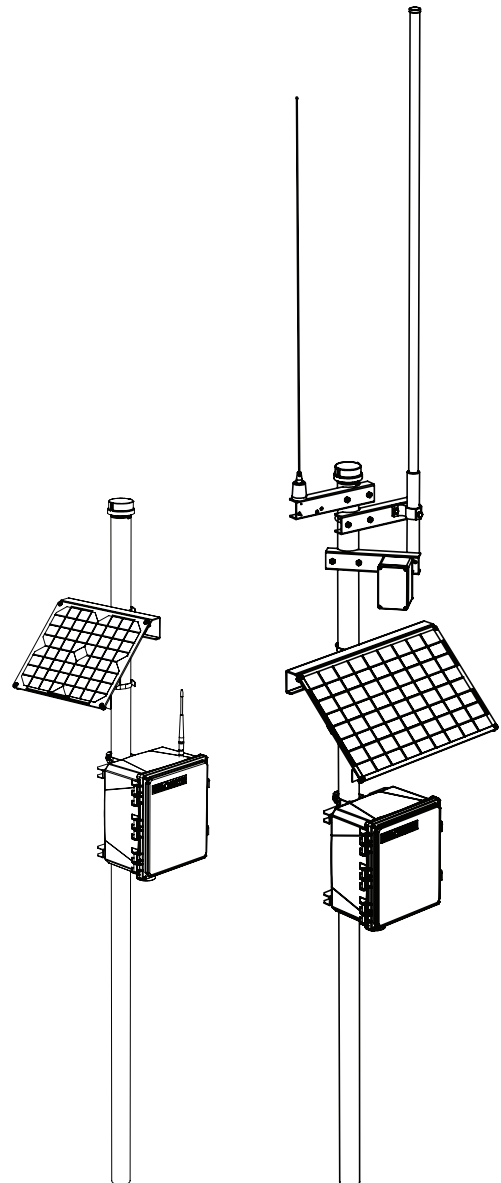




RemoteCONNECT Remote Telemetry System Field Installation Manual

30120-01 Rev. 1.0
April, 2010





Warning:

Refer servicing of any product herein to qualified personnel.

McCrometer, Inc.
Hemet, California, USA
MODEL:
S/N:

FCC Statement: The devices in this manual comply with Part 15 of the FCC Rules. Operation is conditioned to the following two conditions: (1) this device may not cause harmful interference, and (2) this must accept any interference received, including interference that may cause undesired operation.

This Class A digital apparatus complies with Canadian ICES-003. C'est appareil numerique de la classe A est a la norme NMB-003 au Canada.

Contains FCC ID: KQL-AC4490
IC: 2268C-AC44901000

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1. Introduction

The McCrometer RemoteCONNECT Remote Telemetry System is a wireless data collection and transmission system which is designed to work with sensors associated with water supply systems to determine volumetric flow rates. These measurements are used to determine the amount of water supplied to a customer, the volume of water usage. This system allows customers to quickly collect the data from sensors located at well locations and transmit it to a web site base station where it is further processed.

1.1 System overview

The McCrometer RemoteCONNECT Remote Telemetry System is comprised of three basic subsystems: the RC20 Mc Propeller Transmitter (Figure 1) which converts the mechanical pulses into electrical signals; the RemoteCOM Unit (Figure 2), which collects the electrical signal and converts it into a digital format for wireless transmission to the RemoteCOM Satellite Base Station; and the RemoteCOM Satellite Base Station (Figure 3), which transmits the volumetric flow data to the user via a satellite and the internet.

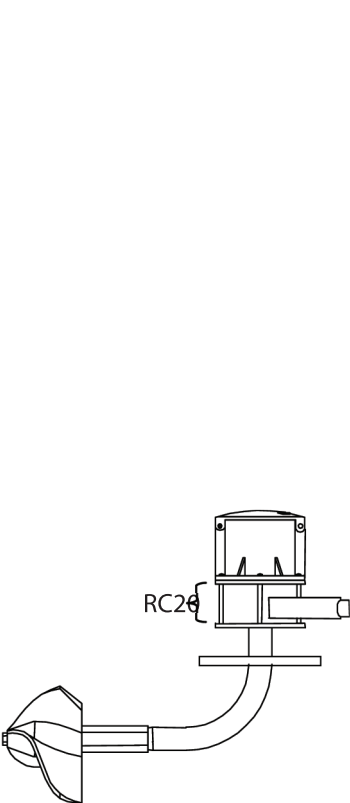


Figure 1: RC20 Mc Propeller Transmitter

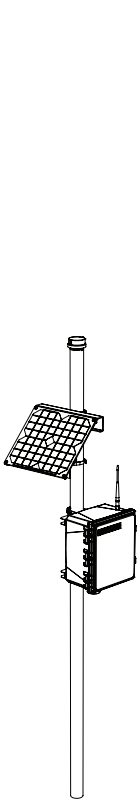


Figure 2: RemoteCOM Unit

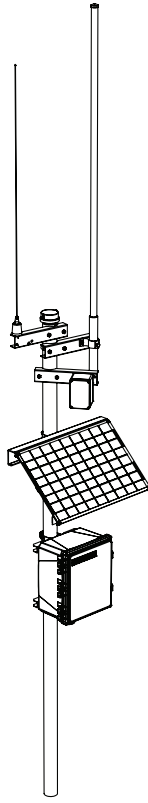


Figure 3: RemoteCOM Satellite Base Station

The RemoteCONNECT is a mast mounted system with solar power and a battery powered reserve capacity for low light days or poor weather conditions. Masts are typically provided by the end user. For McCrometer mast recommendations, see the Appendix. The RemoteCOM and the RemoteCOM Satellite Base Station have a two-mile line of sight range of communication between the two systems. The RemoteCOM unit transmits flow rate data collected from the water meter to the centrally located RemoteCOM Satellite Base Station. Up to twenty five individual RemoteCOM sensing units can be serviced by a single RemoteCOM Satellite Base Station.



2. Parts And Dimensions

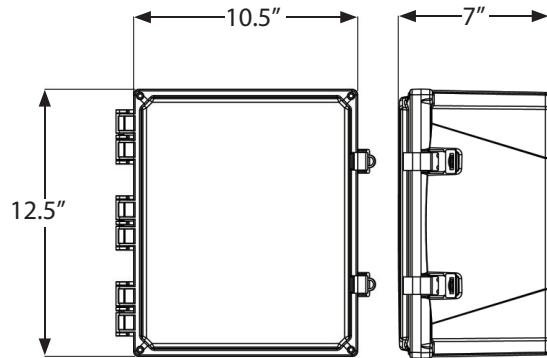


Figure 4: Electronics Enclosure.

