MOSAIC WATER FIREFLY®

USER TRAINING GUIDE

1.0.38.4

(Includes up to RR CX v3.26.4; FIREFLY D4100; FIREFLY D4000; 4110; CXMI 1.3)

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MOSAIC™ regulations and Warranty information

The MOSAIC System is intended to be operated to manufacturer's specifications. As such, Customer understands that electronic communication between Datamatic and your MOSAIC System is required to provide software updates, to conduct support activities and to validate proper configuration and operation. Any blocking or prevention of such access may prevent the System from operating as intended and may void coverage under your Maintenance Agreement and/or your Warranty.

Any change to RF settings, other than by a Datamatic Administrator, may void your MOSIAC FIREFLY Warranty. Do not change RF communication settings without consulting Datamatic first.

FCC and Industry Canada Regulations

FCC Part 15 requires that the Manual include the following statement:

"Changes or modifications not expressly approved by the manufacture could void the user's authority to operate the equipment."

"NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC ID: ODYD4000, ODYD4100 and ODYD4100F

IC: 4421A-D4100F

Datamatic, Ltd.

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
1) This device may not cause harmful interference, and
2) This device must accept any interference received, including interference that may cause undesired operation.

WARNING: These devices operate under Part 15 of the FCC rules. Modifications to these devices not expressly authorized by Datamatic, Ltd. may affect your ability to legally operate these devices.

To comply with FCC RF exposure requirements, the device and the antenna for this device must be installed to ensure a minimum separation distance of 20 cm or more from a person's body. Other operating configurations should be avoided.

Canada

Notice Specific to IC: 4421A-D4100F for operation in Canada:

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This device has an internal antenna which is not detachable.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca

ESD Practices

Electrostatic Discharge (ESD) Warning

Electrostatic Discharge (ESD) is the enemy of electronic devices. You should always take precautions to eliminate any electrostatic charge from your body and clothing before touching any semiconductor device or card by using an electrostatic wrist strap and/or rubber mat.

Static electricity can harm system boards. Perform installation at an ESD workstation and follow proper ESD precautions to reduce the risk of damage to devices. Datamatic strongly encourages you to follow proper ESD procedure, which can include wrist straps and smocks, when servicing equipment.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive device from its shipping carton, do not remove the device's anti-static packaging material until you are ready to install the device. Just before unwrapping the anti-static packaging, be sure you are at an ESD workstation or grounded.
- When transporting a sensitive device, first place it in an antistatic container or packaging.
- Handle all sensitive devices at an ESD workstation. If possible, use anti-static floor pads and workbench pads.

Handle devices and boards with care. Don't touch the devices or contacts on a board. Hold a board by its edges or by its metal mounting bracket.

Introduction

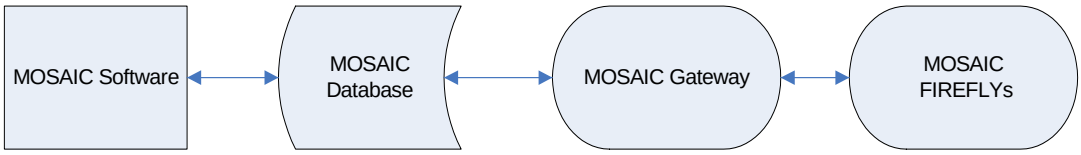
The Datamatic MOSAIC Mesh System is an automatic meter reading system designed for reading meter data remotely and wirelessly. This is accomplished using the Datamatic MOSAIC Mesh system that forms a mesh network with neighboring MOSAIC FIREFLYs and reports data to the MOSAIC Software Interface through strategically placed MOSAIC Gateway devices.

MOSAIC FIREFLYs can be deployed using walk-by, mobile, and MOSAIC Mesh collection platforms.

The main benefits of using The Datamatic MOSAIC Mesh system are:

- Real time access to meter reading data
- Built in logging of up to 240 days of hourly consumption data
- Meter lids do not have to be removed for reads
- Meter pits do not have to be dug out or pumped out for reads
- Safer meter reading procedure
- Visiting the site is not necessary for data collection

Please consult the MOSAIC Software Guide for user instructions regarding data access, configuring or upgrading the MOSAIC Mesh FIREFLY System. After reviewing this guide you should be able to successfully deploy the MOSAIC FIREFLYs for your system.



Equipment

MOSAIC FIREFLY

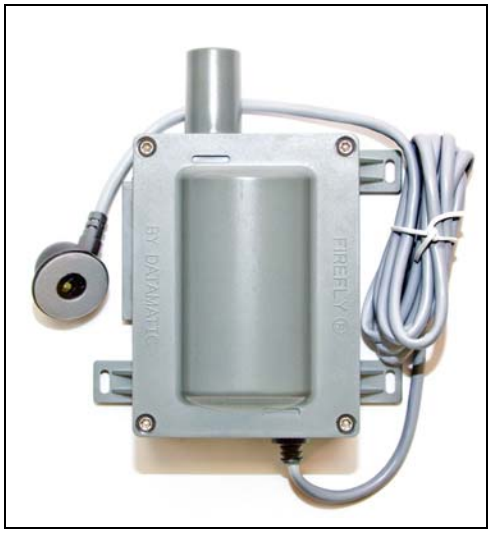
The MOSAIC FIREFLY tracks and transmits meter reading data. Each MOSAIC FIREFLY records up to 240 days of hourly consumption readings, thereby enabling the resolution of billing disputes. The MOSAIC FIREFLY signal includes the meter reading, leak indicators and trouble codes upon detection. (Refer to the troubleshooting section)

- **Batteries:** Dual 3.6-volt lithium-thionyl chloride D-cell
- **Material:** Polycarbonate
- **Construction:** silicon-lubricated gasket sealed tourqued to 12' lbs
- **Operating Temperature Range**: -40 F to 185 F
- **Radio Communication Frequency:** 902-928 MHz frequency hopping spread spectrum

Unique Features

- Use existing meters
- Maintain the freedom to choose meters without the constraints of a proprietary AMR system
- Internally potted, gasket sealed and designed to withstand constant submersion
- Supports direct-read, pulse and encoded registers
- Leak Detection
- Tamper Detection
- Battery Status Indicator
- Above ground or through the lid installation

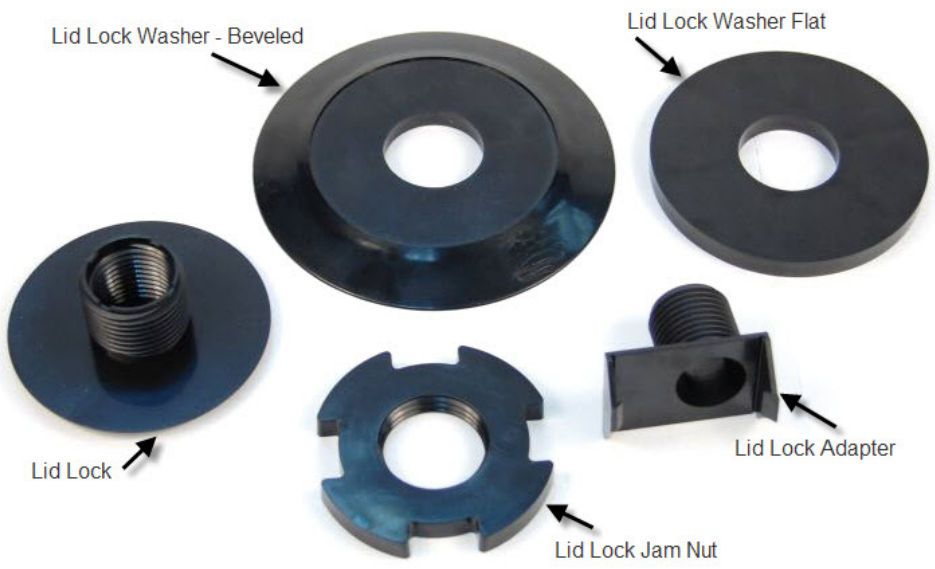
Wire-end MOSAIC FIREFLY



Sensor-end MOSAIC FIREFLY

Lid Lock

The preferred installation method in a water pit environment is to use the Lid Lock system. The Lid Lock adapter holds the MOSAIC FIREFLY securely and allows the MOSAIC FIREFLY to be easily screwed into the Lid Lock.



Remote Shutoff Valve

The Remote Shutoff Valve (RSV) is used in conjunction with the MOSAIC FIREFLY (D411X only) to control water service termination, providing utilities with a convenient method to deploy water shut-off service. The FIREFLY can issue commands to the RSV to Open, Close, or report its current status (open or closed).

There are three software/firmware components to the RSV system. These are ROADRUNNER software, radio firmware, and the FIREFLY firmware. To ensure proper functionality of any RSV, the units should be loaded with the minimum software/firmware listed below:

- ROADRUNNER CE 3.26.4
- Radio firmware 1.3.20
- FIREFLY D4110 firmware 1.5.2

- **Batteries:** Dual CR 2 lithium battery pack with an output of 6V
- **Construction:** brass plated ball-valve with anon-corroding compound; able to operate at a 150 psi pressure and compliant with AWWA Standard C700-02, section 4.2.9
- **Operating Temperature Range**: -1 C to +60 C

Installation Considerations

- Signal distance varies depending on the location of the MOSAIC FIREFLY. Those installed above ground or through plastic lids generally transmit the greatest distance.
- The material of a pit or vault lid greatly affects the transmission range. For example, a transmitter has a greater range sending from a pit with a plastic lid than a cast iron lid. A FIREFLY mounted under any type of lid is subject to flooding. Since water impedes RF transmission it is best to mount through the lid using a Lid Lock.
- Lids with holes of a diameter of roughly 1 ¾ inches make it possible to mount the MOSAIC FIREFLY through the lid. This can increase transmission range significantly and protect against loss of signal due to flooded pits. It is not recommended to install FIREFLYs under iron or metal lids as RF performance is degraded.
- Complete field installation of a MOSAIC FIREFLY takes five to ten minutes, depending on the meter location and mounting application.
- If the lid has a hole for the unit, use the Lid Lock, Lid Lock adapter, and appropriate washer. Ensure that enough space exists between the meter box lid and the ground for the MOSAIC FIREFLY to fit. If not, remove some of the dirt from the bottom of the meter. Do not over-tighten Lid Locks.
- Some meters may be located in such a manner that they require the addition of repeaters to reach the mesh.
- Some areas of your service territory may not have the density to warrant the use of the mesh - your project manager will alert you to these areas where units can be placed into a drive-by mode.
- Profile data uses more mesh bandwidth and as such can require the use of additional repeaters and/or Gateways.
- The system requires ongoing maintenance - make sure to have the proper equipment and training to maintain the system after your installation contractor leaves.
- Do not attempt to repair or trouble-shoot equipment without the proper equipment and training.

Installation Supplies

Basic Supplies:

- Klein Crimping Tool – Part No. D2346
- Wire Stripper
- Zip ties, White 14”
- 9-Volt Battery
- 4 lb pull telescoping magnet
- Lid Lock

Water Sensor-end FIREFLY Installation Supplies

Basic Supplies:

Below is an illustration of materials used with Sensor-end installations:

Work Out Waterless Hand Cleaner

Non Pumice Fast Orange

- 7.5 Fl. Oz Part No. 23108
- 15 Fl Oz. Part No 23116

99% Isopropyl Rubbing Alcohol

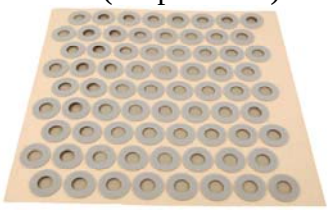
Lint Free Cotton Squares

Razor blade tool or chisel (for cleaning meter faces)

Wire Cutter (for cutting zip ties)

Plumber's Goop Adhesive #15112 (Purple Tube)

Zip Ties—14"



3M Adhesive Replacements

Sensor flaps

Additional supplies: Cloth Rags, ¾" PVC pipe; sch. 40

Water Wire-end FIREFLY Installation / Pit Splice Supplies:

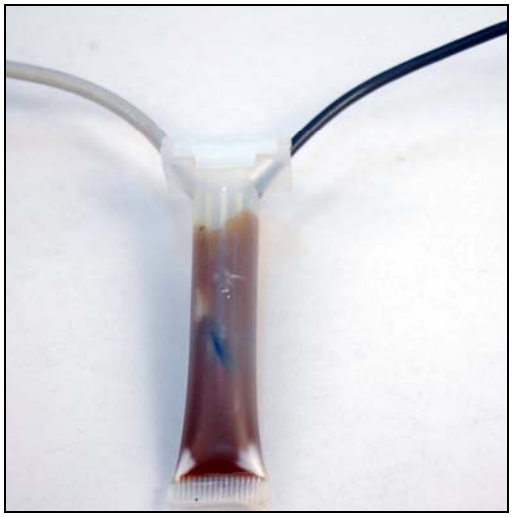
Following is a list of materials required to install a wire-end MOSAIC FIREFLY using the Water Pit Splice technique:

UY Connectors

- 3M IDC Connector – Yellow Part No. 34-7035-9854-9
  (use only approved crimping tool - Klein Crimping Tool – Part No. D2346)

Burial Pod

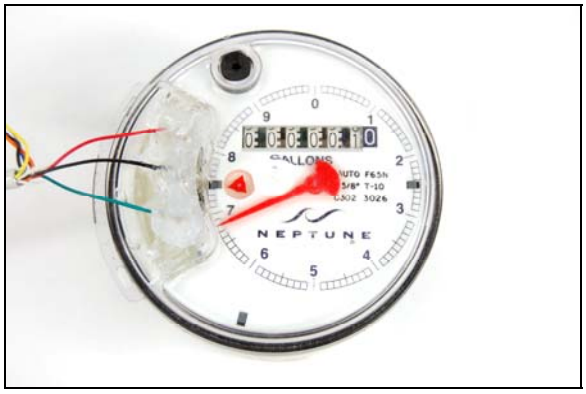
- 3M Direct Burial Splice Pod – Part No. 054007



DOW CORNING

Valve lubricant (for direct-connect only)

- MFG. Model # 111



Grainger Industrial Supply www.grainger.com Call toll-free at 1-888-361-8649, 24 hours a day, 7 days a week.

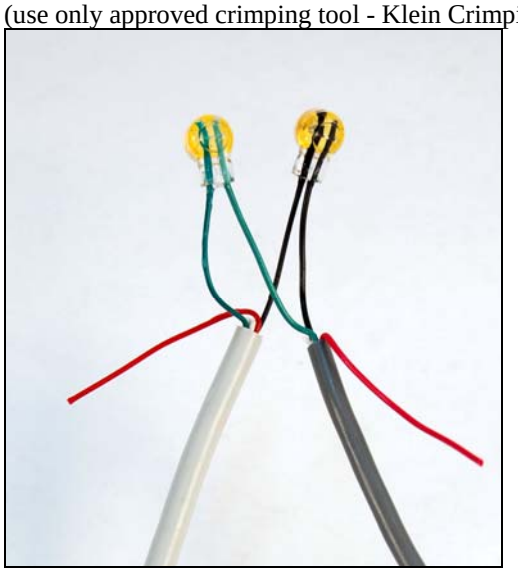
Basement Splice Supplies:

Following is a list of materials required to install a wire-end MOSAIC FIREFLY using the Basement Splice technique:

UY Connectors

- 3M IDC Connector – Yellow Part No. 34-7035-9854-9

(use only approved crimping tool - Klein Crimping Tool – Part No. D2346)



3M Scotch 2200 Vinyl Mastic Pads

- www.3m.com (to locate local distributor)

Note: Supplies for installation can be purchased from:

Grainger Industrial Supply www.grainger.com Call toll-free at 1-888-361-8649, 24 hours a day, 7 days a week.

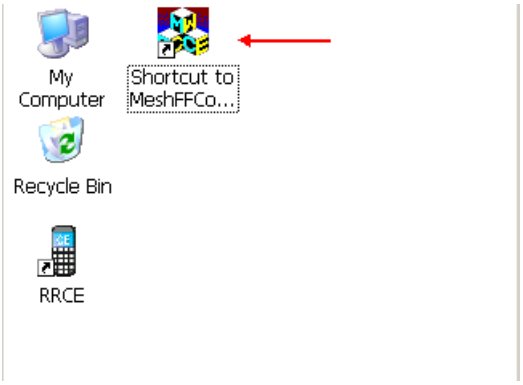
Programming FIREFLYs in Mesh Mode

Mesh FF Config Utility (CXMI 1.3)

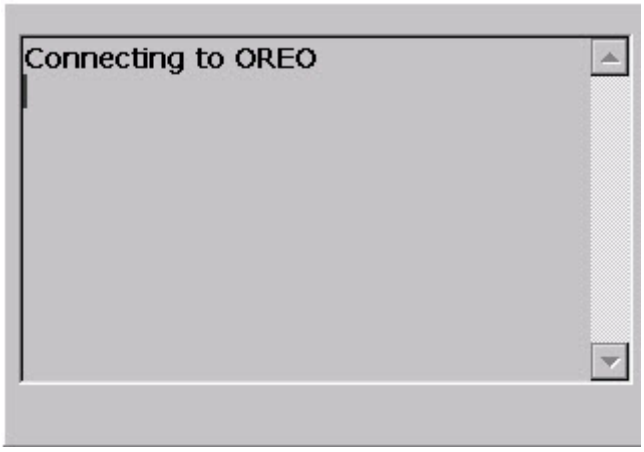
The Mesh FF Config Utility (CXMI) is used to program MOSAIC FIREFLYs in mesh mode. To access the CXMI software from the standard ROADRUNNER program screen, press F3 to bring up the Begin Comm menu, and then press 3 to exit the program. A shortcut to the CXMI program is located on the Desktop. If you do not have the CXMI software, please contact Datamatic Customer Support.

Application Setup

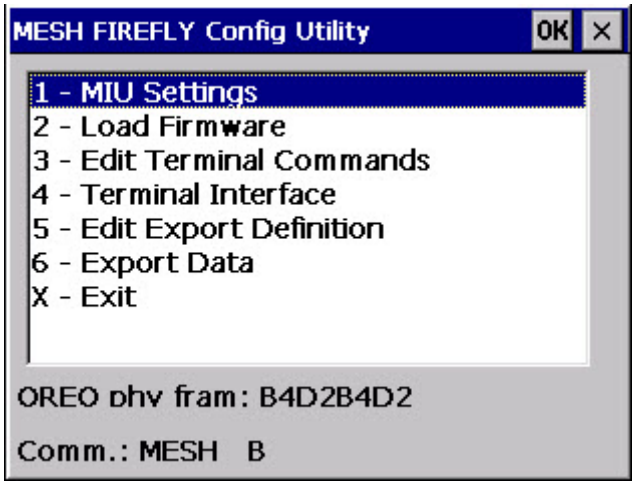
From the ROADRUNNER Desktop, select the shortcut for the MeshFFConfigUtility.



When the application first loads, it will connect to the radio installed in the ROADRUNNER. The following screen will be displayed while the connection process is active:



Once connected, the Main Menu will be displayed:



The following selections are available from this menu:

1 – MIU Settings	Select this option when programming or troubleshooting FIREFLYs
2 – Load Firmware	This option allows users to load firmware images to both the OREO and the FIREFLY
3 – Edit Terminal Commands	This option allows users to add or edit a terminal command
4 – Terminal Interface	This feature allows the user to send pre-defined or ad hoc commands to the FIREFLY
5 – Edit Export Definition	Defines the order of the fields in the export file as well as the fields to export
6 – Export Data	Places defined Export data in the CXMIData folder to be removed from the RR and analyzed using another program
X – Exit	Exit the application and return to the Desktop

At the bottom of these menus the following information is displayed:

OREO Phy Fram: B4D2B4D2

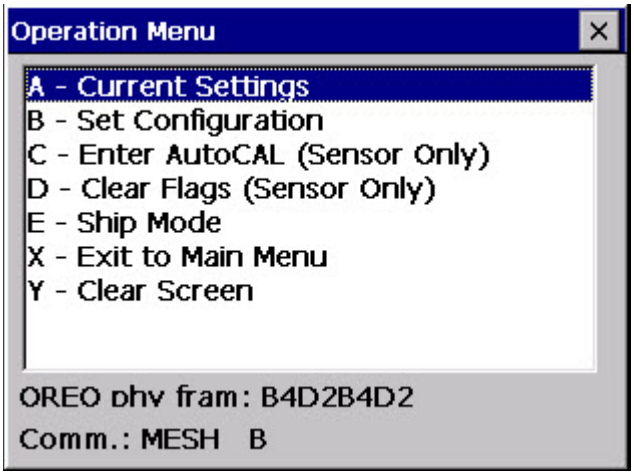
The Phy Fram is the setting the radio inside the ROADRUNNER uses to communicate with the FIREFLY. The radio and FIREFLY must be on the same setting to communicate. The default Phy Fram for all FIREFLYs is B4D2B4D2. If this value is not correct for your setup, your Project Manager will give you instructions on how to change this value.

Comm.: MESH or Fence Read

The communications mode of the ROADRUNNER and FIREFLYs (Mesh or Fence Read/Non-mesh). If necessary, you can toggle between comm. Modes by pressing FNCTN (blue key) + C.

MIU Settings

From the MESH FIREFLY Config Utility Menu, select 1 – MIU Settings.



The following selections are available from this menu:

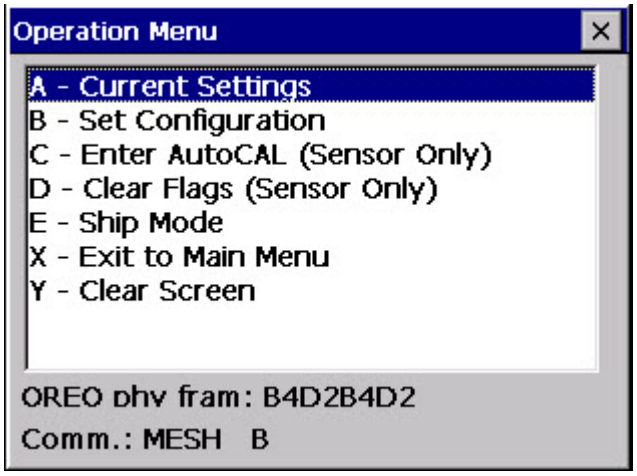
A – Current Settings	View the current configuration of the FIREFLY
B – Set Configuration	Set the configuration parameters of FIREFLY
C – Enter AutoCAL (Sensor Only)	Manually enters AutoCAL mode for a Sensor-end FIREFLY
D – Clear Flags (Sensor Only)	Clears all flags in the Sensor-end FIREFLY
E – Ship Mode	Sets the FIREFLY to Ship Mode
X – Exit to Main Menu	Returns to the Main Menu
Y – Clear Screen	Clears the Configuration Screen

Software Version
To view the current software version press the FNCTN key then the V key from the main menu.

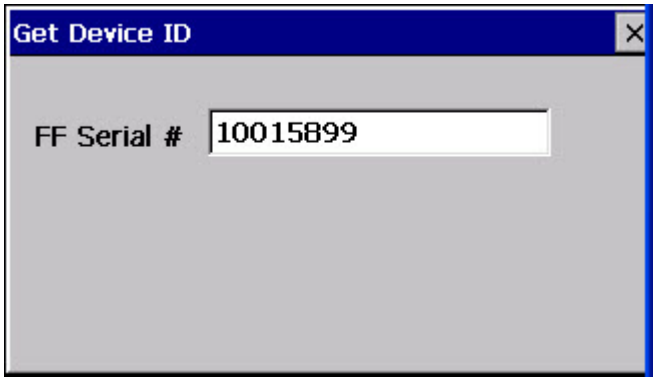
Change Phy Fram
To change the OREO Phy Fram, press the CNTRL key then the P key. Use caution when performing this function as it could prevent your ROADRUNNER from communicating with your FIREFLYs.

NOTE: To perform menu items A, B C, D and E, the FIREFLY must be awake before it will respond. To wake up the FIREFLY, magnet swipe the FIREFLY then perform the function.

Current Settings
To examine the current configuration of a FIREFLY, select A – Current Settings.

