified on the Input Pulse Divisor

of standard current inputs = how many current inputs are being used on the standard

display of standard = the reading of the standard display

of meter elements = the number of elements used on the meter under test

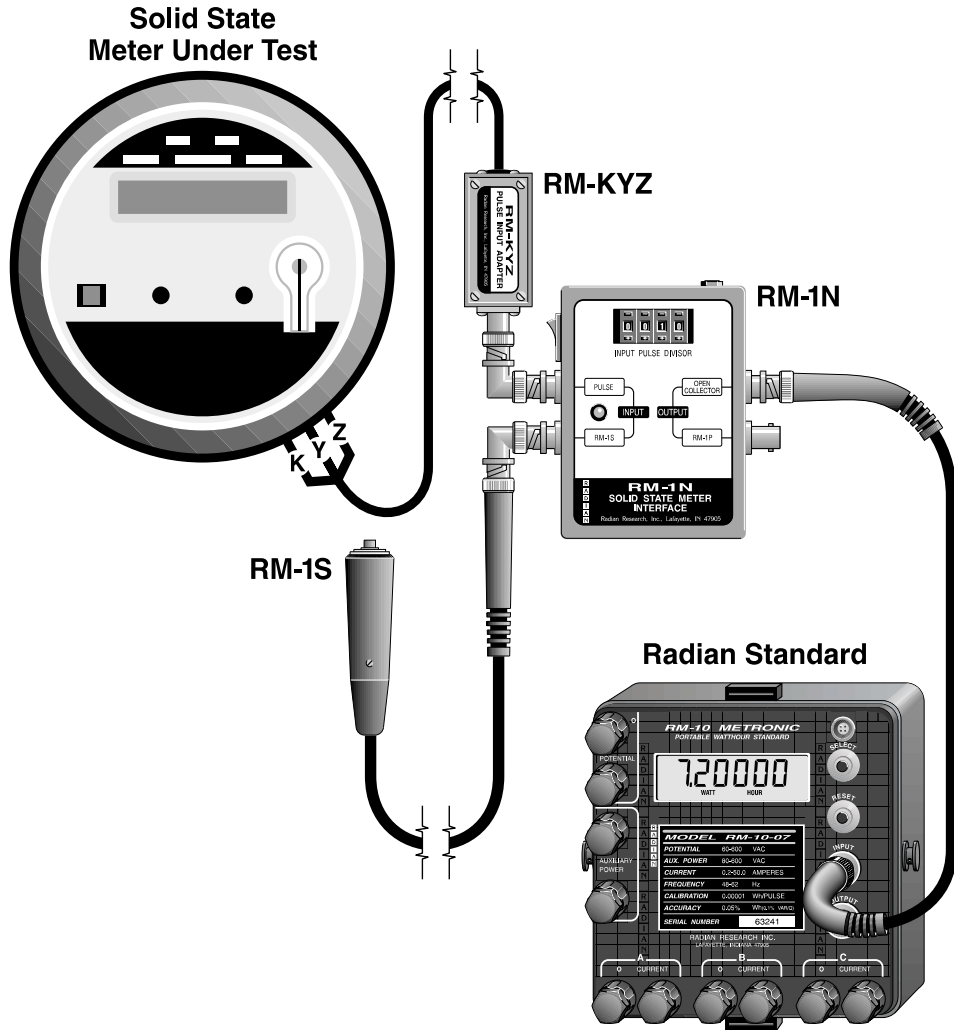
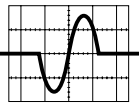
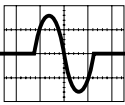


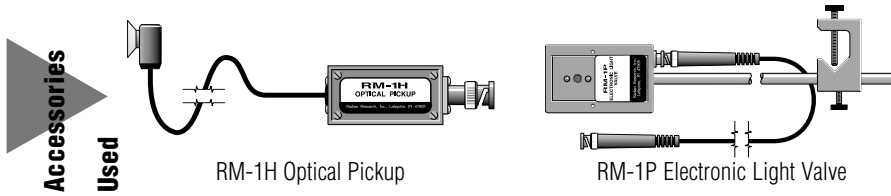
Figure 4.1 Testing A Meter From Its KYZ Output



Application 4

5.0 Interfacing A Solid State Meter To Older Board Designs

Some older test boards do not provide an open collector input or an infrared detector to sense infrared calibration pulses. The RM-1P will operate with test boards that use visible or infrared light and will properly interface solid state meters to those older generation boards.