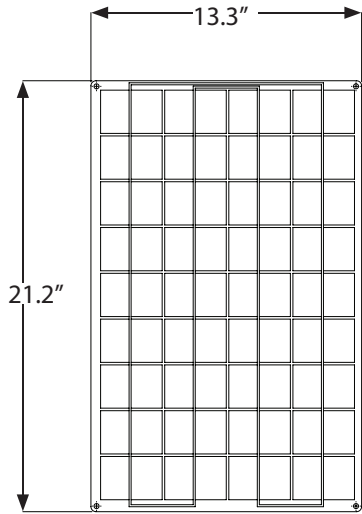


Figure 5: RemoteCOM Satellite Base Station Solar Panel

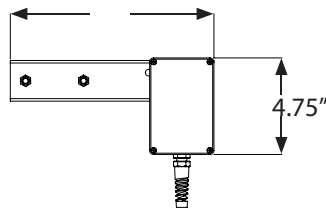


Figure 6: Radio Modem

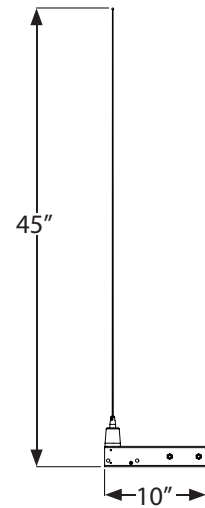


Figure 7: Satellite Antenna

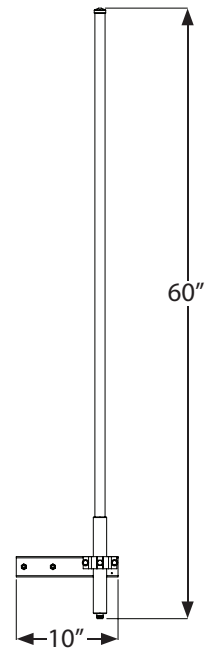


Figure 8: Radio Antenna

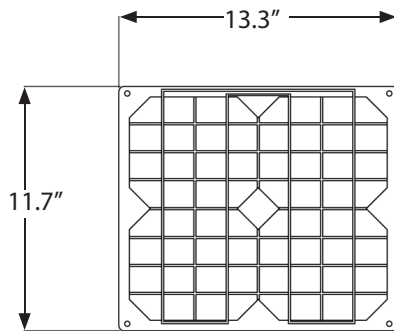


Figure 9: RemoteCOM Unit Solar Panel

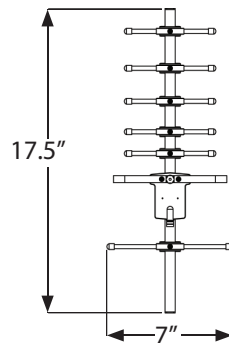


Figure 10: Yagi Antenna

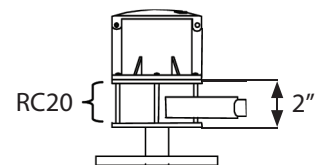


Figure 11: RC20 Mc Propeller Transmitter

3.0 Safety

Installation of the RemoteCOM Satellite Base Station, RemoteCOM and any associated mast system must be done by qualified personnel only. Observe any and all local, state and federal construction and electrical codes. When installing, operating, and maintaining McCrometer equipment where hazards may be present, you must protect yourself by wearing Personal Protective Equipment (PPE).



Warning:

WATCH FOR WIRES!! DO NOT install any mast or antennas near overhead wires. Contact of the antennas or mast with overhead electrical wires can result in serious personal injury or death!

4.0 RemoteCOM Satellite Base Station Installation

4.1 Mast Site Selection

The RemoteCOM Satellite Base Station system can receive data from up to 25 individual RemoteCOM installations. When locating a site for the RemoteCOM Satellite Base Station mast, select a site that is centrally located within the grouping of the RemoteCOM installations to be monitored. The mast location should be selected to avoid obstructions between the RemoteCOM Satellite Base Station antennas and the RemoteCOM antennas. The mast size and type are typically supplied by the end user. McCrometer recommended mast design and installations instructions are provided in the Appendix.

4.2 Component Installation

4.2.1 Antenna Component Installation

At the highest point of the mast, attach the Satellite Antenna (Figure 7) and the Radio Antenna (See Figure 8) using the provided pipe brackets and U-bolts. Once both antennas are securely mounted to the mast, attach the Radio Modem (Figure 6) to the mast approximately 6 inches below the antennas using an appropriate pipe bracket and U-bolt.

Locate the short antenna cable on the Radio Modem and securely screw the cable onto the receptor end located at the bottom of the Radio Antenna. (See Figure 12)

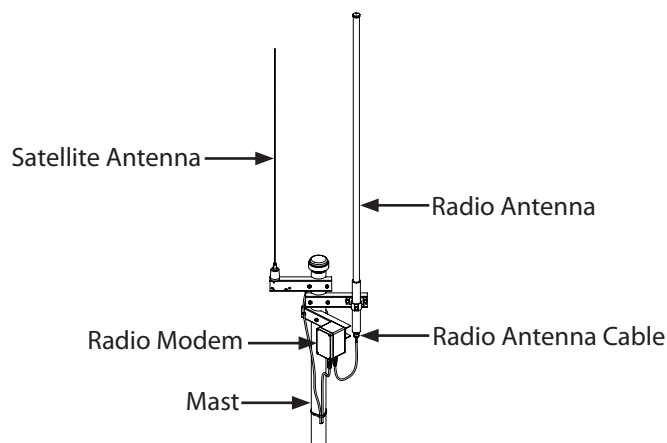


Figure 12: Satcom Components

4.2.2 Electronics Enclosure Installation

With the mast in its upright and fixed position, attach the Electronics Enclosure (See Figure: 4) to the mast using the two sets of pipe brackets located on the back of the enclosure. Each bracket set consists of two halves and a bolt. While holding the electronics enclosure to the mast, insert the tabbed ends of the bracket halves into the channel rail on the back of the enclosure, placing one bracket on either side of the mast. Slide the brackets together around the mast and insert the bolt through the bracket without screw threads into the bracket with screw threads. Tighten the bolt to secure the enclosure to the mast. Repeat steps for the second bracket set. Insure the front of the enclosure is at a comfortable working height and oriented to allow convenient access by an operator.

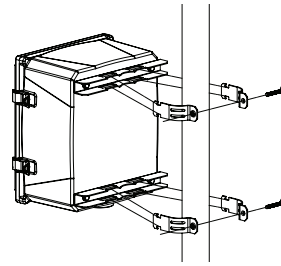


Figure 13: Electronics Enclosure Mounting Brackets

4.2.3 Solar Panel Installation

Attach the Solar Panel (See Figure: 5) to the mast using the provided pipe brackets and pipe clamps. Depending on the installation location, the solar panel may have a lower bracketing system. Both configurations are shown below. Orient the Solar Panel so that it receives the maximum exposure to sunlight. The orientation of the Solar Panel will vary with the geographic location of the SatCOM installation. After orienting the Solar Panel securely fix the panel bracket to the mast.

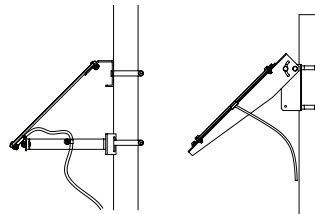


Figure 14: Solar Panel Mounting Brackets (Showing Both Bracket Styles)

4.2.4 Cable Installations

Locate the long cable extending from the Satellite Antenna and attach it to the screw connector located at the bottom outside of the Electronics Enclosure.

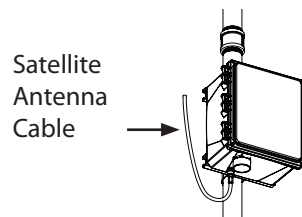


Figure 15: Satcom Satellite Antenna Cable Installation

Next locate the foam insert in the cable entry port located at the bottom of the Electronics Enclosure. (See Figure: 16) Remove the foam insert by grasping the insert and pulling it downward. Locate the cable from the Radio Modem and the power cable from the Solar Panel and insert them into the Electronics Enclosure through the cable entry port. Pull a sufficient amount of each cable through the port to allow each cable to be easily manipulated inside the enclosure. Reinsert the foam by first sliding both cables into the slot in the foam, then pushing the foam into the cable entry port, sealing the port.