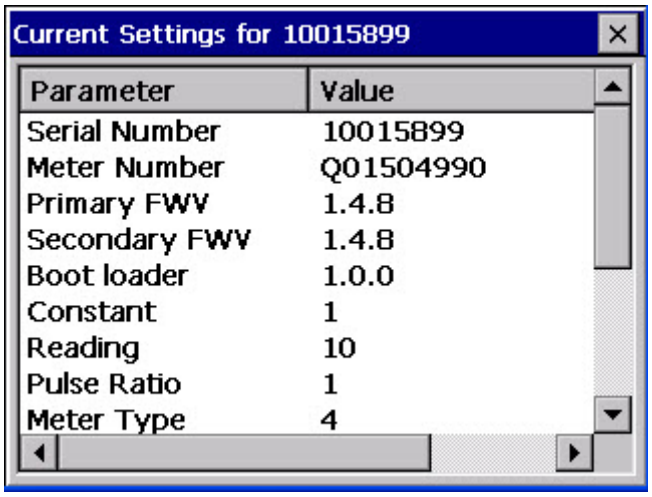


Enter the FIREFLY Serial Number and press Enter.



The application will now read the information from the FIREFLY.

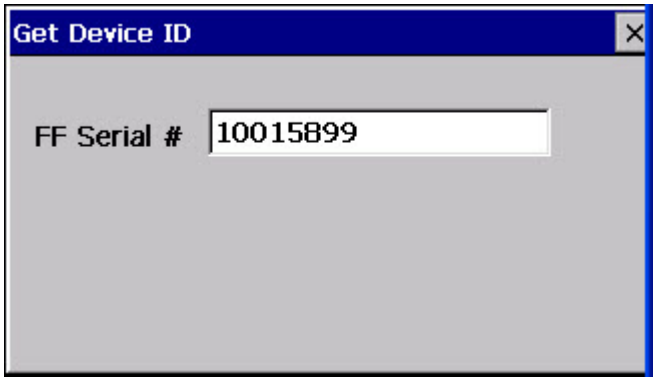
The following information is returned from the FIREFLY:



Set Configuration
See section below titled “Programming the Wire-end MOSAIC FIREFLY”

Enter AutoCAL (Sensor Only)
See the section below titled “Programming the Sensor-end MOSAIC FIREFLY”.

Clear Flags (Sensor Only)
To clear any FIRELY flags select D – Clear Flags.

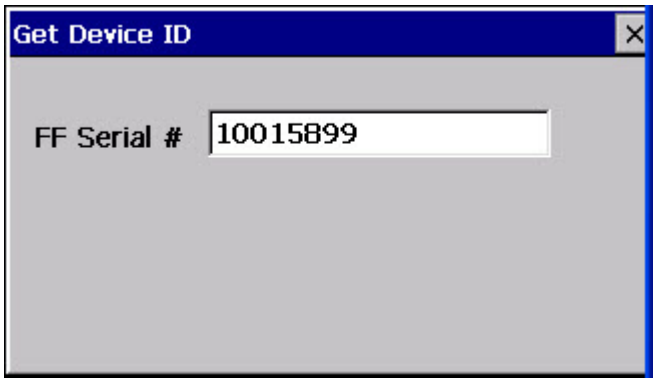


Enter the FIREFLY Serial Number. The application will clear all FIREFLY flags and return to the FIREFLY Sensor menu.

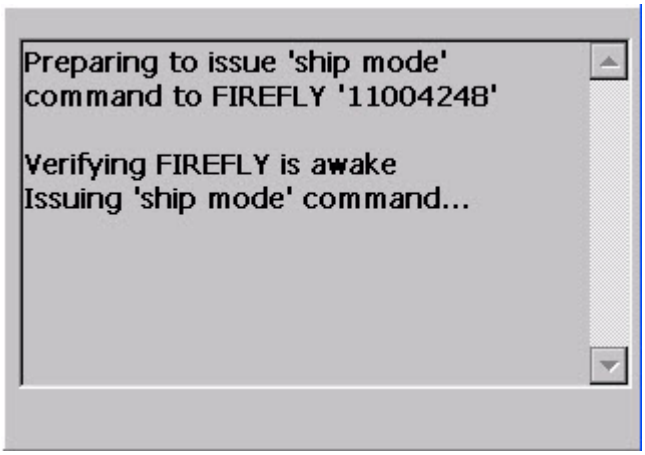
Ship Mode

Ship Mode is when the processor on the FIREFLY is in dormant state and will only respond to an interrupt caused by the closure of the reed switch using a magnet. Ship Mode will reset all parameters except Phy Fram back to defaults.

To put the FIREFLY back into Ship Mode select E – Ship Mode.



Enter the FIREFLY Serial Number. The application will set the FIREFLY to Ship Mode and return to the FIREFLY Sensor menu.



Installing and Programming Sensor-End MOSAIC FIREFLYs in mesh mode

Installing the Sensor-end MOSAIC FIREFLY

The Datamatic Sensor FIREFLY for water meter applications relies on pulses of infra-red light emitted by the sensor head four times a second and are directed at the face of the register dial. Sensors in the head then read the infra-red light pulses reflected off the register face to determine if the needle has passed underneath the sensor head. The successful sensing of the needle passage then depends on the unrestricted light transmission from the light-emitting source in the sensor, through the air between the source and the register lens, the register lens, the atmosphere in the register, the reflectance of the register dial face and the reflected light's transmission back through those elements to the sensor. The performance of the Datamatic Sensor FIREFLY for water meter applications could be affected unless the following requirements are maintained:

- Register lens face must be free of scratches to allow for a permanent, water-tight seal with the sensor.
- Register lens material must be clear, free of cloudy imperfections or milky tones, etc.
- Register must have a solid colored, radius-type needle (no full-diameter needles).
- Register must be permanently sealed, with a completely dry register cavity - no water, moisture or dirt or humidity fogging can be present in the register.
- Register conditions must allow for the Datamatic Sensor FIREFLY to generate a minimum background value of 100.

Note - There will be a percentage of meter registers in every system, depending on age and condition of meters, which may require replacement based on failures of above in order to support the Sensor FIREFLY. You should incorporate these requirements in your ongoing water meter maintenance program.

The 4 P's of Installation

1. **Preparation**
2. **Placement**
3. **Pressure**
4. **Programming**

#1 <u>Preparation</u> of the Meter

a) Remove meter box lid and check for meter serial number.
b) Survey the meter, checking lid, hole depth, and overall cleanliness.
c) Check for meter disqualification. Enter the corresponding skip code if necessary.
d) Place sensor flap onto FIREFLY cable.
e) Flip lid back and pre-clean meter face/lens using Work Out Waterless Hand Cleaner or Fast Orange non-pumice cleaner and a cloth or cotton swab to remove residue.
f) Clean meter face/lens with 99% isopropyl alcohol and a **NEW** lint-free cotton swab.
g) Re-wipe the surface of the meter lens with a clean, new cotton swab each time until the swab comes up clean, and the clean lens squeaks when wiped.
h) After cleaning, ensure that the lens is *completely dry*; allow time for the alcohol to evaporate.

NOTE: Only use isopropyl rubbing alcohol marked "**99% by volume"**. Lower concentrations, such as the commonly available 91%, do not clean or evaporate well and adversely affect sensor-to-meter bond.

#2 Placement of the Sensor

a) Insert sensor cable through sensor flap.
b) Remove the adhesive backing from the high-bond tape on the optic sensor face.
c) Orient the sensor so the water meter needle approaches the sensor from the cable side and perpendicular to the cable. There are marks on each side of the sensor base that are to be in line with the needle when it passes. Do not place the sensor over any moving part or the sweep hand of the register. Normally, place sensor along outer edge of register.

Here is an example of correct Sensor Placement

:

#3 Pressure – To the Sensor on the Meter

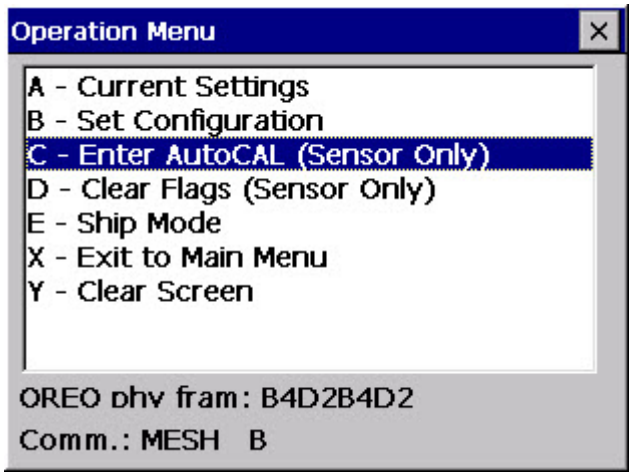
NOTE: Since the 3M tape provides a **pressure sensitive seal,** the installer must apply 15 lbs. of pressure to the FIREFLY optical sensor immediately after attaching to the lens surface for a minimum of 60 seconds.

a) **Very Important**: Press the adhesive down for **60+ seconds** using **15 lbs of pressure.** Allow 24-96 hours to cure.
b) Fasten the cable to the register with a zip tie.
c) Place Goop-Plumber's Adhesive #15112 (purple tube) around the edge of the sensor and under the tail of the sensor. Do not squirt the adhesive UNDER the 3M seal. The goal is to provide a temporary water barrier between the meter face and the edge of the sensor, so that the 3M adhesive can cure properly.
d) Position the flap at the base of the sensor so that it folds over and "hangs" above the register to try to keep most of the stray light out while it processes through AutoCAL. The flap will be "pulled" over the sensor snuggly lying flatter on the meter during the Read and Verify procedure that will be discussed later.

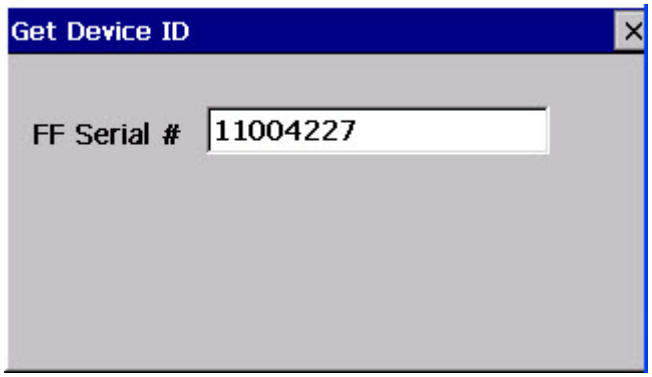
#4 Programming (see below)

Programming the Sensor-end MOSAIC FIREFLY

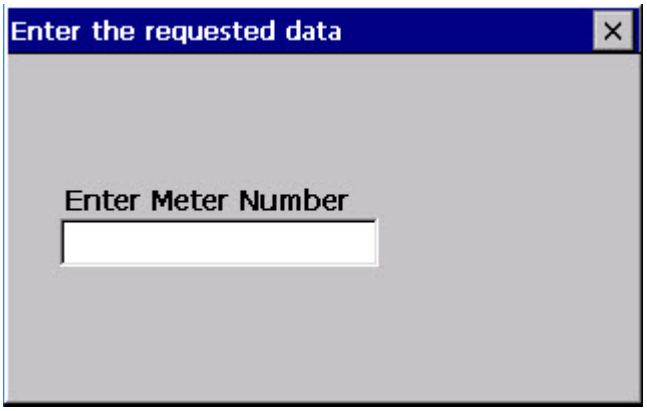
Enter AutoCAL (Sensor Only)
To configure a FIREFLY, select C – Enter AutoCAL.



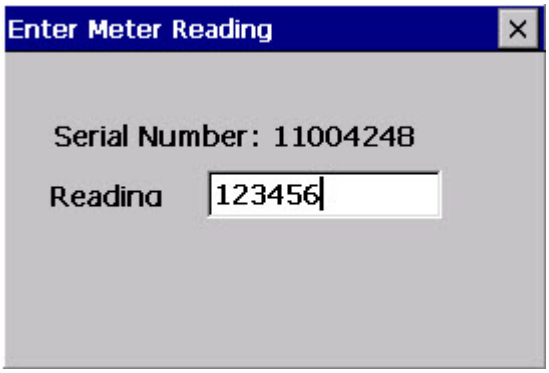
Enter the FIREFLY serial number and press Enter.



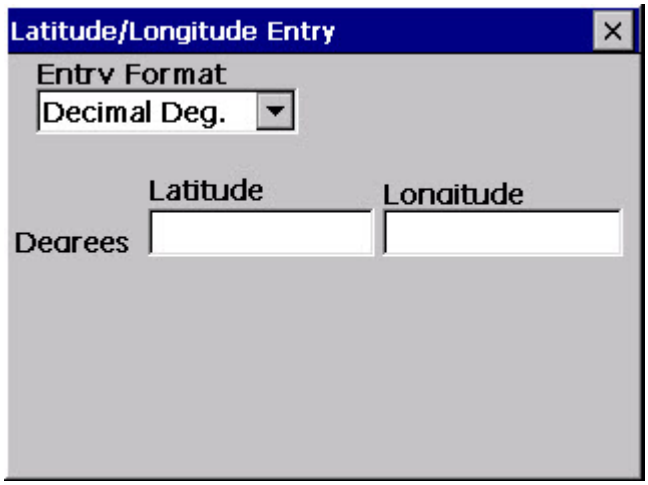
Enter the Meter Number and press Enter.



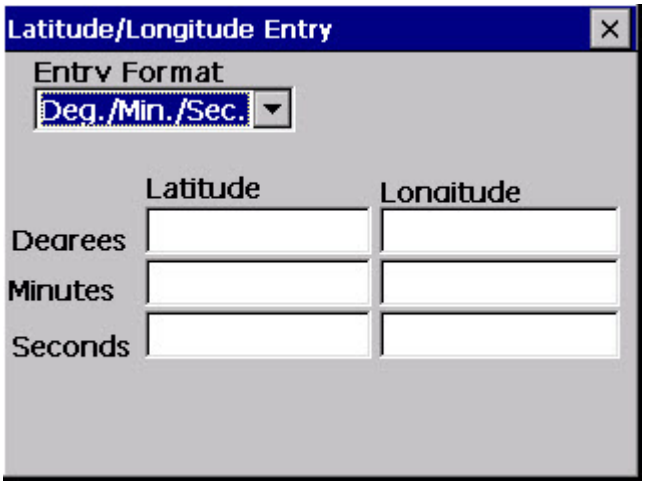
Enter the meter reading and press Enter.



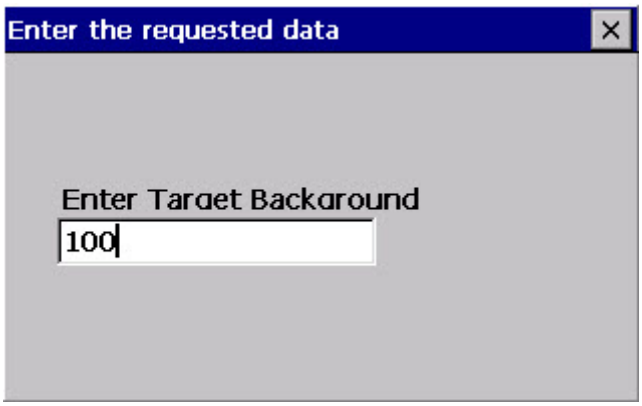
Enter Latitude and Longitude and press Enter.



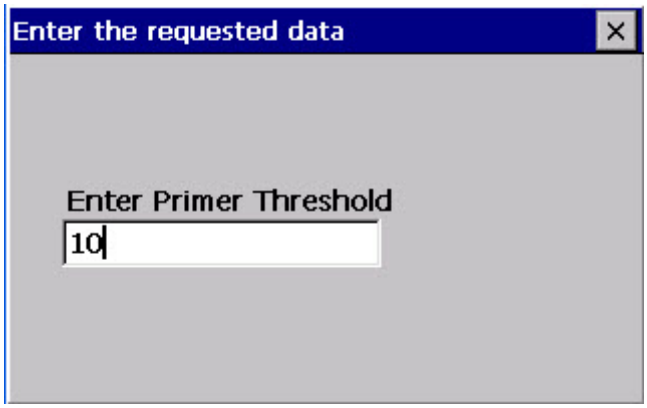
OR



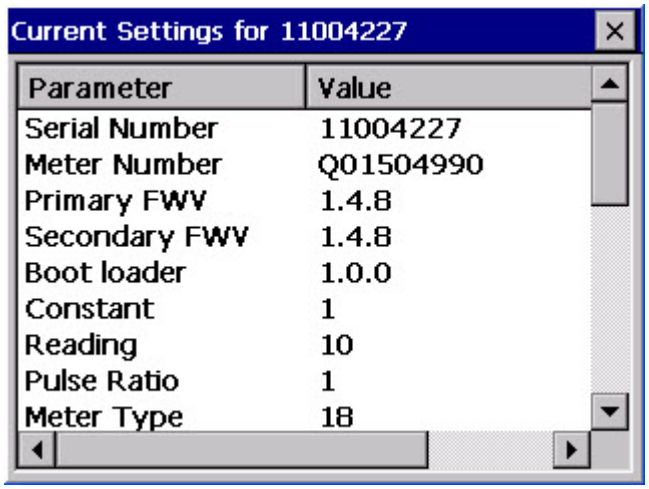
Enter the target background and press Enter.



Enter the primer threshold and press Enter.



When the updates are complete, the Current Settings will be displayed.



Press End to return to the Operation Menu.

Select Y – Clear Screen to clear the existing parameters so that you can program the next unit.

Installing and Programming Wire-end MOSAIC FIREFLYs in mesh mode

Installing Wire-end MOSAIC FIREFLYs

Connect the wires with the MOSAIC FIREFLY and meter using the wiring scheme below:

If the meter you wish to use does not appear on this list, please contact your Datamatic Project Manager.

MOSAIC-Class FIREFLY ENCODED WIRING				
Brand	**Model**	**FF Wires**	**Meter Wires**	**Meter Type**
Actaris	Cyble Coder	**Red**	**Red**	**3 or 17**
		Green	**Green**	
		Black	**Black**	
ABB/AMCO/Kent	Scancoder	**Red**	**Green**	**2**
		Green	**Red**	
		Black	**Black**	
AMCO	InVision	**Red**	**Green**	**14**
		Green	**Red**	
		Black	**Black**	
Badger	ADE	**Red**	**Red**	**3**
		Green	**Green**	
		Black	**Black**	
Hersey	Translator	**Red**	**Red**	**16**
		Green	**White or Green**	
		Black	**Black**	
Metron	Hawkeye OER	**Black**	**Black**	**3**
		Red	**Red**	
		Green	**Green**	
Neptune/Schlumberger	ARB V	**Red**	**Black**	**9** (4 digit) **10** (5 digit) **11** (6 digit)
		Green	**Red**	
		Black	**Green**	
Neptune/Schlumberger	ARB VI PRO	**Red**	**Black**	**15***
		Green	**Red**	
		Black	**Green**	
Neptune/Schlumberger	AUTO	**Red**	**Black**	**15***
		Green	**Red**	
		Black	**Green**	
Neptune	E-coder	**Red**	**Black**	**13 or 15**
		Green	**Red**	
		Black	**Green**	
Sensus/Rockwell/Invensys	SR II / ICE (**TR-PL**)	**Red**	**Red**	**3**
		Green	**Green**	
		Black	**Black**	
Sensus/Rockwell/Invensys	Touchread/SR II (**TR-PL**)	**Red**	**Red**	**1**
		Green	**Green**	
		Black	**Black**	
Sensus/Rockwell/Invensys	PMM/AMR System (**TR-PL**)	**Red**	**Red**	**3**
		Green	**Green**	
		Black	**Black**	

*Previously installed FIREFLYs may report a Meter Type of 12

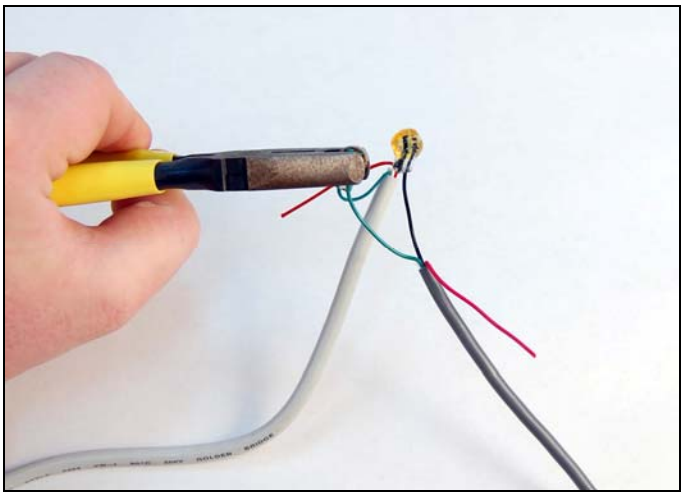
MOSAIC-Class FIREFLY PULSE WIRING					
Brand	**Model**	**FF Wires**	**Meter Wires**	**Note**	**Meter Type**
Actaris	Cyble Sensor	**Black**	**White**	*FF Red and Green shorted together*	**4**
		Blue	**Brown**		
AMCO	Digital Pulse	**Black**	**Red**		**5**
		Green	**Green**		
		Blue	**Black**		
Badger	RTR	**Black**	**Black**	*FF Red and Green shorted together*	**4**
		Blue	**Red**		
Badger	RTR (Pulse with tamper)	**Black**	**Black**		**5**
		Blue	**Red**		
		Green	**Green**		
Kent/Elster	V100	**Black**	**Blue**	*FF Red and Green shorted together*	**4**
		Blue	**Red**		
Master	Logical Switch	**Black**	**Black**	*FF Red and Green shorted together*	**4**
High Glass		**Blue**	**Red**		
MOSAIC-Class FIREFLY REPEATER WIRING					
	All models except D4000 & D4110	**Red**		*FF Red and Blue shorted together*	**253**
		Blue			

Schematics: Write in the Wire Color Combinations Below			
MOSAIC FIREFLY			
Meter			

Schematics: Write in the Wire Color Combinations Below			
MOSAIC FIREFLY			
Meter			

Schematics: Write in the Wire Color Combinations Below			
MOSAIC FIREFLY			
Meter			

Schematics: Write in the Wire Color Combinations Below			
MOSAIC FIREFLY			
Meter			

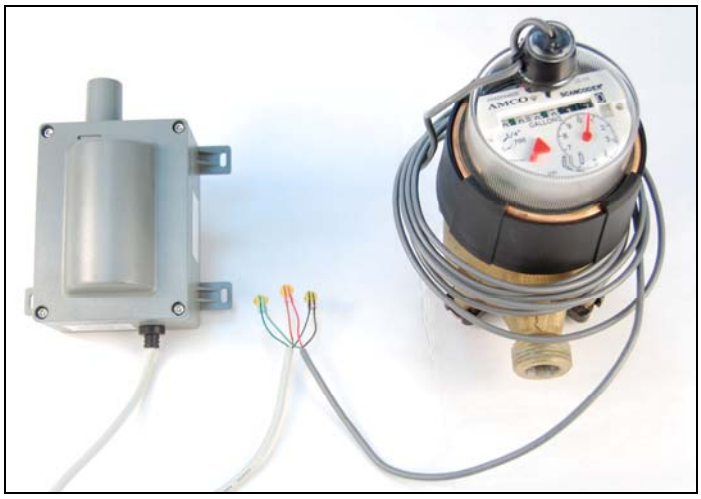


Crimping UY connectors

Be careful not to nick any individual wires when removing the insulated covering from the wires.

Connect the wires using UY gel cap connectors. If the wires are stripped, cut off the stripped ends. Wires must have un-stripped ends for use in gel cap connectors. Use the Klein crimping tool to secure the gel cap connectors. Do not use standard pliers to crimp UY connectors.

Make sure wires are fully seated – pull gently to verify that there is a secure connection.