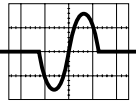


5.1 Test Steps

1. Make connections as specified in Figure 5.1.
2. Set the RM-1N's Input Pulse Divisor to one.
3. Turn power on to the RM-1N by using the ON/OFF Power Switch. The Visual Pulse Indicator will flash one time. Note that when used with the RM-1P, it is recommended that the AC Power Adapter be used instead of a 9 volt battery.
4. Affix the suction cup of the RM-1H to the meter cover in close proximity to the meter's infrared calibration pulse output.
5. The RM-1P will operate with both visible and infrared light sources and will function in conjunction with the test board's light emitter and detector. Therefore, if applicable the test board should be set up for a through-hole test and not a reflective test.

The RM-1P should be positioned between the test board's light emitter and detector such that the label side of the RM-1P is facing the test board's light emitter. Align the RM-1P so that the target beam from the test board's emitter is focused on the RM-1P's detector. In turn, the RM-1P's emitter should be properly aligned with the test board's light detector.

The test will begin as the RM-1H senses the calibration pulse from the solid state meter and transmits a pulse to the RM-1N. The RM-1N will then trigger the RM-1P to emit a beam (pulse train) which will be



sensed by the test board's detector. Thus, the test board thinks that it just sensed one of the holes in a meter disk.

After setting up the equipment, if the test board is not registering, check the positioning of the RM-1P to see that the superluminescent LED is flashing whenever it is supposed to be outputting a pulse to the test board's detector. Check the light sensitivity adjustment of the test board (if there is one). Also confirm that the RM-1N is properly receiving pulses by observing the Visual Pulse Indicator.

6. After confirming proper operation of the RM-1P, perform the normal calibration test procedure with the test board.

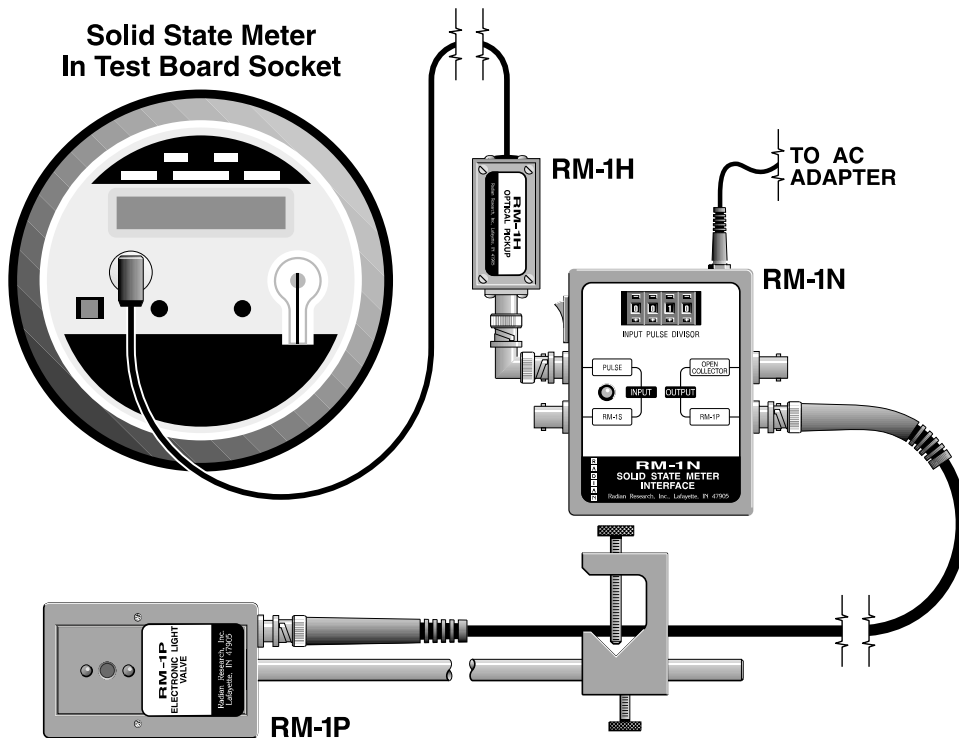
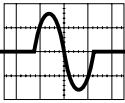


Figure 5.1 Interfacing A Solid State Meter To Older Test Board Designs



5.2 Positioning the RM-1P

On the top of the RM-1P there are three devices. The one in the center is the infrared detector while the two on the perimeter of the detector are infrared emitters. This application will use the detector and will not be concerned with the two infrared emitters that are located on the opposite side. On the bottom side of the RM-1P there also are three devices. The one in the center is a superluminous LED visible light emitter (bubble shaped) and the two on the perimeter of the visible light emitter are infrared emitters. The RM-1P will automatically utilize the correct light emitter depending upon the test board's type of light source. If it is an infrared light then the RM-1P's internal circuitry will determine the frequency and modulation of the infrared beam. In this manner, it will duplicate the beam's pulse train when it is time for the RM-1P to output a signal to the test board's detector.