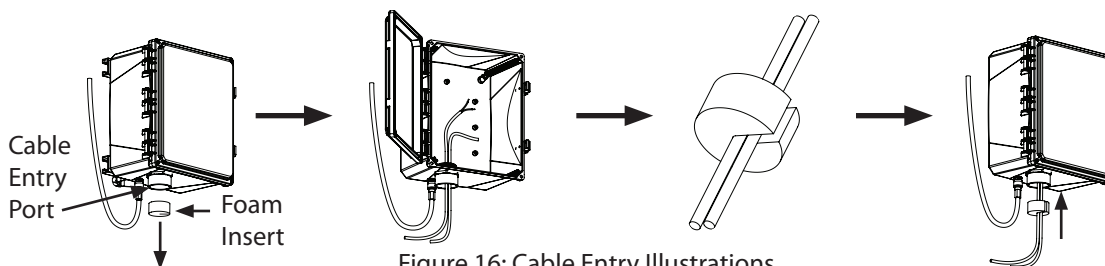


Figure 16: Cable Entry Illustrations

4.2.5 Satellite Cable Connections

The end of the cable from the Radio Modem is split into two separate four-wire cable connectors. Each cable connector has a different wire color configuration. Locate the wires with the following color configuration: yellow/purple/brown/orange. Plug this cable onto the connector pins at the top of the circuit board labeled RSSI (J10). (See Figures: 17 and 18)

Next locate the other set of wires with the following color configuration: blue/white/black/red. Plug this cable onto the connector pins located on the right side of the circuit board labeled J12. (See Figures: 17 and 18)

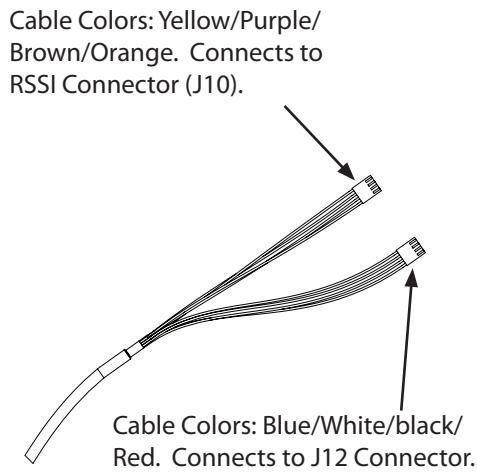


Figure 17: Cable From Satellite Antenna

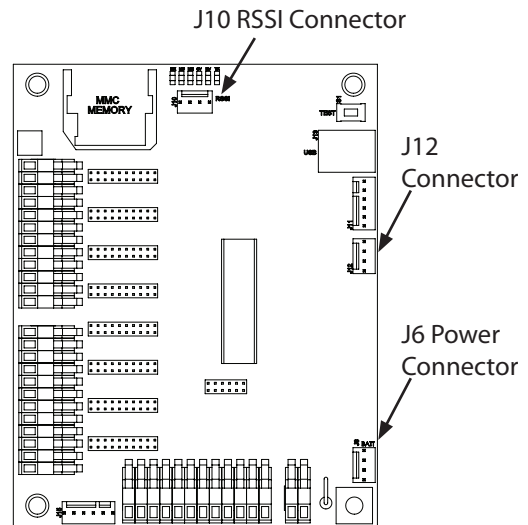


Figure 18: Circuit Board Showing The RSSI, J12 and J6 (Power) Connectors

4.2.6 Power Cable Connections

Locate the power cable from the Solar Panel. The power cable has two wires: a red (+) wire and a black (-) common wire. Next locate the terminal block positioned in the lower-center of the Electronics Enclosure. Attach the red (+) wire to the number 1 terminal. Attach the black (-) common wire to the number 2 terminal. (See Figure: 19)

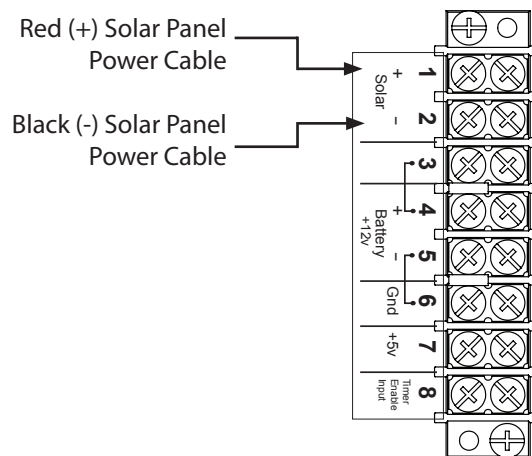


Figure 19: Solar Panel Power Cable Terminal Assignments

4.2.7 Wiring For SatCOM Telemetry System

If the SatCOM being installed will also serve as a RemoteCOM station, please see the sensor wiring diagrams provided in the RemoteCOM section of this manual. While the terminal block will be in a different orientation, the wire and terminal assignments will be the same.

4.2.8 Powering Up The Unit

Once all set-up cabling is complete, connect the battery cables to the connector tabs on the battery. Connect the red cable to the positive (+) battery tab, and the black cable to the negative (-) battery tab. It is important that this power cable be attached last as it powers the unit.

4.2.9 Cable Management

To insure the longevity of the cables and components, securely fix the cables from the antennas to the mast system. When securing cables, leave enough cable slack between the connection and the mast to prevent stress on the cable. See the Appendix for suggestions on mast system cable management.

4.2.10 SatCOM System Testing

Upon connecting the power look for the following: the LED light labeled "MN" at the top of the circuit board will illuminate and the LED lights on the Satellite Communicator will illuminate.

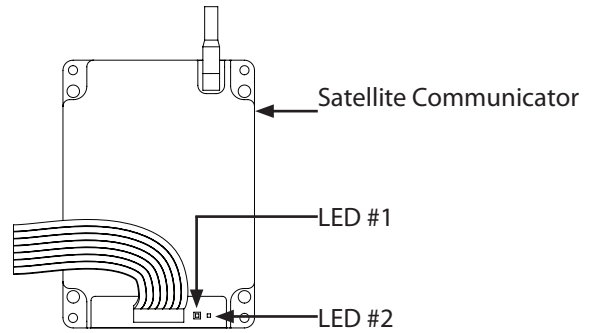


Figure 20: Satellite Communicator


There are two LED lights on the Satellite Communicator. See Figure 20. LED light number 1 glows red when the unit is searching for a satellite, then illuminates a steady green when a satellite is in range. LED light number 1 flashes green when the unit is sending data to a satellite. LED 2 glows amber when there is data in the buffer. (See Figure: 20)

To test the SatCOM system, press and hold for 5 seconds the Test button located in the upper-right corner of the circuit board.

5.0 RemoteCOM System Installation

5.1 Mast Site Selection

Read and follow the safety instructions located in Section 3. The RemoteCOM system sends data via radio signal to the centrally located RemoteCOM Satellite Base Station installations. When locating a site for the RemoteCOM mast, select a site to avoid obstructions between the RemoteCOM antennas and the SatCOM antennas. It is important to locate the mast where the solar panels will not be subjected to shade at any time during the year. The mast size and type are typically supplied by the end user. McCrometer recommended mast design and installations instructions are provided in the Appendix.



Warning:

WATCH FOR WIRES!! DO NOT install any mast or antennas near overhead wires. Contact of the antennas or mast with overhead electrical wires can result in serious personal injury or death!

5.2 Component Installation

5.2.1 Optional Yagi Antenna Component Installation

If the optional Yagi antenna is to be used instead of the dipole antenna, mount the Yagi antenna in the following manner. At the highest point of the mast, attach the RemoteCOM Yagi Antenna (Figure 21) using the provided pipe brackets and U-bolts. Point the Yagi antenna towards the RemoteCOM Satellite Base Station unit it will be transmitting to.



Figure 21:
RemoteCOM Yagi
Antenna And Bracket

5.2.2 Electronics Enclosure Installation

With the mast in its upright and fixed position, attach the Electronics Enclosure (See Figure: 4) to the mast using the two sets of pipe brackets located on the back of the enclosure. Each bracket set consists of two halves and a bolt. While holding the electronics enclosure to the mast, insert the tabbed ends of the bracket halves into the channel rail on the back of the enclosure, placing one bracket on either side of the mast. Slide the brackets together around the mast and insert the bolt through the bracket without screw threads into the bracket with screw threads. Tighten the bolt to secure the enclosure to the mast. Repeat steps for the second bracket set. Insure the front of the enclosure is at a comfortable working height and oriented to allow convenient access by an operator.

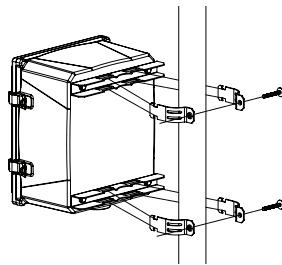


Figure 22: Electronics
Enclosure Mounting
Brackets

5.2.3 Solar Panel Installation

Attach the RemoteCOM Solar Panel (See Figure: 9) to the mast using the provided pipe brackets and pipe clamps. Depending on the installation location, the solar panel may have a lower bracketing system. Both configurations are shown below. Orient the Solar Panel so that it receives the maximum exposure to sunlight. The orientation of the Solar Panel will vary with the geographic location of the RemoteCOM installation. After orienting the Solar Panel securely fix the panel bracket to the mast.

