

<b>Read-o-Matic®</b>	<b>Model ROM-P Pit Generator</b>	<b>Installation Data</b>
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## SUGGESTED TOOLS

Electric Drill and Extension Cord  
 3/16" Carbide Tip Masonry Drills  
 Screw Driver Wire Stripper  
 T-10 Stapler With Cable Attachment  
 Ohm Meter

59983-001 Crimping Tool  
 59989-001 Cable Stripper  
 59991-001 Wire Cutting Pliers  
 57537-001 Portable Remote Register Tester  
 34027-000 Battery Powered Generator Tester

## REQUIRED MATERIAL

Non-Corrosive Staples  
 Caulking Compound  
 Masonry Fastners  
 Non-Corrosive Screws  
 20937-001 19 Gauge ROM Cable

Field Splice Kit P/N 62084-001 includes:

59761-001 (3) Insulation Displacement Splice Connectors  
 34776-001 (2) Plastic Cable Ties  
 62085-001 (1) Splice Enclosure

## IDENTIFICATION

Badger Meter Read-O-Matic generators and Model 570 remote registers are designed for use with Badger Recordall® and Easy-Read® meters. Each generator and remote register is identified on the face plate (dial) with an assembly number and unit of measure. Before proceeding with installation, make certain that the ROM generator and remote register correspond to the meter size, model, and unit of measure. Refer to Selection Guides ROM-S-60 and ROM-S-61.

READ-O-MATIC pit generators are supplied with a 3' lead wire completely wired and factory-sealed for operation in meter pits or vaults subject to submersion. A Field Splice Kit is supplied for connection of the ROM generator lead wire to the ROM cable. Components listed above are identified in Figure 1.

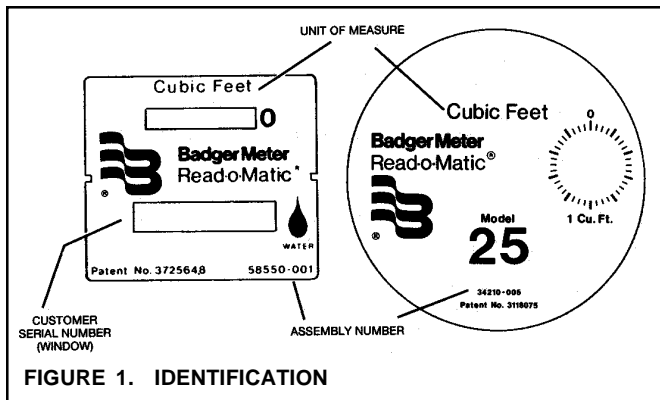


FIGURE 1. IDENTIFICATION

## SELECTING LOCATION FOR OUTSIDE REGISTER

The location of the outside register should be your preference. Remember, Read-O-Matic was developed to help utilities operate more efficiently. Customer convenience is a secondary feature of the product and should be treated as such.

The register should be mounted at eye level for easy reading in a spot accessible to your personnel in any weather. If the unit is set behind bushes or hidden out of sight in some inaccessible area, you lose the intended purpose of the unit - quick and efficient reading. The register should not be mounted close to the ground. Snow and ground dampness can cause corrosion to the terminals which may make the unit inoperative. For areas with constant condensing humidity or subject to washdown, the Model 776 waterproof remote register is available. Location of the register should not be determined by the amount of wire required. At the minimal cost of the wire, the register can be located for convenient reading which is the purpose for installing Read-O-Matic.

## SERIAL NUMBER WINDOW

The face plate(dial)on the register has a window for water utilities to include their serial number identification. With numbers provided by the utility, blocks of serial numbers can be stamped or printed on self-adhesive strips and attached to registers. If customers desire, they can order "blank" strips to type or write in their serial numbers and affix to the face of registers. Besides these options, blocks of strips with customer serial numbers printed in sequence can be ordered from Badger for utilities to attach to their registers.

## REGISTER INSTALLATION

1. Locate mounting holes on outside wall of building with mounting template supplied in accessory kit. Register should be located at eye level in an easily accessible location. Maximum distance is 625 feet with 19-gauge wire. For longer distances, refer to Figure 2 for wire size.