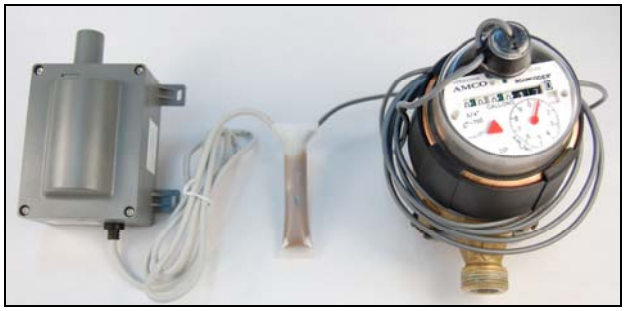
MOSAIC FIREFLY with UY gel cap connectors to register

Note: Once connected to the encoded register, test the MOSAIC FIREFLY connections by swiping the magnet under the LED's to activate the MOSAIC FIREFLY.

After swiping, the MOSAIC FIREFLY will indicate a good connection to an encoded register by displaying a solid red LED. Note, if the red LED does not go solid after attaching to an encoded register the FIREFLY may not be connected correctly or the register cannot be read.

Pulse output registers do not provide instant feedback from the register after programming. A Read Verification will need to be performed after installation to verify the meter is pulsing to the FIREFLY properly. It is crucial to be sure the wires are connected properly prior to inserting them into the burial pod.

After swiping, the MOSAIC FIREFLY will indicate a successful connection to a pulse register by displaying a fast-blinking red LED. Insert the connections into the 3M burial pod.



MOSAIC FIREFLY with burial pod connecting to the register

Splice Methods

Water Pit Splice Method for Direct Register Connections:

- Strip the wires back.
- Cut excess wires and direct connect to meter according to wire connections guide per register type.
- Fill the wire connection reservoir on the meter with DC-111.

Each register terminal and wire connection must be protected from moisture utilizing the Electrical Insulating Compound Specified below:

DOW CORNING
MFG. Model # 111

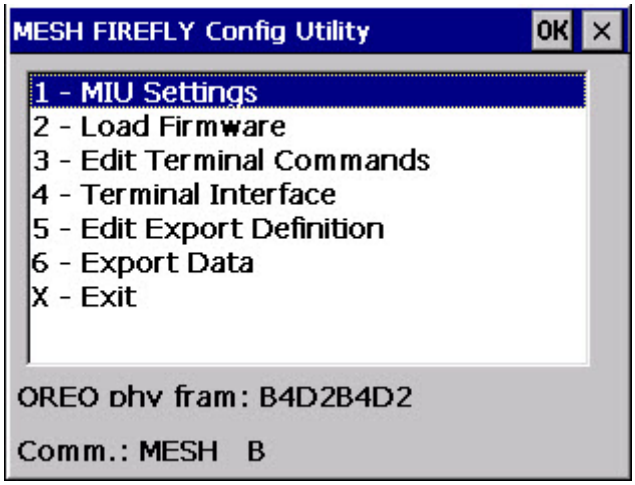
Basement Splice:

- Space the connections out so that the Mastic Pad will cover the entire connection.
- The 3M Scotch Vinyl Mastic Pad can be cut so that one pad covers 2-3 installations depending on the number of wires needed and type of connectors used.
- Be sure there is enough pad to completely cover the connections.
- Due to the nature of the Mastic Adhesive, this installation cannot be completed in temperatures below 45 degrees Fahrenheit.
- Once the Mastic Adhesive is placed over the splice, it must be squeezed together and molded around the splice to insure a watertight seal.

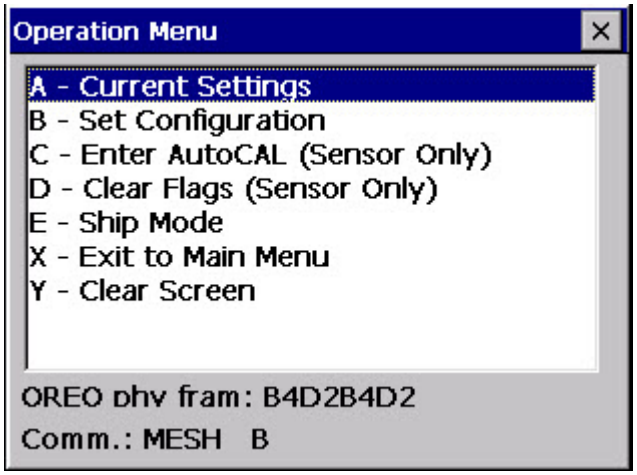
Mastic Pad

Programming the Wire-end MOSAIC FIREFLY

From the MESH FIREFLY Config Utility Menu, select 1 – MIU Settings.



The following selections are available from this menu:

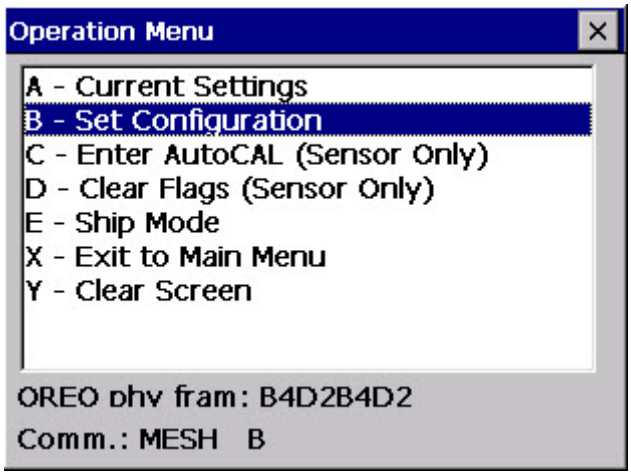


A – Current Settings	View the current configuration of the FIREFLY
B – Set Configuration	Set the configuration parameters for this type of FIREFLY
C – Enter AutoCAL (Sensor Only)	Manually enters AutoCAL mode for a Sensor-end FIREFLY
D – Clear Flags (Sensor Only)	Clears all flags in the Sensor-end FIREFLY
E – Ship Mode	Sets the FIREFLY to Ship Mode
X – Exit to Main Menu	Returns to the Main Menu
Y – Clear Screen	Clears the Configuration Screen

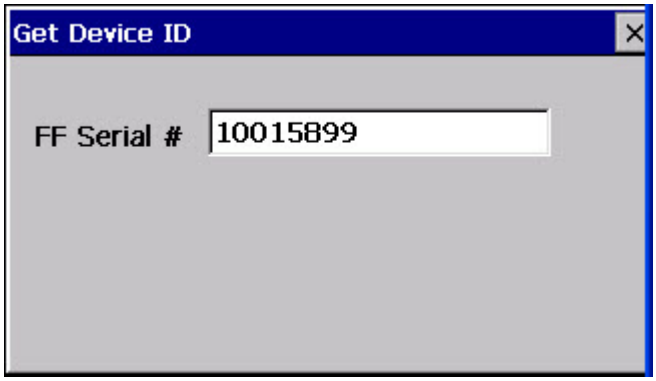
NOTE: To perform menu items A, B C, D and E, the FIREFLY must be active (i.e. LEDs must be active) before it will respond. To activate the FIREFLY, magnet swipe the FIREFLY then perform the function.

Set Configuration

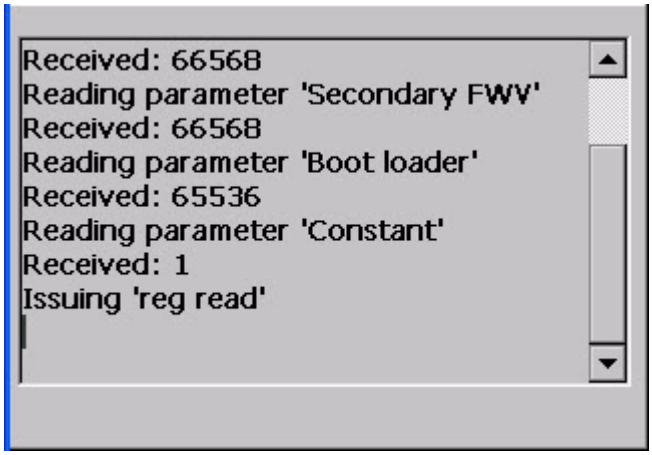
To set the configuration of the Wire-end FIREFLY, select B – Set Configuration.



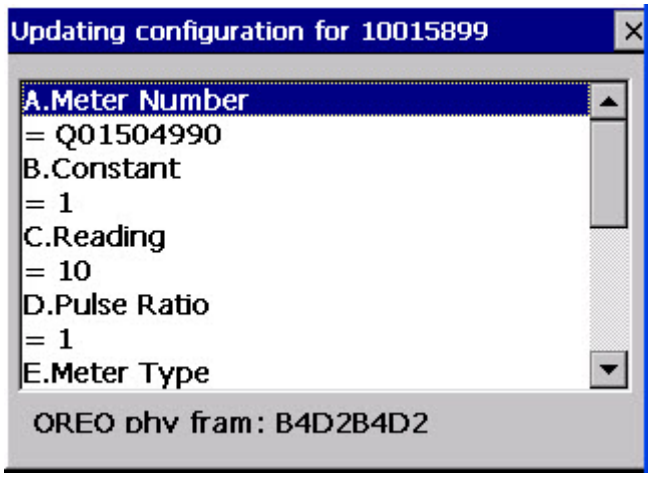
Enter the FIREFLY serial number and press Enter.



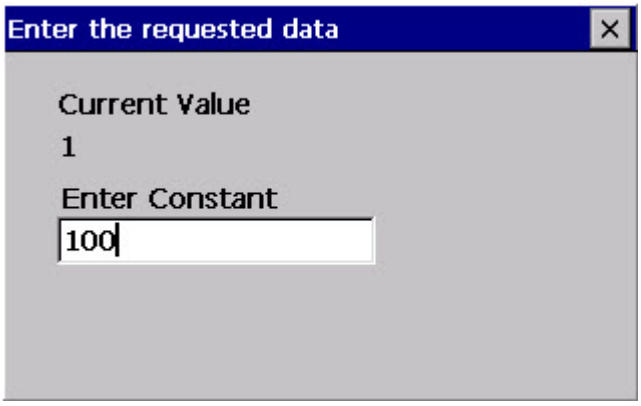
The values will be read and displayed from the FIREFLY.



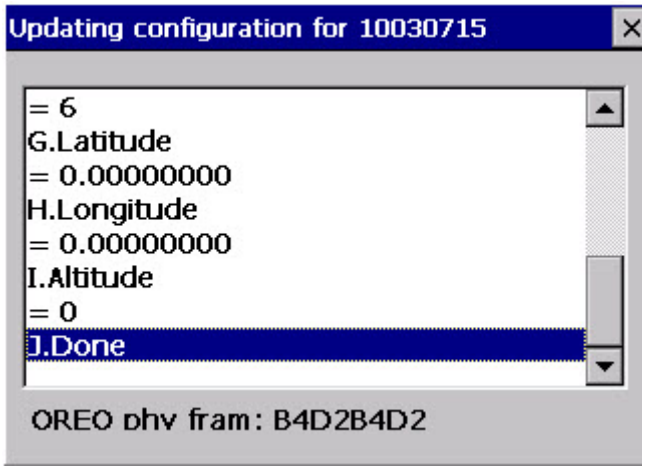
When complete, the values will be read back from the FIREFLY and redisplayed for user verification:



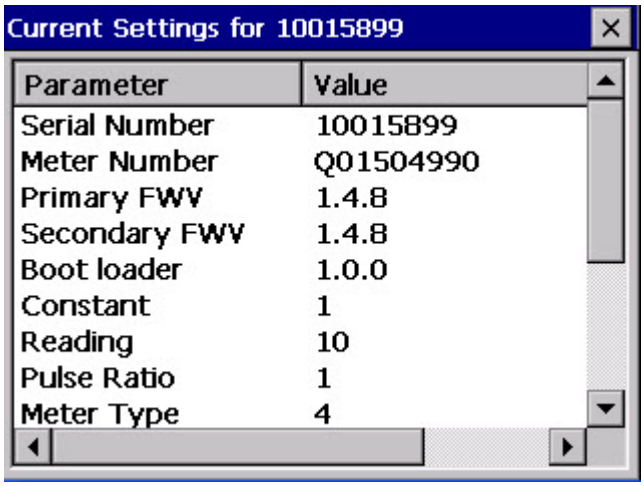
To change any parameters, highlight the line and press Enter. Type in the value you wish to update and press Enter.



When updates are complete, select J. Done, then press Enter.



When the updates are complete, the Current Settings will be displayed.



Press End to return to the Operation Menu.

Select Y – Clear Screen to clear the existing parameters so that you can program the next unit.

Using a FIREFLY as a Repeater

You will need a repeater in situations where there is excess distance between installed units. Repeaters help 'lighten the load' in passing data to the MOSAIC Gateway in dense installation areas and areas with excessive RF obstructions.

- Wire red & blue together and swipe with the magnet to activate the MOSAIC FIREFLY as a repeater.

Repeaters are ideally placed above ground with the antenna in a vertical position. When using FIREFLYs as repeaters, they can be placed in pits, but a resulting loss of RF performance should be anticipated. For best results and maximum coverage mount the repeater similar to the picture above.

Load Firmware

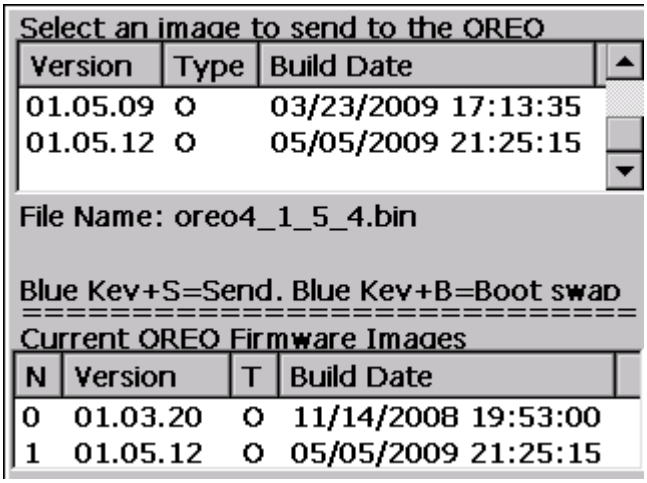
Load Firmware Image to OREO
After the user selects the 'Load Firmware' option, the following dialog is displayed:

MESH – Datamatic fixed network technology. All FIREFLYs are networked and reads are collected via Gateways then displayed in the MOSAIC software.
Fence – Datamatic non-mesh technology. All FIREFLY reads are collected via a ROADRUNNER handheld or drive by ROADRUNNER Mobile system.

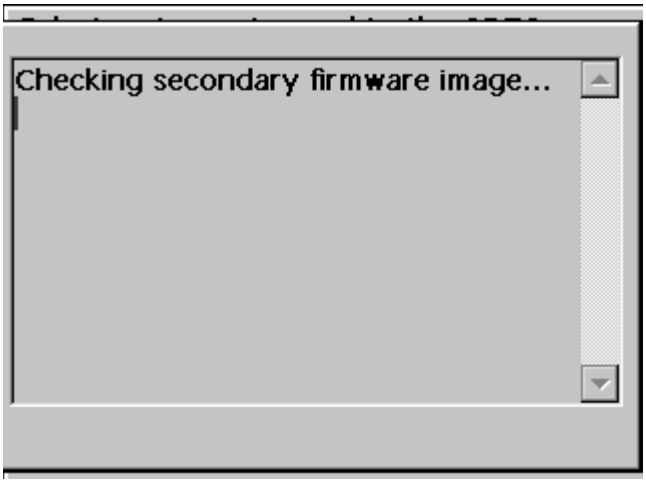
Options 3 and 5 allow loading firmware images to Fence devices and options 2 and 4 allows loading firmware images to a MESH device.

If the user is loading a firmware image from one type to another type, i.e. from Fence to MESH or from MESH to Fence, if the image is being loaded into the primary image location, the software will temporarily switch the radio mode to match the new expected mode when the firmware image loading process has completed. This will allow the software to verify that the image loaded correctly. When the user exits the firmware loading dialogs, the software will switch the radio mode back to the original settings (if necessary) prior to the firmware image loading operation.

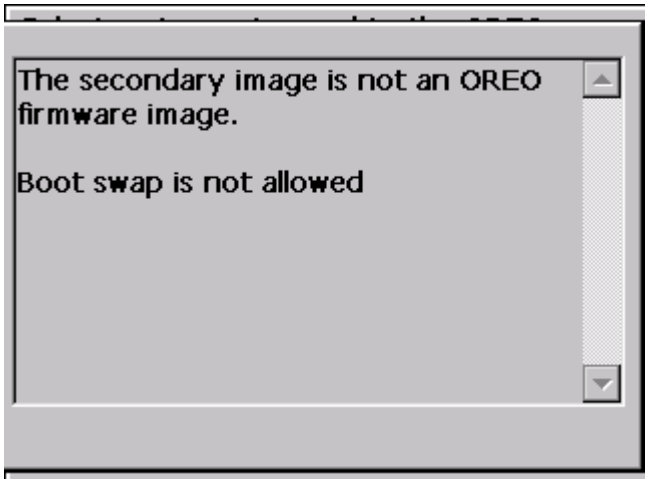
If the user chooses the Update OREO firmware option, the load firmware image to OREO dialog will be displayed but only OREO images will be shown in the display. The user can then select an image to send to the OREO. Once there is an OREO image in the secondary image location, the user will then be given the option to boot swap the OREO images by pressing the Blue Key + 'B'. If the OREO secondary firmware image already contains an OREO firmware image when the dialog is opened, the user will immediately have the option to send a new image or boot swap the primary and secondary images. The following screen shots are examples of upgrading the OREO firmware.



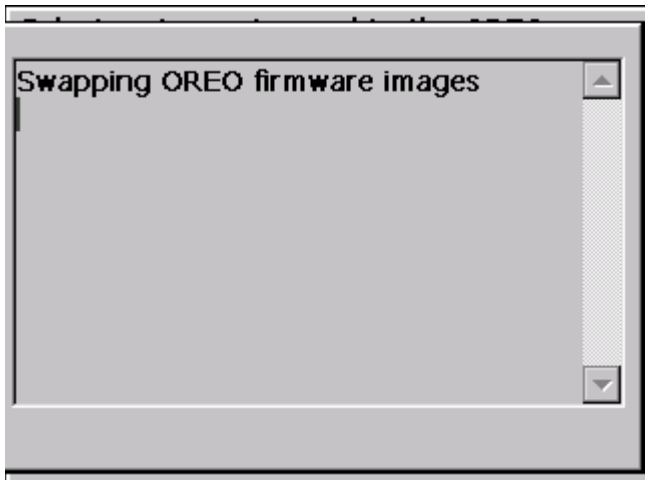
After a new OREO firmware image has been loaded into the secondary image location of the OREO, the user will then have the option to swap the OREO firmware images by pressing the Blue Key + 'B' key to initiate the boot swap. After the user initiates the boot swap the following dialog is displayed:



The software must first verify that the secondary firmware image in the OREO is an image targeted for the OREO hardware. If the secondary image is not an OREO image, the image swap will not be allowed. The following screen shot is an example:



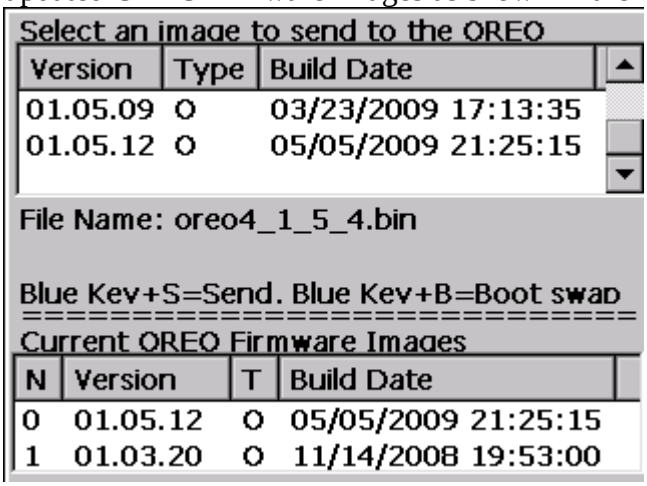
If the secondary firmware image is a valid OREO firmware image, the software will then proceed to swap the images as shown in the following screen shot:



After the image swap has been completed, the following messages are displayed in the status dialog:

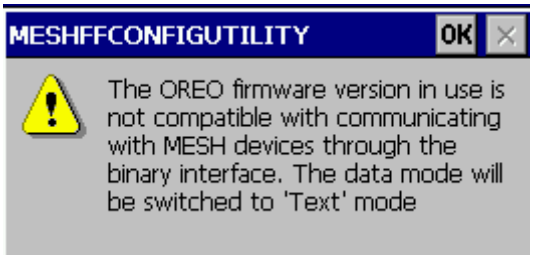
The software disconnects from the radio and then attempts to reconnect in order to verify that the radio is working properly after the firmware image swap.

After the image swap is complete, the Load Firmware Image dialog is redisplayed along with the updated OREO firmware images as shown in the following dialog:



Note that the primary and secondary firmware images have been swapped.

If the user loads an updated OREO firmware version to the OREO, when the user returns to the main menu, the software will check the OREO version to verify it is compatible with the radio settings. This is mainly due to the fact that 1.3.20 does not support communicating with MESH devices through the binary interface. If the OREO firmware version is not compatible with the radio communication settings, the settings will be automatically updated to match those supported by the OREO firmware. The user will be notified when this occurs. The following dialog is an example:



NOTE: It is highly recommend updating the OREO firmware to version 1.5.12 immediately after loading CXMI 1.3 to the hand held. CXMI 1.3 will be supplied with ROADRUNNER 3.26.3 and 3.26.4 bin files. OREO firmware version 1.5.12 is also supplied in these bin files.

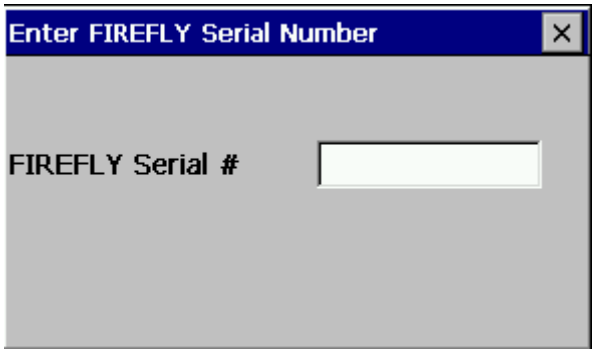
Once the transfer has completed, the user will be returned to the list of available firmware images dialog box. The firmware image was transferred to the secondary image on the OREO. If the image loaded is to replace the existing OREO image, a boot swap command must be done to move the image to the primary location.

Load Image to FIREFLY

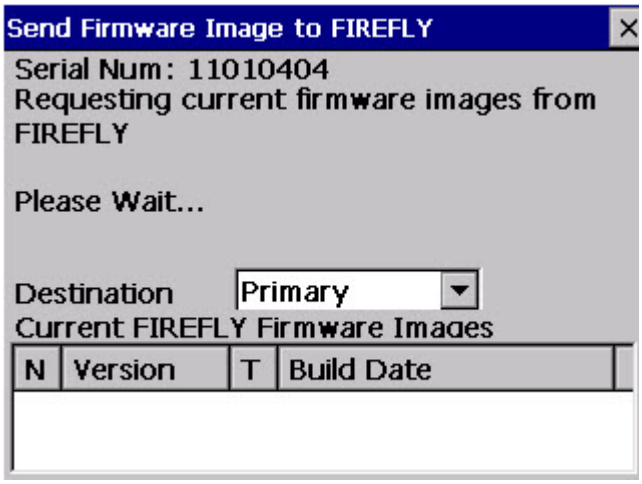
To load a firmware image to the FIREFLY the user will select option 2 or 3 from the Load Firmware dialog:

The firmware image that will be sent to the FIREFLY is the image that is stored in the secondary image location within the OREO. So in order to send a firmware image to a FIREFLY, the image must first be loaded into the OREO.