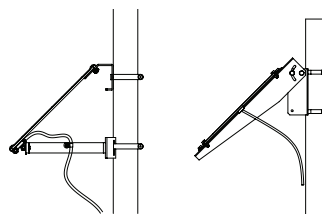


Figure 23: RemoteCOM Solar Panel
Mounting Brackets (Showing Both
Bracket Styles)

5.2.4 Cable Installations (With Standard Dipole Antenna)

Locate the foam insert in the cable entry port located at the bottom of the Electronics Enclosure. Remove the foam insert by grasping the insert and pulling it downward. Locate the cable from the power cable from the RemoteCom Solar Panel and insert them into the Electronics Enclosure through the cable entry port. Pull a sufficient amount of each cable through the port to allow each cable to be easily manipulated inside the enclosure. Reinsert the foam by first sliding both cables into the slot in the foam, then push the foam into the cable entry port, sealing the port. (See Figure: 24)

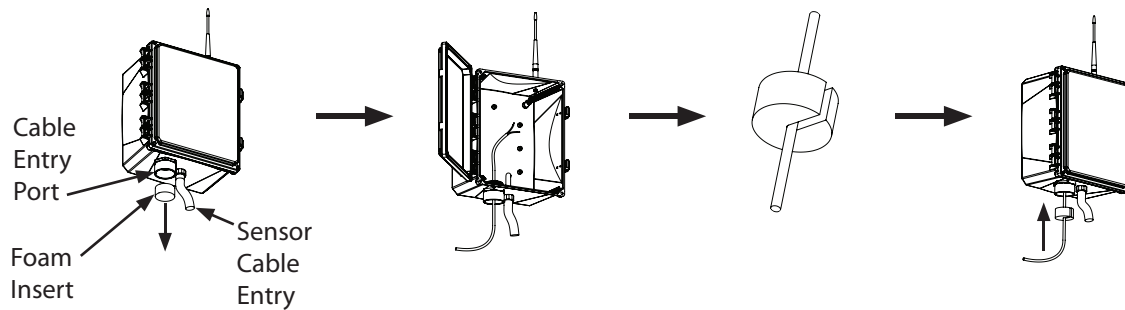


Figure 24: Cable Entry Illustrations

5.2.5 Cable Installations (With Optional Yagi Antenna)

Locate the foam insert in the cable entry port located at the bottom of the Electronics Enclosure. Remove the foam insert by grasping the insert and pulling it downward. Locate the cable from the RemoteCOM Solar Panel and insert them into the Electronics Enclosure through the cable entry port. Pull a sufficient amount of each cable through the port to allow each cable to be easily manipulated inside the enclosure. Reinsert the foam by first sliding both cables into the slot in the foam, then push the foam into the cable entry port, sealing the port. (See Figure: 25) Locate the cable from the Yagi antenna and screw it into the bulkhead connection at the bottom right of the enclosure. To attach the Sensor Cable, bore a hole in the bottom of the enclosure next to the cable entry port of sufficient size to accommodate the user-selected cable enclosure system.

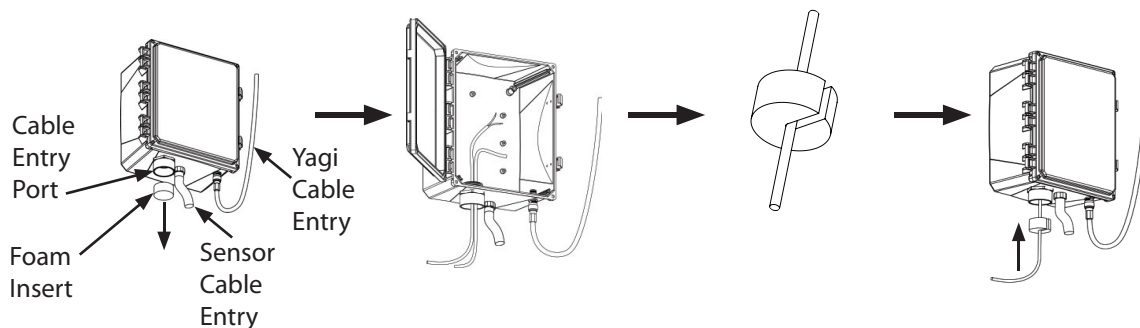


Figure 25: Cable Entry Illustrations

5.2.6 Meter Sensor Cable Installation

Attach the sensor cable from the RC20 Mc Propeller Transmitter to the Electronics Enclosure through a user-supplied water-tight connection as shown in *Figure: 25*. The sensor cable is user-supplied and will typically have five wires: black ground, shield wire, red +5V, green timer cable and white flow signal. See *Figure 26* below for a diagram of the following sensor cable connections.



Important Note: The White flow signal wire is to be connected to the pc board at digital input 2 (gray terminal) 5th from left. (See *Figure: 25*)

Terminal Number	Wire Description
1	Red Solar Panel wire (+)
2	Black Solar Panel common wire (-)
3	no connection
4	Red Battery +12v wire
5	Black Battery -12v wire
6	Black wire and shield wire
7	Red +5V wire
8	Green timer enable wire

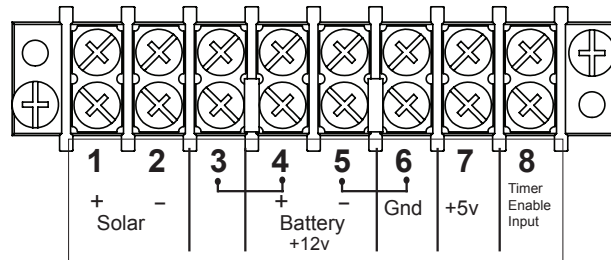


Figure 26: Terminal Block And Wire Associations

5.2.7 Power Connections

1. Locate the power cable from the RemoteCOM Solar Panel. The power cable has two wires: a red (+) wire and a black (-) common wire. Next locate the terminal block positioned in the lower-left corner of the Electronics Enclosure. (See *Figure 26*) Attach the red (+) wire to terminal 1. Attach the black (-) common wire to terminal 2. After all power and sensor cable connections have been properly attached, locate the battery leads near the battery mounted at the top of the enclosure. Attach the red (+) wire to the positive battery terminal, and the black (-) wire to the negative battery terminal. (See *Figures: 27 and 28.*)



Important Note: It is important that the battery connections be attached last as this will power the system.