## WIRE SIZE AND DISTANCE CHART

Required Wire Run From Generator To Remote in Feet	Minimum Wire #
0 - 625	19
625 - 800	18
800 - 1000	17
1000 - 1250	16
1250 - 1600	15
1600 - 2000	14
2000 - 2500	13
2500 - 3250	12
3250 - 4000	11
4000 - 5000	10

FIGURE 2

2. Remove register cover. Check to make sure the number wheel stack assembly is held firmly in place by tension from the spring, and not the screw (see illustration). This will allow the number wheel stack assembly to float independent from the register base when the remote register is mounted on an uneven surface. If the number wheel stack assembly can be rotated off its mounting pads by compressing the spring, the screw setting is too loose. (See Figure 3)

**NOTE:** This screw is set at the factory, and it should **NOT** require any adjustment.

3. Secure register base to wall with appropriate attaching hardware. An optional backing plate, P/N 59915-001 is available for use in retrofit of order model remote registers on painted structures to cover the outline.

**NOTE:** The register must be securely mounted to a rigid surface. Avoid mounting register on loose siding of any type since this will only lead to wire breakage or other potential problems. (Register mounting hardware is supplied by the customer.)

4. Drill 3/16" wire entry hole at a suitable location in the building wall.

**NOTE:** Wire access to the Read-O-Matic register may be through either a bottom or rear access port. When utilizing rear access, allow approximately 8" of extra wire behind register base to facilitate easy wiring and moving of remote register should it become necessary. (See illustration.)

5. Feed two-conductor wire through hole in wall to route to water meter. For front access, be sure to allow sufficient wire to form a small U-shaped loop where the wire enters the building. This loop eliminates the possibility of rain water running down the wire into the building.

6. Cut wire to proper length at register. **NOTE:** Allow sufficient wire for connection to register. Any excess wire should be trimmed off at this time to insure a neat installation.

7. Place strain relief ring around wire and secure. (See illustration.)

**NOTE:** Position strain relief ring to eliminate the possibility of breaking the wire connection at the terminals if the wire is accidentally pulled.

8. Strip insulation from both wires and connect to register terminal screws. It is not necessary to observe polarity.

**NOTE:** To enhance the electrical junction, the bare wire should be tightly wrapped around the terminal screw in a clockwise direction. The terminal screw should be tightened to firmly grip the wire between the screw head and terminal. Excess bare wire ends should be removed.

9. Remove "Pull Me" tab which is inserted between the ratchet armature and U-shaped pole piece assembly. This tab prohibits the number wheel assembly from advancing during shipment. Until it is removed, the register will not operate. (See illustration.)

10. Check gasket to insure it is properly positioned before installing register cover.

11. Attach register cover to register base with seal screw. Remember to remove tab on bottom of register cover when front wire access is used. (See illustration.) Tighten seal screw and secure in place with seal wire and lead seal. The seal wire and lead seal provide system security to discourage and identify tampering.

**NOTE:** Examine register cover and base to insure that these two parts have been mated properly. If there are any obvious gaps or spaces, remove the cover and examine the gasket, terminals, and wire for any obstructions.

12. Staple wire along entire length of wire run from the register to the water meter. Staple wire along floor joist or beams inside the building allowing sufficient wire for neat installation and easy connection to the Read-O-Matic generator on the meter.

13. The complete system (meter, generator, register, and wire) should be performance tested to insure proper installation, refer to performance check section of this bulletin for procedures.

#### ADDITIONAL INSTALLATION TIPS

- Never short yourself on wire. It is better to have a little excess than to have to go back and rewire.
- If after wiring, unit does not operate, check for bare wires touching each other. Also, make sure "Pull Me" tag is removed.
- When stapling wire, be careful not to pierce covering. This could short out unit.
- When wiring unit, strip wire to allow an excess of approximately two inches. Loop wire around terminal screws. Hold excess wire tight in hand and secure screw. Twist this excess wire clockwise until wire fractures. This will form a cone-shaped lock assuring proper mechanical contact and it will also enhance the electrical connection.
- When installing the unit on buildings having a stone or masonry

exterior, the use of masonry cleats and fasteners is required. After determining register location, use a 3/16" carbide-tip masonry bit and drill two register mounting holes. Insert masonry cleats and attach register with round head screws. Drill entrance hole for wire and secure wire near entrance hole with a No. 8 masonry fastener. Snug wire inside building and caulk opening. Follow same procedure for completing installation as outlined above.