After selecting option 2 or 3, the user will be prompted for the serial number of the FIREFLY:

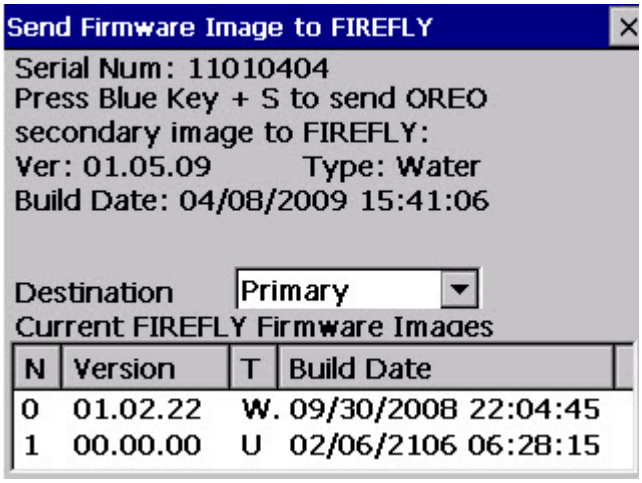


After entering the serial number, the 'Send Firmware Image to FIREFLY' dialog is displayed:



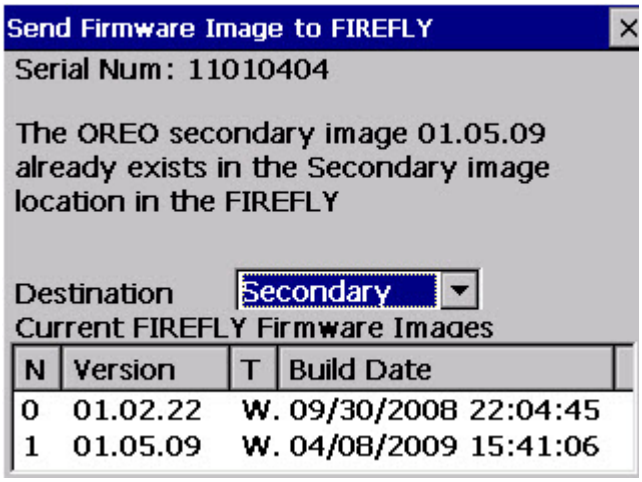
NOTE: Choosing “Destination: Both” will only work when upgrading firmware in the same mode (i.e. mesh to mesh or non-mesh to non-mesh).

Immediately the application begins requesting a list of the current firmware images stored in the FIREFLY. After a few seconds, these images are displayed in the list control at the bottom of the screen:



Once the application has a list of firmware images from the FIREFLY, it displays the current image that is available in the OREO for sending to the FIREFLY.

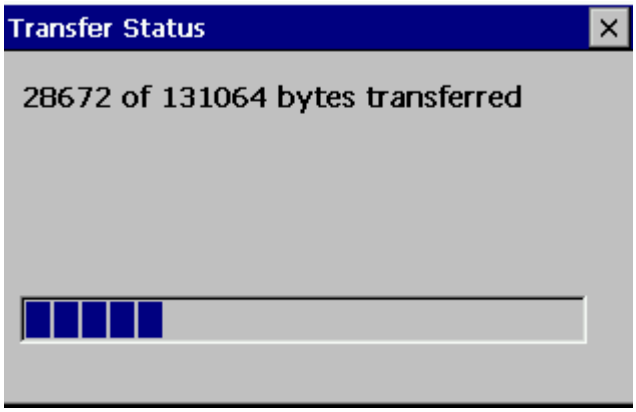
If the firmware image that will be sent to the FIREFLY from the OREO already exists in the secondary image location in the FIREFLY, it will be indicated as in the following screen shot:



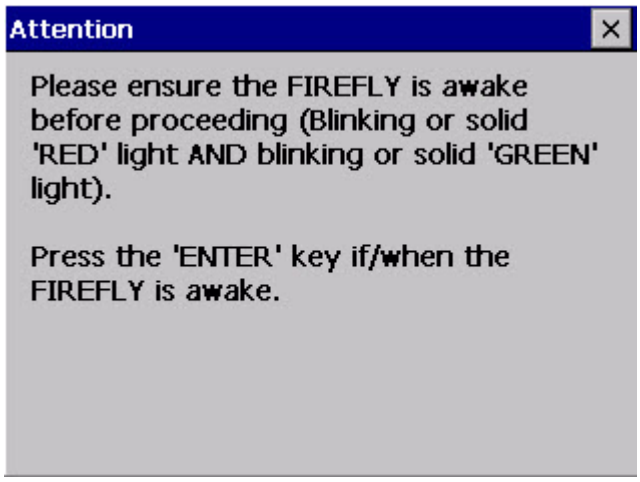
It determines that the images are the same by examining the version, firmware type and build date. If all three of these are the same, the message is displayed.

If the image does not already exist in the FIREFLY, the user will be required to press the Blue (FNCTN) key and the S key to start the transfer from the OREO to the FIREFLY.

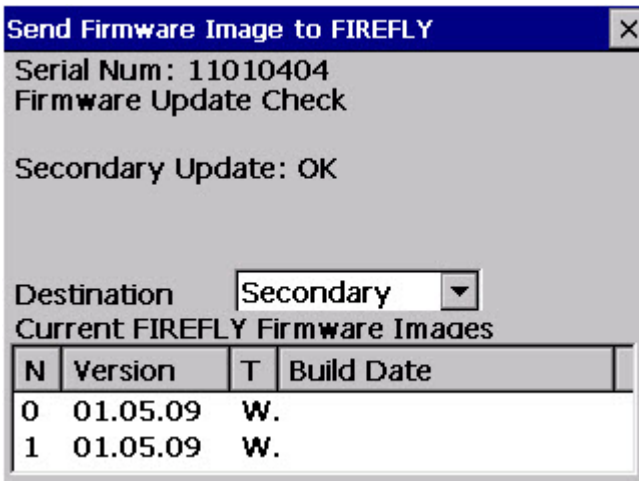
When sending the image the software will display the progress of the transfer as shown in the following dialog:



After the transfer has completed, a message is displayed on the screen indicating that the transfer is almost done (re-activate the FIREFLY if needed):

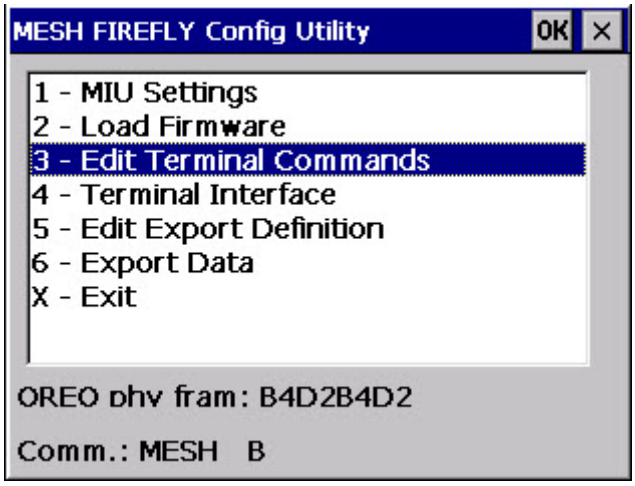


After the transfer has completed, a message is displayed on the screen indicating that the transfer is done:



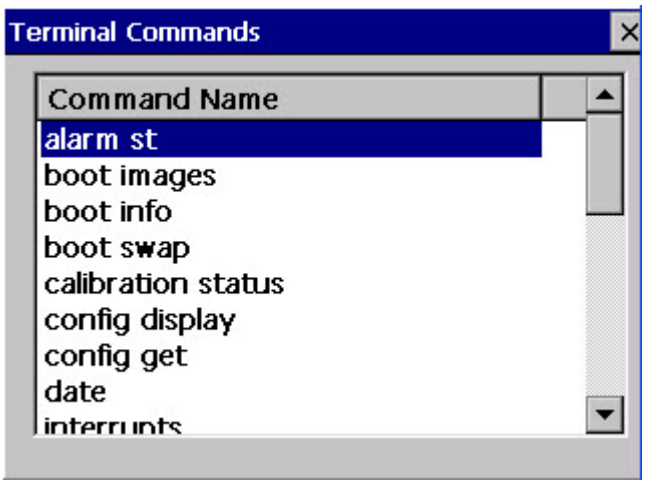
It should be noted that the FIREFLY goes inactive after the transfer has completed. In order to swap the image into primary location on the FIREFLY, the boot swap command must be issued to the FIREFLY from the command line.

Edit Terminal Commands



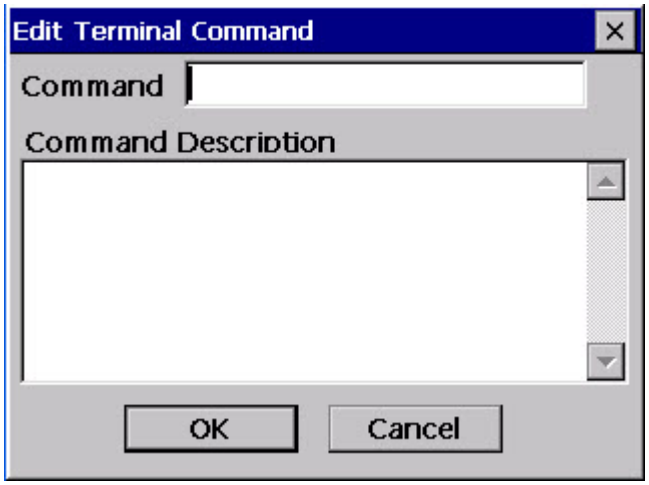
Adding a new terminal command
To add or edit a terminal command, from the main selection menu, select the 'Edit Terminal Commands' menu item:

After selecting this option, the following dialog is displayed:



This dialog displays all of the commands that have been added to the command list. The commands are sorted in alphabetical order. All of the commands are stored in a file called TerminalCommands.dat. The file is expected to be in the same location as the CXMI application itself. If you do not have this file, please contact Datamatic Customer Support.

To add a new command, press the Blue Key and the 'A' key to display the following dialog:

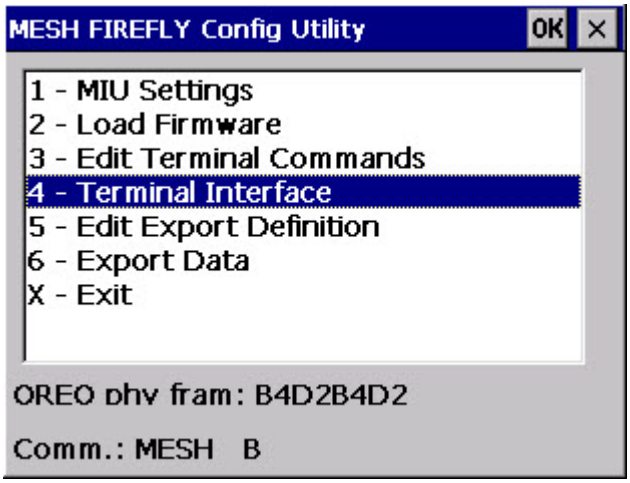


The command edit control is where the terminal command is entered. The command description is not required.

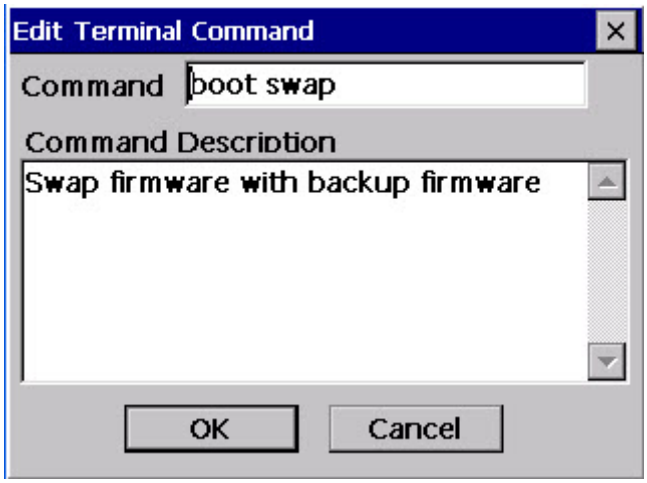
When entering a description, the 'ENTER' key can be used to add line feeds to the description as needed.

To dismiss the dialog box and accept the changes, press the 'OK' button. To discard the changes, press the 'CANCEL' button or press the 'ESC' key.

Terminal Interface

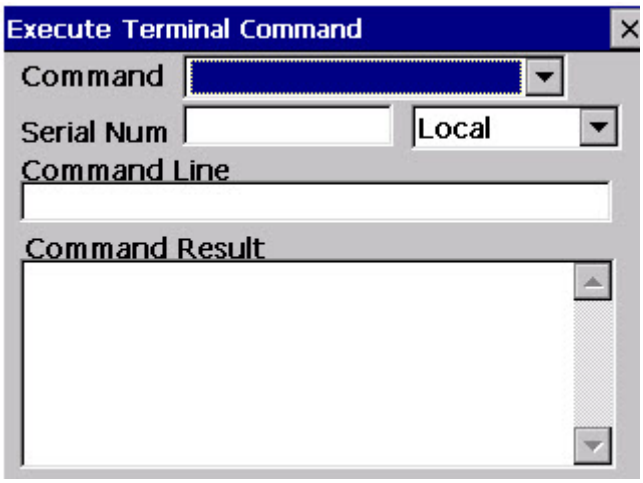


To edit an existing terminal command, select the command by highlighting it and then press the 'ENTER' key. The command along with its description will be displayed in the dialog box:



The dialog behaves the same as when adding a new command. The 'ENTER' key can be used to add line feeds. To accept the changes and dismiss the dialog, press the 'OK' button. To discard the changes press the 'CANCEL' button or hit the 'ESC' key.

To execute a terminal command, select option 4. Terminal Interface from the main selection menu. After selecting the terminal interface menu item, the following dialog is displayed:



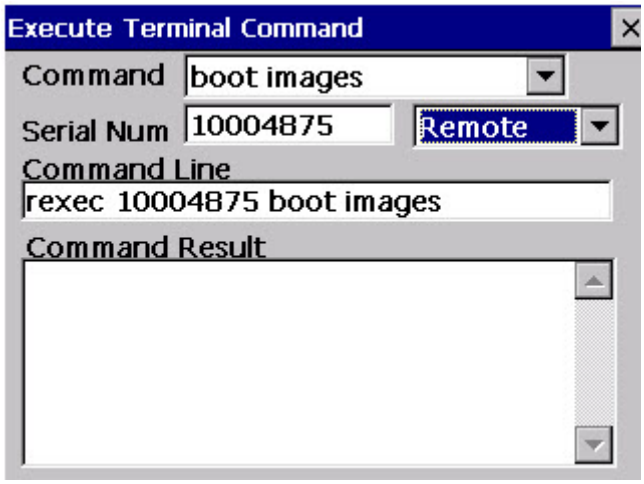
This dialog has 5 controls.

The Command drop down list contains the list of available commands that can be executed on the command line.

The Serial Num edit box is where the serial number for a remote device is supplied.

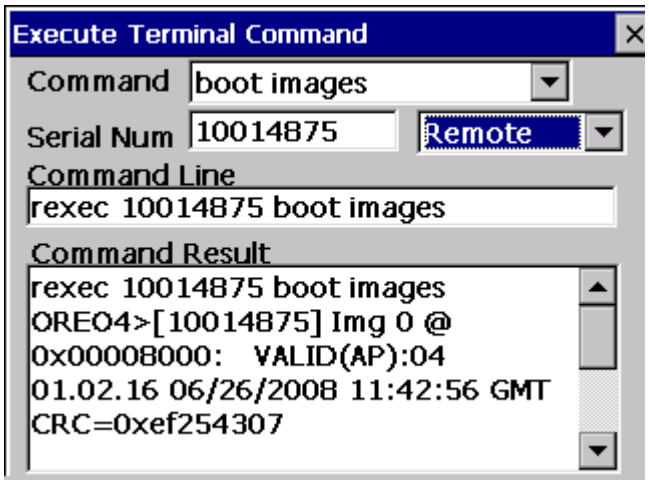
The drop down list following the serial number edit control indicates whether a command will be local or remote. A local command will be directed to the OREO. A remote command will be directed to the device indicated by the serial number.

The Command Line edit box shows the formatted command that will be executed on the target device. When the user selects a command from the drop down list box, the command is automatically formatted and added to the command line edit box. If the user is executing a command on a remote device (for example, a FIREFLY), the 'rexec' command is automatically added to the command line as shown in the following dialog:

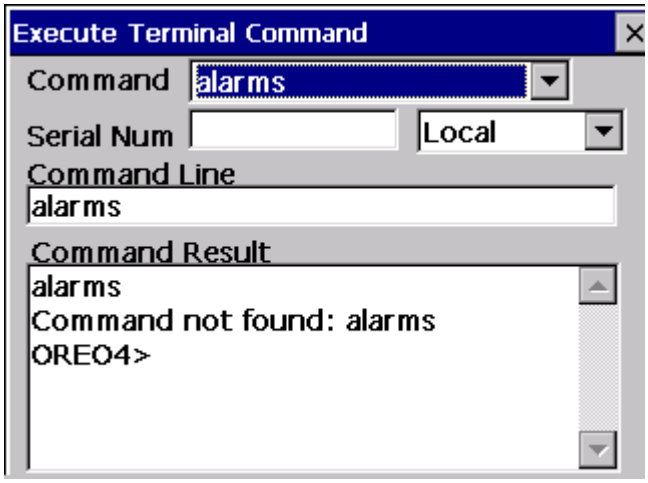


It should be noted that when a serial number is supplied, the command is automatically configured for remote execution.

After the command is entered, press the Blue Key and the 'E' key to execute the command. For the remote execution of the boot images command, after the command is executed, the 'Command Result' edit window will show the results of the command as shown in the following dialog:



If the device does not support a command that is executed, the typical response from the device is 'Command not found: (command)'. The following is an example:



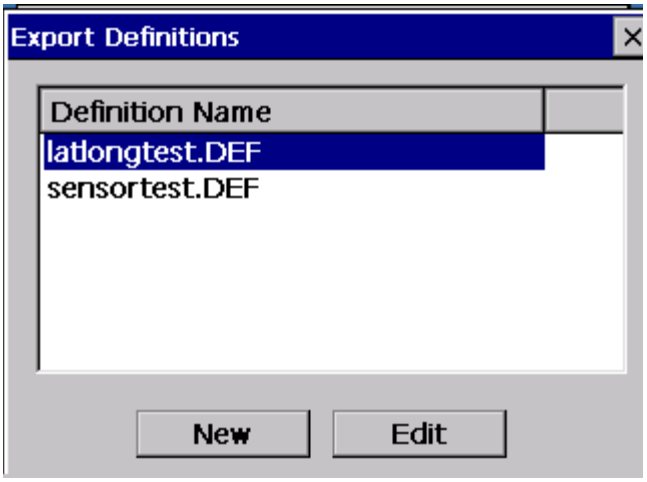
Also, if a terminal command that is needed has not been set up in the list, it can be entered directly in the Command Line edit control and executed just as if it were in the list.

It should be noted that only a single command can be executed at a time.

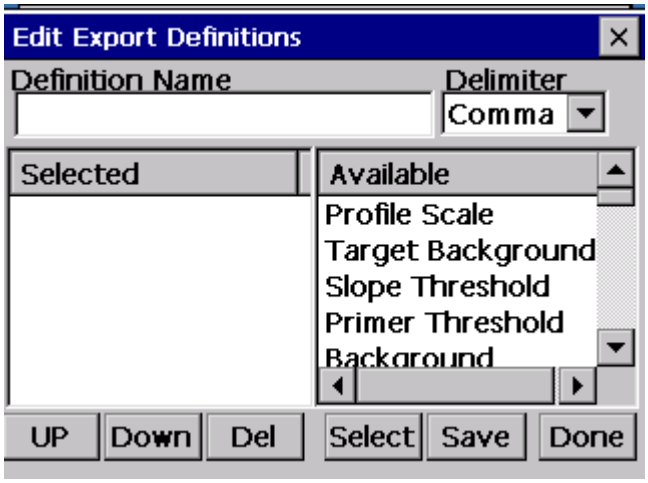
Edit Export Definition

The data export feature will allow exporting most of the data items captured during the FIREFLY configuration process. In order to export data that has been captured, a definition that defines the order of the fields in the export file as well as the fields to be export must be created. To create a new export definition or to edit an existing export definition, the user will select option '5' from the main menu. This option is the Edit Export Definition option.

After selecting option 5, the following dialog is displayed:



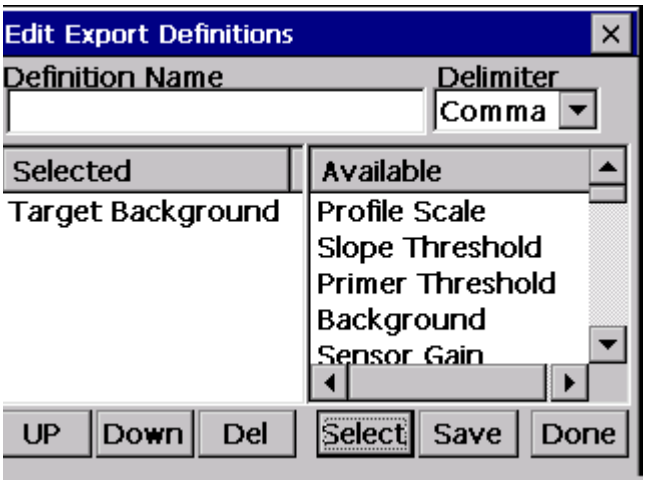
The list in the dialog shows the existing definitions that have been set up previously. To edit an existing definition, the user will highlight the definition that requires modification and press the 'Edit' button. To create a new definition, the user will press the 'New' button.
If the user selects either the new button or selects to edit an existing definition, the following dialog is displayed:



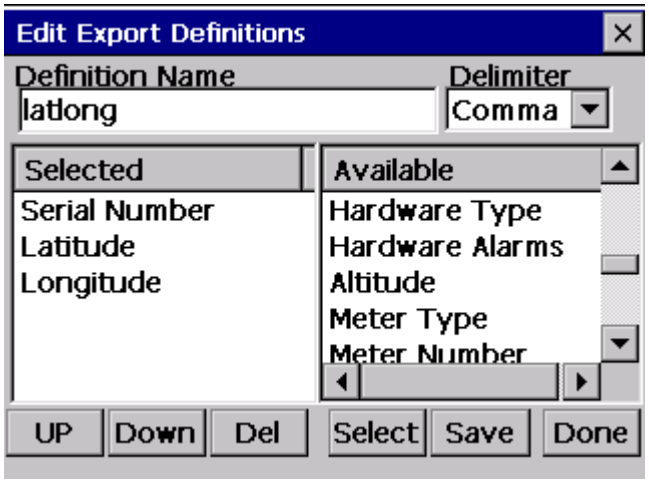
When setting up a new definition, the user will be required to enter a definition name. The delimiter option allows the user to specify how the fields will be separated in the export file. There are three available separators the user can choose from: Comma, Semicolon, and Tab.

The default selection is to separate the fields in the exported file by commas.

There are two list views on the dialog. The list control on the left shows the data items that are selected to be exported. The list control on the right shows the available data items that can be exported. In order to select an available item, the user must highlight the item to be included in the export and press the 'Select' button. This action will move the item from the 'Available' list control to the 'Selected' list control. The following dialog is an example of moving the 'Target Background' field to the 'Selected' list.



Only one item can be selected at a time. This process can be used to move several items to the 'Selected' list until the 'Selected' list contains all of the items of interest to be exported.
The items will be exported in the order that they appear in the 'Selected' list. The following screen shot is an example of setting up a definition to export lat/long data.



The fields will be exported in the order that they appear in the 'Selected' list. To arrange the order of the fields, highlight the field and press the 'Up' button to move the item up in the list or the 'Down' button to move it down in the list. To remove an item from the selection, press the 'Del' button. Removing an item will move the item back to the Available fields list.

When the export definition is finished, the user can select the 'Save' button to save the definition. The location where the export definitions are saved to will be the \CXMIExportDef folder.

To exit the dialog, the user will select the 'Done' button or press the 'ENTER' key. To exit the dialog without saving changes to the dialog, the user will be required to press the 'ESC' key. A warning indicating that the definition has not been saved will be displayed to verify that the user wants to exit the dialog without saving any changes to the definition.

