Southwest Microwave, Inc.
Security Systems Division

INTREPID™

MicroPoint™ II

A FENCE MOUNTED
OUTDOOR PERIMETER INTRUSION DETECTION SYSTEM

MicroPoint II Installation and Operation Manual

SOUTHWEST MICROWAVE

Version 0

INTREPID™ MicroPoint™ II Software

Southwest Microwave, Inc. thanks you for your purchase of the INTREPID MicroPoint II System. Please refer to the Universal Installation Service Tool II (UIST II) manual for the software setup of this sensor.

There is one disk required to setup the system**.**

1. Universal Installation Service Tool II (UIST II) Software

   This software is used to configure and set-up the system as well as being used for maintenance and troubleshooting the system.

Software provided by Southwest Microwave, Inc. is subject to the license agreement terms of the individual product. A copy of the license agreement is available by contacting Southwest Microwave, Inc.

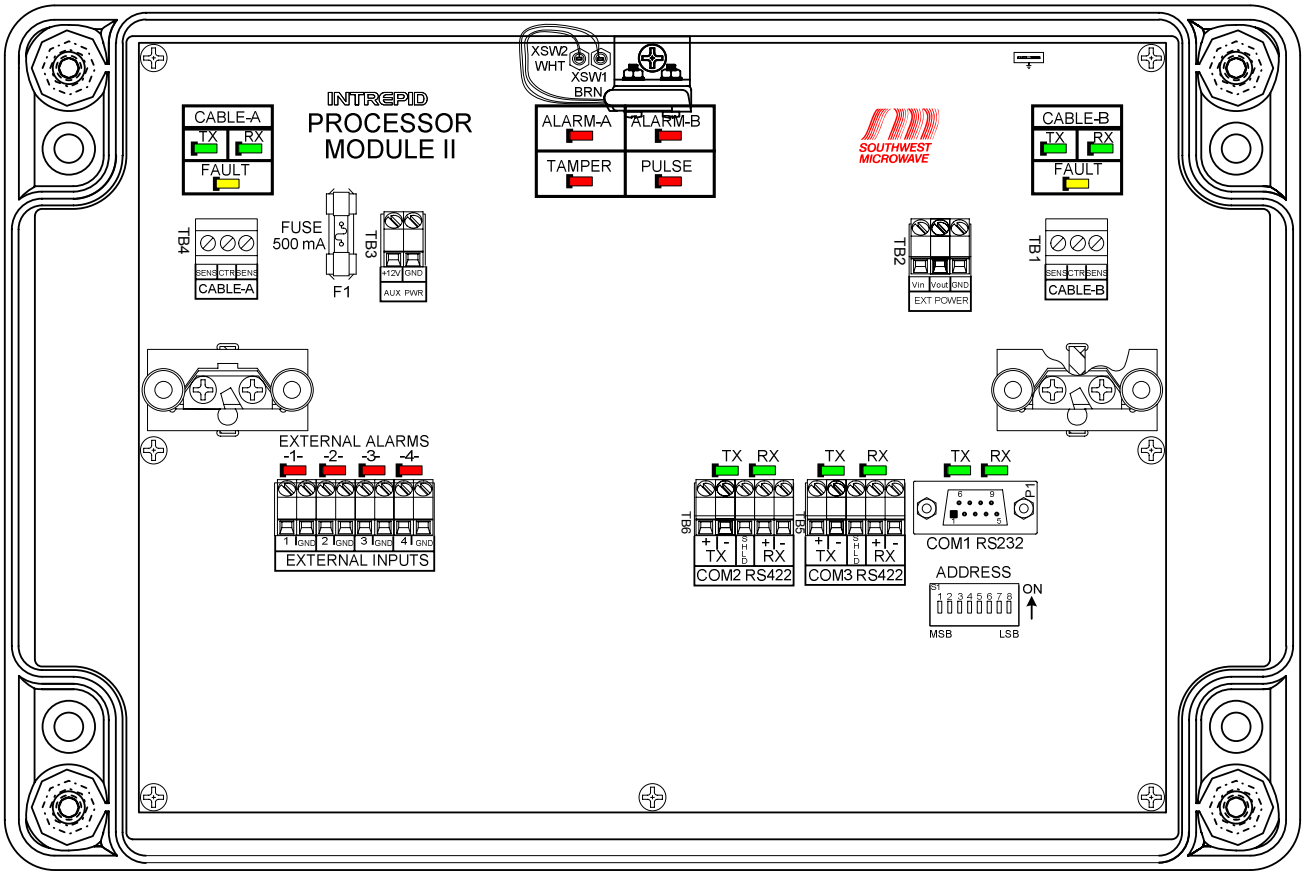
Basic Tools Required for Installing the MicroPoint II System

The basic tools and materials required for installing the MicroPoint II system are:

- PC operating Windows™ XP Pro (with *.net framework 3.5), Vista Pro or 7 Pro
- Basic hand tools (screwdrivers, wrenches, cutters, etc.)
- Multi-meter
- Tools for installing conduit in an enclosure
- Pole to un-spool the MicroPoint sensor cable

NOTICE

Typical Processor Module II power and MicroPoint™ cable connection points are shown below:



CAUTION

BE VERY CAREFUL NOT TO SHORT THE MICROPOINT CABLE SENSE WIRES TO THE CENTER CONDUCTOR. THIS MAY SEVERELY DAMAGE THE ELECTRONICS. THIS ALSO APPLIES TO CABLE CONNECTIONS MADE IN ALL MODULES AND UNITS.

DO NOT LAND OR REMOVE MICROPOINT CABLE SENSE WIRES WITH POWER APPLIED TO THE PROCESSOR MODULE II, LINK UNIT II OR TU II.

Trademark Notice

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Notice

This equipment has been designed and tested to meet EN 61000-6-1:2005 and EN 61000-6-3:2006. Application of EMC Directive: 2004/108/EC 2004

RoHS Compliant

Patent Notice

Southwest Microwave Inc. intellectual property in INTREPID and MicroPoint Cable is protected by the following patents:

USA 5,446,446 and 5,448,222

Patents are pending in many counties of the world.

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1. Introduction

1.1 INTREPID™ MicroPoint™ II Fence Detection System

Thank you for purchasing the INTREPID MicroPoint II perimeter security system.

INTREPID is a completely new perimeter security system platform. The first intrusion detection sensor in the INTREPID family is called MicroPoint II. It is a sensor cable designed to operate on fences where it detects vibrations caused by a person cutting or climbing the fence and precisely locates the point of intrusion. The same cable is used to communicate with each Processor Module II (PM II) as well as provide power to these modules and auxiliary sensors along the perimeter with no other equipment or wiring.

Patented MicroPoint detection technology enables MicroPoint II to locate a disturbance along the length of the sensor cable to within 10 feet (3m). Location information is used to create detection zones that are totally independent of processors or electronics in a process called ***Free Format Zoning***. Location information is used during calibration to automatically adjust the system sensitivity to account for variations in fence fabric in a process called **Sensitivity *Leveling*™**.

The system utilizes Microsoft Windows™ based software called Universal Installation/Service Tool II (UIST II) for installation and service.

1.1.1 General Application Note

The most common use of MicroPoint II is installation on a chain link, weld mesh or expanded metal fences. The examples in this manual are written for a chain link fence. For installation of MicroPoint II on other types of barriers, please call Southwest Microwave for additional details.

The sensor cable is not ordinary coaxial cable. Care must be taken in all aspects of its installation. This is particularly true of connections to the cable. Read the connection instructions carefully and follow them.

In order to setup the MicroPoint II sensor, a PC using UIST II software must be used.

We assume that the installer is familiar with the basics of perimeter security - Detection, Assessment, Delay and Apprehension. MicroPoint II is a part of a much larger system. While MicroPoint II is an excellent means of detecting and locating intruders it is only useful as part of a complete security system. If attention is not paid to the other factors, the full benefits of using MicroPoint II will not be realized.

1.2 Detection Process and Unique Terms

INTREPID MicroPoint II system is completely different than any other perimeter security system. It is important to have a basic understanding of how the system operates. Southwest Microwave, Inc. provides training courses in the application, installation and operation of the system. It is recommended that both installer and users of this system complete one of these training courses.

1.2.1 The Detection Process

The basic operation of the MicroPoint II sensor is illustrated in Figure 1.1. A pulse is transmitted down the cable between center conductor and braid. This creates an electromagnetic field inside the coaxial cable that propagates down the cable at 66% the velocity of light. As this field propagates along the cable energy is coupled into the two sense wires located in the keyways next to the braided outer conductor. The sense wires are insulated from the braid by a Mylar sheath. Any mechanical deflection of the sense wires causes a portion of the pulse to be reflected back to the receiver at 80% the velocity of light. The time delay between the onset of the transmitted pulse and the receipt of the pulse reflected from the deflected sense wires is a measure of the distance that the signal has propagated in the cable. This is a standard means of detecting faults in cables, commonly referred to as Time Domain Reflectometry (TDR). This is a form of radar inside a cable. The fixed return from the cable in its steady state is called **Clutter.** When an intruder climbs on the fence or cuts the fence fabric the induced motion of the cable causes the sense wires to move in the key ways and it is this motion that is detected and located.