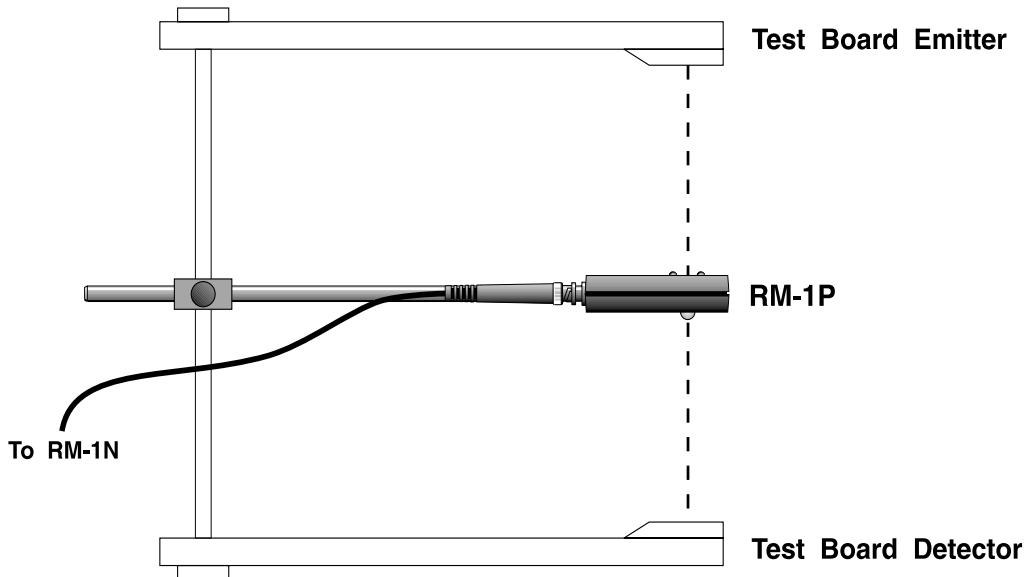
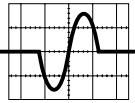
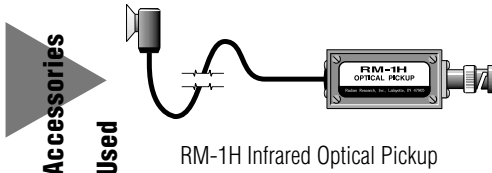


Figure 5.2 Positioning the RM-1P



6.0 Interfacing A Solid State Meter To A Test Board's Open Collector Input

This application is helpful when using test boards that do not have an infrared calibration pulse pickup, but do provide an open collector input. The RM-1H will sense the infrared calibration pulse from the meter and send a signal to the RM-1N. The RM-1N will interface the solid state meter to the test board's open collector input. Note that for proper operation the open collector input must have a positive polarity. If it is negative then a polarity adapter should be used. (This can be accomplished using ITT Pomona Electronics' Model 1270 BNC Male to Double Banana Plug with Model 1452 Binding Posts to BNC Female.)



Accessories
Used

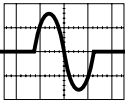
RM-1H Infrared Optical Pickup

6.1 Test Steps

1. Make connections as specified in Figure 6.1.
2. Set the Input Pulse Divisor to one.
3. Turn power on to the RM-1N by using the ON/OFF Power Switch. The Visual Pulse Indicator will flash one time.
4. Affix the suction cup of the RM-1H to the meter cover in close proximity to the meter's calibration pulse output. The RM-1H will sense the meter's infrared calibration LED and send a signal to the RM-1N. In turn, the RM-1N will emit a signal from its open collector output to the test board's open collector input.

Note that it will be apparent when the RM-1N is receiving calibration pulses because the Visual Pulse Indicator will flash upon sensing the pulse. If the Visual Pulse Indicator is not periodically flashing, then confirm that the RM-1H's pickup is properly affixed to the meter cover in close proximity to the calibration LED output. Also, confirm that the RM-1N has been turned on and that its output is correctly connected to the test board's open collector input.