5.2.8 Electronics Enclosure Configuration With Dipole Antenna

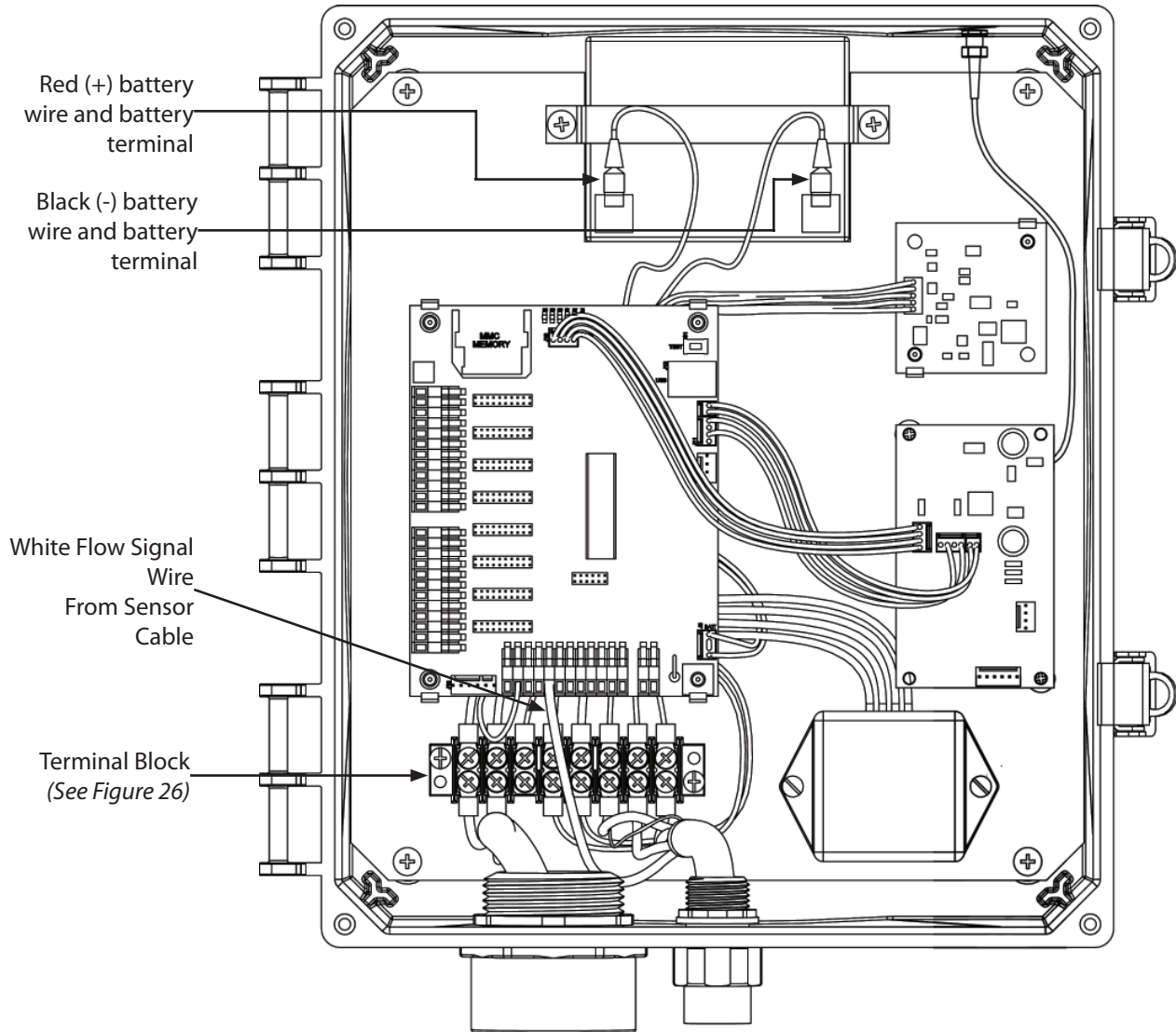


Figure 27: Electronics Enclosure Configuration With Dipole Antenna

5.2.9 Electronics Enclosure Configuration With Optional Yagi Antenna

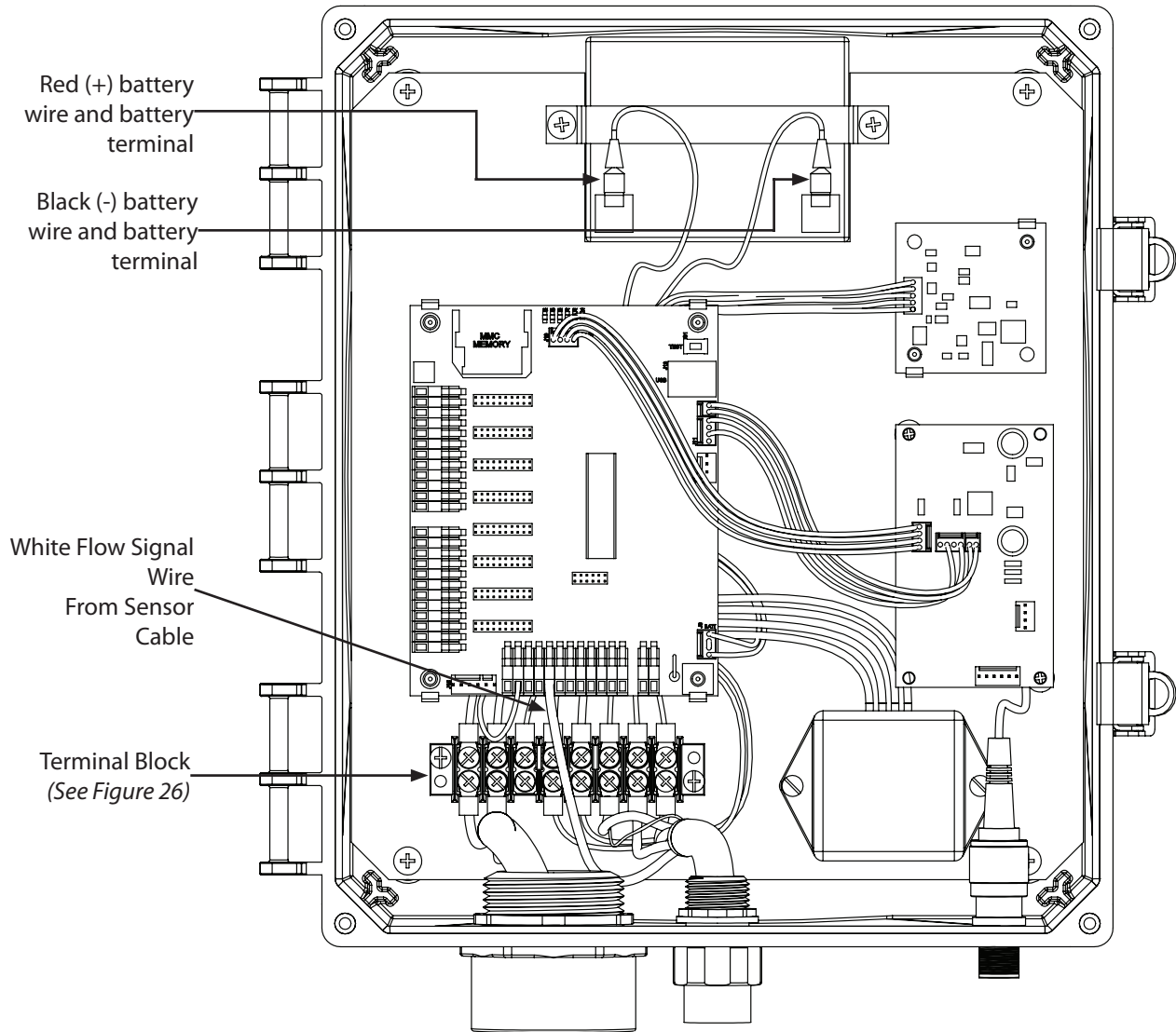


Figure 28: Electronics Enclosure Configuration With Optional Yagi Antenna

5.2.10 Cable Management

To insure the longevity of the cables and components, securely fix the cables from the antennas to the mast system. When securing cables, leave enough cable slack between the connection and the mast to prevent stress on the cable. See the Appendix for suggestions on mast system cable management.

5.2.11 RemoteCOM Test Procedure

To test the RemoteCOM simply press and hold for 5 seconds. (See Figure: 29) When the test button is released the indicator LED lights for SV (Sensor Voltage) and RV (Radio Voltage) will flash on and off momentarily. Also, the TX (Transmit) LED will flash one time indicating that data transmission to the RemoteCOM Satellite Base Station has occurred. After the test procedure the data transmission can be verified by checking the website for the new station (allowing time for the information to be transmitted from the RemoteCOM Satellite Base Station via satellite to the website).