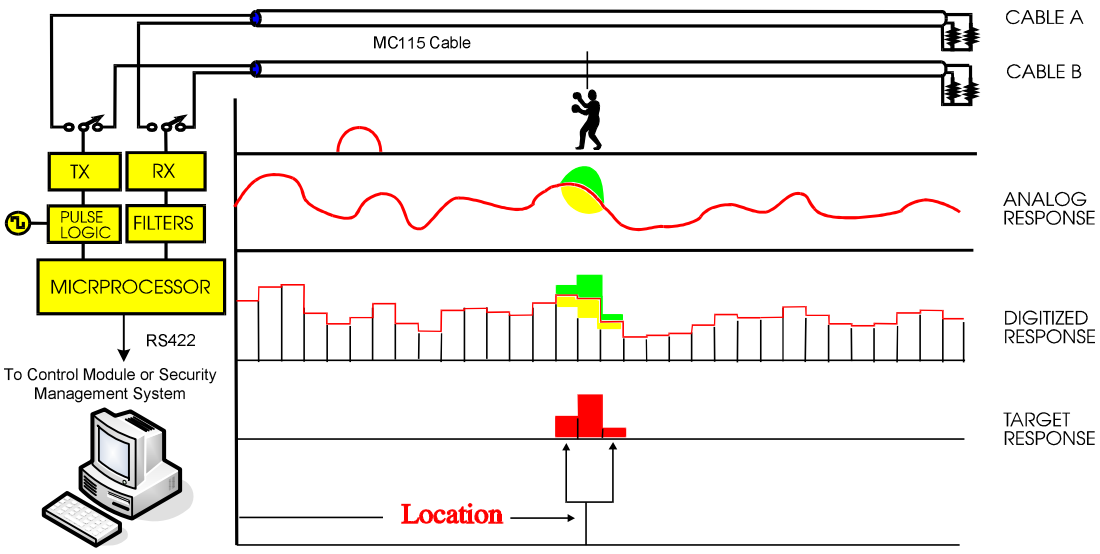


Figure 1.1 - Detection Process

The analog response is digitized into range bins that we refer to as **Cells**. A microprocessor is used to process the digitized data. The Fixed clutter is removed so that only the response to the moving sense wires remains. The shape of this remaining pulse is then analyzed to determine the location of the intrusion to within a Cell. A Cell corresponds to approximately 3.6 feet (1.1 meters) of cable. The Cell is the basic unit to which the PM II locates an intrusion. To account for the uncertainty at boundaries between Cells and the mechanical migration of the disturbance along the fence fabric MicroPoint II is specified to locate to within 10 feet (3m).

1.2.2 Unique Terms

The use of the Universal Installation Tool II (UIST II) software is an integral part of setting up a MicroPoint™ II system. This "teaches" the system all the relevant details of the site such as cable length, hardware configuration, and where auxiliary sensors are. Please refer to the UIST II manual for software setup. Some of the unique terms used in the MicroPoint II system are:

Cell: the basic unit to which the PM II will locate an intrusion alarm, approximately 4.0 feet (1.22 meters).

Sensitivity Leveling™: the automatic adjustment of the system sensitivity to account for variations in fence fabric during the calibration process.

Alarm Mask Time: prevents multiple alarms from occurring at the same location for a set period of time. In many applications it is desirable to "mask out" multiple alarms at the same location since the alarm is already being assessed or the response force has already been sent.

Alarm Mask Window: the number of cells to be masked out during the alarm mask time.

Incremental Threshold: an independent threshold adjustment for a cell or group of cells.

Incremental Enable/Disable: a process that allows making sections of the sensor cable active or inactive.

2. MicroPoint II System Components

In this section each of the MicroPoint™ II system components are introduce and their functions described. MicroPoint II system components are presented in three categories: hardware, controllers and software components. Components that have a microprocessor are called "modules" while components that do not have a microprocessor are called "units".

INTREPID™ MicroPoint II System comprises MicroPoint Cable and three (3) modules and units (PM II, LU II, and TU II) that are each designed to operate in an outdoor environment of -40^0 to 158^0 F (-40^0 to 70^0 C) and humidity range of 0 to 100%.

2.1 Hardware Components

2.1.1 MicroPoint Cable

The cross section of the MC115 MicroPoint cable is shown in Figure 2.1.

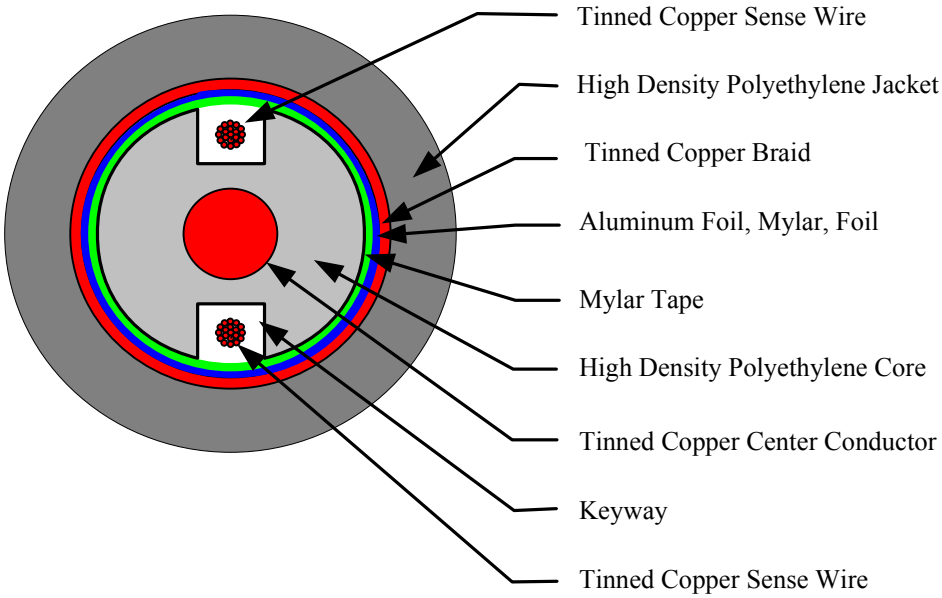


Figure 2.1 - MC115 Cable Cross Section

Patented MicroPoint Cable is similar in size to RG58U coaxial cable but it has two sense wires near the circumference of the core. The sense wires "float" in "keyways" which are made in the solid polyethylene core during the manufacturing process. Physical disturbance of the transducer cable causes the sense wires to move relative to the coaxial cable center and outer conductors, and this motion is detected and located using Time Domain Reflectometry (TDR). The pulse used in this TDR has Radio Frequency (RF) components.

The MicroPoint Cable has a high density, solid polyethylene jacket designed for outdoor use and comes on 100 or 220 meter (328 or 722 foot) reels. An armored version (MC315) of the MicroPoint cable is also available. Contact Southwest Microwave for cable model number and pricing.

2.1.2 Processor Module II – PM II

The Processor Module II (PM II) is the "engine" of the distributed sensor system and is shown in Figure 2.2. Each PM II processes data from two lengths of transducer cable (A and B). Each length of transducer cable can be up to 220 meters (722 feet) long. Both A and B transducer cable must be terminated in a TU II as shown in Figure 2.3 or a Link Unit II (LU II). A LU II terminates detection from the cable and inter-connects two PM II's for power and data while a TU II terminates a cable. PM II's can be used with other INTREPID™ Series II devices such as the AIM II, ROM II, MicroTrack II and MicroWave 330 Digital Microwave Intrusion Link. A controller such as the RCM II, CM II, GCM II, PSM or SDK is required to annunciate alarms. It can also communicate directly with other reporting systems or monitoring systems through use of the INTREPID™ Polling Protocol II (IPP II) Customer Development Specification (SDK).

Figure 2.2 - Processor Module II

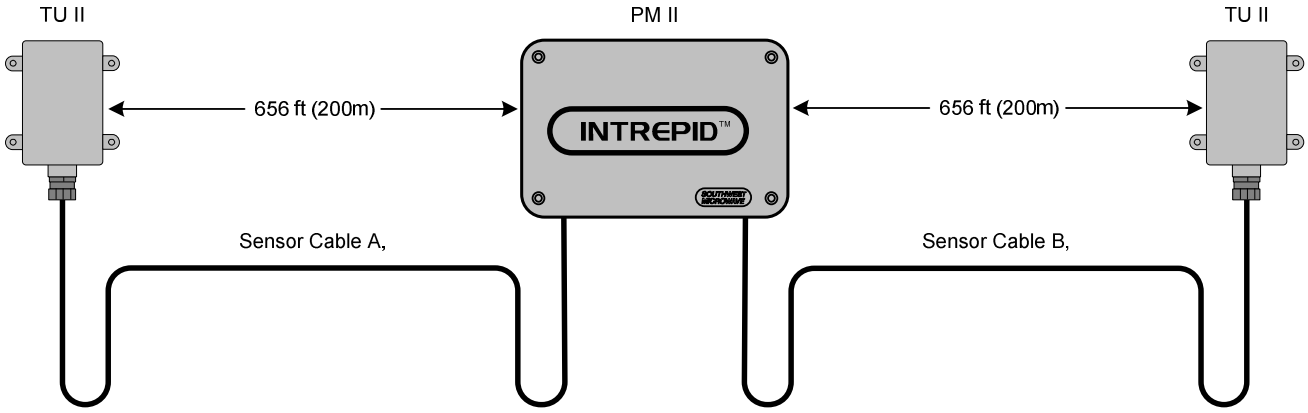


Figure 2.3 - Small System - 1 PM II & 2 TU II's

The PM II provides all digital signal processing and system management. Multiple PM II's communicate with each other as peers through the network operating over the sensor cable from a controller using RS422 data communication with the INTREPID Polling Protocol II (IPP II). All data logging and setup parameters are stored in the flash memory of PM II's.

The PM II includes a processor board and enclosure. The enclosure mounts directly on the fence fabric with 2 "J" bolts. The PM II cover is protected by a tamper switch and the unit is inherently protected by the sensor cable itself when it is fastened to the fence fabric.

The processor board is a multi-layer circuit card with surface mount components. It is held in the enclosure by eight (8) screws. The PM II has no potentiometers or physical adjustments of any kind except for an address dip switch. All connections to the PM II are with screw terminals. A dB9 connector is incorporated for connecting with the UIST II software for programming and diagnostics. LED's are incorporated for communications status, alarm status, tamper status, pulse status and fault status. All sensor cable strain relief blocks are equipped with a built-in stripping tool for the MicroPoint™ cable jacket. All input and output lines are protected against lightning. The PM II meets all FCC and CE regulations governing computing devices.

Four (4) auxiliary sensors inputs are available at each PM II. Devices such as microwave sensors, photo beam sensors or gate contacts can be connected directly to a PM II to receive power (12 VDC @ 150mA) and to report alarms from their relay and tamper contacts.

2.1.3 PM II Interconnections

The electrical interconnections to a PM II are shown in Figure 2.4.