5. Perform the normal calibration test procedure with the test board.



Application 5

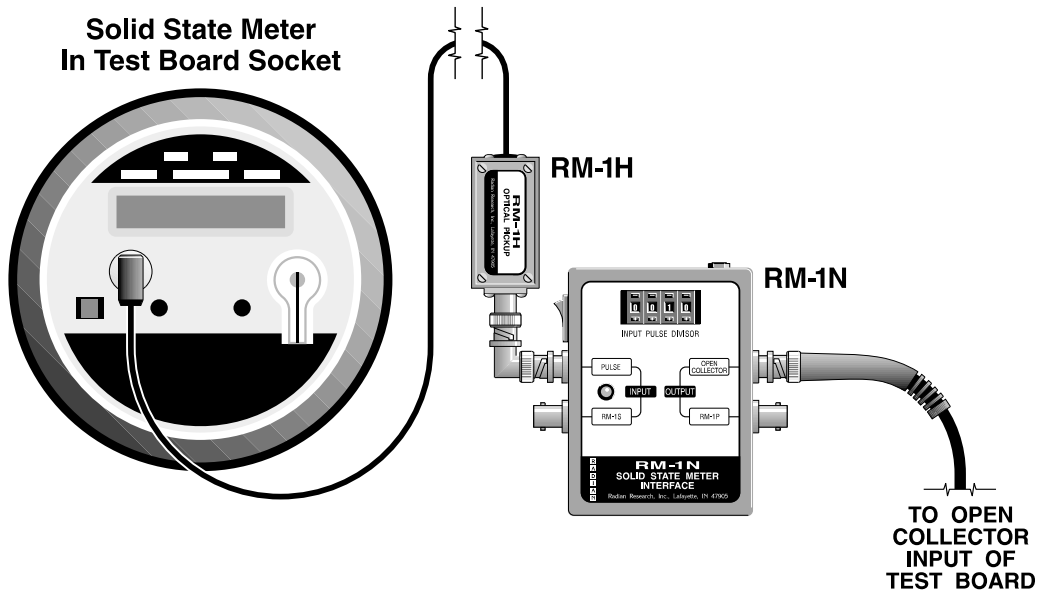
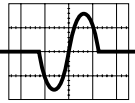


Figure 6.1 Interfacing A Solid State Meter To A Board's Open Collector Input



7.0 Test Accessories

7.1 RM-1S Remote Reset Switch

The RM-1S Remote Reset Switch is a normally closed push button switch. The RM-1S will connect directly to the “Input” BNC of a Radian standard or to the RM-1S Input of the RM-1N Solid State Meter Interface. The switch of the RM-1S is hermetically sealed to provide increased reliability during field use. The push-button has tactile feel to provide instantaneous feedback of switch actuation.

Specifications	Application:	<i>Used to reset the display of a Radian standard and rearm the RM-1N</i>	
	Switch:	<i>Normally closed contact; momentary open</i>	
	Size:	<i>Handle; 19 mm (.75") dia. x 79 mm (3.1")</i>	
		<i>RM-1S Cable; 1727 mm (68") Length</i>	
		<i>RM-2S Cable; 2743 mm (108") Length</i>	
Weight:	<i>RM-1S, .12 kg (.26 lbs)</i>	<i>RM-2S, .15 kg (.33 lbs)</i>	

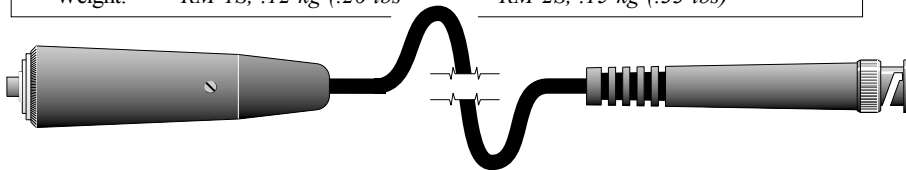
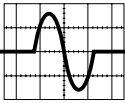


Figure 7.1 RM-1S Remote Reset Switch

7.2 RM-1H Optical Pickup for Infrared LED

The RM-1H Infrared Optical Pickup is used to sense the infrared pulses from the calibration LED found on most solid state meters. The pulses from the RM-1H are fed into the input section of the RM-1N Solid State Meter Interface or RM-109 Digital Watthour Comparator. With the RM-1H and the RM-1N or RM-109, testing of solid state watthour meters is done automatically. The wide angular displacement of this sensor allows for fast, noncritical alignment. Also, automatic gain control circuitry of the RM-1H assures operation in all ambient sunlight conditions. The RM-1H/v is available for those solid state meters that provide a visible calibration LED.