## ROM PIT GENERATOR INSTALLATION

1. Check to insure that ROM pit generator matches the model, size, and unit of measure required for the installation. Mount the ROM pit generator on the meter and properly engage bayonet mount.

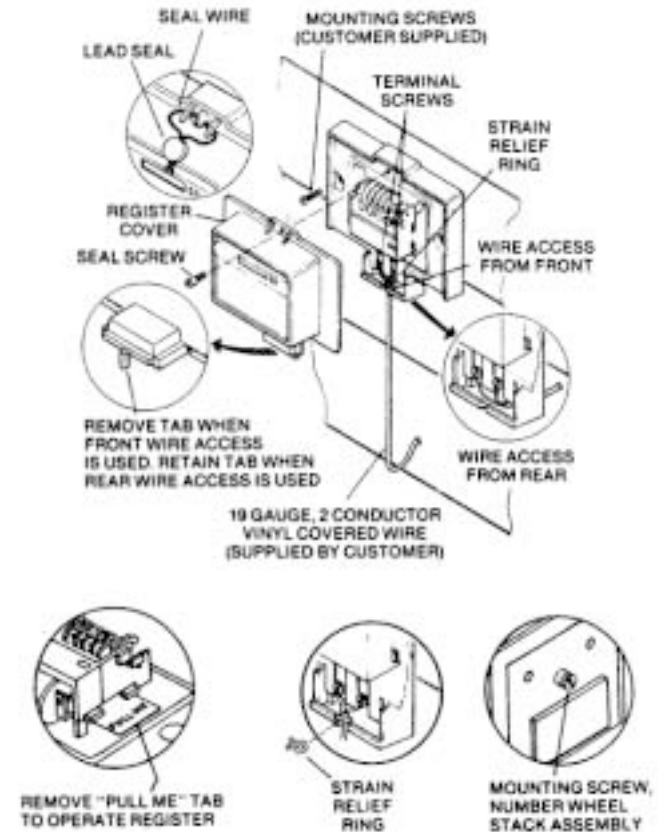
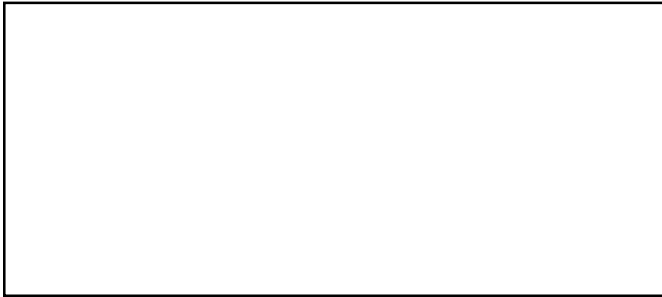
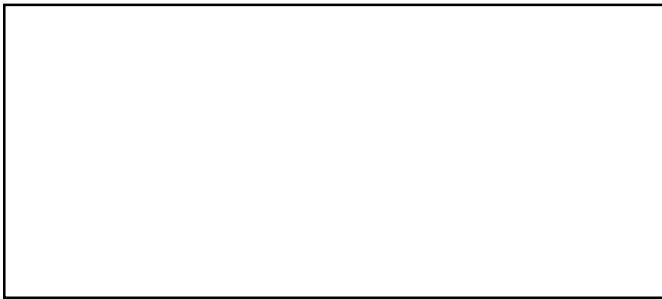