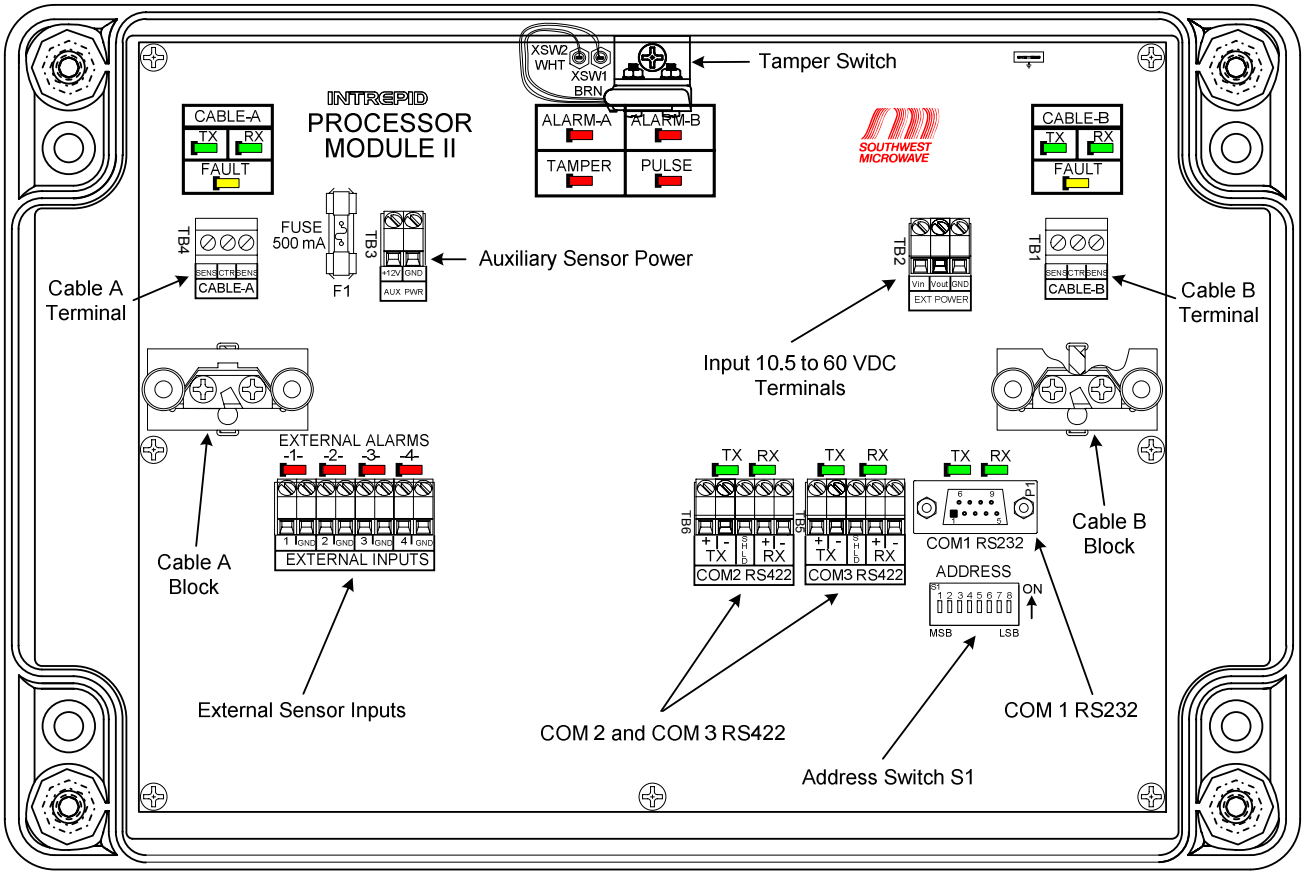


Figure 2.4 - Processor Module II Interconnections

2.1.4 PM II Properties

2.1.4.1 Enclosure

- 8.59 inches (218mm) high, 13.11 inches (333mm) wide and 4.25 inches (108mm) deep.
- Cover held by four (4) screws.
- Sensor cables, power cables and communications cable enter from the bottom of the enclosure.
- PCABS material.

2.1.4.2 Processor Module II Card

- 7.65 inches (194mm) high x 10.4 inch (264mm) wide, four-layer circuit card conformal coated.
- Mounts in enclosure with eight (8) screws.
- Two (2) stain relief blocks to capture MicroPoint™ cable.
- Two (2) RS422 communications terminals.
- One (1) dB9 connector for setup, service and diagnostics.
- LED's for diagnostics.

2.1.4.3 PM II Electrical Properties

Power

- 10.5 - 60 volts DC.
- 13 watts start up and 8 watts continuous (without auxiliary sensors).

Relay Inputs

- Four (4) dry contact inputs.

Auxiliary Sensor Power Output

- 150mA @ 12 volts.

Address Dip Switch

2.1.5 Link Unit II – LU II

The Link Unit II (LU II) is used to interconnect PM II's. It is a passive device that terminates the detection process while passing DC power, FSK and IPP II data to the next PM II. The LU II is housed in the same enclosure as the

PM II as shown in Figure 2-1. It mounts in the enclosure with six (6) screws. The LU II includes a circuit board and enclosure. The enclosure mounts directly on the fence fabric with 2 "J" bolts.

For sites with five (5) or more PM II's, ground loops are a possibility. To eliminate this concern the LU II can become isolated by removing fuses F1 and F2. It is recommended that for sites with more than five (5) PM II's, that one of the LU II's have the fuses removed to become an isolating LU II.

2.1.6 LUII Interconnections

The interconnections to a LU II are shown in Figure 2.5.

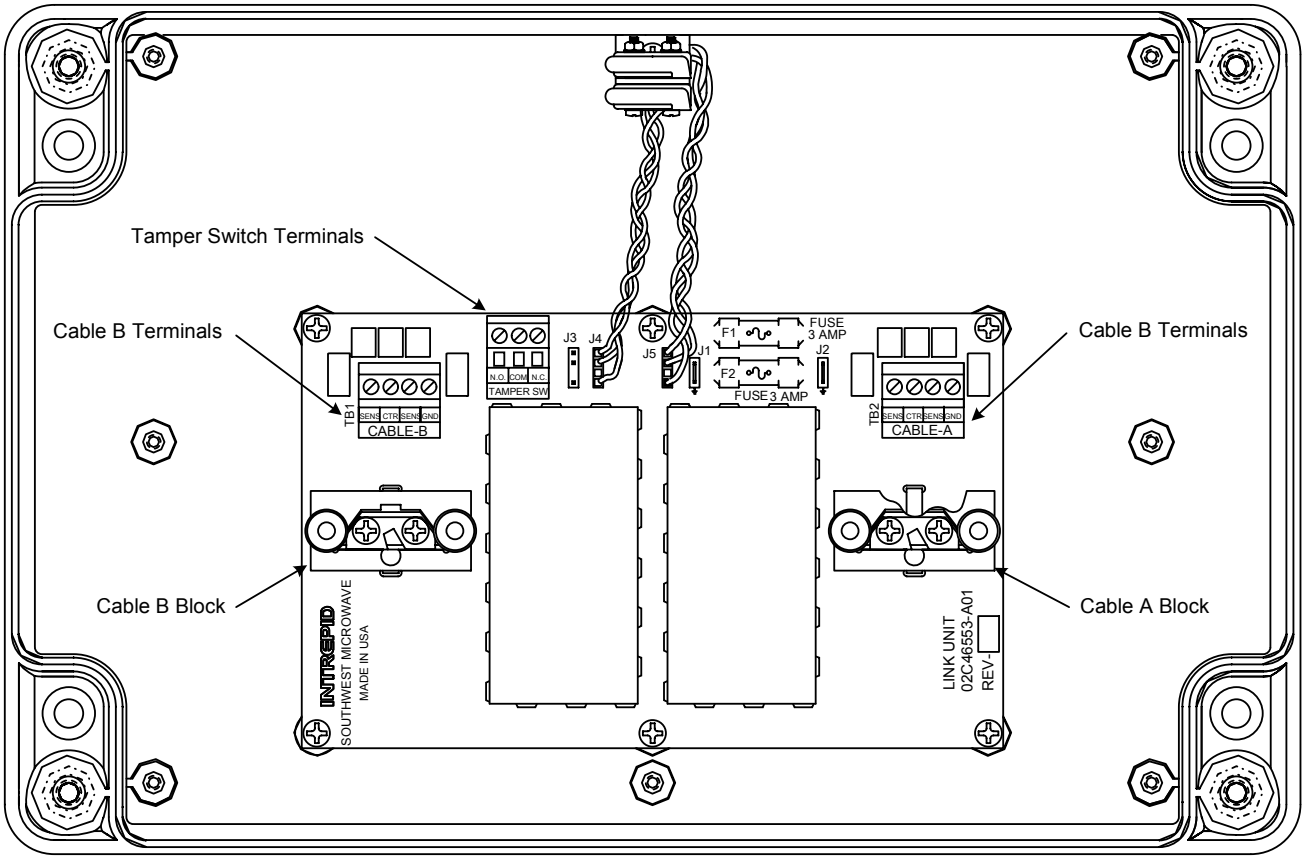


Figure 2.5 - Link Unit II Interconnections

2.1.7 LU II Properties

2.1.7.1 Enclosure

- 8.59 inches (218mm) high, 13.11 inches (333mm) wide and 4.25 inches (108mm) deep.
- Cover held by four (4) screws.
- Sensor cables enter from the bottom of the enclosure.
- PCABS material.

2.1.7.2 LU II Card

- 4.40 inches (112mm) high x 7.10 inch (180mm) wide.
- Mounts in enclosure with six (6) screws.
- Two (2) stain relief blocks to capture MicroPoint cable.
- One tamper switch terminal.

2.1.8 Termination Unit II – TU II

The Termination Unit II (TU II) is used at the end-of-line in open loop systems to terminate the detection process and the FSK for a single sensor cable. The TU II is housed in a small enclosure. The TU II uses the same strain relief block and termination as is used in the other modules to connect to the sensor cable. The TU II includes a circuit board and enclosure. The enclosure mounts directly on the fence fabric with cable ties.

2.1.9 TU II Interconnections

The interconnections to a TU II are shown in Figure 2.6.