Test Accessories

Specifications

RM-1H Application:	<i>Senses pulses from infrared calibration LED; Input pulses to RM-1N or RM-109</i>
Peak Sensitivity	
Wavelength:	<i>980nm</i>
Size:	<i>Case; 30 mm (1.2") H x 57 mm (2.25") W x 23 mm (.9") D Cable; 1803 mm (71") Length</i>
Weight:	<i>.09 kg (.19 lbs)</i>

Specifications

RM-1H/v Application:	<i>Senses pulses from visible calibration LED; Input pulses to RM-1N or RM-109</i>
Peak Sensitivity	
Wavelength:	<i>680nm</i>
Size:	<i>Case; 30 mm (1.2") H x 57 mm (2.25") W x 23 mm (.9") D Cable; 1803 mm (71") Length</i>
Weight:	<i>.09 kg (.19 lbs)</i>

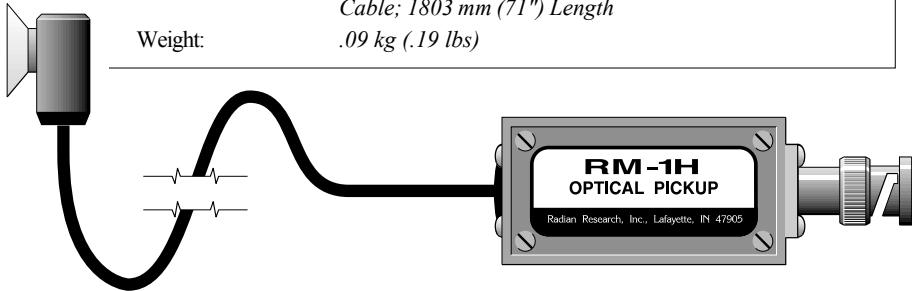
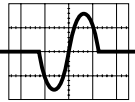


Figure 7.2 RM-1H Infrared Optical Pickup

7.3 RM-DS Meter Disk Sensor

The RM-DS Meter Disk Sensor is a reflective pickup assembly used to sense the disk rotation of an induction type meter. The pulses generated by the RM-DS are fed into the input section of the RM-1N Solid State Meter Interface or the RM-109 Digital Watthour Comparator. With the RM-DS and the RM-1N or RM-109, testing of induction type meters is done automatically and with a high degree of accuracy as compared to using a conventional push-button or snap switch.



Specifications

Application:	<i>Senses disk rotation of an induction meter. The signal is conditioned and sent to the RM-1N or RM-109</i>
Supply Voltage:	<i>9 volts DC to 24 volts DC</i>
Current Consumption:	<i>30mA</i>
Max. Detection Distance:	<i>100 mm (4")</i>
Size:	<i>Case; 30 mm (1.2") H x 57 mm (2.25") W x 23 mm (.9") D Cable; 2032 mm (80") Length</i>
Weight:	<i>.13 kg (.29 lbs) RM-DS with sensor (add mount weight below)</i>
Field Mount Version:	<i>Pickup Assembly; 95 mm (3.75") H x 71 mm (2.8") W x 44 mm (1.75") D, .1 kg (.22 lbs)</i>
Shop Mount Version:	<i>Base; 51 mm (2.0") dia. x 9.7 mm (.38"), .17 kg (.38 lbs) with Flexible Arm Flexible Arm; 8 mm (.32") dia. x 465 mm (18.3")</i>
Suction Mount Version:	<i>Pickup Assembly; 57.7 mm (2.27") H x 44 mm (1.73") W x 44 mm (1.73") D, .05 kg (.12 lbs)</i>

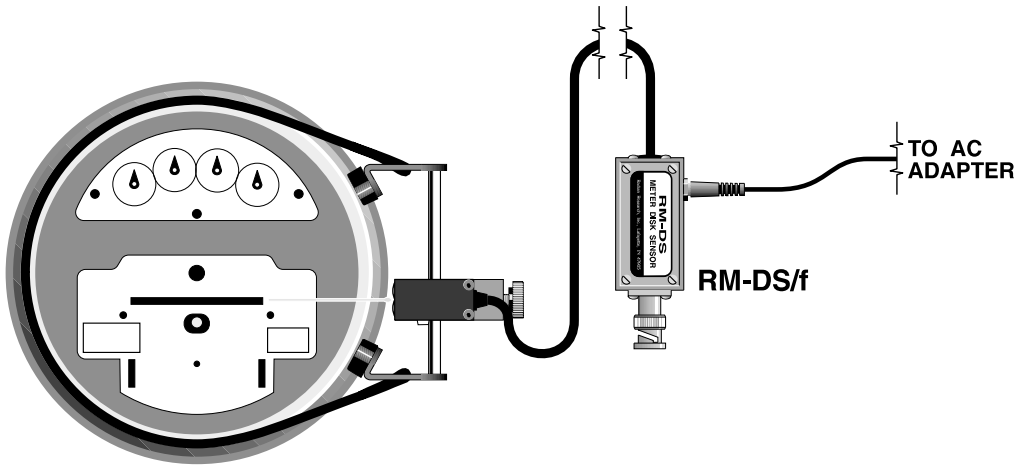
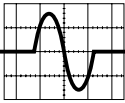