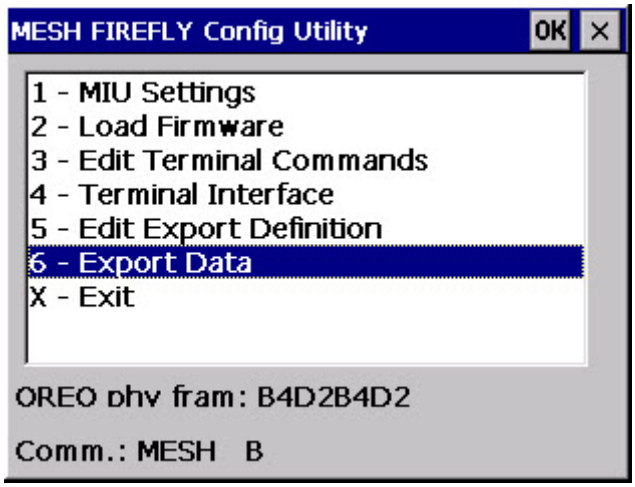
In the example above, when the lat/long data is exported, on each row of data, the serial number will appear first followed by the latitude and then followed by the longitude. Each row will contain these 3 items. Also, the first row in each exported file will contain the names of the fields represented in the file. The following is an example of the exported data:

Serial Number, Latitude, Longitude
13000082, 11954973, -35195374
13000184, 11955067, -35195540

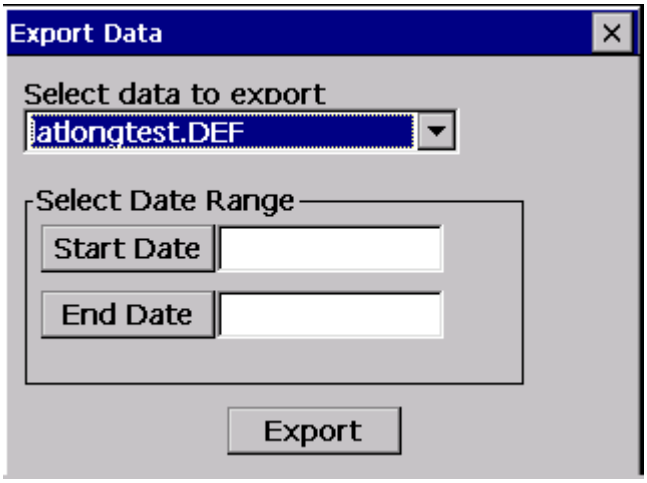
Once exported, this file can be imported into excel or some other application to view or process the data (after the file has been retrieved from the ROADRUNNER). A common software program used for retrieving data from a handheld or mobile device is ActiveSync. If you do not have this software on your PC, please contact a member of your IT staff.

Export Data

In order to export data using a definition, the user will select option ‘6’ from the main menu. The following screen shot is an example of the main menu.



Selecting option 6 will show the following dialog:

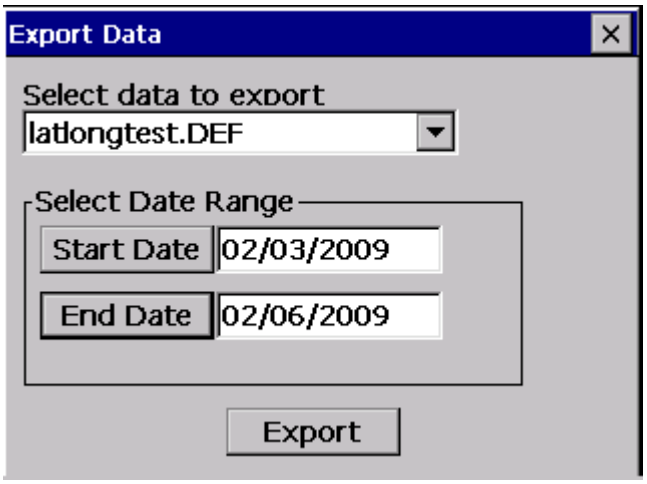


There will be a drop down list that contains all of the definitions that have been set up for exporting data. After selecting a definition, the user will then have the option for entering a start date and an end date. Each of the records captured from a FIREFLY is time stamped with the date and time at the extraction. This will allow exporting data for a specific range of dates. Leaving the start and end date fields blank will export all records that are available for export.

If the user decides to enter a start date and end date, the user can enter the date manually in the edit control in the format MM/DD/YYYY or the user can simply press the ‘Start Date’ button or the ‘End Date’ buttons to select a date from a calendar. Selecting the start or end date buttons will bring up the following dialog:

To select a date, the user can use either the arrow keys to move between dates and months or use the stylus to select a date. The left/right arrow keys will scroll through the dates backward/forward through the month. The up/down arrow keys will cause the date selection to scroll from week to week.

After selecting a date, the user will need to either press either the 'OK' button on the screen or press the 'ENTER' key on the keyboard. After the user dismisses the dialog used to select a date, the date will be displayed in the Export Data dialog edit control. The following screen shot is an example:



Once the user has selected the start and end date, the user can begin the export by pressing the 'Export' button. The following is an example of the exported data:
Serial Number, Latitude, Longitude
13000082, 11954973, -35195374
13000184, 11955067, -35195540

The location where the exported data is stored will be in the \CXMIData folder. The file name will be the same name as the definition file with the '.DEF' extension removed and an '.EXP' extension will be added. Also, the date will be added to the name of the file. For example, using the above definition name, the output file would be 'latlongtest_20090209.EXP'. The exported data will be stored for up to 90 days before being automatically deleted.

Joining the MESH Network/LED Status

General LED Information

LED Key:

Slow blink = on and off once per second

Fast blink = on and off four times per second

= Meter Indicator

= Mesh Indicator

Swipe the magnet in the box area surrounding the lights. After a successful magnet swipe, the green light will be solid for a *very short period* of time to confirm that the MOSAIC FIREFLY is initializing.

If the green light is fast blinking with no red light activity, there is a possibility that the real time clock (RTC) has stopped and the FIREFLY will need to be returned via RMA.

A solid GREEN LED indicates that the MOSAIC FIREFLY has received a valid message from the mesh. Confirmation that the MOSAIC FIREFLY has successfully transmitted to the mesh is indicated by the appearance of the FF in the MOSAIC software.

Generally, in mesh mode the GREEN LED indicates the status of MOSAIC FIREFLY communications with the mesh. The RED LED indicates the status of MOSAIC FIREFLY communications with the meter.

After a certain amount of time, the LEDs will go out during normal operation. This is a power-save mode. The MOSAIC FIREFLYs will be performing normally, but not exhibiting LED behavior. When MOSAIC FIREFLYs are in “ship mode” they are literally turned off and can be reactivated by following normal installation procedures.

MOSAIC FIREFLYs in non-mesh mode do not communicate via the mesh. The RED LED indicates the status of the MOSIAC FIREFLY’s communications with the meter. The RED and GREEN LEDs flash in unison every 5 seconds to indicate that the MOSIAC FIREFLY is functioning in non-mesh mode.

MOSAIC FIREFLYs Connected to an Encoded Meter (Mesh Mode)

After a successful initial swipe, the GREEN LED will flash slowly as the MOSAIC FIREFLY searches for the mesh. When communication has been established with a node already connected to the mesh (MOSAIC Gateway, Repeater or another MOSAIC FIREFLY) the GREEN LED will go solid.

Additionally, the RED LED will flash slowly until it detects the encoder. If the MOSAIC FIREFLY successfully connects to the encoder, the RED LED will go solid.

If the RED LED flashes quickly, the MOSAIC FIREFLY has detected its connection to a meter, but has not received an acknowledgement that verifies it is connected to a supported encoder. In this scenario, the wires may not be connected correctly or the encoder may not be supported in the current MOSAIC FIREFLY firmware.

If the RED LED flashes slowly, the MOSAIC FIREFLY is searching for an acknowledgement from a meter, but has not received any. The MOSAIC FIREFLY will continue to wait for an acknowledgement, but will eventually go into ship mode if none is received.

The MOSAIC FIREFLY is successfully connected to an encoded meter and the mesh when both the GREEN and RED LEDs are solid.

MOSAIC FIREFLYs Connected to a Pulse Meter (Mesh Mode)

After a successful initial swipe, the RED LED will blink slowly until it detects a connection with a pulse meter. NOTE: this happens very quickly.

Once the MOSAIC FIREFLY detects the connection to a pulse meter, the RED LED blinks quickly until 5 meter pulses are detected. Once 5 pulses are detected, the RED LED will go solid.

If the MOSAIC FRIEFLY is not wired correctly, the RED LED will continue blink slowly, or the MOSAIC FIREFLY could go back into ship mode (meaning the RED LED will go off after the magnet swipe).

MOSAIC Sensor-end FIREFLYs (Mesh Mode)

After a successful magnet swipe, the RED LED will blink slowly as the FIREFLY attempts to achieve the Target Background. Once the RED LED begins a fast blink then goes solid, the FIREFLY has achieved the target background.

Additionally, the GREEN LED will flash slowly as the MOSAIC FIREFLY searches for the mesh. When communication has been established with a node already connected to the mesh (MOSAIC Gateway, Repeater or another MOSAIC FIREFLY) the GREEN LED will go solid.

If both the RED LED and the GREEN LED blink slowly, then go off. The FIREFLY was unable to achieve the target background. Reprogramming should be attempted.

MOSAIC FIREFLYs as Repeaters (Mesh Mode)

When wired as a repeater, after a successful initial swipe, the RED LED will go solid and the GREEN LED will flash slowly as the MOSAIC FIREFLY searches for the mesh. When communication has been established with a node already connected to the mesh (MOSAIC Gateway, Repeater or another MOSAIC FIREFLY) the GREEN LED will go solid.

MOSAIC FIREFLYs in Non-Mesh Mode

After a successful magnet swipe, the green light will be solid for a *very short period* of time to confirm that the MOSAIC FIREFLY is initializing. There is no other GREEN LED behavior on MOSAIC FIREFLYs in non-mesh mode until programming is complete. When MOSAIC FIREFLYs in non-mesh mode are working correctly, the RED and GREED LEDs will flash in unison every 5 seconds.

MOSIAC FIREFLYs on Encoded Meters (Non-Mesh Mode)

After a successful initial swipe, the RED LED will flash slowly until it detects the encoder. If the MOSAIC FIREFLY successfully connects to the encoder, the RED LED will go solid.

If the RED LED flashes quickly, the MOSAIC FIREFLY has detected its connection to a meter, but has not received an acknowledgement that verifies it is connected to a supported encoder. In this scenario, the wires may not be connected correctly or the encoder may not be supported in the current MOSAIC FIREFLY firmware.

If the RED LED flashes slowly, the MOSAIC FIREFLY is searching for an acknowledgement from a meter, but has not received any. The MOSAIC FIREFLY will continue to wait for an acknowledgement, but will eventually go into ship mode if none is received.

MOSAIC FIREFLYs on Pulse Meters (Non-Mesh Mode)

After a successful initial swipe, the RED LED will blink slowly until it detects a connection with a pulse meter. NOTE: this happens very quickly.

Once the MOSAIC FIREFLY detects the connection to a pulse meter, the RED LED blinks quickly until 5 meter pulses are detected. Once 5 pulses are detected, the RED LED will go solid.

If the MOSAIC FRIEFLY is not wired correctly, the RED LED will continue to blink slowly, or the MOSAIC FIREFLY could go back into ship mode (meaning the RED LED will go off after the magnet swipe).

MOSAIC FIREFLYs (D411X only) Connected to Remote Shutoff Valves (Non-Mesh Mode)

The Remote Shutoff Valve (RSV) controls a water valve remotely. The RSV is connected to a FIREFLY in non-mesh mode. The ROADRUNNER communicates to the FIREFLY to control the RSV. The ROADRUNNER is able to control the RSV with or without a route loaded. There are 3 functions that can be performed on a RSV; Open RSV, Close RSV, and get current status of RSV (Open or Closed).

Connecting the Remote Shutoff Valve

Connect the RSV wires with the MOSAIC FIREFLY using the wiring scheme below:

FIREFLY Wire	Remote Shutoff Valve Wire	FIREFLY
Green	Green	Blue
Yellow	White	Red
Black	Brown	Shorted together

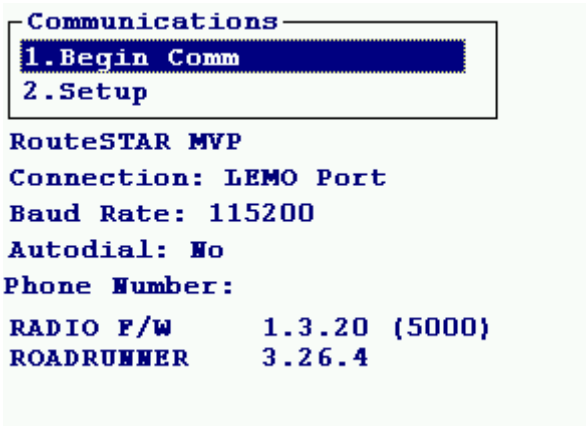
See **Installation Procedures** section for detailed instructions and approved splicing methods.

NOTE: Remote Shutoff Valves should only be installed by a licensed plumber.

Please see section entitled ”Programming and Controlling the Remote Shutoff Valve” for specific instructions.

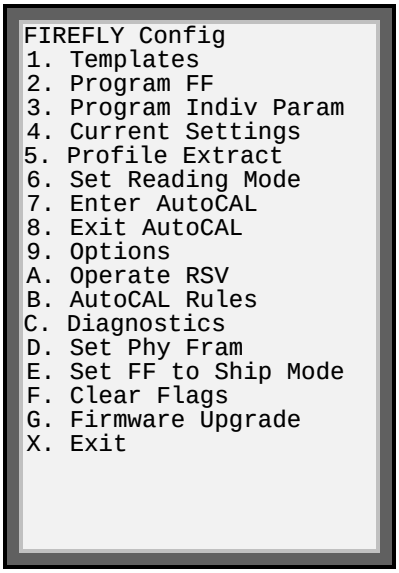
Programming FIREFLYs in Non-Mesh Mode

Setup Communication Method on the ROADRUNNER

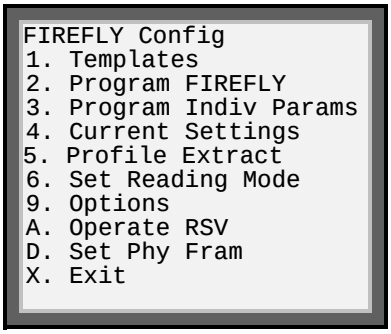


Press the FFMNU key (F5 key) bring up the MOSAIC FIREFLY Config Menu.

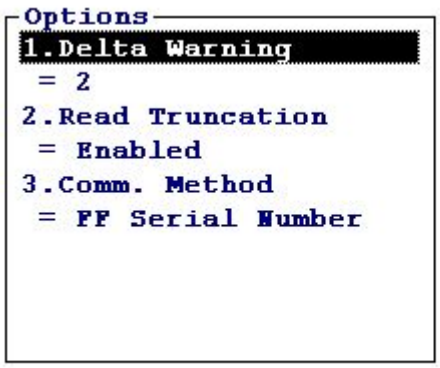
3.26.3



3.26.4

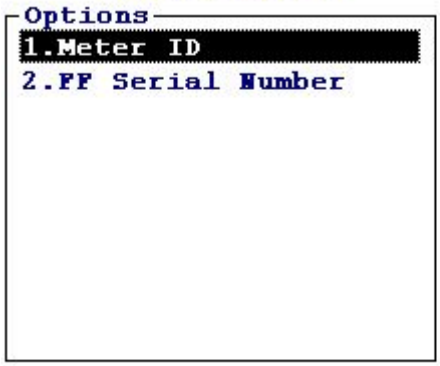


Select the Options Menu (Option 9) from the FIREFLY Config menu to specify how the ROADRUNNER will communicate with the FIREFLY.



The current Comm. Method is displayed on the menu. Select Option 3 to change the Comm. Method

Comm. Method



Select which method to use for communicating with the FIREFLY by highlighting the selection and pressing Enter. It is only necessary to make this selection once. When programming the FIREFLY for the first time, use the FF Serial Number method of communicating.

Programming the FIREFLY

Programming the D4100 Wire-End FIREFLY:

****Programming for RR version 3.26.3****

```
Communications
1.Begin Comm
2.Setup
RouteSTAR MVP
Connection: LEMO Port
Baud Rate: 115200
Autodial: No
Phone Number:
RADIO F/W          5000
ROADRUNNER         3.26.3
```

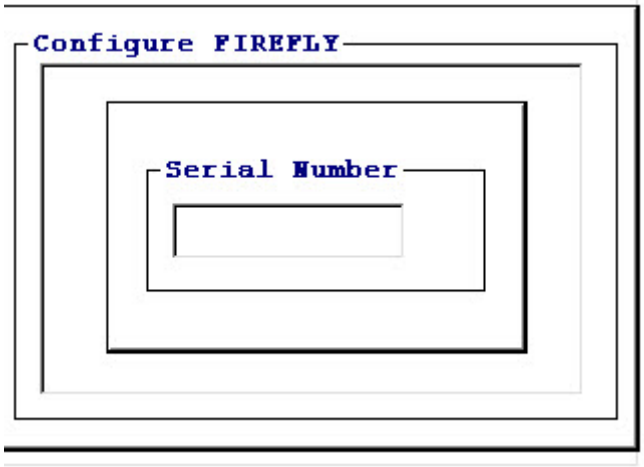
Press the FFMNU key (F5 key) bring up the MOSAIC FIREFLY Config Menu.

```
FIREFLY Config
1. Templates
2. Program FF
3. Program Indiv Param
4. Current Settings
5. Profile Extract
6. Set Reading Mode
7. Enter AutoCAL
8. Exit AutoCAL
9. Options
A. Operate RSV
B. AutoCAL Rules
C. Diagnostics
D. Set Phy Fram
E. Set FF to Ship Mode
F. Clear Flags
G. Firmware Upgrade
X. Exit
```

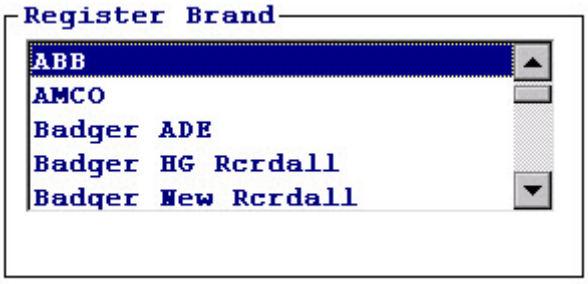
Please note that the Template for the wire-end FIREFLY is not available at this time.

Select 2. Program FF

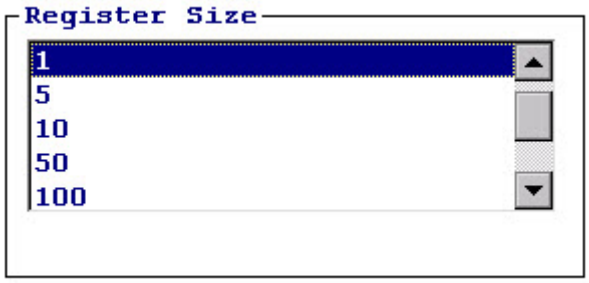
All fields are required. The FIREFLY Serial Number must be exactly 8 digits, no alpha characters are allowed. The Meter ID can be up to 10 alphanumeric characters (16 characters may be used only if employing the RS3 Import/Export record layouts). The Meter Reading can be up to 9 digits, no alpha characters.



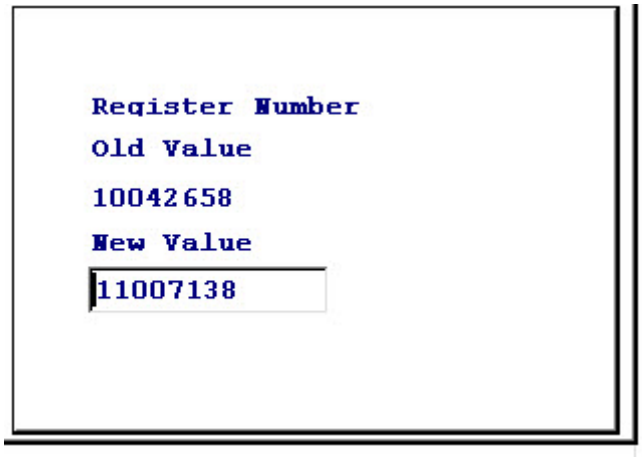
The ROADRUNNER will then start connecting to the FIREFLY.
Select the Register Brand of the meter you are installing the FIREFLY to:



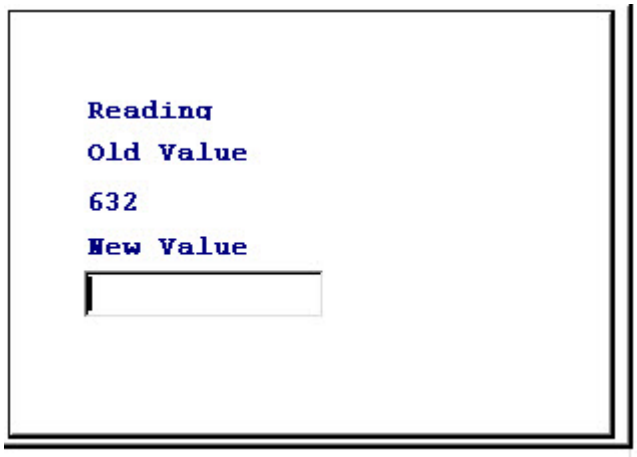
Select the Register Size of the meter you are installing the FIRELY to:



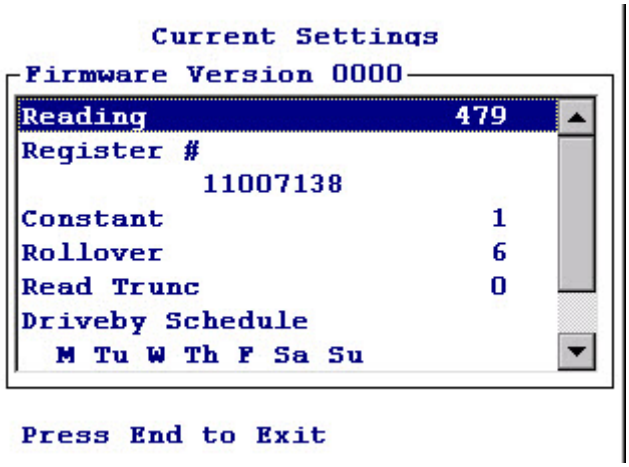
Verify that the Register/Meter number is correct that you are programming into the FIREFLY:



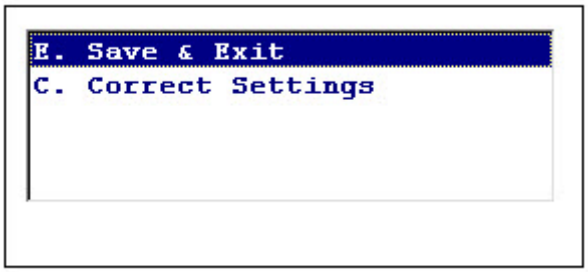
Enter the Reading of the meter to be programmed into the FIREFLY:



The ROADRUNNER will then Update the Configuration of the FIREFLY. Once this is complete, you will then see the Current Settings screen:



Select Save and Exit to complete programming the FIREFLY:

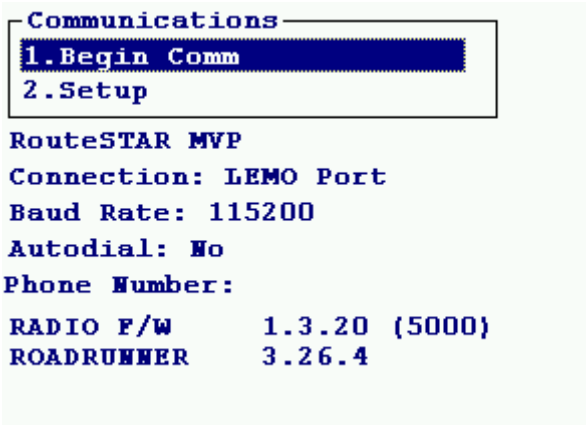


Press Enter to be returned to the account screen.