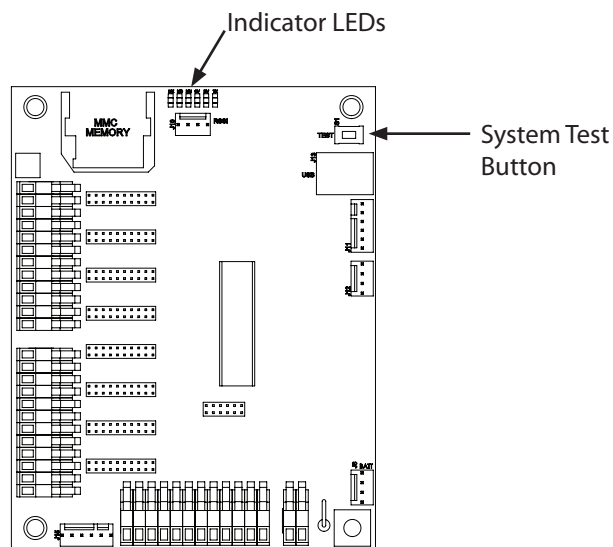


Figure 29: RemoteCOM Board Showing Location Indicator LEDs And System Test Button

6. RC20 Mc Propeller Transmitter Installation

6.1 Overview

The RC20 Mc Propeller Transmitter is used to adapt a mechanical flowmeter to provide a pulse output for the RemoteCOM to capture the flow data and transmit to the end user via the RemoteCOM Satellite Base Station. Each RC20 conversion kit will contain the following parts:

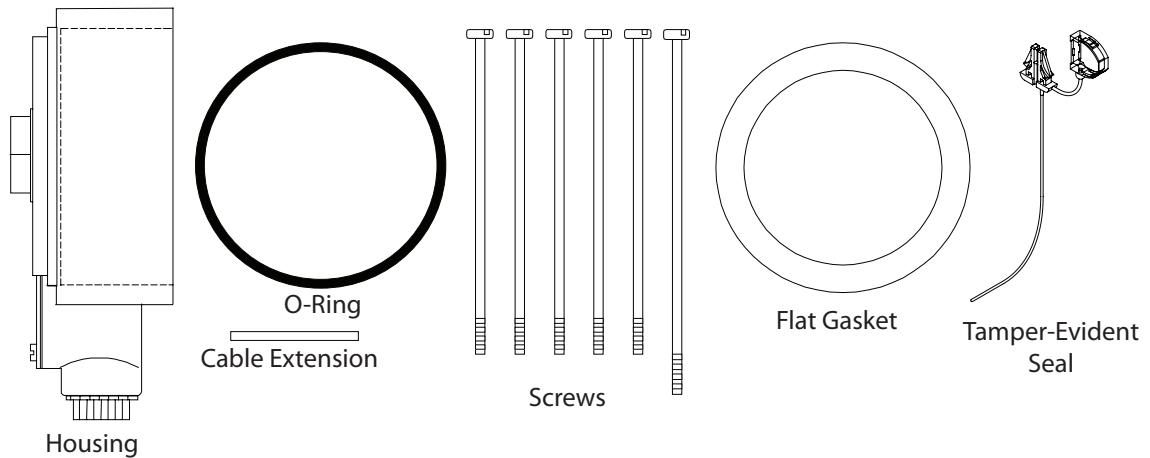


Figure 30: RC20 Mc Propeller Transmitter Parts

6.2 Disassembly Of Mechanical Register

It is necessary to remove the existing canopy and register. The RC20 mounts between the register and the register mounting plate already installed on top of the pipe protruding from the top of the meter. The meter can be in full operation during the installation of the RC20.

Remove the six (6) screws holding the Canopy to the mounting plate and discard. (See Figure: 31) One of the screws has a seal attached, remove it prior to removing that screw. Lift off the canopy carefully to prevent damage to the register.

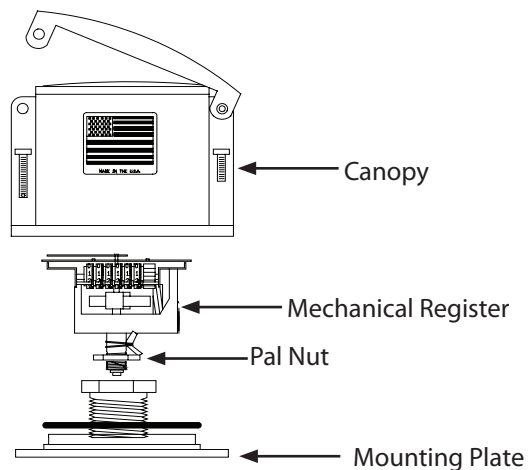


Figure 31: Flowmeter Parts

Loosen the pal nut located on the threaded shaft of the register. Carefully unscrew the register counter clockwise and lift it from the bushing.

CAUTION: Protect the Register from dust while it is outside of the Canopy.

You can now see the open end of the ELL with the drive cable. (See Figure: 32) If the flowmeter is in operation the cable will be rotating. If the flowmeter is not installed turn the propeller by hand to check that the bearing and cable rotate freely with no excess play.

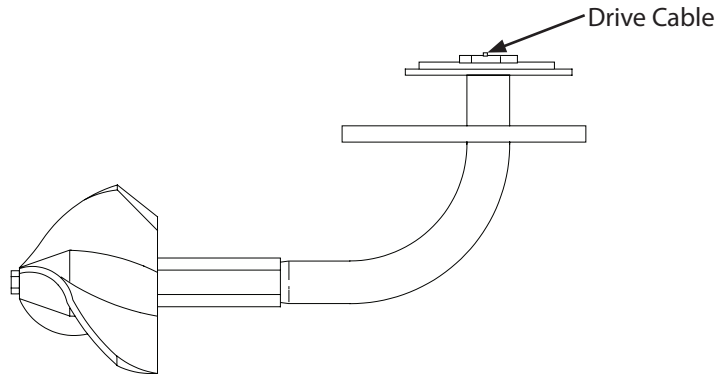


Figure 32: Flowmeter with Canopy And Register Removed

6.3 Installation Of The RC20 And Assembly

Cleanliness is vital for the operation of the transmitter and the register. Check the threaded area and the mounting plate, Figure 33, they should be free of grease, dust, or any other foreign materials. Place the o-ring and flat gasket over the lip on the mounting plate. Use a small amount of oil to lubricate the o-ring. Rotate the transmitter to align and locate the conduit to the desired position. Lower the transmitter to insert the cable into the center shaft of the transmitter. Continue to lower the unit until it touches the o-ring on the Plate. Work the transmitter carefully down over the o-ring, seat it firmly into place. Avoid unnecessary movement to prevent damage to the o-ring.

Find the short cable extension in the installation kit and insert it into the center of the bearing on top of the transmitter. Place the register with the Pal nut still in place on this cable extension and rotate it clockwise three (3) or four (4) turns. Stop when the register is positioned as it was prior to its removal and snug up the pal nut. If the flowmeter is operating turn register in until there is a slight binding of the cable in the Register and back out approximately two (2) turns and then tighten the Pal nut; this should give you smooth operation and be correctly positioned.

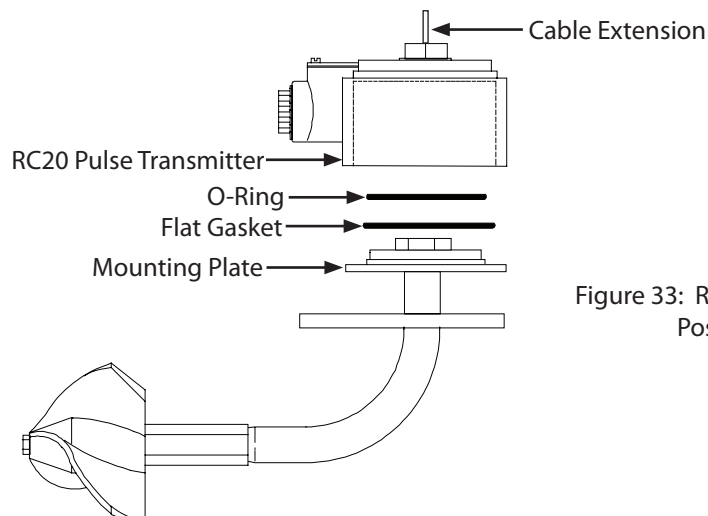


Figure 33: RC20 Mounting Position

The canopy can now be installed. Check the transmitter housing and the canopy for cleanliness and clean if needed. (See Figure: 34) Orient the canopy and lower it carefully over the lubricated o-ring and seat it firmly onto the Transmitter Housing. Again, be careful so that the o-ring on the transmitter housing is not damaged.