Figure 7.3a RM-DS/f Meter Disk Sensor (field mount version)



Test Accessories

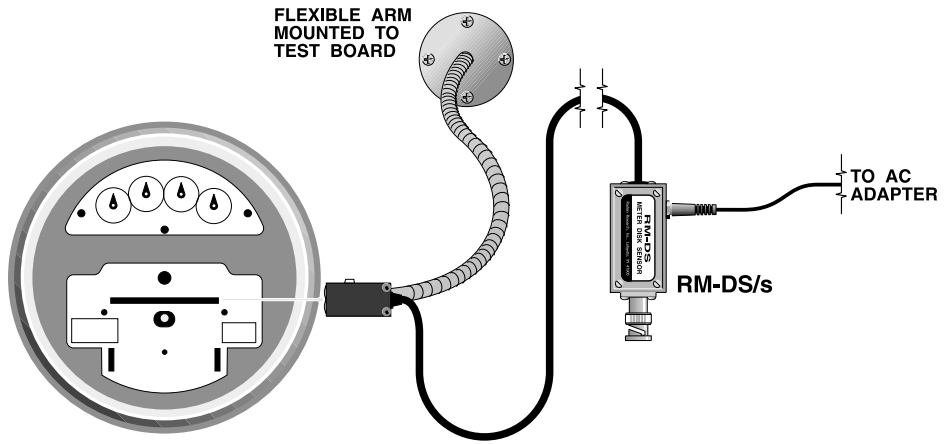


Figure 7.3b RM-DS/s Meter Disk Sensor (shop mount version)

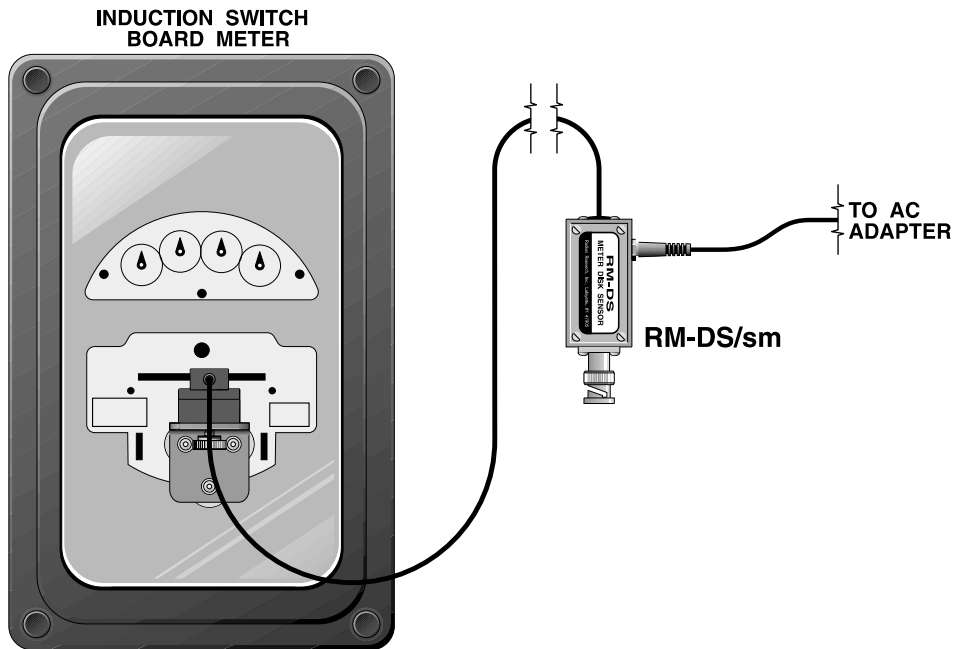
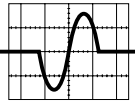


Figure 7.3c RM-DS/sm Meter Disk Sensor (suction mount version)



7.4 RM-KYZ Pulse Input Adapter

The RM-KYZ Pulse Input Adapter is used to sense the KYZ output pulses of induction or solid state meters. The pulses received from the meter's KYZ output are conditioned and fed into the input section of the RM-1N Solid State Meter Interface or the RM-109 Digital Watthour Comparator. With the RM-KYZ and the RM-1N or RM-109, testing of KYZ equipped meters is done automatically.