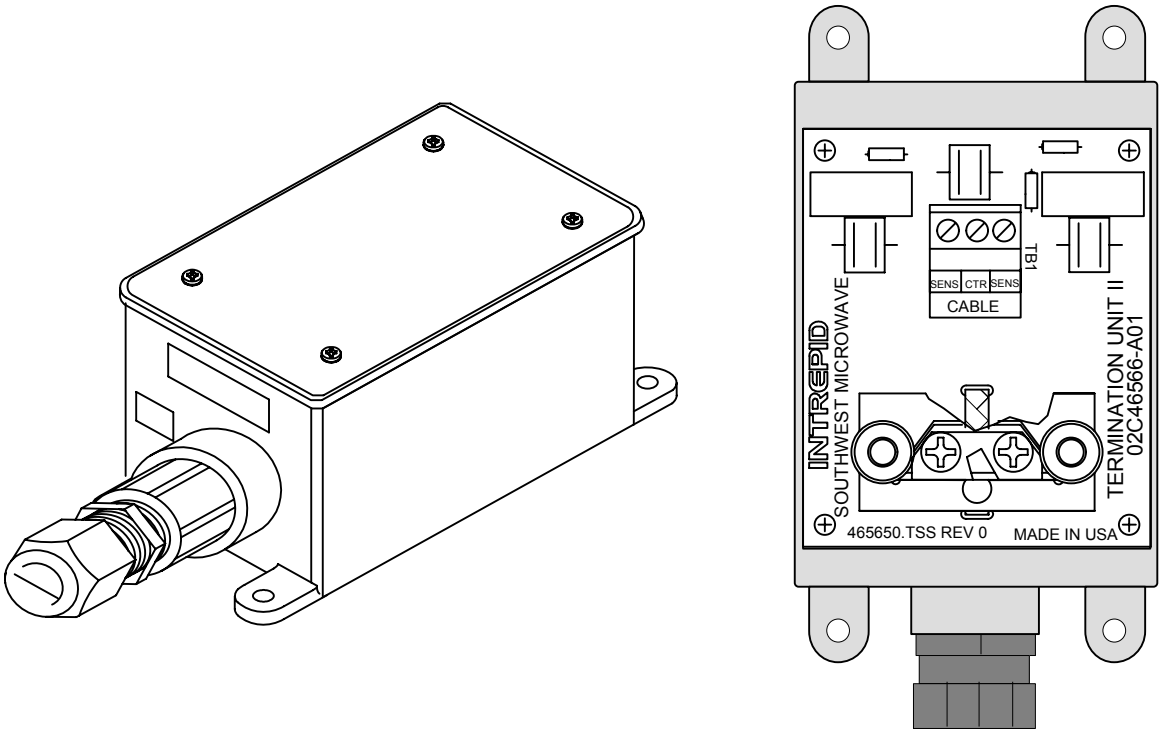


Figure 2.6 - Termination Unit II Interconnections

2.1.10 Splice Unit – SU

A Splice Unit (SU) is available to repair damaged sensor cable and to make installation of the senor cable around gates easier. The sensor cable should not be pulled long distances. At gates where the sensor cable needs to be routed under the gate, a SU provides a splice point to minimize the amount of cable to be pulled through the conduit underneath the gate. The Splice Unit is housed in an outdoor electrical outlet enclosure 5 inches x 4 inches x 2.5 inches (127mm x 102mm x 63mm). It is recommend that the maximum number of splices in any length of cable be limited to three (3) to maintain reliability.

2.1.11 SU Interconnections

The interconnections to a SU are shown in Figure 2.7.

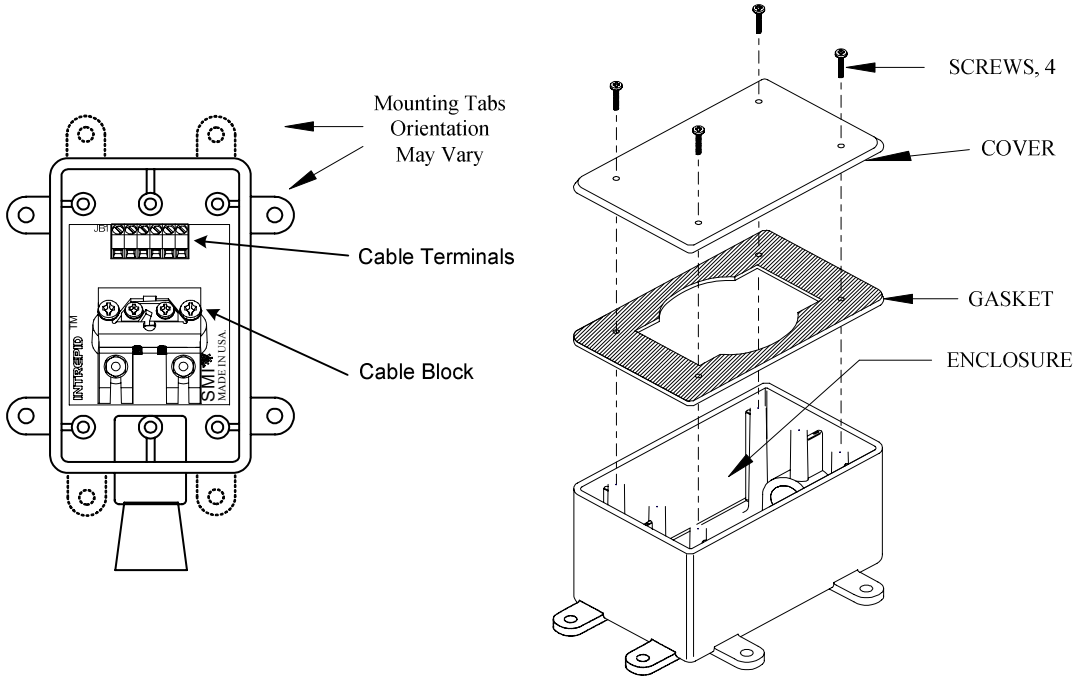


Figure 2.7 - Splice Unit Interconnections

2.1.12 JB70A Lightning/Surge Protection Module

The JB70A provides protection against lightning, EMI, RFI, and other induced voltages through the use of gas discharge and transorb devices. The JB70A offers a weatherproof enclosure for protection of eight (8) data signal lines and two (2) power lines. The box includes two installed 1/2" (12.7mm) strain relief's for the signal and power lines. Four mounting holes are spaced for 2 1/2" (63.5mm) u-bolts, clamps or unistrut (not provided) for pole mounting, or lagging into side of building. The holes diameter is .375 inches (9.5mm). The power lines clamp at 75 VDC and the data lines clamp at 18 VDC. The JB70A is shown in Figure 2.8.

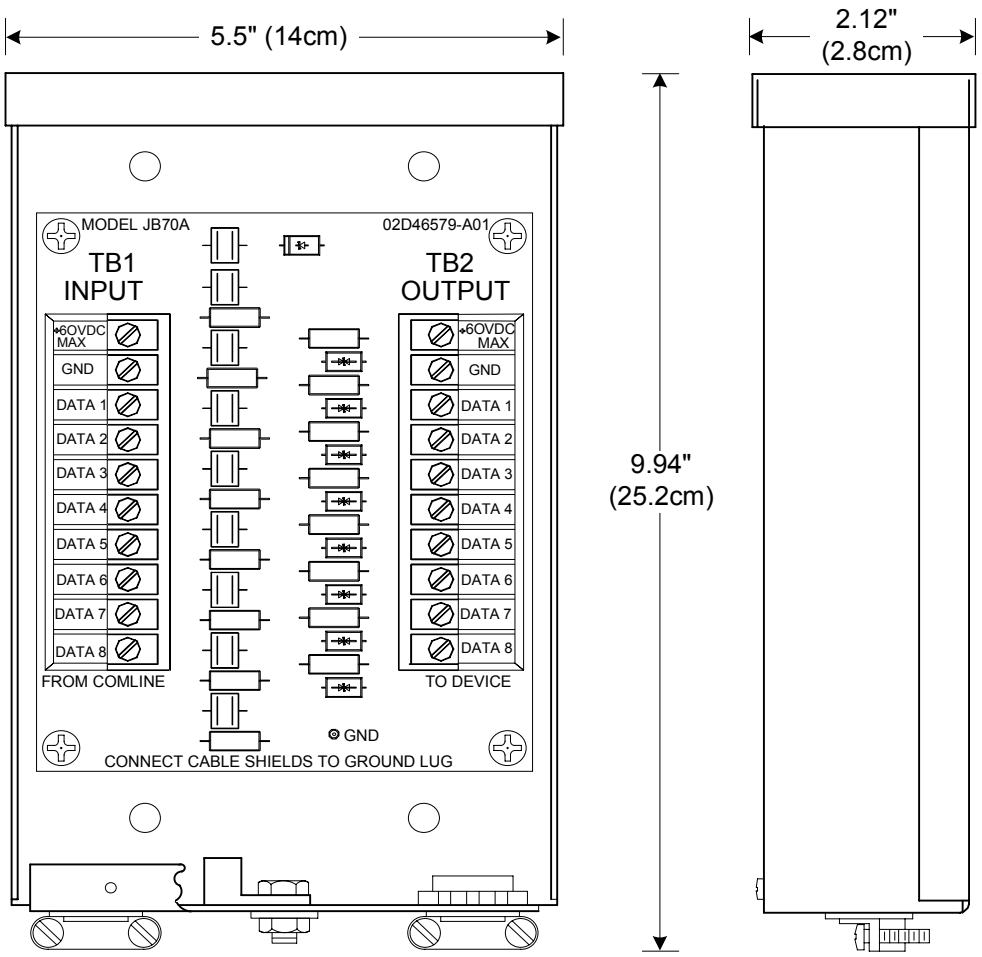


Figure 2.8 - JB70A

2.1.13 Power Supplies

12 VDC power supply: Model PS13 Power Supply operates from 85-246VAC, 47-63Hz and furnishes 13.6 VDC at up to 2.8A. Power supplies contain automatic switchover and battery charging circuitry for optional standby batteries of up to 25AH. Temperature rated from 14° to 122° F (-10° to 50° C). UL, ETS, EMC, CE, RoHs compliant.