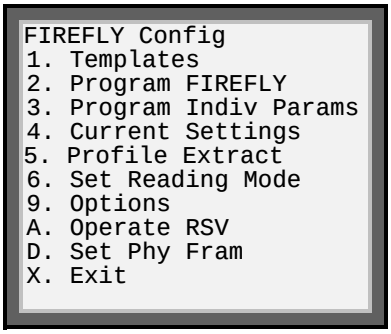
Press the ‘I’ Key to initialize the RF Receiver and read the FIREFLY.

Programming the D4100 Wire-End FIREFLY:

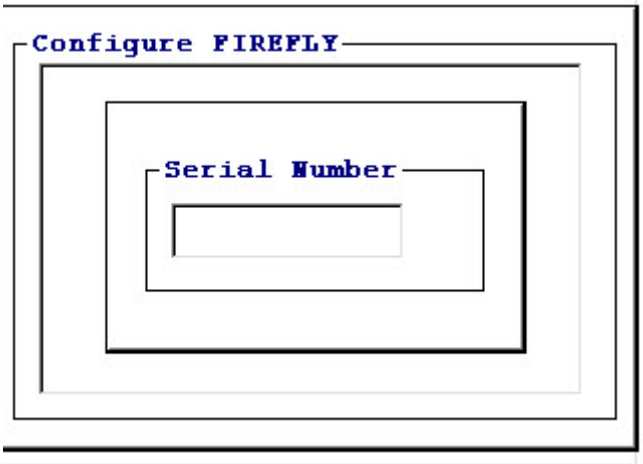
****Programming for RR version 3.26.4****



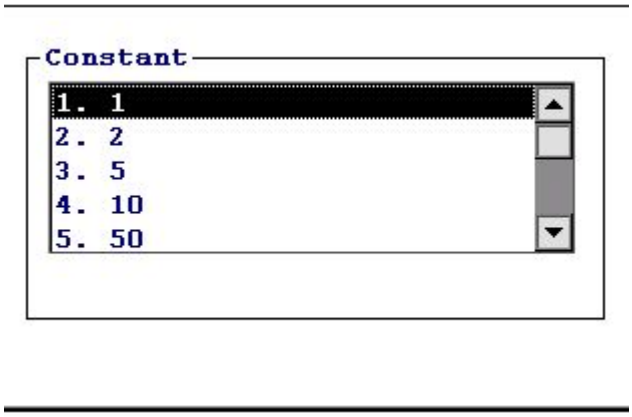
Press the FFMNU key (F5 key) bring up the MOSAIC FIREFLY Config Menu.



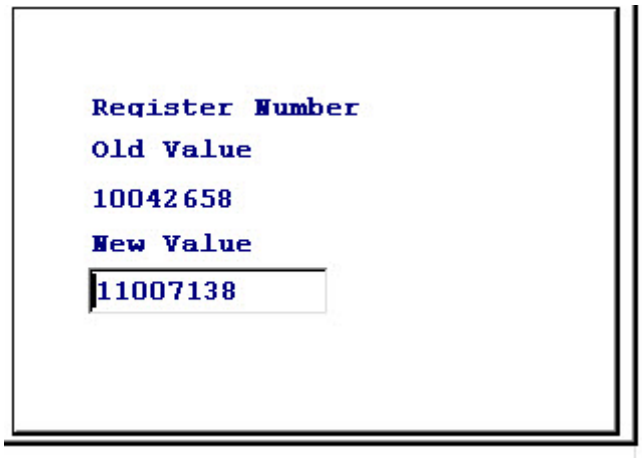
Go to Program FF (the Template is not available in this version)



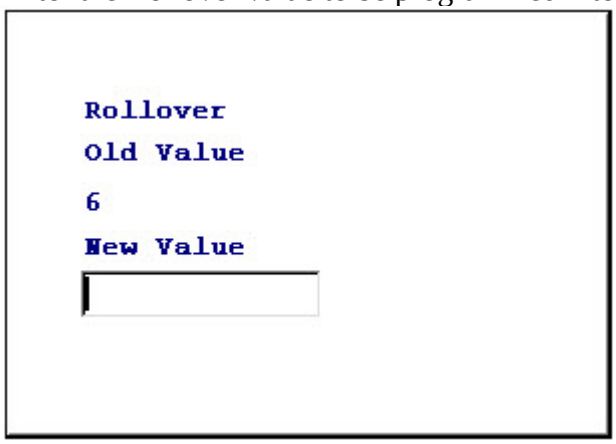
Select the Constant value.



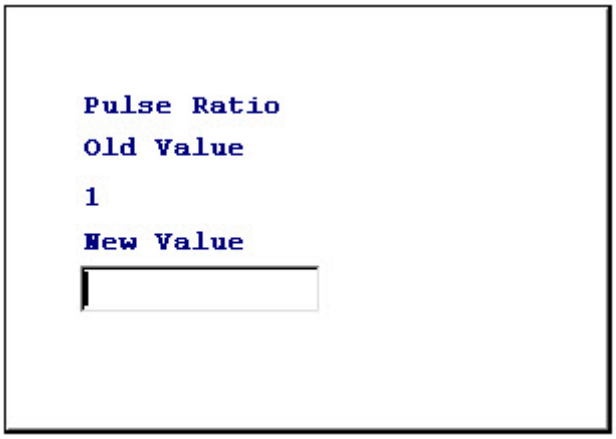
Verify that the Register/Meter number is correct that you are programming into the FIREFLY:



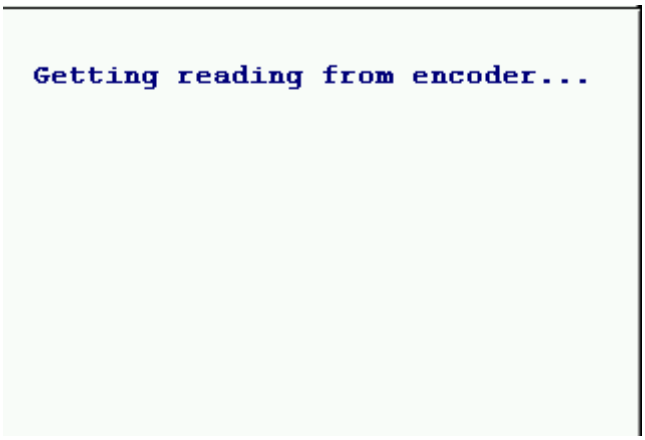
Enter the Rollover value to be programmed into the FIREFLY:



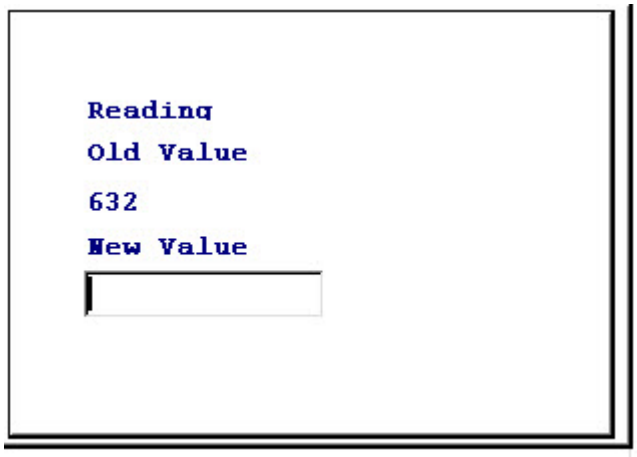
Enter the Pulse Ratio of the meter to be programmed into the FIREFLY:



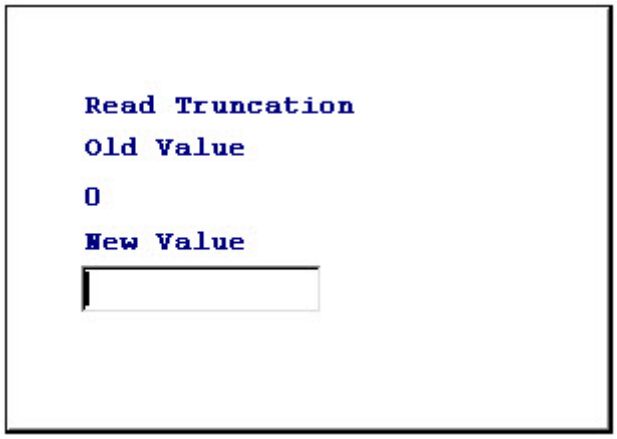
For Encoded meters, the following screen will display:



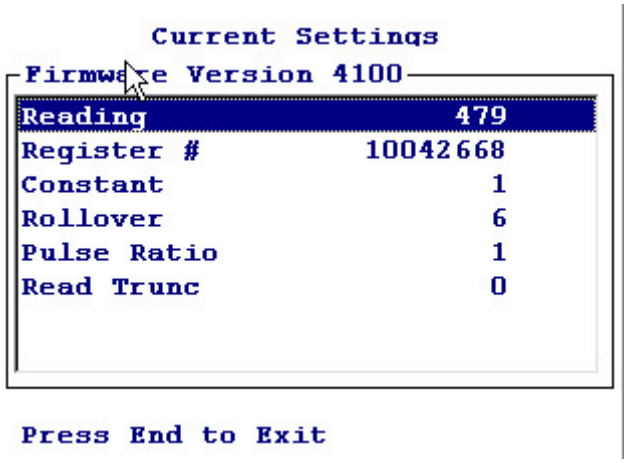
Enter the Reading of the meter to be programmed into the FIREFLY:



Enter the Read Truncation of the meter to be programmed into the FIREFLY:



The ROADRUNNER will then Update the Configuration of the FIREFLY. Once this is complete, you will then see the Current Settings screen:

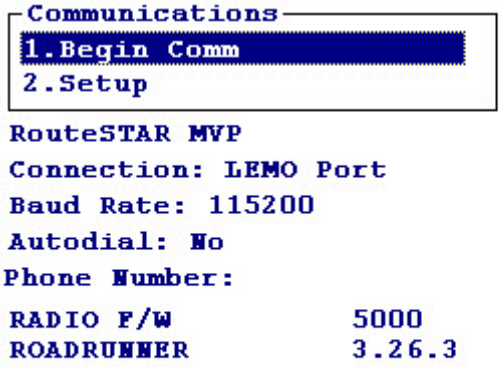


Press End to return to the FF Config menu. Press End to be returned to the account screen.

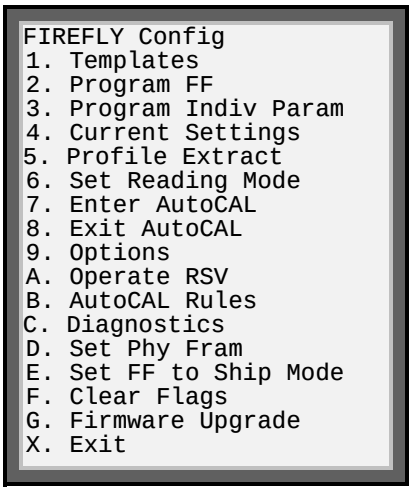
Press the ‘I’ Key to initialize the RF Receiver and read the FIREFLY.

Programming the D4000 Sensor-End FIREFLY:

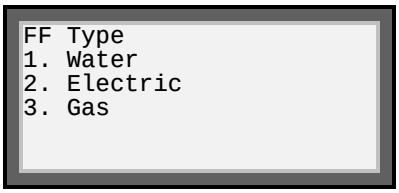
Programming for RR version 3.26.3



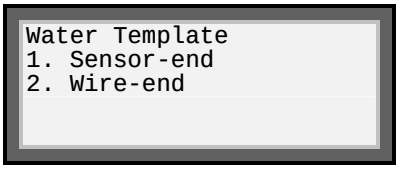
Press the FFMNU key (F5 key) bring up the MOSAIC FIREFLY Config Menu.



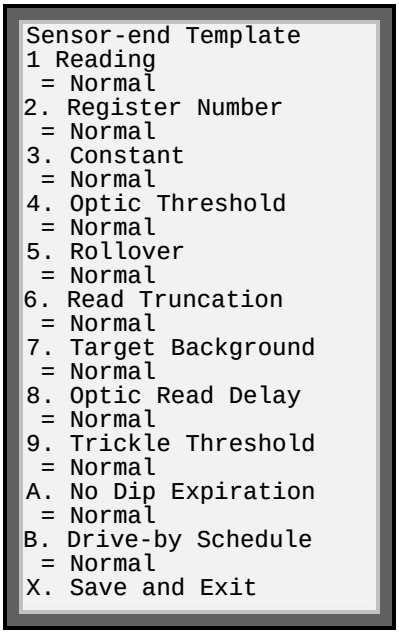
Select Templates for setting the FIREFLY programming options (Option 1)



Select Water (Option 1)



Select Sensor-end (Option 1)



Please see Appendix A for specific Sensor FIREFLY parameters to set in the template.

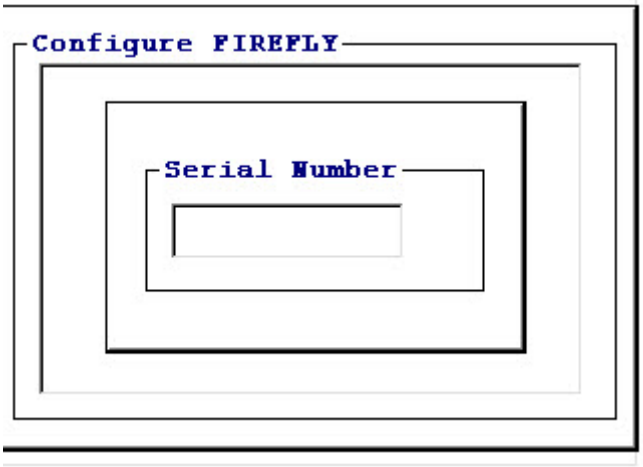
Select AutoCAL Rules from the FFMNU key (F5 key) for setting the FIREFLY calibration rules (Option B)

```
AutoCAL Rules

1. Minimum Dip
 = 18
2. Minimum Background
 = 60
3. Maximum Background
 = 225
4. Primer Threshold
 = 10
5. Maximum Threshold
 = 50
6. Dip Multiplier
= 43%
Reset to Defaults
Done
```

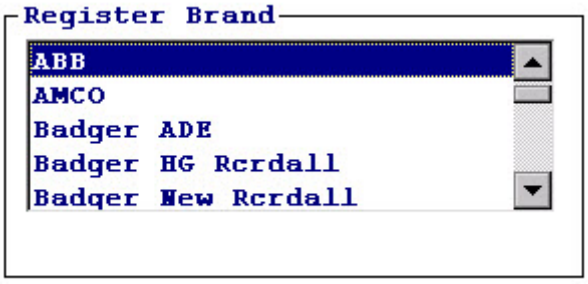
Select Program FIREFLY from the FFMNU key (F5 key) to start programming the FIREFLY(Option 2)

```
FIREFLY Config
1. Templates
2. Program FF
3. Program Indiv Param
4. Current Settings
5. Profile Extract
6. Set Reading Mode
7. Enter AutoCAL
8. Exit AutoCAL
9. Options
A. Operate RSV
B. AutoCAL Rules
C. Diagnostics
D. Set Phy Fram
E. Set FF to Ship Mode
F. Clear Flags
G. Firmware Upgrade
X. Exit
```

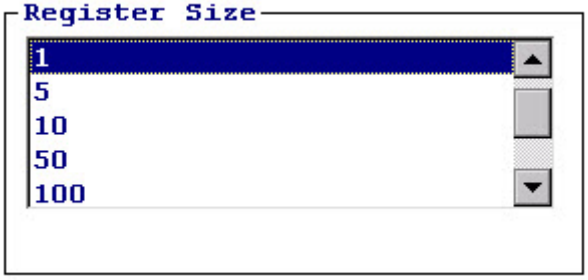
Enter the FIREFLY Serial number. The FIREFLY Serial Number must be exactly 8 digits, no alpha characters are allowed.



The ROADRUNNER will then start connecting to the FIREFLY.
Select the Register Brand of the meter you are installing the FIREFLY to:

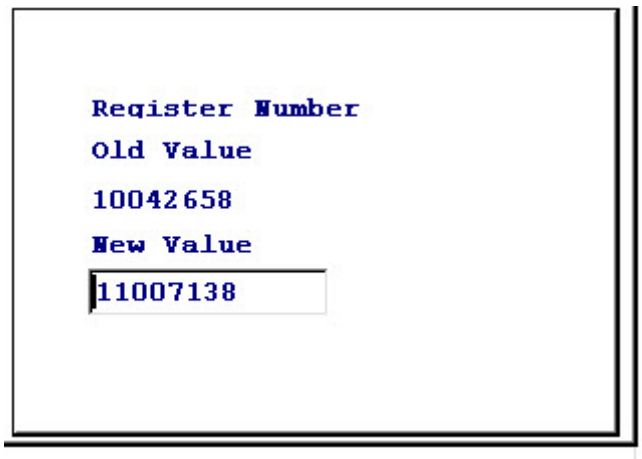


Select the Register Size of the meter you are installing the FIRELY to:

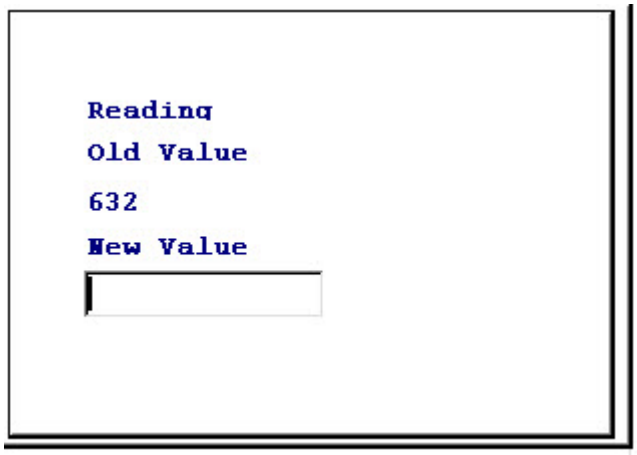


The FIREFLY will begin calculating the background values and return a Success/Failure message.

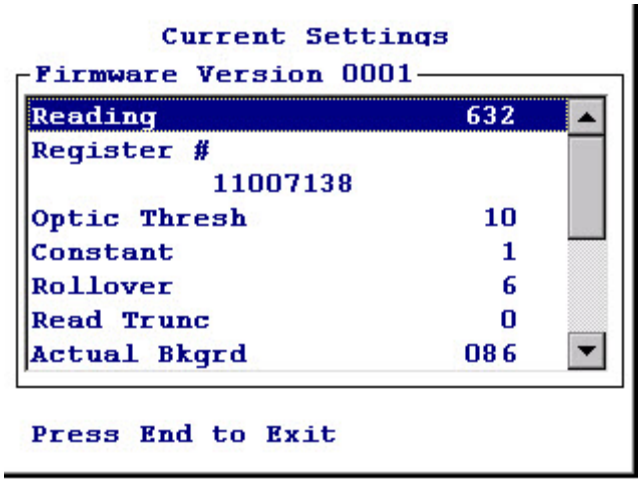
Verify that the Register/Meter number is correct that you are programming into the FIREFLY:



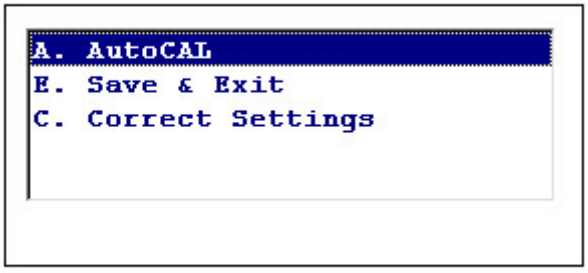
Enter the Reading of the meter to be programmed into the FIREFLY:



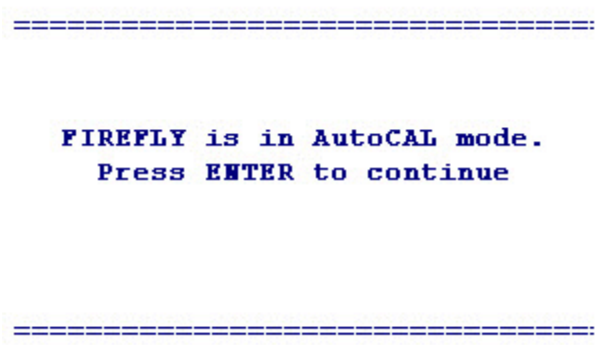
The ROADRUNNER will then Update the Configuration of the FIREFLY. Once this is complete, you will then see the Current Settings screen:



Once you have reviewed the setting, press End to Exit and put the FIREFLY into AutoCAL mode by selecting option A:

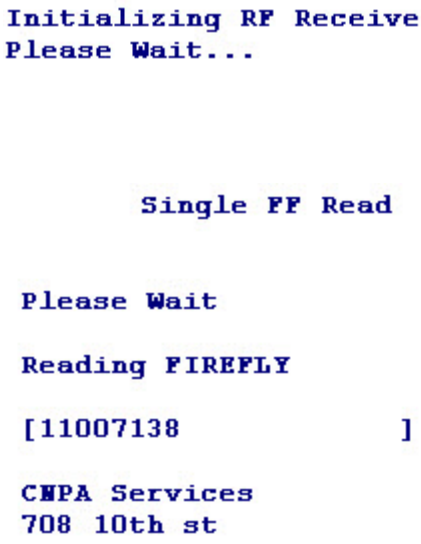


You will get the following screen indicating that the FIREFLY is in AutoCAL mode:



Press Enter to be returned to the account screen.

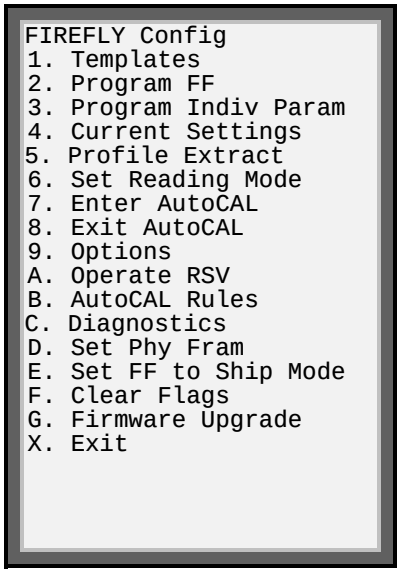
Press the ‘I’ Key to initialize the RF Receiver and read the FIREFLY.



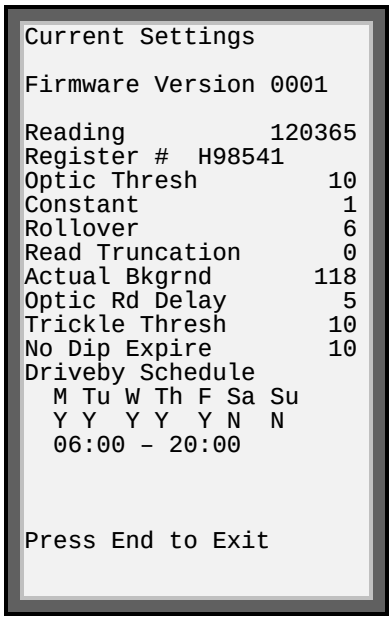
Troubleshooting Sensor FIREFLYs

ROADRUNNER Version 3.26.3

Press the FFMNU key (F5 key) bring up the MOSAIC FIREFLY Config Menu.



Select item 4 (Current Settings) to display Current Settings of the FIREFLY.



From the MOSAIC FIREFLY Config Menu, select item 3 (Program Indiv Params) to view the Individual Parameters of the FIREFLY.