Locate the long screws; insert the screws through the canopy, transmitter housing, and the Mounting Plate. Tighten them using the crisscross method. Use caution when tightening the screws to prevent thread damage. The o-ring will seal the transmitter and mechanical register from environmental contaminants

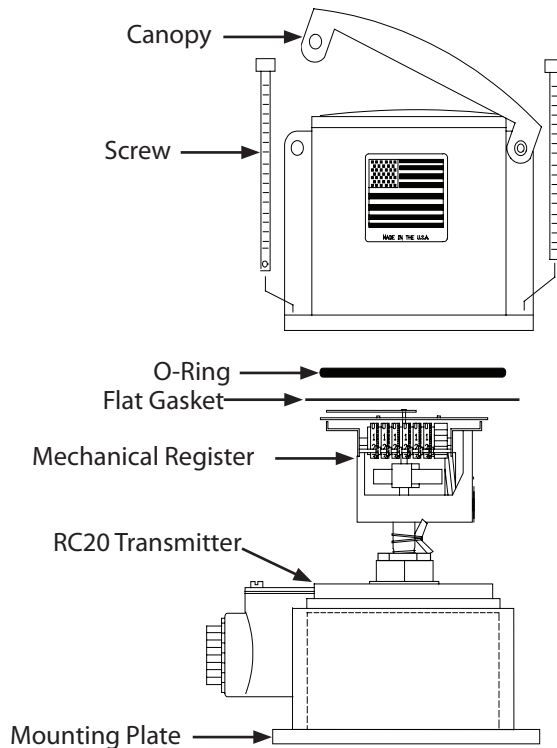


Figure 34: Attaching The Bonnet To The Installed RC20 And Mechanical Register

6.4 Installation Of The Tamper-Evident Seal

Once the bonnet is installed, locate the long bonnet screw with the hole in the end. Thread the wire from the tamper evident seal through the hole in the screw. Then thread the wire through the hole in the arrow shaped part of the seal. Wrap the wire over the top of the arrow and back down the channel down the middle. The firmly snap the clear cap over the arrow until it snaps into place. Tug the wire to insure it is locked into place. Cut away any excess wire remaining.

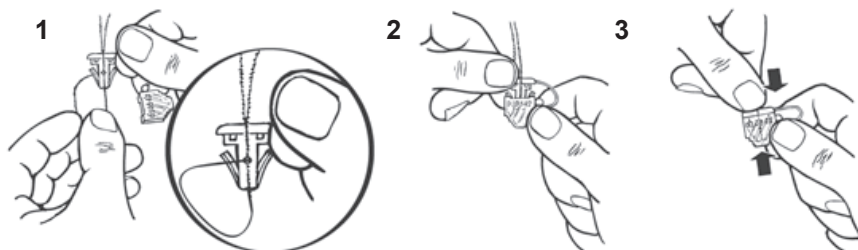


Figure 35: Procedure For Installing The Tamper-Evident Seal

APPENDIX

1.0 Suggested Mast Installation

There are several versions of masts which are commercially available. The suggested McCrometer mast system will be used as an example. Considering the requirements detailed in section III, locate and mark the spot to mount the RemoteCOM mast near the sensor. Again, the location must be free of underground utilities. The area which is chosen should be checked and marked for underground obstructions during the site preparation.



Warning:

WATCH FOR WIRES!! DO NOT install any mast or antennas near overhead wires. Contact of the antennas or mast with overhead electrical wires can result in serious personal injury or death!

1.1 Wood Post Installation

A pressure treated four inch by six inch by eight feet long wooden post will provide the ground contact base on which the steel pipe mast will be supported.

1. Using a post hole auger, drill a three foot deep hole using an 8 or 10 inch auger. This will leave five feet of exposed post above ground.
2. Insert the post into the three foot deep hole and using a bubble level, measure two flat sides of the wood post to insure that it is as vertical as possible. Nail an opposing set of two inch by four inch by six foot wood braces (length as needed) to support the post until it can be cemented into place. Recheck the installation with the level tool before the final set. After the cement has set, remove the 2x4 braces.

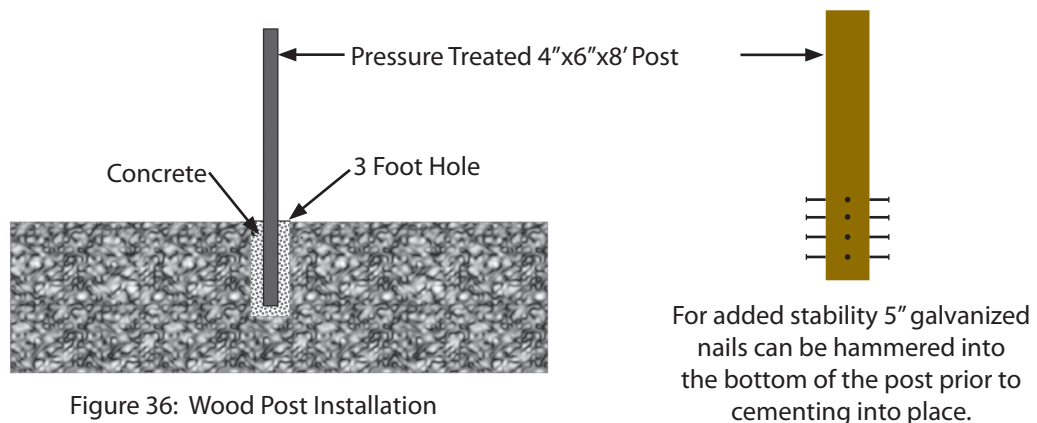


Figure 36: Wood Post Installation

1.2 Mast Assembly

The steel mast consists of one each ten foot and six foot section of two-inch (2") galvanized pipe. These sections are joined by a threaded coupling to make a length of sixteen feet of metal mast. The bottom of the steel mast will later be connected to a 2" cross and short section of 1 1/4" pipe which is inserted into and out of the other side of the wooden post. This small section of pipe is then cinched down tight using a small reducer. A three-foot section of 2" pipe is connected to the bottom of the cross and terminates with a bell reducer. The bell reducer is left open to allow for moisture weeping. (See Figure: 37)

NOTE: All threaded connections should be sealed with pipe sealant and painted with rust resistant paint to avoid corrosion.