24 VDC power supply: Model 78B1064 operates from 120VAC to provide 24VDC at 5A with 6.5AH battery backup. Includes; indoor enclosure 15 x 11 x 4 in. (381 x 280 x 102mm). Temperature rated from 32° to 122° F (0° to 50° C).

48 VDC power supplies: Model PS48 operates from 120VAC to provide 48VDC at 3A. Includes; indoor enclosure 14 x 12 x 4 in. (356 x 305 x 102mm). Model PS49 operates from 220VAC to provide 48VDC at 3A. *Model PS49 supply does not include enclosure*. Temperature rated from 32° to 122° F (0° to 50° C). UL, CSA, TUV, CE compliant.

2.1.14 Alarm Input Module II (AIM II)

The AIM II is an optional device used to connect additional auxiliary contacts to the system. It connects to the RS422 line on any of the PM II's or from the controller. It has eight (8) inputs that can also be set to supervised mode. Refer to the AIM II manual for more details.

2.1.15 Relay Output Module II (ROM II)

The ROM II is an optional device used to connect relay outputs to alarm panels, CCTV matrix systems, cameras, lighting, etc. It connects to the RS422 line on any of the PM II's or the controller. There are two models: ROM II-16 which has sixteen (16) relay outputs and ROM II-8 which has eight (8) relay outputs. Refer to the ROM II manual for more details.

2.2 Control Modules

There are several control modules that can be used to annunciate alarms from the MicroPoint™ II. The alarms that can be annunciated are: intrusions, enclosure tamper, cable faults, communication failure, service alarm and device configuration change. The controllers function is to be a "Poll Master" using the IPP II protocol. The available controllers are: Relay Control Module II (RCM II), Control Module II (CM II), Graphic Control Module II (GCM II), Perimeter Security Manager (PSM) and the third party INTREPID™ Polling Protocol II Customer Development Document (57A46504-A01). *Please refer to each of the control modules manual for setup and operation.*

2.2.1 Relay Control Module II (RCM II)

The RCM II allows up to eight (8) IPP II devices to be connected to the communications line. The RCM II also has eight (8) form C dry relay output contacts. These outputs or outputs from the Relay Output Module II (ROM II) can be connected to alarm panels, CCTV matrix systems or any other device that can use contact closures for alarm annunciation. A maximum of 32 zone records can be programmed. Refer to the RCM II manual for more details.

2.2.2 Control Module II (CM II)

The CM II allows up to sixteen (16) IPP II devices to be connected to the two (2) communication lines. Eight (8) devices can be connected to each line. The CM II also has eight (8) form C dry relay output contacts. These outputs or outputs from the Relay Output Module II (ROM II) can be connected to alarm panels, CCTV matrix systems or any other device that can use contact closures for alarm annunciation. A maximum of 256 zone records can be programmed. Refer to the CM II manual for more details.

2.2.3 Graphic Control Module II (GCM II)

The GCM II allows up to sixteen (32) IPP II devices to be connected to the four (4) communication lines. Eight (8) devices can be connected to each line. The outputs from the Relay Output Module II (ROM II) can be connected to alarm panels, CCTV matrix systems or any other device that can use contact closures for alarm annunciation. The GCM II also provides a graphic display. A maximum of 1024 zone records can be programmed. Refer to the GCM II manual for more details.

2.2.4 Perimeter Security Manager (PSM) Software

Perimeter Security Manager is a software package that provides easy-to-use operator command and control for MicroTrack™, MicroPoint™, MicroTrack II, MicroPoint II, 330 MicroWave, AIM II, ROM II and auxiliary sensors. It uses Microsoft Windows™ based software and a PC with a color monitor to display all sensor zones on a custom site map. The Perimeter Security Manager communicates with all INTREPID™ and other SMI products, and displays intrusion alarm information. It is available for single or multi-user operation as well as in a migrating server configuration. Please refer to the Perimeter Security Manager user's guide for additional information. Refer to the PSM manual for more details.

2.2.5 INTREPID™ Polling Protocol II (IPP II)

The INTREPID Polling Protocol II (IPP II) is a document that allows third party vendors to develop a software or data stream interface to the processor. For more information, please contact Southwest Microwave, Inc. and request document number 57A46504-A01.

2.3 Software Component

2.3.1 Universal Installation / Service Tool II (UIST II)

The Universal Installation / Service Tool II, is a Microsoft Windows™ (XP, Vista or Windows 7™) based program that runs on a standard PC. This software is used to configure the PM II for proper operation, detection, service and maintenance.

3. MicroPoint™ II System Design

This chapter describes how the various modules, units and devices piece together to make a complete perimeter security system. Presented below are some general notes, systems limits followed by a number of example configurations.

3.1 System Limits

- Maximum number of PM II's per communications port is 8 for a 1 second alarm delivery.
- Maximum length of cable per PM II is 440 meters (1,444 feet).
- Maximum number of auxiliary sensors per PM II is 4.
- Maximum power output for auxiliary sensors is 12 volts DC @ 150mA.
- Maximum number of controllers per system is one (1).
- Polling time for eight (8) devices is 125ms each from the controllers. For nine (9) or more devices on the same port the polling time is 150ms each.

3.2 General Notes

- All MicroPoint II modules and units may be installed either indoors or outdoors.
- All MicroPoint II modules and units normally attach to the fence fabric with two "J" bolts. Unistrut is optional.
- When used indoors components are normally attached to a wall using lag screws in place of the "J" bolts.
- PM II's, LU II's and TU II's are distributed around the perimeter with no more than 200 meters (656 feet) of linear distance between modules or units.
- When a PM II is used indoors the 200 meters (656 feet) limit on sensor cable must include the portion of lead-in cable.
- Locate PM II to reduce cabling for power and data and to minimize wiring to auxiliary sensors.
- A "Fault Tolerant" system will provide redundancy to the data network.
- Tensioning of fence may not be required because of the Sensitivity Leveling™ feature.
- A SU can be added to the sensor cable at any point to repair damaged cable. (Do not make more than three {3} splices in any length of sensor cable.)
- Zones are assigned by the controller after the system is physically installed. They can easily be assigned to match CCTV or other site criteria. *See controller manual for maximum devices*.

3.3 Typical System Configurations

The following INTREPID™ MicroPoint™ II site configurations are intended to illustrate how the various components can be interconnected to meet different site requirements.

3.3.1 Basic One PM Perimeter System - up to 400 meters (1312 feet)

Figure 3.1 show a one (1) PM II system using two (2) TU II's with a linear distance of 200m (656 ft) from the PM II to the TU II's. This is a suitable configuration for many small commercial sites. The controller can be the RCM II or CM II for relay outputs, the GCM II or PSM for graphics and relay outputs or an SDK. *A ROM II -8 or -16 may be required for relay outputs and an AIM II for additional inputs*.

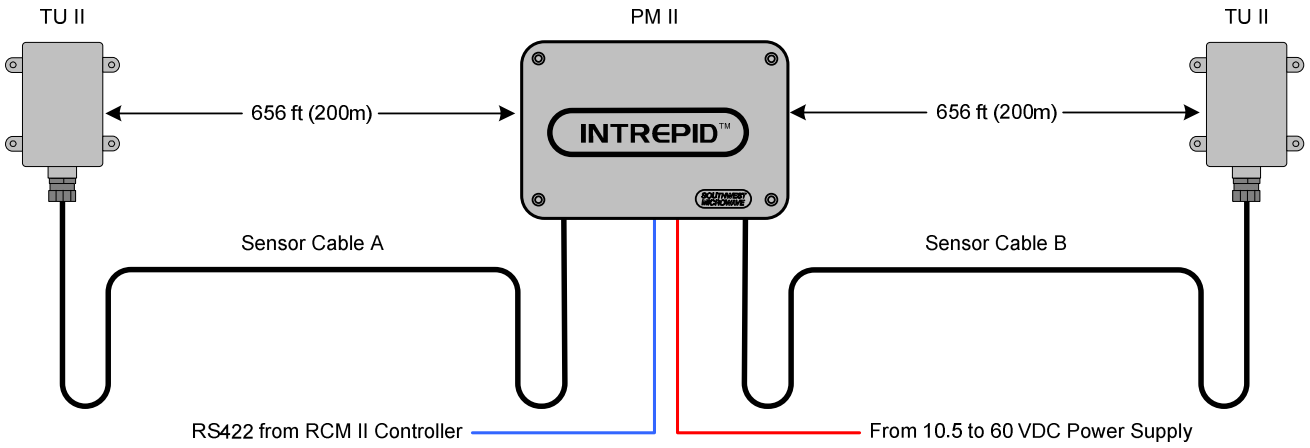


Figure 3.1 – One PM II System

3.3.2 Multiple PM II Perimeter System

Figure 3.2 shows a four (4) PM II system using relays (ROM II-16) for alarm annunciation. The typical controllers for this type of configuration would be the RCM II or the CM II since only relay output are being used. This configuration can be turned into sixteen (16) 100 meter (328 ft.) zones. If smaller zones are required another ROM II can be added. A UPS or batteries are recommended for backup power.

Power and data, in this example, are carried over the sensor cable itself to the next PM II. The LU II terminates the detection process but lets power and data pass on through to the next PM II. The systems FSK communications is terminated at the TU II's. The JB70A lightning and surge protection modules are used to protect the communications and power lines at the fence and at the control building.

For graphical annunciation of the alarms, the controller could be the GCM II, PSM or SDK (developed by a third party) as shown in Figure 3.3. A ROM II could still be added to the system to provide relay outputs. If additional inputs for auxiliary device are required above the four provided by the PM II, an AIM II could also be added to the system. A UPS or batteries are recommended for backup power.