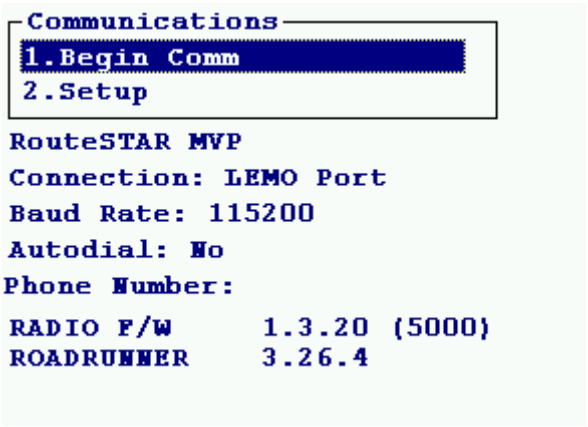
```
Program Individual
Parameter
1 Reading
 = 12569
2. Register Number
 = H98541
3. Optic Threshold
 = 10
4. Constant
 = 1
5. Rollover
 = 6
6. Read Truncation
 = 0
7. Target Background
 = 100
8. Optic Read Delay
 = 5
9. Trickle Threshold
 = 24
A. No Dip Expiration
 = 30
B. Drive-by Sched.
 = M T W Th F Sa Su
   Y Y Y Y  Y Y  N
   06:00 – 20:00
Done
```

From the MOSAIC FIREFLY Config Menu, select item C (Diagnostics) to view the Diagnostic values of the FIREFLY.

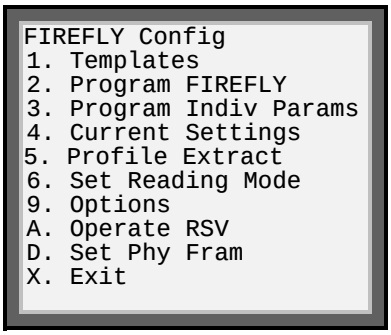
```
-Diagnostics-
Firmware Ver: 0001

Current Background: 100
Last Sweep Max: 101
Last Sweep Min: 71
Optic Threshold: 6
NDIP Counter: 0
```

Programming the D4000 Sensor-End FIREFLY:

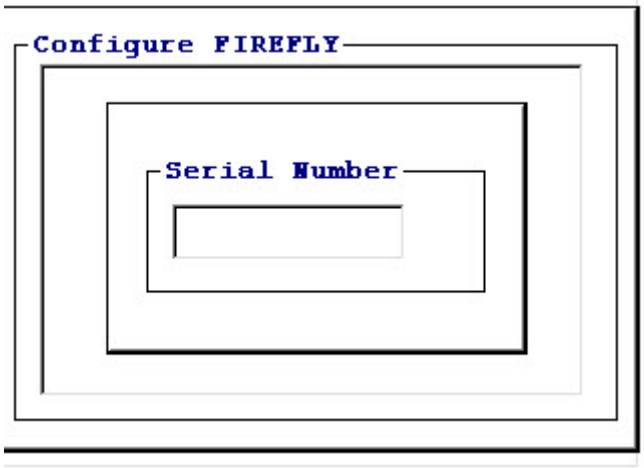
****Programming for RR version 3.26.4****



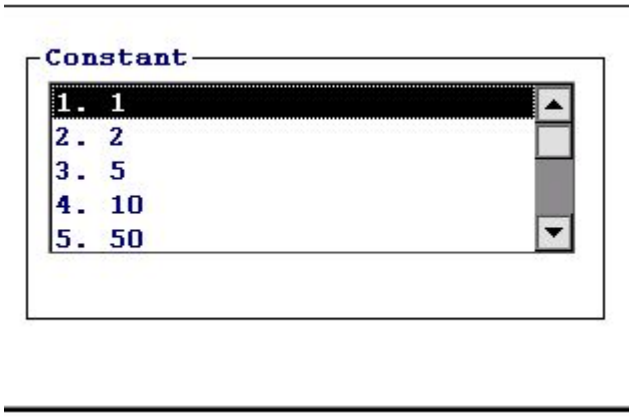
Press the FFMNU key (F5 key) bring up the MOSAIC FIREFLY Config Menu.



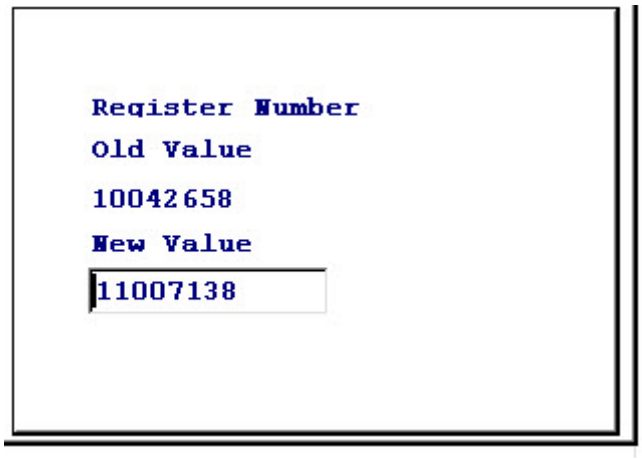
Go to Program FF (the Template is not available in this version)



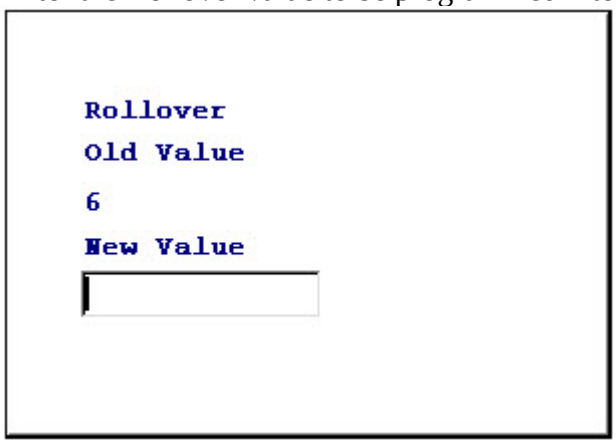
Select the Constant value.



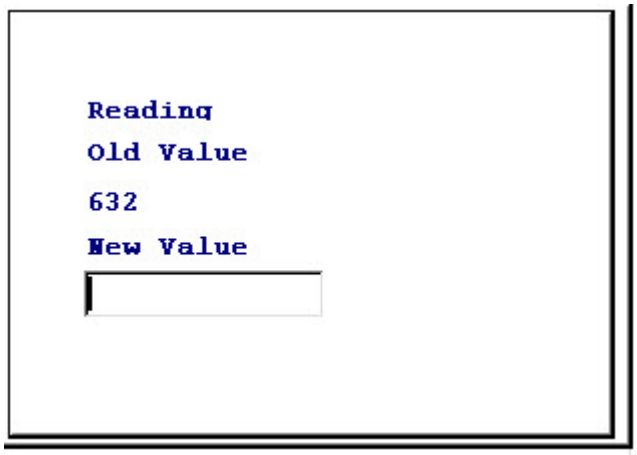
Verify that the Register/Meter number is correct that you are programming into the FIREFLY:



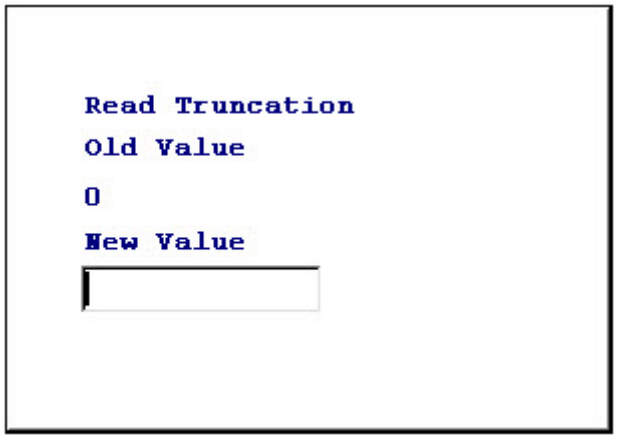
Enter the Rollover value to be programmed into the FIREFLY:



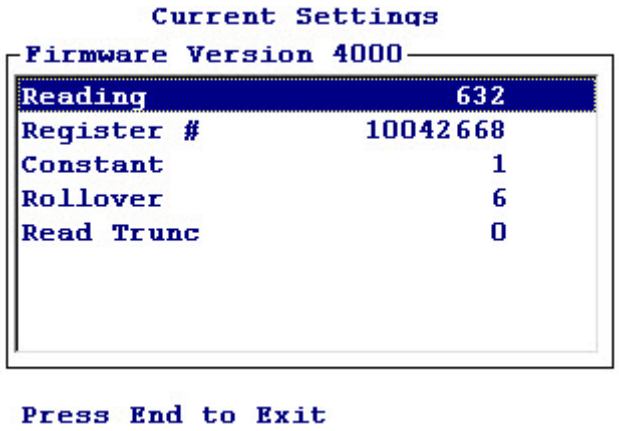
Enter the Reading of the meter to be programmed into the FIREFLY:



Enter the Read Truncation of the meter to be programmed into the FIREFLY:



The ROADRUNNER will then Update the Configuration of the FIREFLY. Once this is complete, you will then see the Current Settings screen:

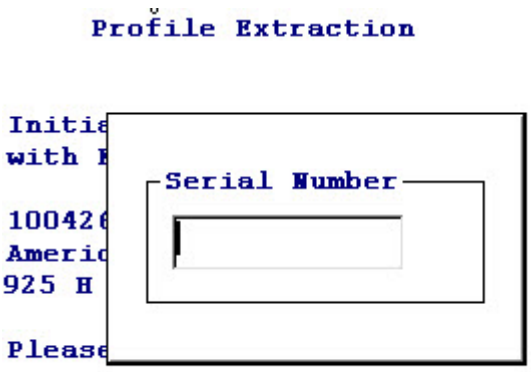


Press Enter to be returned to the account screen.

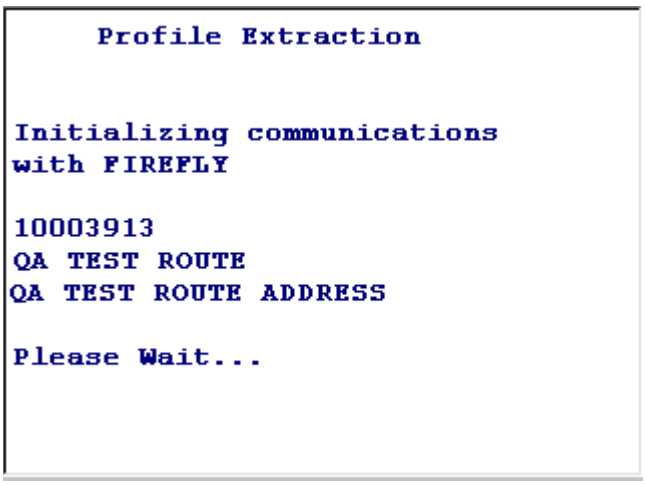
Press the ‘I’ Key to initialize the RF Receiver and read the FIREFLY.

Profile Extraction from the non-mesh FIREFLY:

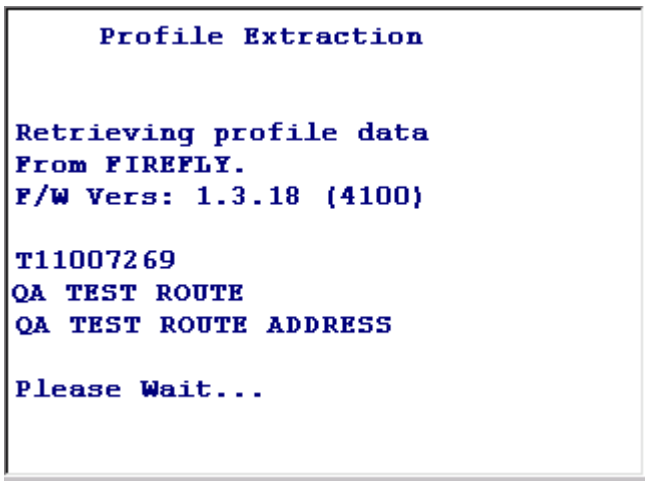
Go to F5, and then select option 5 for Profile Extract.
Enter the Serial Number of the FIREFLY you are trying to extract Profile data from.



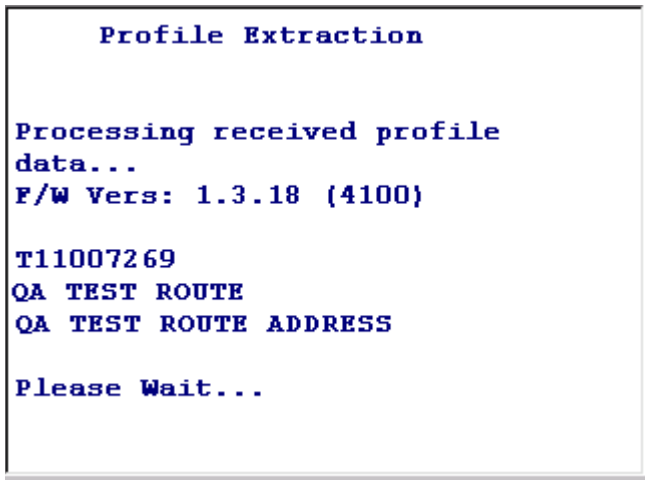
The following screen shot is shown when the software first attempts to connect to a FIREFLY device:



The following screen shot is shown when the software actually connects to a FIREFLY. The message "Retrieving profile data from FIREFLY is displayed. Following that, the FIREFLY firmware version is displayed with the hardware version in parenthesis:



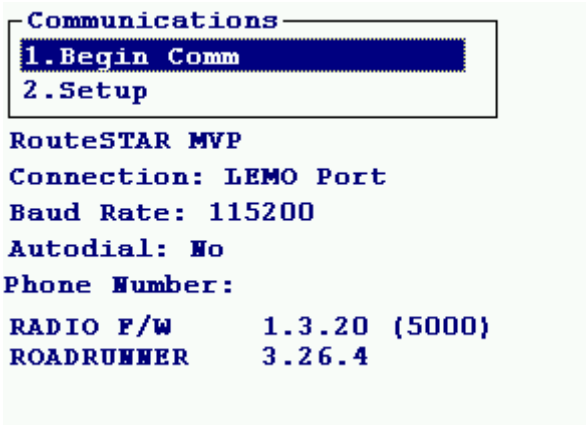
The following screen shot is shown after the profile data has been received from the FIREFLY:



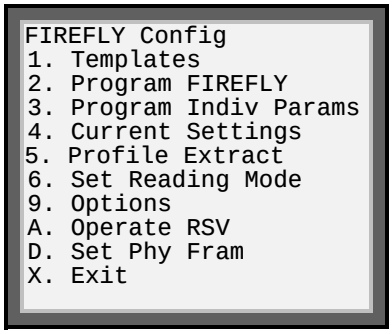
Programming and Controlling the Remote Shutoff Valve

Programming the D4110 Wire-End FIREFLY:

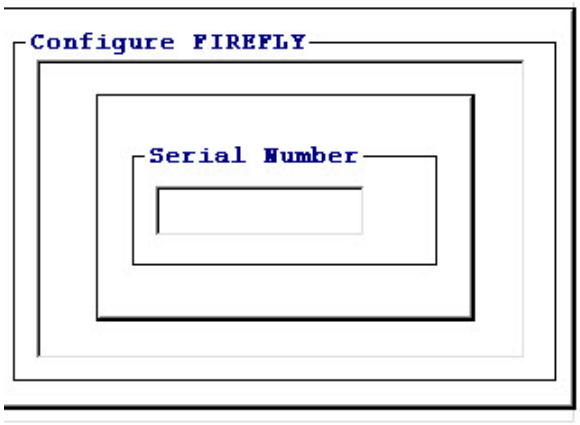
****Programming for RR version 3.26.4****



Press the FFMNU key (F5 key) bring up the MOSAIC FIREFLY Config Menu.



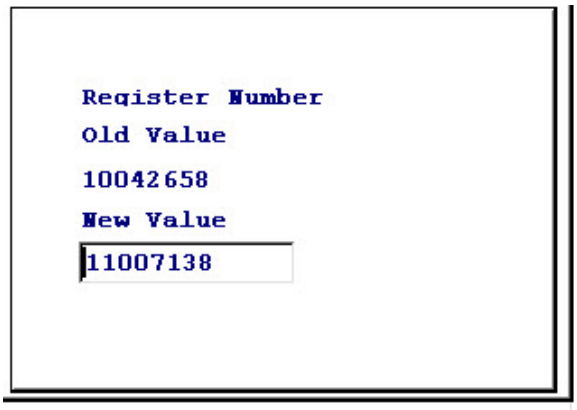
Go to 3. Program Individual Parameters



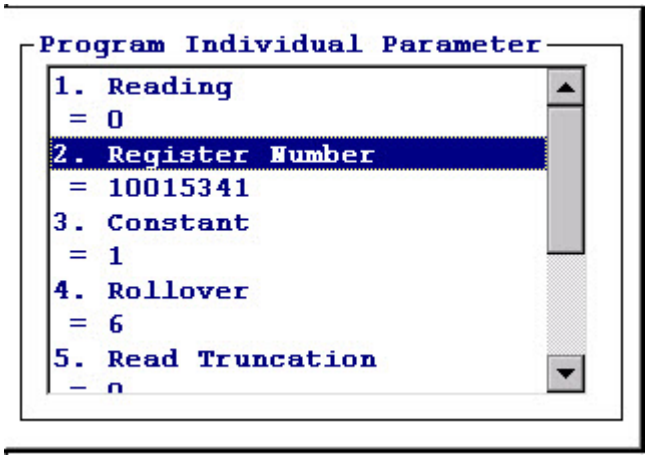
Enter the FIREFLY Serial Number and press Enter

```
Program Individual Parameter
1 Reading
 = 12569
2. Register Number
 = H98541
3. Optic Threshold
 = 10
4. Constant
 = 1
5. Rollover
 = 6
6. Read Truncation
 = 0
7. Target Background
 = 100
8. Optic Read Delay
 = 5
9. Trickle Threshold
 = 24
A. No Dip Expiration
 = 30
B. Drive-by Sched.
 = M T W Th F Sa Su
   Y Y Y Y  Y Y  N
   06:00 - 20:00
Done
```

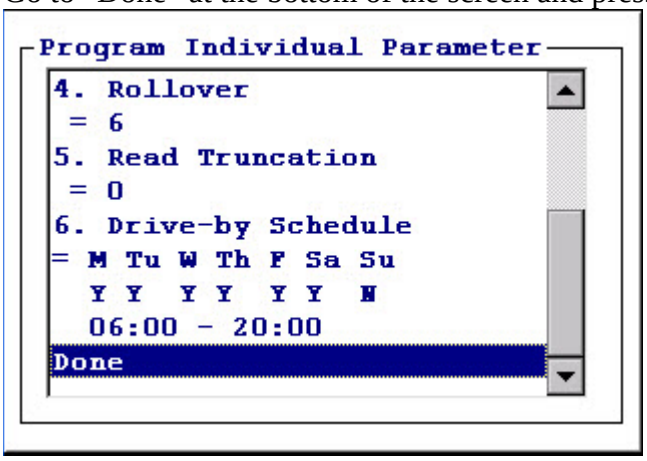
Go to 2. Register Number. Verify that the Register/Meter number is correct that you are programming into the FIREFLY:



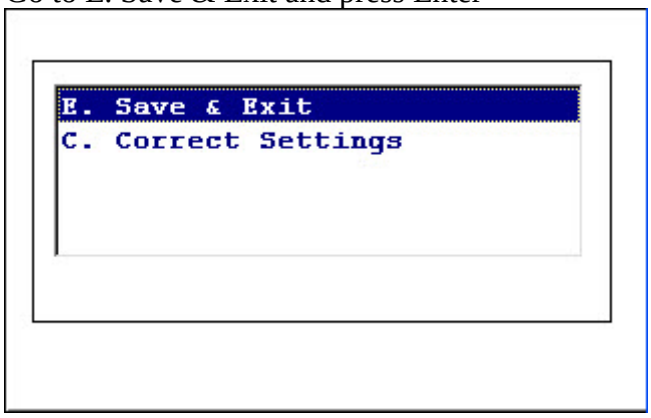
Enter the Register/Meter (FIREFLY Serial Number) number and press Enter



Go to “Done” at the bottom of the screen and press Enter



Go to E. Save & Exit and press Enter

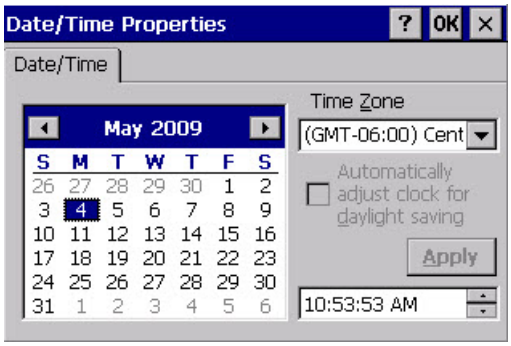


The software will return to the FF Config menu. Press End to be returned to the account screen.

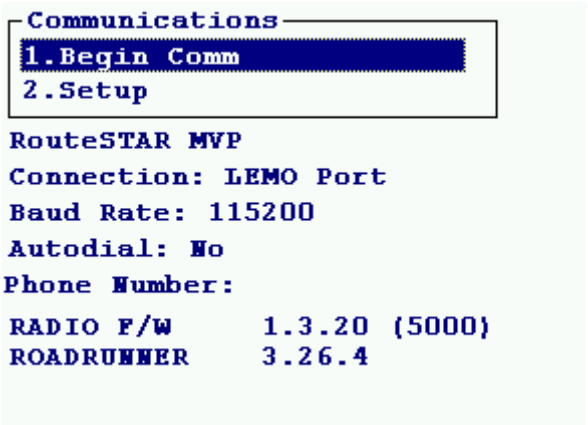
Press the ‘I’ Key to initialize the RF Receiver and read the FIREFLY.

NOTE: By default, all FIREFLYs are programmed with a default active window of 8:00 am to 6:00 pm, GMT. You must program the FIREFLY according the to instructions above in order to load it with the offset value required for the FIREFLY to be active between 8:00 am and 6:00 pm in your local time zone.

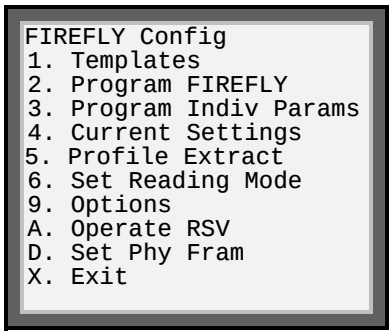
Please verify that the time zone is correctly set on your ROADRUNER by accessing Control Panel via the Windows desktop. Once in Control Panel, select View: Supervisor Mode. Enter the password 'YIWT" and press Enter. Select the Date / Time icon and use the drop down box to select your correct Time Zone setting. Press Apply then OK (in the top right-hand corner) to save the settings.



Controlling the Remote Shutoff Valve:



From the Communications Screen press the FFMNU key (F5 key) to display the Config Menu. Select Option A (Operate RSV)

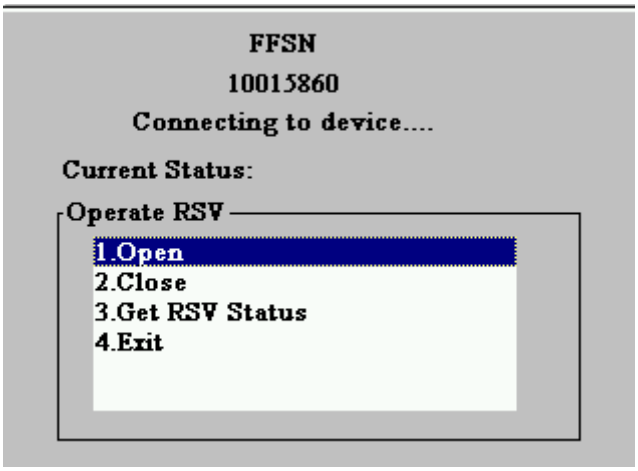


When requesting the current valve state, the software sends a message to the FIREFLY. The FIREFLY (firmware versions 1.5.2 and above) will respond with 0 for closed, 1 for open, 2 for changing, and 3 for indeterminate. The software interprets this response and appropriately displays a message on the status screen.