Specifications	Application:	<i>Senses pulses from the KYZ output of a meter. The signal is conditioned and sent to the RM-1N or RM-109. For proper operation, meter output must be a true 3 wire Form C output.</i>
	Max. Pulse Input	
	Frequency:	<i>60 pulses per second</i>
	Size:	<i>Case; 30 mm (1.2") H x 57 mm (2.25") W x 23 mm (.9") D Cable; 1905 mm (75") Length</i>
	Weight:	<i>.13 kg (.29 lbs)</i>

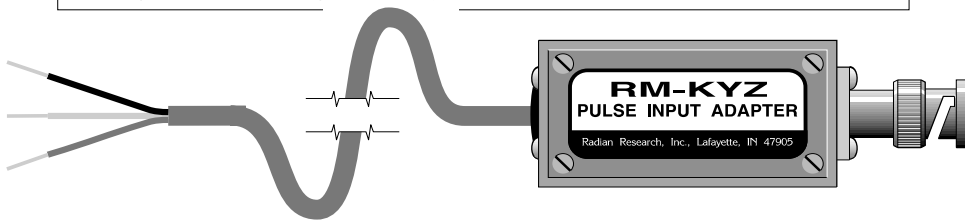
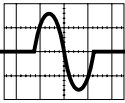


Figure 7.4 RM-KYZ Pulse Input Adapter

7.5 RM-1P Electronic Light Valve

The RM-1P Electronic Light Valve is used to interface the output of the RM-1N Solid State Meter Interface or the RM-109 Digital Watthour Comparator with the optics of a calibration test board. The RM-1P will operate with both incandescent and infrared optic assemblies. To trigger incandescent source optics, the RM-1P uses a super luminous LED. This red visible light LED must be aligned with the sensing assembly of the test board's optics. To trigger infrared (modulated or non-modulated) source optics, the RM-1P uses an infrared sensor and emitter combination. With the use of the RM-1P with the RM-1N and RM-1H, solid state meters can effectively be interfaced to older test board designs.



Test Accessories

Specifications

Application:	<i>Interface with optics of calibration test board</i>
Emitter for Incandescent Optics:	<i>Superluminous LED with 5000mcd luminous intensity and peak emission wavelength of 660nm</i>
Sensor/Emitter for Infrared Optics:	<i>Infrared sensor with peak sensitivity wavelength of 960nm. Two sets of infrared emitter LED's with peak emission wavelength of 950nm.</i>
Size:	<i>Case; 61 mm (2.4") H x 97 mm (3.8") W x 23 mm (.9") D Rod; 356 mm (14") Length Clamp Assembly; 89 mm (3.5") H x 38mm (1.5") W x 19 mm (.75") D Cable; 1219 mm (48") Length</i>
Weight:	<i>.25 kg (.55 lbs)</i>

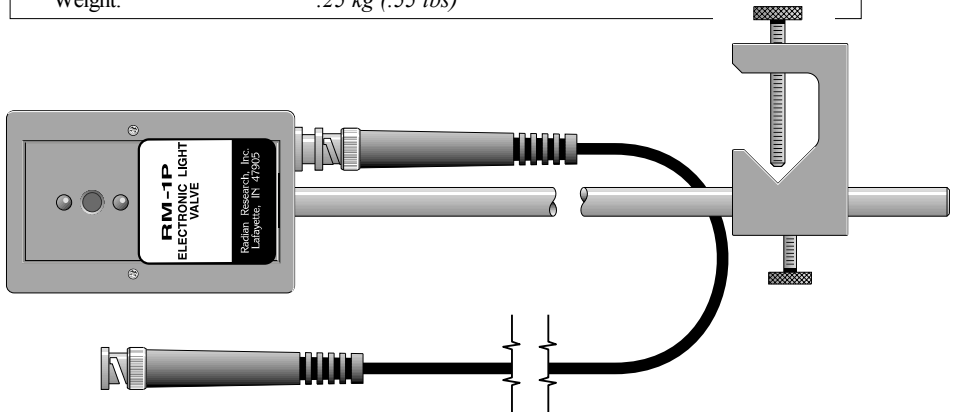
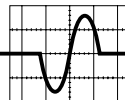


Figure 7.5 RM-1P Electronic Light Valve



7.6 RM-PCA Computer Adapter and PCA-Link™ Meter Test Software

PCA-Link™ Meter Test Software automates field testing and eliminates the need for manual record keeping by metering personnel. All meter test variables are entered with minimal key strokes from a single screen. Multiple test configurations may be created and saved to memory. Each configuration contains user-definable fields to record any additional test information. Examples may include: customer account number, service connection code, voltage checks, current checks, etc. This flexible format allows for customized test configurations as well as increased efficiency.