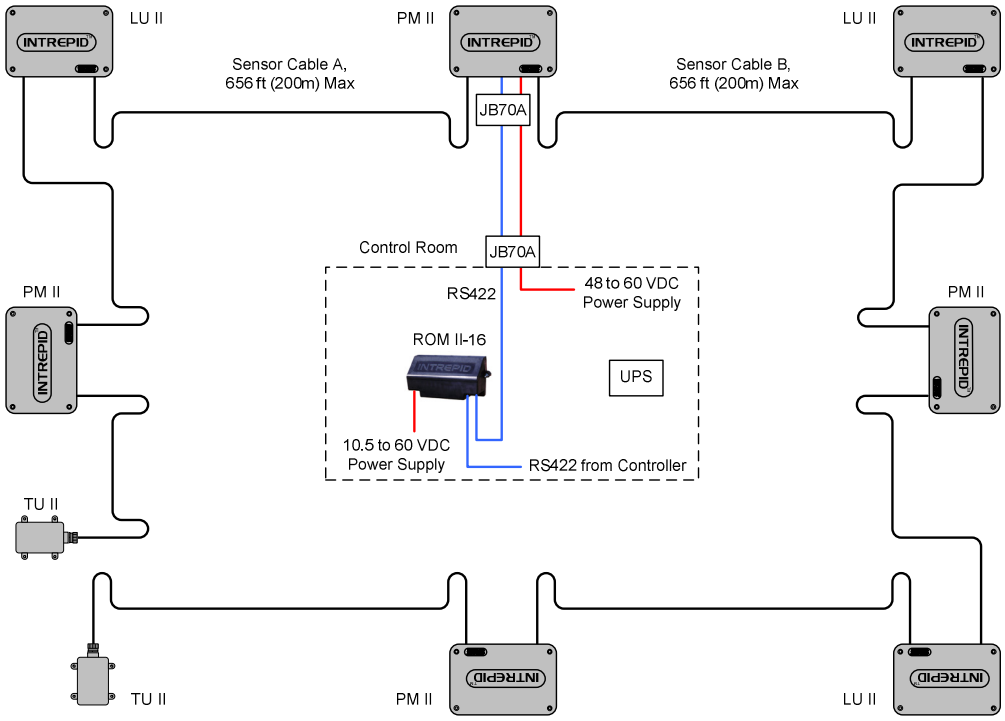


Figure 3.2 – Multiple PM II System using Relays

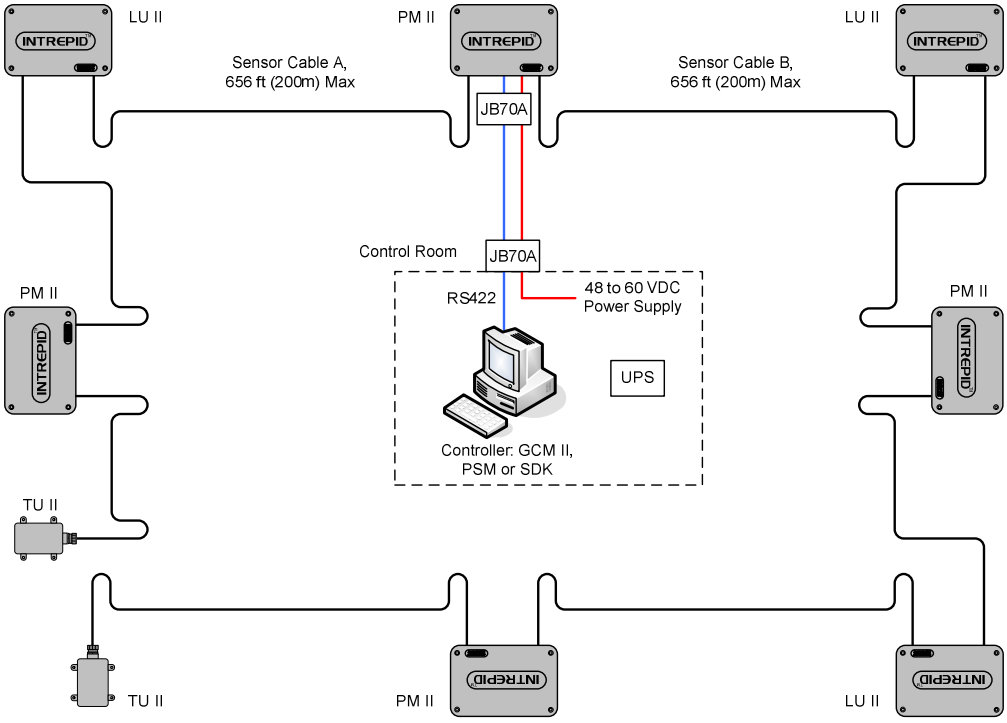


Figure 3.3 – Multiple PM II System using Graphics

Figure 3.4 shows the system using a "Star" configuration for power and data. This is the most secure configuration as each PM II has a dedicated power and data communications connection. A GCM II is used as the controller in this example.

Depending on site requirements, the controller can be the RCM II, CM II, GCM II, PSM or SDK.

Using a RCM II, four (4) would be required for the configuration as shown in Figure 3.4. If more PM II systems are used each would require a RCM II for this type of configuration.

Using a CM II, two (2) would be required for the configuration as shown in Figure 3.4. If more PM II systems are used every tw0 (2) would require a CM II for this type of configuration.

Using a GCM II with more systems would require the addition of a RS422 hub expander. The maximum number of PM II connections in this type of configuration is thirty two (32) and with the PSM the maximum number is sixty four (64).

Using the SDK, the maximum number is only limited to what the programmer decides to implement.

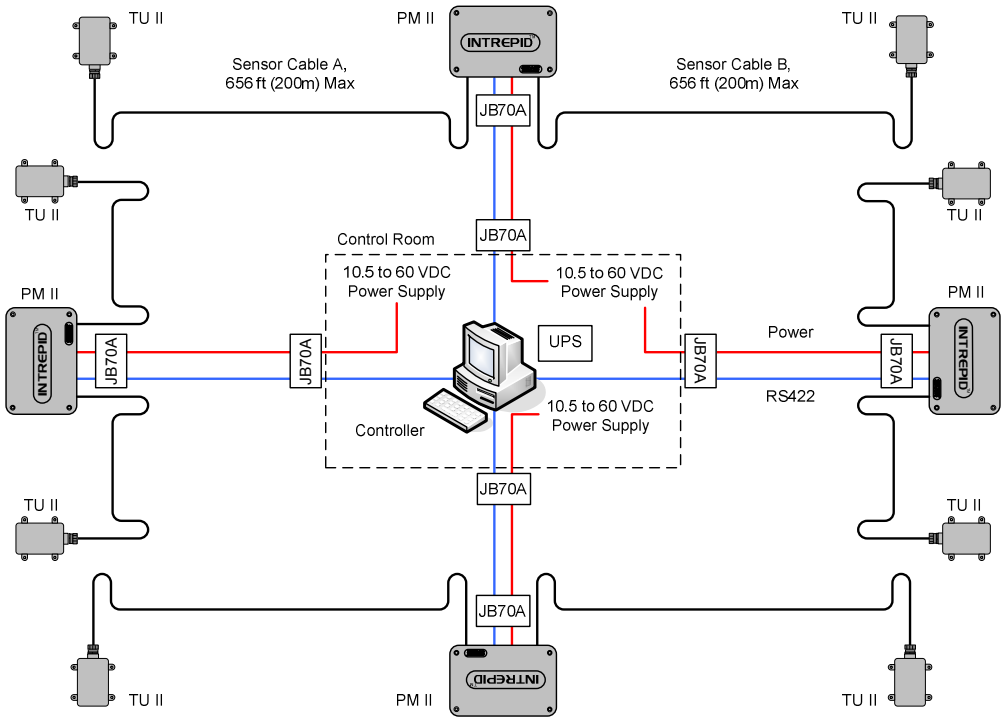


Figure 3.4 – Multiple PM II System using Star Configuration

Figure 3.5 shows a system in the "Fault Tolerant" configuration. In this configuration the CM II or GCM II controller will poll the system from both directions. This configuration serves as a redundant communication system in the event of any failures or cut cables. Two (2) power supplies are required.

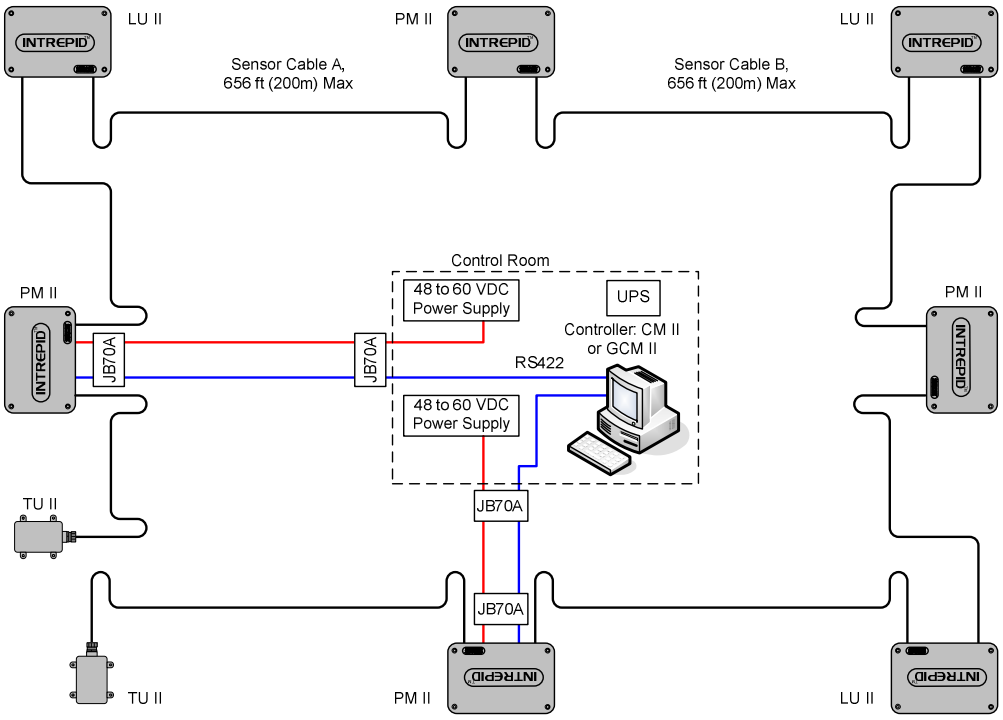


Figure 3.5 – Multiple PM II System in Fault Tolerant Configuration

If an AIM II, ROM II, MTP II or MicroWave 330 needed to be added to a system, it can be inserted in the RS422 line from the controller or taken from the RS422 communications port on the PM II.