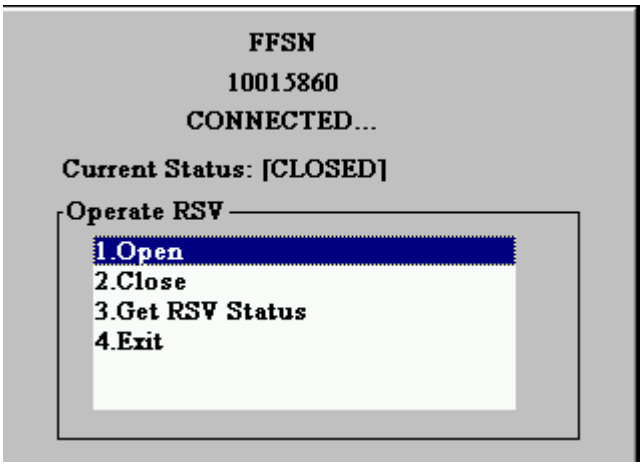
Also, it should be noted that when the software initially displays the selection menu after the user enters the FIREFLY serial number (or meter number), it attempts to connect to the FIREFLY. It displays the message "Connecting to device..." at the top of the screen. Once it connects to the FIREFLY, the message changes to 'CONNECTED..." and it then displays the current state of the valve directly underneath the connection status message. The valve state displayed will be one of the following:

- [OPENED]
- [CLOSED]
- [CHANGING]
- [INDETERMINATE]
- [UNKNOWN]

The state of '[UNKNOWN] is displayed if the software is unable to retrieve the valve state from the FIREFLY. Also, chances are the status '[CHANGING]' will never be displayed on the screen with the 1.5.2 release and subsequent releases since the FIREFLY does not respond to commands when the state of the valve is changing. The following screen shot is an example of initially displaying the selection menu screen:

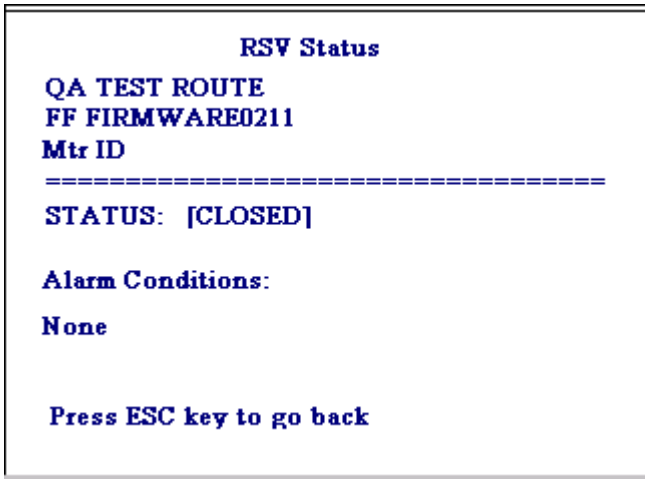


The following screen shot is an example of the selection menu after the software has connected to the specified FIREFLY:



The current status of the RSV is displayed on the screen.

When the user selects option 3 to get the current status, the software displays the current status and also reads and interprets the hardware alarms flags. The following screen shot is an example:



The alarm conditions that can be detected for the RSV are:

- Failed
- Stuck
- Low Battery
- Tamper

When the 'Failed' flag is reported, the software will display 'Stuck' since the valve is stuck in the wrong position. It is possible that the FIREFLY can report one or more of these conditions. In the cases where more than one condition is reported, commas will separate the conditions.

Once the FIREFLY reports a stuck valve, in order for that condition to be cleared, the valve must successfully be cycled between opened, closed, and then opened again before it will clear the stuck status.

Mounting the MOSAIC FIREFLY

Basic Install Information:

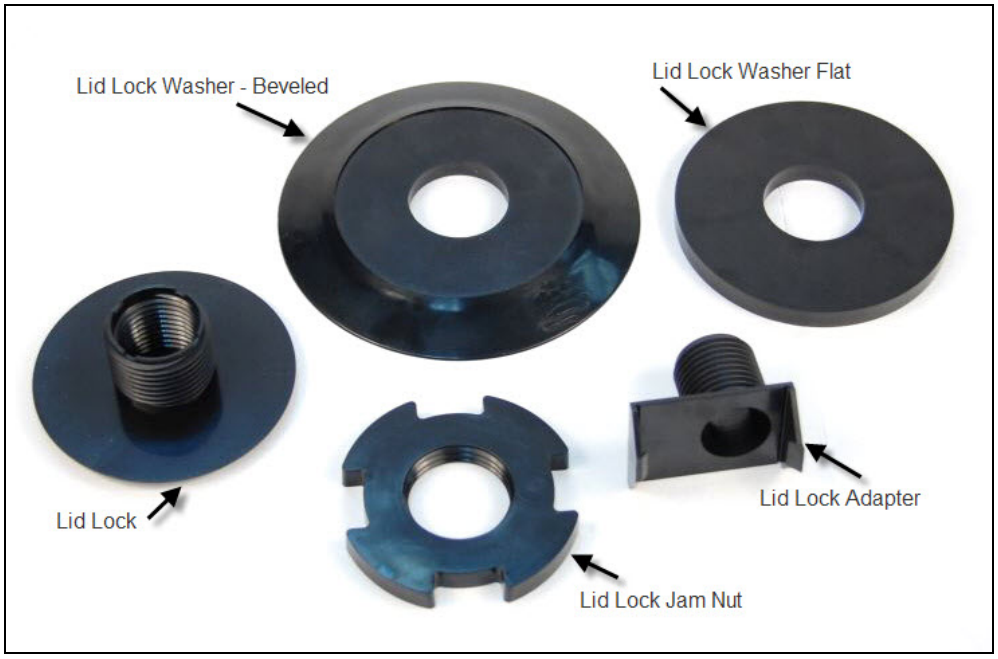
- Mount the MOSAIC FIREFLY in the meter box with the neck/antenna pointing up.
- Mounting can be accomplished by attaching the MOSAIC FIREFLY to a wall, stake, through the hole in the meter box/vault lid, or with Lid Lock, adapter and spacers.
- When utilizing a Lid Lock, make certain to not over-tighten the MOSAIC FIREFLY within the lock.
- Check for lid clearance; be sure to never rest the weight of the meter lid on the MOSAIC FIREFLY.
- Secure the lid back on the pit.

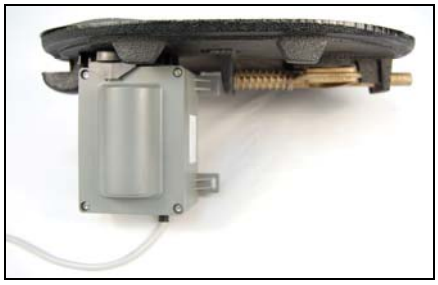
Wall Mount / Basement Splice Mount

- Make sure the antenna points up.
- Secure the MOSAIC FIREFLY to the wall.

Lid Lock Mount

- Verify that you have a Lid Lock Adapter Spacer Ring.
- Never rest the lid on the MOSAIC FIREFLY.
- Do not over tighten the lid lock.
- Both clips should be inserted fully into the MOSAIC FIREFLY.



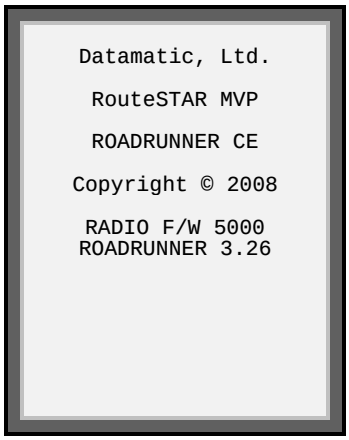


Vault Mount

- Mount the MOSAIC FIREFLY as high as possible.

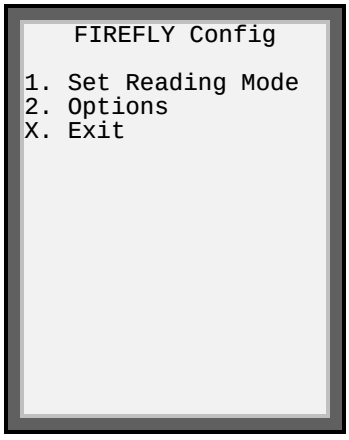
Reading Non-mesh MOSAIC FIREFLYs

ROADRUNNER CX software version 3.26 and higher will read MOSAIC FIREFLYs programmed in non-mesh mode. Radio firmware version 5000 and higher is also required for this functionality. Pressing Shift - 2 on the ROADRUNNER will detect the radio firmware and ROADRUNNER software versions by displaying the screen below:



Press ESC to exit this screen

The FIREFLY menu (F5) will display the following options for reading non-mesh FIREFLYs.



Select option **1. Set Reading Mode** to display the Interrogation Mode options.

The Interrogation Mode Menu appears when Option 1 (Set Reading Mode) is selected. By default, the non-mesh FIREFLY is set to accept reading requests Monday through Saturday 6:00 AM to 8:00 PM.

"**Single FF Read**" allows the user to interrogate a single non-mesh FIREFLY (selected on the ROADRUNNER) during the time it is configured to accept reading requests.

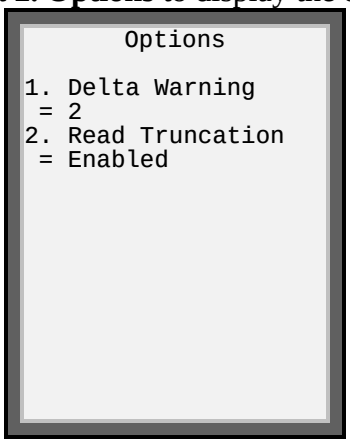
"**Multi FF Read**" allows the user to interrogate all non-mesh FIREFLYs (in the current route on the ROADRUNNER) during the time they are configured to accept reading requests.

NOTE: After a read is taken in Multi FF Read mode, the FIREFLY enters a dormant state for 10 minutes. This is done to reduce the amount of RF traffic. The FIREFLY will not respond to commands during this dormant time.

"**Verify FF Read**" allows the user to Read Verify the physical meter reading against the non-mesh FIREFLY reading during the time the non-mesh FIREFLY is configured to accept reading requests.

After setting the reading mode, press "I" to interrogate the FIREFLY(s).

Select **2. Options** to display the options screen.



The settings above are the recommended default values and should not be changed unless advised and authorized by Datamatic.

Troubleshooting Procedures

MOSAIC FIREFLY Codes

Code	Description	Meaning	Onsite visit Y or N?	Steps To Resolve
BA10	Battery	Battery is low	Yes	RMA for battery replacement
Ta40	Tamper	System recorded En70 48 times	Yes	Perform *Connection Troubleshooting** below
Le60	Leak	25 hours of continual consumption	Yes	Check for leak
EN70	Encoder Not Read	Did not receive reading	Yes	Perform *Connection Troubleshooting** below
EN80	Encoder Invalid	"Other" message. System received "garbled" data from meter	No	Should get a reading at next scheduled reading time. Check register if the message is being transmitted frequently.
MESH	Mesh Alarm	Hardware Alarm	Yes	Remove & Replace immediately
Pr11	Primary Image	Loading primary image	No	Should not affect reading
Se13	Secondary Image	Loading secondary image	No	Should not affect reading

Connection Troubleshooting

1. Check for physical damage to the MOSAIC FIREFLY wire.
2. Check for physical damage to the Register.
3. If possible, test the register head.
4. If there is no physical damage detected resplice and reswipe the MOSAIC FIREFLY.
    a. Repeat step several times if necessary.
    b. If the red light goes solid, repot the MOSAIC FIREFLY and continue to monitor.
    c. Request an RMA if the issue persists.

Unread Meters Troubleshooting

1. Research in the MOSAIC Software Interface to determine when the last read was and check for possible patterns.
2. If the MOSAIC FIREFLY is unable to join the network:
    a. Verify that the MOSAIC FIREFLY is installed and mounted properly in the meter pit
    b. Swipe the meter & refer to the LED Operational States for verification of functional status Mesh (light will slow blink green). Go to the nearest neighboring MOSAIC FIREFLY and swipe.

   c. Check the unread MOSAIC FIREFLY for solid green light (this process can take several attempts). Before swiping both units must be “asleep” (no LED lights) before attempting to swipe again.
3. Continue monitoring in MOSAIC Software & replace unread MOSAIC FIREFLY if the issue persists.
4. If after all troubleshooting is complete & you are unable to achieve a solid green light the MOSAIC FIREFLY should be replaced.
   a. If there is no LED response within 5 seconds of magnet swipe retry several times. If the unit in question continues to be unresponsive it should be replaced.

Red Light is Not Solid After Installation

The MOSAIC FIREFLY has been wired but the red light never changes to solid upon installation.

1. Check the wire connections, it is likely there is a wiring problem.
2. Verify that the register head is working.

NOTE: When connected to a pulse meter, the red light will fast-blink until 5 pulses are received.

FAQ's

Can I use all three MOSAIC Gateway backhaul types in a single installation?
Yes.

Will I see a difference as far as data collection between the three MOSAIC Gateway backhaul configurations?
No, you will not see a difference.

Why would I need to use GPRS in an installation?
GPRS works well in areas where other types of backhaul coverage are not available.

Is the Wi-Fi product 802.11 compliant?
Yes, our Wi-Fi product is 802.11B compliant.

How many MOSAIC FIREFLYs can mesh together?
Typically 1-24 MOSAIC FIREFLYs can communicate directly with each other. The minimum number of MOSAIC FIREFLY connections needed to continue the mesh is 1. The total number of MOSAIC FIREFLYs per MOSAIC Gateway should not exceed 1,500.

What is the output power of a MOSAIC FIREFLY?
Transmissions are rated at 250mW.

What is the range of a MOSAIC FIREFLY?
Above ground = approximately ¾ mile (line of sight). Pit mounted (through lid) = 600' – 1000' (depending on lid material). Many variables affect range, including topography, meter lid material and height of the MOSAIC Gateway.

Are the new MOSAIC FIREFLYs compatible with previous legacy FIREFLYs?
No, the transmission frequencies and messages scheme are different; thus a new radio is needed for handheld, mobile and mesh readings.

Do the MOSAIC FIREFLYs read via the ROADRUNNER MOBILE product?
Yes, a mobile reading mode is available with the same hardware used for Mesh reading.

Will I need different MOSAIC FIREFLYS for Mesh and Mobile functionality?
No, the same hardware used for mobile mode will work with both.

How do I program an MOSAIC FIREFLY?
MOSAIC FIREFLYs used on encoded water meters are automatically set-up. MOSAIC FIREFLYs for other meters are programmed via 2-way radio communications from a handheld programmer. New schedules, profile requests and firmware are also loaded via the Mesh.

What does your handheld programming tool look like?
The handheld programmer is a Datamatic, LTD ROADRUNNER CX unit with a MOSAIC 2-way radio.

What is the battery life for the MOSAIC FIREFLY?

When run at a 20 minute mesh interval, 10 plus years.

Is the battery pack replaceable?
Yes, the battery pack can be replaced at Datamatic.

What frequency does the MOSAIC product use?
We use a Frequency Hopping Spread Spectrum (FHSS) over the 902-928 MHz band. 50 separate frequencies are utilized.

Do you use a licensed frequency?
The radio frequency that Datamatic, LTD uses operates on the ISM band, which is unlicensed.

Does your product provide profiling?
Yes the battery operated MOSAIC FIREFLYS have 240 days of hourly profile data on board.

How do you get the profiling?
Profile data is extracted in two ways, the MOSAIC FIREFLY can be programmed via the mesh to send an hourly profile packet along with its midnight read, or you can use the RR programmer to extract the profile data on demand (in development). Keep in mind that requesting profile data over the Mesh in large quantities will take time and network resources.

How often do I get reads via the Mesh?
Once daily is recommended, but this is user definable. Battery powered MOSAIC FIREFLYs send in daily readings by default, with the ability to send in up to hourly intervals on selected basis. A sampling of all meters can be configured to send in higher resolution profile data for statistical analysis, but can have a negative impact on the mesh network performance.

Is the system 2-way?
Yes, the MOSAIC FIREFLYS can send data and receive commands from the MOSAIC Gateway, which in turn communicates with the back office utility. MOSAIC FIREFLYs can also communicate 2-way with a handheld programmer.

What can I do with the 2-way functionality?
Update schedules, configurations, extract profile or other data, and more. Communications can be broadcast to an entire Mesh or directed to an individual MOSAIC FIREFLY.

Does the MOSAIC system have repeaters?
Yes, low cost repeaters are utilized to bridge the gap between distant MOSAIC FIREFLYs to reduce network congestion at unavoidable Mesh network bottlenecks or to reduce latency.

How do the MOSAIC FIREFLY repeaters work?
Each MOSAIC FIREFLY already acts as a repeater. Units wired and dedicated as a MOSAIC FIREFLY repeater utilize the same firmware but do not read a meter and therefore only repeat readings upstream that they receive.

What is the MOSAIC FIREFLY repeater battery life?

It works similar to that of a MOSAIC FIREFLY.

Do you support cellular backhaul from the MOSAIC Gateway?
Yes, via GPRS only at this time.

Do you support Wi-Fi backhaul at the MOSAIC Gateway?
Yes, 802.11 b.

Appendix A

ROADRUNNER CX with
Sensor-end FF

FIREFLY Template for_____

Parameter	Prompt Type	Value	Suggested Value
1. Reading	Normal	Normal	Depends on meter/billing units
2. Register #	Normal	Normal	Normal
3. Constant	Default		Depends on meter/billing units
4. Optic Threshold	Default		10
5. Rollover	Default		Depends on meter/billing units
6. Read Truncation	Default		Depends on meter/billing units
7. Target Background	Default		100
8. Optic Read Delay	Default		5
9. Trickle Threshold	Default		24 (hours)
A. No Dip Expiration	Default		30 (days)
B. Drive-by Schedule	Default		Default Schedule Defined*
X. Save and Exit	**Save**	**Your**	Template

*The schedule defined as the default value in the Template will be used

Appendix B

ROADRUNNER CX with Wire-end FF

Please note that the Template for the wire-end FIREFLY is not available at this time.

Appendix C

The CXMI software provides Hot Keys to perform certain functions. Please see below for the current list.

FNCTN (blue key) + E = **E**xecute command

FNCTN (blue key) + V = Display application **v**ersion

FNCTN (blue key) + S = **S**end firmware image to destination device

FNCTN (blue key) + A = **A**dd new terminal command

FNCTN (blue key) + C = Change **c**ommunication mode

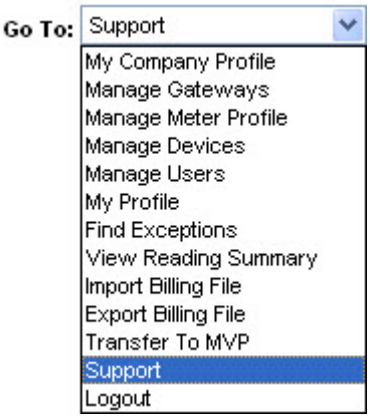
FNCTN (blue key) + D = Change **d**ata mode

CTL (control key) + P = Display/Edit **p**hy fram value

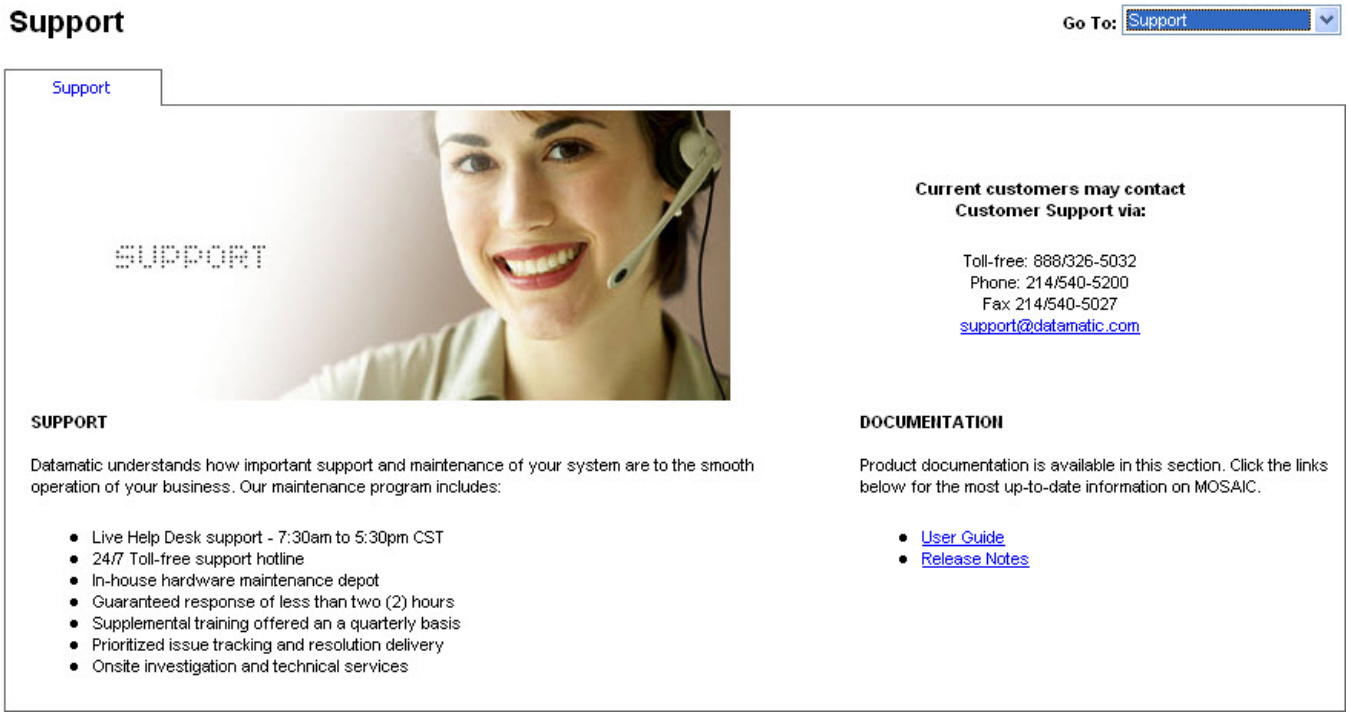
FNCTN (blue key) + B = **B**oot Swap (OREO)

Contacting Datamatic

Use the **Go To:** master navigation menu to access the '**Support**' page.



The Support page consists of the following:



Document Revisions

Do Not Print

Team Members:	Deena Duffy
Date:	6/10/08
Revision:	A
Revision Log:	Starting from last draft, added: updated wiring connections Non-mesh read functionality Re-worked LED behavior explanations Changed MOSAIC-Class FIREFLY references to MOSAIC FIREFLY per Andy Kercher

Team Members:	Deena Duffy
Date:	06/17/08
Revision:	B
Revision Log:	Completed updates per 06.04.08 approvals

Team Members:	Deena Duffy
Date:	July 1, 2008
Revision:	C
Revision Log:	Dd added new Support page

Team Members:	Deena Duffy
Date:	September 10, 2008
Revision:	D
Revision Log:	Dd added RSV control instructions

Team Members:	Deena Duffy
Date:	September 11, 2008
Revision:	E
Revision Log:	Dd added sensor-end install and programming instructions

Team Members:	Deena Duffy
Date:	September 15, 2008
Revision:	F
Revision Log:	Dd added sensor-end light behavior and wire-end programming instructions and formatted for review

Team Members:	Deena Duffy
Date:	October 15, 2008
Revision:	G
Revision Log:	Dd updated wiring connections to match last approved version of the laminated wire connections card

Team Members:	Amy Fair and Deena Martin
Date:	January and February, 2009
Revision:	H
Revision Log:	Updated for RR 3.26.3 and 3.26.4

Team Members:	Deena Martin
Date:	February 24, 2009 – March 19, 2009
Revision:	I
Revision Log:	Misc. general updates per emails, etc.

Team Members:	Deena Martin
Date:	April 20, 2009 – May 4, 2009
Revision:	J
Revision Log:	Updates related to CXMI 1.2 release; new Installation Considerations added by AK

Team Members:	Deena Martin
Date:	July 6, 2009 – July 17, 2009
Revision:	K
Revision Log:	Updates related to CXMI 1.3 release

Team Members:	Deena Martin
Date:	August 14, 2009
Revision:	L
Revision Log:	Added Work out Waterless Hand Cleaner

Team Members:	Ken Derry
Date:	December 14, 2009
Revision:	K
Revision Log:	Updated FCC and IC numbers and statements