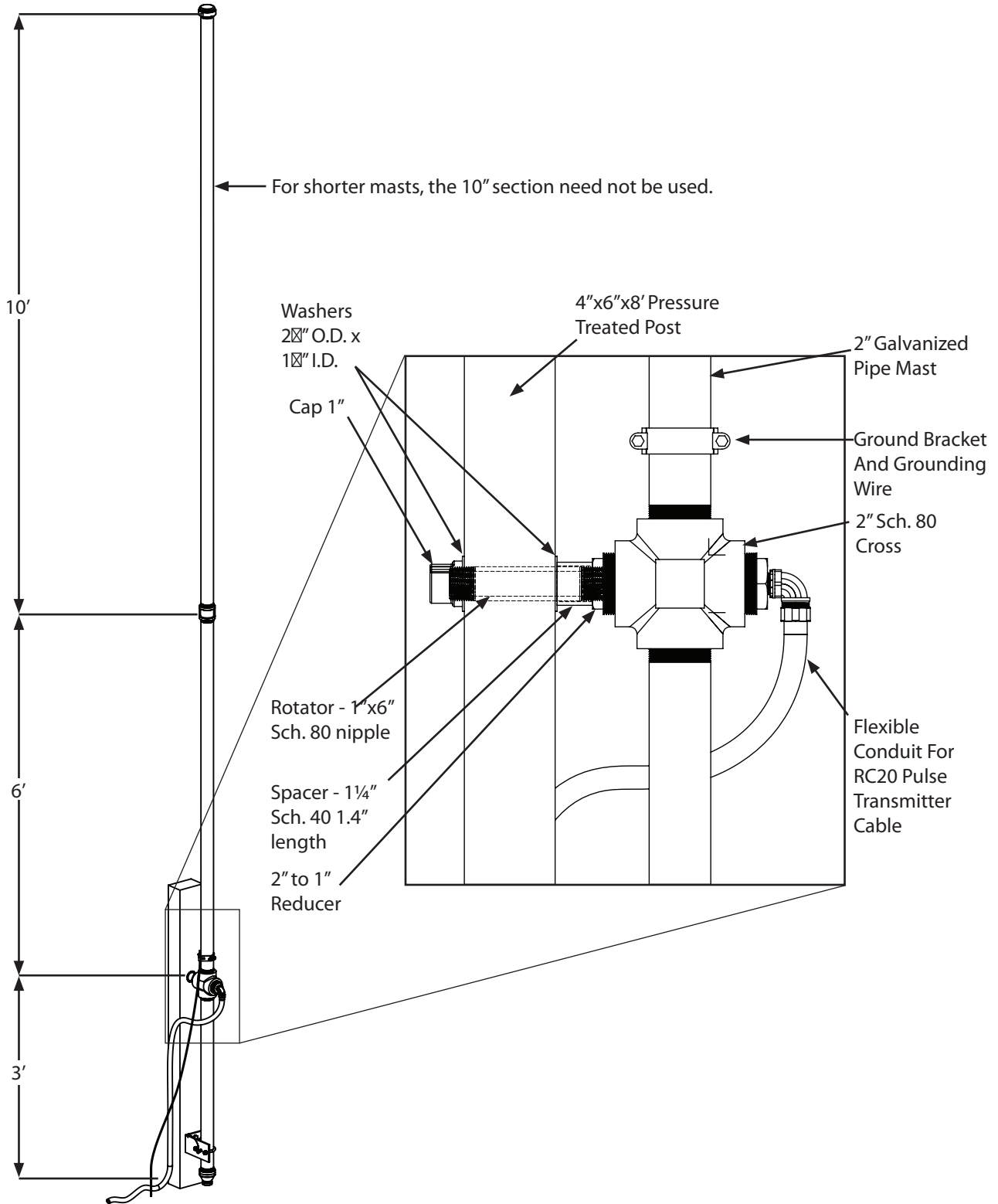


Figure 37: Suggested Mast Configuration

1.3 Mast Pivot System

The McCrometer suggested mast is designed to pivot allowing the mast to be easily lowered for component installation and maintenance. McCrometer recommends the use of a sawhorse, or other such means to rest the mast upon when lowered. (See Figure: 38)

The pivot system consists of a 2" schedule 80 cross, a 2" male to 1" female reducer bushing, a 1"x6" schedule 80 NPT threaded nipple, a spacer of 1¼" schedule 40 pipe 1.4" in length, two 1⅜" I.D. washers and one 1" cap. Drill a 1⅜" hole through the center of the wood post at a height suitable for the pivot point (approximately 8 inches from the top of the post). Screw the reducer bushing into the 2" cross. Screw the 1" threaded nipple into the reducer bushing. Slide the spacer over the nipple, then slide one of the washers onto the nipple. Insert the nipple assembly through the pivot hole in the post. Slide a washer over the nipple on the side of the post opposite of the cross. Screw the 1" cap onto the end of the nipple. The cap should press up against the washer and create a snug fit, allowing the mast to pivot with some resistance. See figure 37.

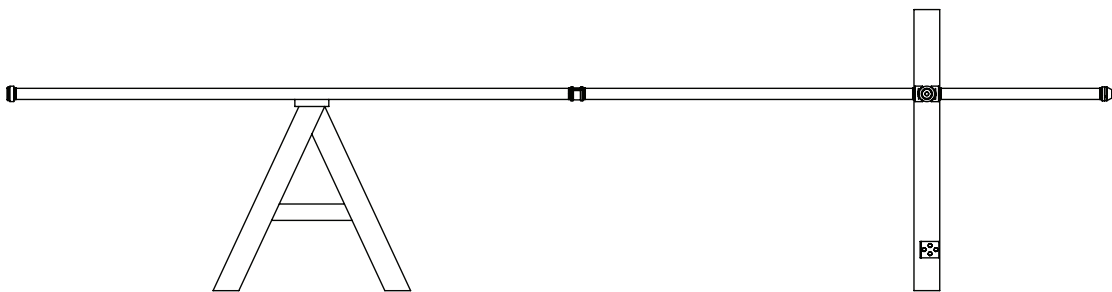


Figure 38: Mast Shown In Pivoted Position

McCrometer recommends the use of a heavy gauge steel "L" bracket for the bottom of the mast attached with 2"x⅜" hex head lag screws. The mast is held in place by a locking pin, and secured by a U-bolt. The locking pin holds the mast in place and allows a single person to install the U-bolt.

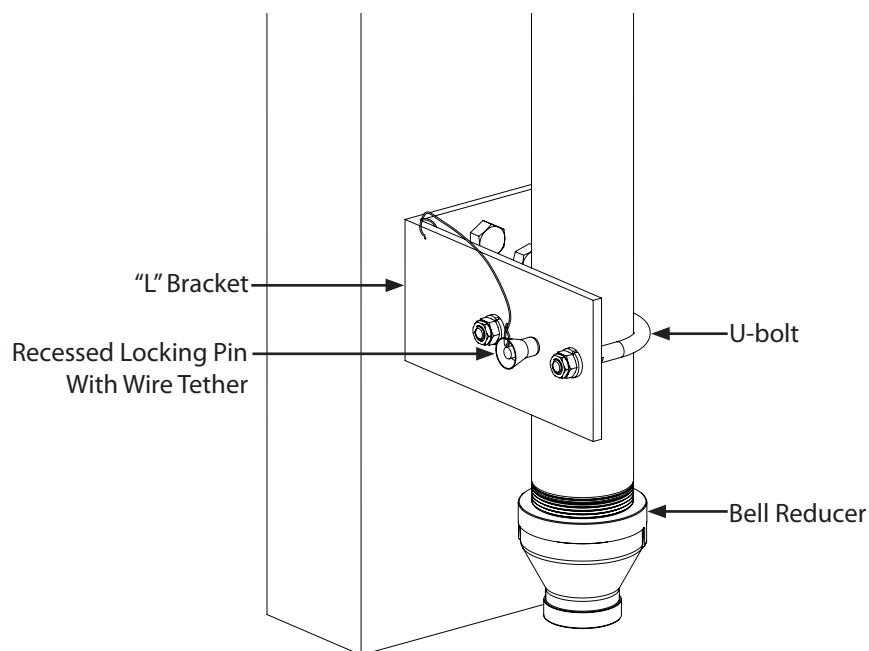


Figure 39: Mast Lower Brace And Bell Reducer

1.4 Grounding

It is required that the mast be properly grounded according to any local, state or federal electrical codes. (See Figure: 40)

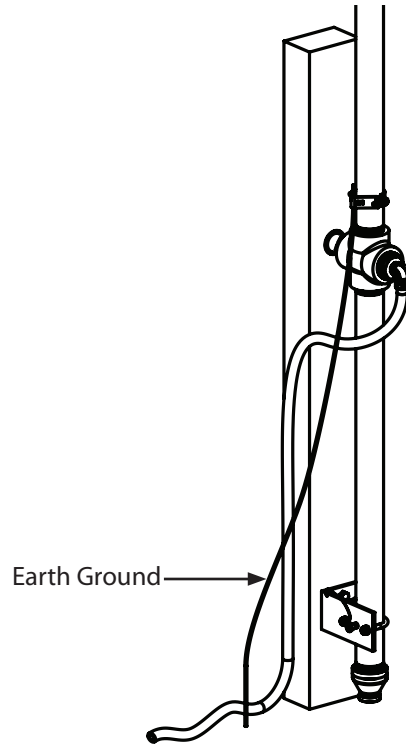


Figure: 40 Mast Ground

1.5 Cable Management

To insure the longevity of the cables and components, securely fix the cables from the antennas to the mast system. This can be accomplished by use of exterior clamps, or by running the cables through the interior of the mast pipe. When securing cables, leave enough cable slack between the connection and the mast to prevent stress on the cable.

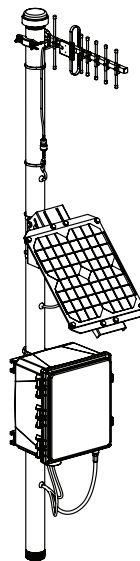


Figure 41: An Example Of Cables Run Through The Interior Of The Mast Pipe (With Optional Yagi Antenna)

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