3.3.3 Typical Applications

Figure 3.6 show the typical application of the MicroPoint™ II system.

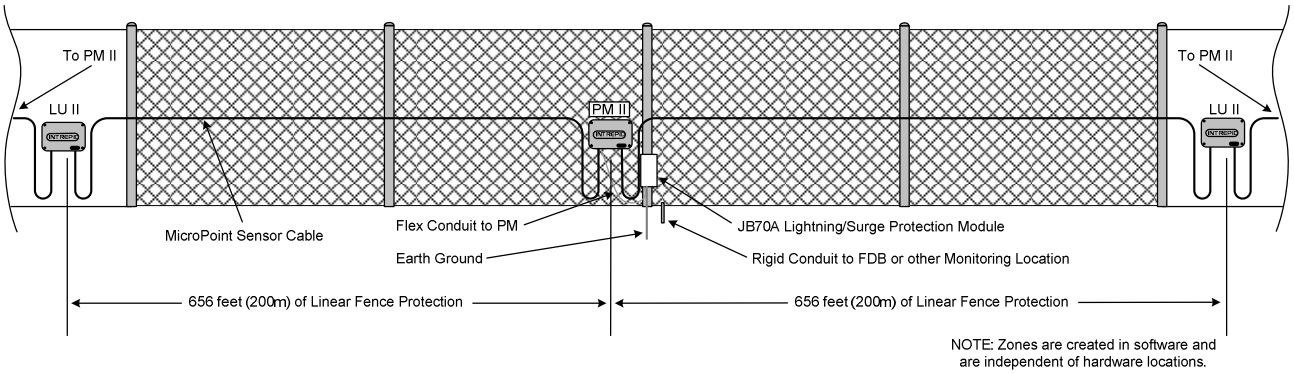


Figure 3.6 – Typical Fence Application

The MicroPoint can also be installed on barbed wire in Y and vertical outrigger configurations. It can also be installed on razor wire. Figure 3.7 shows two examples of the cable installed on vertical barbed wire using both LU II's and TU II's. For unassisted intrusion climbs the cable can be installed on any vertical wire.

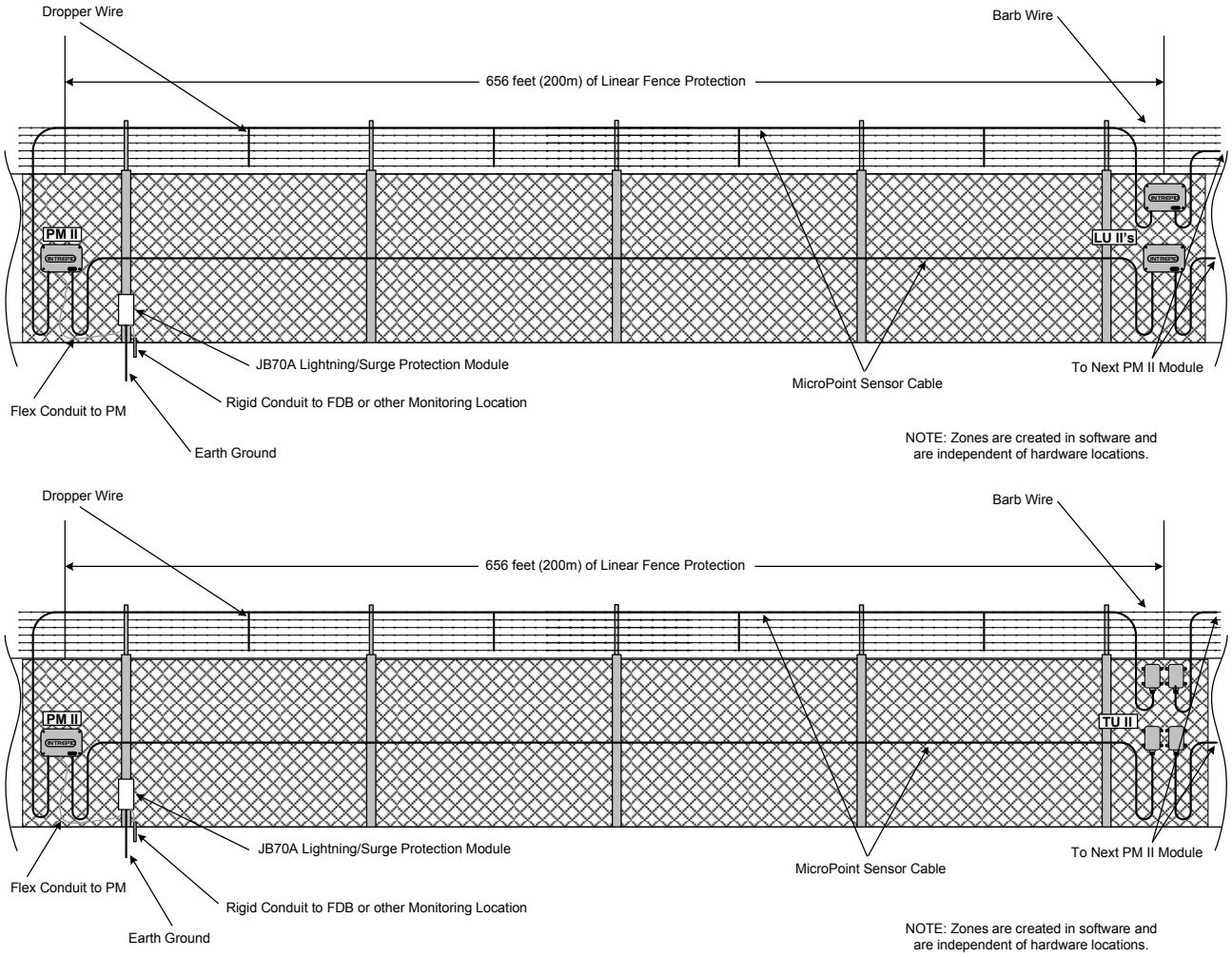


Figure 3.7 – Barbed Wire Application

3.3.4 Notes

The TU II does not have a tamper switch. This is an end of line termination on a circuit board which provides convenience. Other systems require soldering, heat shrinking or sealing in the field to make this termination. As this is just a termination, no tamper switch is required.

For sites with five (5) or more PM II's, ground loops are a possibility. To eliminate this concern the LU II can become isolated by removing fuses F1 and F2 as shown in Figure 3.8. It is recommended that for sites with more than five (5) PM II's, that one of the LU II's have the fuses removed to become an isolating LU II.

If a box with a tamper switch is required, the LU II should be used. If cable will only be connected to one side of the LU II, the other side needs to be terminated with a 50 ohm, ¼ watt resistor from the Center Conductor to the Ground terminals as shown in Figure 3.8. If the cover of the LU II is removed, the tamper switch(s) will activate and the cable on one or both sides will indicate a **"Cable Fault Alarm"**.

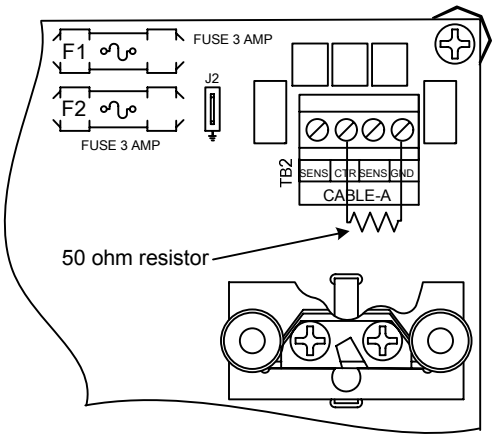


Figure 3.8 – LU II Fuses and Termination Resistor

If the LU II tamper switch needs to be assigned as an independent alarm point, the Tamper Switch terminal strip needs to be wired back to the inputs on a PM II or an AIM II as shown in Figure 3.9. The AIM II can also be set as a supervised input for the tamper switch.

One of the sets of tamper switch wires from J4 or J5 needs to be moved to J3. The other is left disconnected. Wire the NO or NC and COM contact from the terminal strip to one of the inputs on the PM II or AIM II.

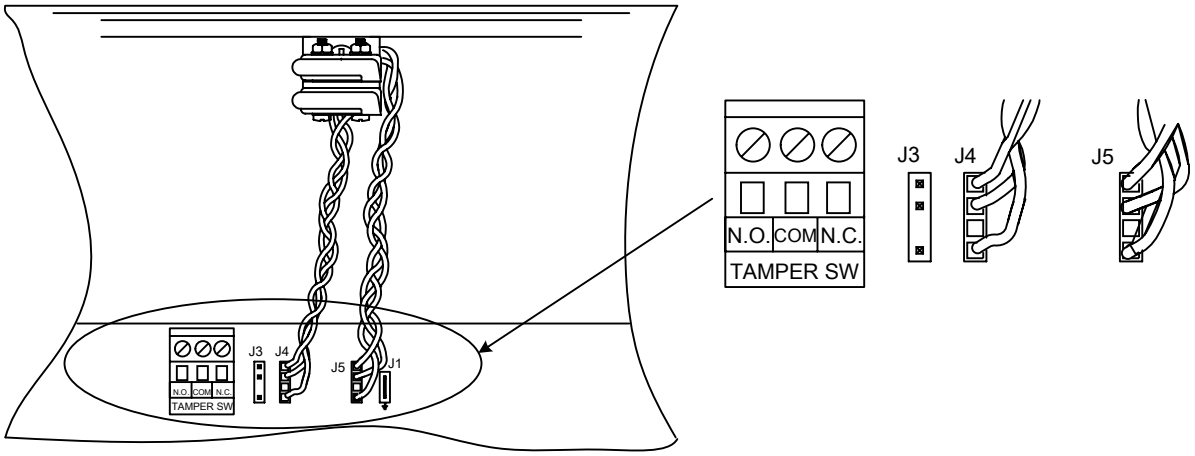


Figure 3.9 – LU II Tamper Switch Wiring

Figure 3.10 shows a typical configuration routing the tamper switch from the LU II to the external input on the PM II processor.