PCA-Link™ will display the standard's reading on the computer screen at the conclusion of each test. The percent registration is automatically calculated for Light Load, Full Load, Power Factor and kW Demand. Test results may be saved for "As Found," "As Left" and "Individual Elements." Test results are saved on the computer's hard disk according to the meter serial numbers. Data is in ASCII file format so that it can be uploaded into and processed by commercial software packages such as Lotus® 1-2-3, Microsoft® Excel or Word.

PCA-Link™ operates with the RM-PCA Computer Interface Adapter. The RM-PCA is an intelligent cable assembly which interfaces the serial port of a computer to the I/O port of a Radian standard. Popular Radian test accessories, such as the RM-1N, RM-1H, RM-KYZ, RM-DS and RM-1S, can be effectively used with the RM-PCA and PCA-Link™ Software. The PCA-Link™ Software, RM-10 Standard and Radian test accessories can be used to upgrade older test boards and load boxes. This upgrade will not only automate testing but will also provide the accuracy required for testing solid state meters. PCA-Link™ comes complete with a simple install program and a fully illustrated operations manual. The manual provides step-by-step procedures for conducting a complete test using PCA-Link™ with Radian test accessories.

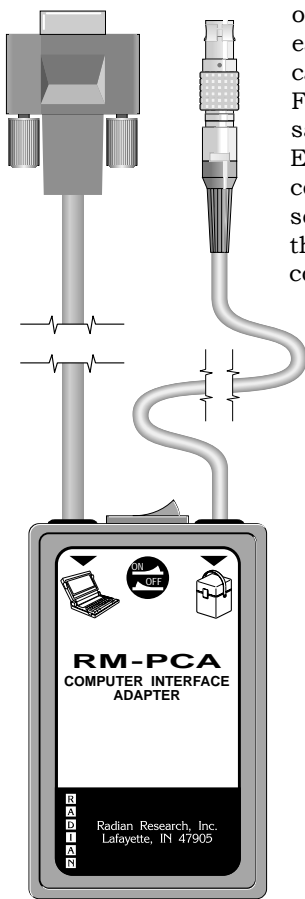
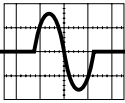


Figure 7.6a RM-PCA Computer Interface Adapter



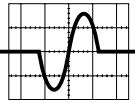
Test Accessories

Specifications

Application: *Interface a Radian standard to a personal computer*
Size: *97 mm (3.8") H x 61 mm (2.4") W x 23 mm (.9") D*
Weight: *.18 kg (.39 lbs)*
Cable: *9 Pin Serial Port; 203 mm (8"), 4 Pin Lemo; 1829 mm (72")*
Battery Type: *9 Volt alkaline*
Use Radian #800001, Duracell MN16004B2 or Eveready 522BP-2
Battery Life: *Approximately 1700-1800 hours of operation*



Figure 7.6b PCA-Link™ Meter Test Software
Main Menu and Test Screen



7.7 RM-OA Optical Adapter

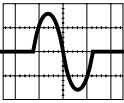
The RM-OA Optical Adapter is used with solid state meters whose infrared calibration pulse is emitted from the optical communications port. The RM-OA magnetically couples to the communication port of solid state meters. The suction cup of the RM-1H is attached to the clear polycarbonate cover of the RM-OA. The RM-OA incorporates a rare earth permanent magnet for exceptional holding power over the life of the product.

Specifications

- Application: *Magnetically couples to solid state meters' optical communication port for the RM-1H suction cup*
- Magnet: *Rare earth*
- Lens: *Scratch resistant polycarbonate*
- Size: *35 mm (1.38") dia. x 23 mm (.9")*
- Weight: *.05 kg (.1 lbs)*



Figure 7.7 RM-OA Optical Adapter



8.0 Warranty Service

Radian Research warrants each of our products to be free from defects in material and workmanship. Our obligation under this warranty is to repair or replace any instrument or component therein which, within two years after shipment, proves to be defective upon examination. Radian will pay local domestic surface freight costs.

If warranty service is required, write or call your local Radian Research representative or contact our headquarters in Lafayette, Indiana and ask for an RMA (Return Material Authorization) number. You will be given prompt assistance and shipping instructions.

This warranty is voided by disassembly of the unit.

Our mailing and shipping address is:

RADIAN RESEARCH, INC.

3852 Fortune Drive

Lafayette, IN 47905

ATTN: RM-1N Service

The RM-1N is 100% digital and will remain within .0001% transfer error for life. It never needs to be calibrated.

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Radian Research, Inc.
3852 Fortune Drive
Lafayette, IN 47905
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