Figure 3 Installing a direct-reading Model 570 Register

2. Secure the READ-O-MATIC pit generator to the meter using the seal screw, seal wire, and lead seal.
3. Strip approximately 3/4" of the outer insulation sheath from the ROM generator lead wire and remote cable to be spliced using the 59989-001 Cable Stripping Tool. Use caution in removing the outer sheath so that the inner signal wire insulation is not damaged. Unwind the foil shield and uninsulated drain wire from the ROM lead wire and cut both off even with the outer sheath using the wire cutter. Cut the two insulated conductors in each cable off even to leave 3/4" of insulated wire as shown in Figure 4.
4. Place the two plastic cable ties P/N 58759-001 around both cables near the end of the outer sheath insulation and tighten securely to provide strain relief. Cutoff excess cable tie as shown in Figure 5.
5. Insert one insulated wire from each cable completely into the gel-filled splice - P/N59761-001 provided in the Field Installation Kit. DO NOT STRIP INSULATION FROM THE TWO CONDUCTORS - THE SPLICE AUTOMATICALLY MAKES CONNECTION THROUGH THE INSULATION.



6. Crimp the splice completely and carefully using a parallel jaw crimper such as P/N 59983-001 only. Use of Pliers or other devices will distort the connection because of their uneven action resulting in a poor connection. Repeat the process for the second wire from each cable. Polarity is NOT important in ROM installations. Refer to Figure 6.

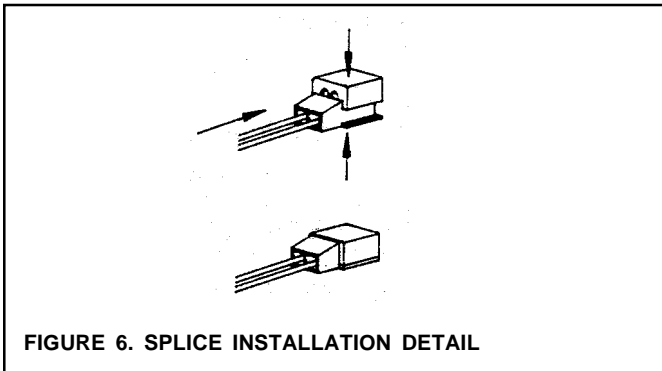


FIGURE 6. SPLICE INSTALLATION DETAIL

AFTER CONNECTIONS ARE COMPLETE, TEST THE ENTIRE SYSTEM IN ACCORDANCE WITH THE PERFORMANCE CHECK SECTION OF THESE INSTRUCTIONS.

7. Insert the entire splice assembly into the silicone filled splice enclosure P/N 62085-001 as indicated in Figure 7.

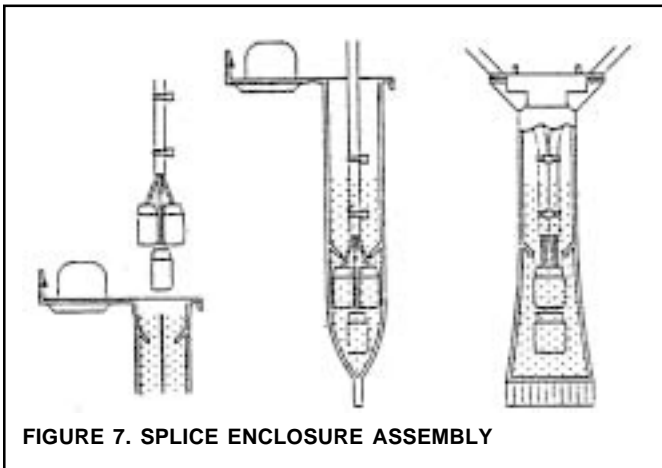


FIGURE 7. SPLICE ENCLOSURE ASSEMBLY

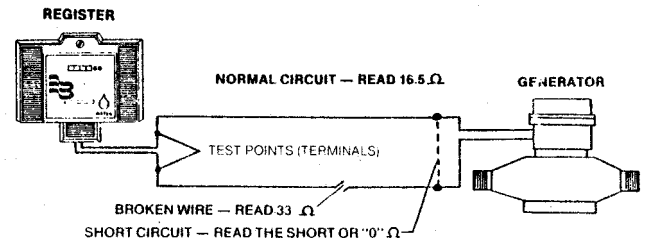
## PERFORMANCE CHECK

The Read-O-Matic installation should be checked for proper operation by using one of the following methods:

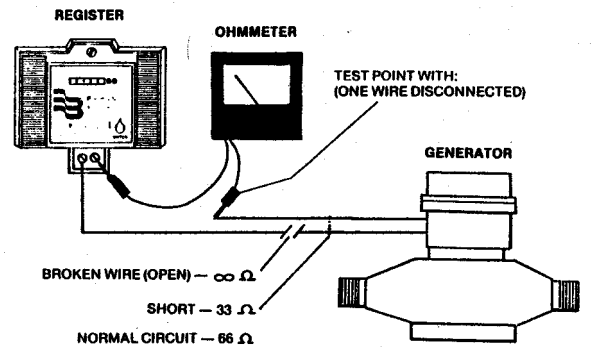
**NOTE:** If meter is installed backwards the Read-O-Matic generator will not pulse the remote register. To insure meter is installed correctly, flow arrow on meter should point in direction of water flow.

- **Off Meter Test** - Use Badger's portable tester to operate the generator and observe that outdoor register advances one digit for each pulse output of generator. (Refer to TM-200.)
- **On Meter Test** - Install generator on meter, then run 1 00 gallons or 10 cubic feet of water through the meter and observe that outdoor register advances one digit.
- **Ohm Meter Test** - Once the complete system is wired, it is important to check for continuity using an ohm meter. By following test procedure #1, both the register and generator, as well as the wiring, can be checked to ensure that the system has been installed correctly. If the system fails to pass this test, procedures #2 or #3 can be used to isolate and identify the problem.

### 1 TEST WITH GENERATOR AND REMOTE CONNECTED



### 2 REMOVE ONE LEAD FROM REMOTE AND PLACE METER IN SERIES



### 3 TEST GENERATOR AND REMOTE INDIVIDUALLY WITH LEADS REMOVED

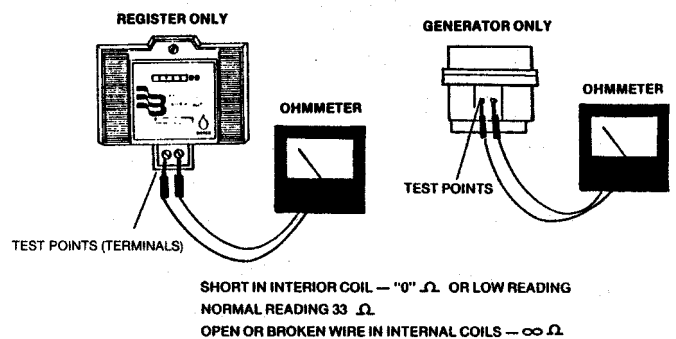


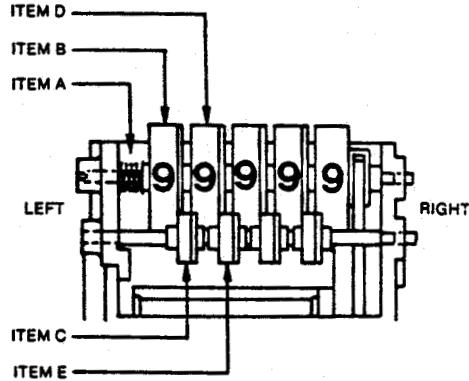
FIGURE 8. TEST PROCEDURES

## SETTING OUTDOOR REGISTERS

Should it be necessary to set an outdoor register to a specific reading or reset a register after test or maintenance, refer to the applicable procedures given below:

Remove cover from register.

The number wheel stack on the Badger Model 57O Read-O-Matic outside register has a spring loaded feature which allows resetting of the register without any special tools or fixtures. This spring (item A) is located on the left side of the number wheel spindle.



To reset the number wheel stack to zero or any other combination, follow this procedure. First, with your thumb move the 5th number wheel (item B) to the left towards the register frame depressing the spring. This will disengage the 5th number wheel from the 4th trip pinion (item C) allowing you to set the 5th wheel to desired number. To reset the 4th number wheel (item D) place right thumb between 4th and 5th number wheel and left thumb between 4th and 3rd trip pinion (item E) push 4th pinion and 5th wheel to depress spring. Spring can now be held depressed with the left thumb only freeing right hand to reset the 4th wheel to desired setting. Follow this procedure to reset all but the 1st and 2nd number wheels which can be reset by turning backward only.

Reinstall cover on register.

**NOTE:** In order to insure proper operation of reset registers, care must be taken that all trip pinions are properly aligned. You will note that the trip pinions have both full and half teeth around the diameter. The proper setting requires that the full tooth on the pinion be showing nearest the number wheel.

### **WARNING**

At no time should any tools (screw driver, pliers, etc.) be used to assist in setting or resetting the number wheels. Care must be taken to insure that the teeth on the number wheels and trip pinions are not damaged. Even the smallest deformity will impair reliable operation.

## TROUBLESHOOTING GUIDE

1. After checking the meter to confirm proper operation and magnetic coupling of the pulse generator, check the remote register for proper number wheel alignment. If properly aligned each number wheel will be centered (top to bottom) within the dial window.
2. Remove the outside register cover and examine the dial. If the dial is loose, cracked, or otherwise inoperative, replace the entire register/dial assembly.

**NOTE:** Any time the register cover is removed or replaced it is best to also replace the gasket (P/N 34495-001). Gasket materials will take a set. Once the register cover is removed, the seal is broken. The only sure way to regain the original environmental seal is to replace the old gasket with a new (unused) gasket.

A dial spacer (P/N 58695-00100) can be used on registers manufactured prior to July 1984 (registers manufactured without a dial spacer nib located on the top right hand number wheel frame support) to ensure that a loose dial does not impair proper operation.

3. With the outside register cover removed, and without disturbing the wire connections, check the electrical integrity of the wiring by using an Ohmmeter. Follow instructions for test procedure #1.

**NOTE:** If the wire connections are disturbed by making this resistance measurement, it is possible that the problem may be masked, i.e. a loose connection, or an open circuit due to corrosion at the terminals.

If access to the pulse generator on the water meter is possible, these same test procedures can be executed using the generator's terminals. Using the generator as the test point instead of the register, may help identify corrosion at the outside register terminals. Follow test procedure #1.

4. Check for proper trip pinion alignment. If properly aligned each trip pinion will be positioned such that the broad pinion teeth will be against the outside diameter of the number wheels.

5. Check for spider webs, corrosion, or the presence of foreign material (dirt) in or around the number wheels, trip pinions, ratchet, or armature assembly.

**NOTE:** If the register is contaminated, it is not practical to try to clean it adequately to restore proper (reliable) performance. Remove and replace with a new register.

6. Attach the alligator clip leads of a Hand Crank Read-O-Matic Register Tester (P/N 57537-001) to the register terminals/terminal screws. Crank the Register Tester for a minimum of ten pulses. If the register being tested fails to index the corresponding number of digits, **immediately** replace the register.

**NOTE:** Before replacing the register cover, replace the gasket and reset the number stack to the correct meter reading.

## ADDITIONAL TROUBLESHOOTING HINTS

- If the outside register reading is higher than the reading on the meter, inspect the register mounting to make sure it is solid and tight. If the register is not mounted tightly to a solid surface it may be possible for the register to advance each time it is hit.
- Inspect the entire wire run for signs of tampering. If a staple or pin happens to pierce the wire insulation, it may short out the circuit; the generator pulse will not reach the register or be counted.
- Inspect both the register and generator for signs of tampering. If the seal wire and lead seal (or other tamper detection devices) are not in place or properly installed, there may be a problem with the customer tampering.
- Inspect the register number wheel gear teeth and trip pinions for signs of physical damage (abrasions, nicks, or scratches). Any deformation of the number wheels or trip pinions will prevent proper, reliable operation.
- If the installation, register, and generator check out properly, but the readings (inside and outside) show a mismatch, replace both the register and generator.

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