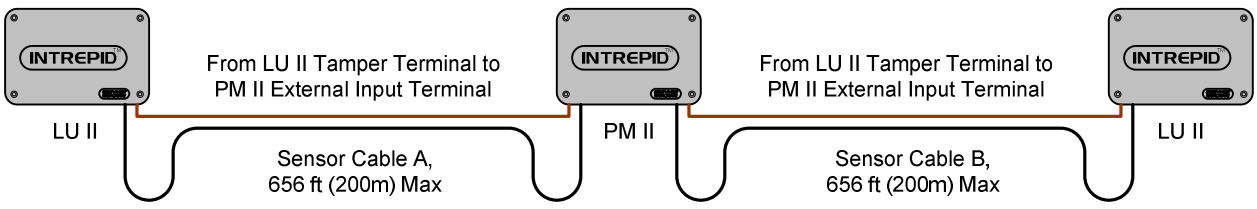


Figure 3.10 – LU II Tamper to PM II Wiring

Figure 3.11 shows a typical configuration routing the tamper switch from the LU II to the external input on the AIM II (Alarm Input Module II). In this configuration the AIM II can be set as a supervised input.

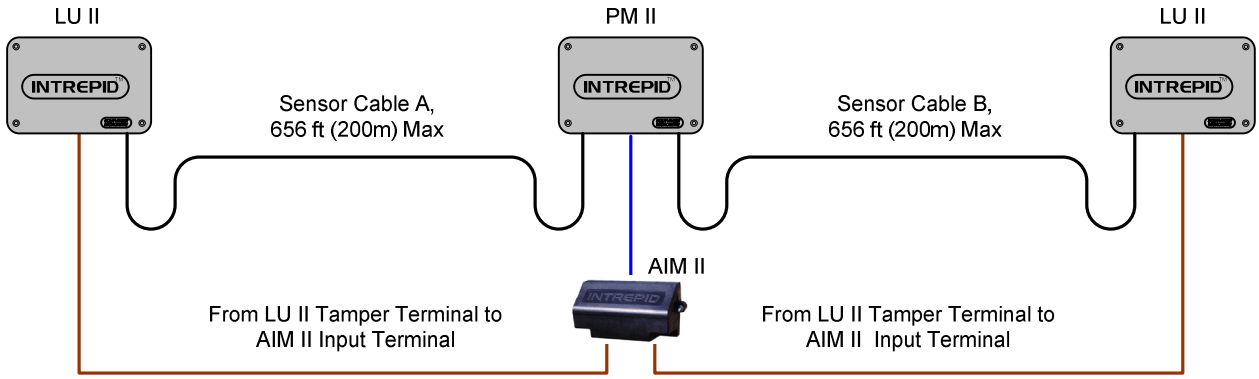


Figure 3.11 – LU II Tamper to AIM II Wiring

3.4 Controller to PM II Limitations

Each controller has specific limitations. As well as connections to the PM II processors, there are also other devices that can or may need to be used in a site configuration. Other devices could be the AIM II, ROM II, MTP II and MicroWave 330. With eight (8) devices on the communications port each will be polled for 125 milliseconds. With nine (9) or more devices on the communications port each will be polled for 150 milliseconds. More devices on a port will reduce the alarm delivery time. The following will outline how many devices can be connected to a controller.

RCM II: a maximum of eight (8) devices can be connected. The RCM II has one (1) comm. port.

CM II: a maximum of sixteen (16) devices can be connected. The CM II has two (2) comm. ports. With eight (8) devices on one (1) port, the alarm delivery time will be one (1) second. With sixteen (16) devices on one (1) port the alarm delivery time will be 2.4 seconds. The CM II can be set in a Fault Tolerant configuration.

GCM II: a maximum of thirty two (32) devices can be connected. The GCM II has four (4) comm. ports. With eight (8) devices on one (1) port, the alarm delivery time will be one (1) second. With sixteen (16) devices on one (1) port the alarm delivery time will be 2.4 seconds. With thirty two (32) devices on one (1) port the alarm delivery time will be 4.8 seconds. The GCM II can be set in a Fault Tolerant configuration.

PSM: a maximum of 240 devices can be connected. The PSM has 64 available channels.

SDK: a maximum of 240 devices can be connected. Ports are dependent on type of PC used and programmer's configuration.

3.5 DC Power Network

Power can be supplied to the MicroPoint™ II system at any PM II. Depending on the size of the site the system may be powered from one point on the perimeter using a 12, 24 or 48-volt DC 3 to 4 ampere power supply. It is recommended that this power supply have a battery backup or be connected to an AC UPS supply. When a GCM II is used for monitoring purposes, it should be connected to an AC UPS supply as well.

A single 12 or 24 volt supply is usually more than adequate for any single PM II site assuming the distance and wire size for the dc power is within standard specifications.

A single 48-volt supply is usually adequate for a three to four PM II site. Larger sites require the addition of power at a second point on the perimeter. This can be at the nearest PM II to a second source of AC power on the perimeter where the power supply can be located. *On a four PM II system it is recommended that power be connected to the second or third PM II for even power distribution*.

The PM II circuits are designed to pass DC power from one sensor cable to the other while performing their other functions.

A fuse is provided in each PM II to protect against shorts on lines going to auxiliary sensors. PM II electronics are protected against inadvertent application of supply voltage on the sense wires as can be caused by shorting the sense wires to the center conductor of the sensor cable.

3.6 IPP II Data Communications

IPP II (INTREPID™ Polling Protocol II) is a peer to peer communications network superimposed on the sensor cable. It uses Frequency Shift Keying (FSK) to send and receive data over the sensor cable. The IPP II can also be sent over the RS422 data line.

The highest priority on the IPP II network is to report alarms. It also supports the Universal Installation/Service Tool II on the PC (CM II and GCM II only). Sensor performance is not affected by communication traffic on the sensor cable.

4. Installing the Hardware

Following are the basic steps to install the hardware:

- Unroll the MicroPoint™ Cable and pull the sense wire.
- Install the MicroPoint Cable on the fence.
- Install the PM II's, LU II's and TU II's on the fence.
- Connect the MicroPoint Cable to the PM II's, LU II's and TU II's.
- Install any auxiliary sensors, AIM II's and/or ROM II's.
- Install the Power and Data wiring to the perimeter.
- Connect a controller to monitor alarms.

4.1 MicroPoint Cable Installation

4.1.1 MicroPoint Cable - MC115

MicroPoint Cable comprises four conductors: the outer braid, the center conductor and two Sense Wires. See Figure 2.1 for cross section view.

!! CAUTION !!

MicroPoint is a special transducer cable. It is not a piece of regular coaxial cable. **IT CAN BE EASILY DAMAGED!**

MECHANICAL DAMAGE can occur from over-bending, twisting, or stretching the cable. Be sure to follow the installation instructions carefully. When pulling the sense wires, do not exert more than 3 pounds of pressure on the wires or breakage may occur.

WATER DAMAGE is also a concern. Water entering the keyways (the grooves in the center core of the cable that contain the sense wires) will cause unpredictable results and will require replacing the cable. Keep the rubber end caps on at all times until ready to install. **Once the cable is terminated at the modules and units, the supplied dielectric grease must be applied.**

4.1.2 Checking the Cable

Check the MicroPoint Cable before unreeling it. Please note that it is normal to have the sense wires either sticking out or sucked in at the end of the cable. Using a MicroPoint stripping tool remove about two (2) inches (51 mm) of jacket from both ends of the cable. Trim back the braid and foil as shown in Figure 4.1. Carefully remove the Mylar tape and expose the Sense Wires. Strip the core from the end of the center conductor. Separate the conductors so they are not shorted together.

Using an ohmmeter check the resistance between the shield and each of the three remaining conductors. The resistance should be greater than six megohms. A measurement less than 100 ohms indicates a short between the conductors - check the other end of the sensor cable and insure the wires are not shorted. A measurement between 100 ohms and six megohms indicates that water has entered the cable. This **MUST** be replaced with new cable.

Perform a continuity check on each sense wire and center conductor to ensure there are no breaks in the cable. If there is no continuity the cable must be replaced.

Perform a resistance check of the sense wire. Using an ohm meter measure the resistance of each sense wire. The resistance should read approximately .33 ohms per meter (.11 ohms per foot).

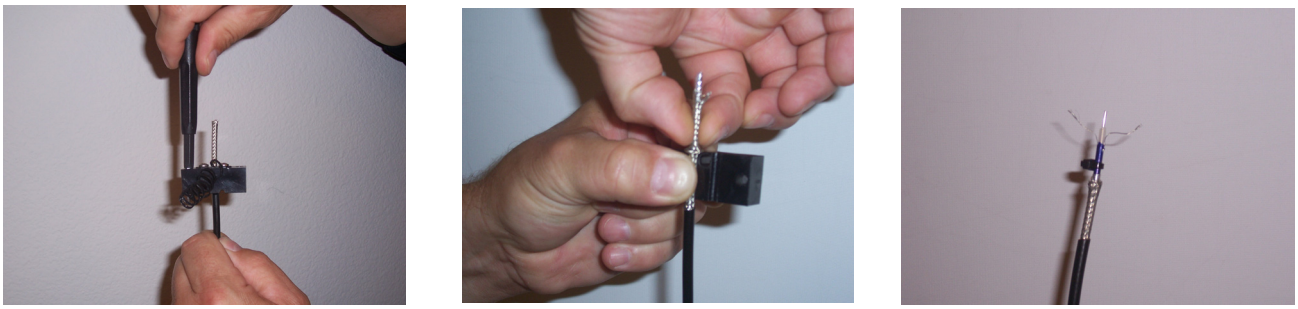


Figure 4.1 - Preparing the MicroPoint Cable Ends

When the cable has been checked, cut off the ends and replace the end caps to protect the cable while it is unreeled.

4.1.3 Unreeling the Cable

!! WARNING !!

The cable **MUST** be unreeled as described below.

Normally **the cable should be placed on the protected side of the fence**. Applications where the requirement is to keep intruders out, then the cable should go on the inside of the perimeter fence. Applications where the requirement is to keep intruders in, then the cable should go on the outside.

Place a four feet section of pipe through the center of the MicroPoint™ Cable reel. Be sure the ends of the cable, are not in a position, where they will be damaged by the pipe.

Locate a position on the fence, where the cable must start. Secure the end of the cable to that point using the tie-wraps or have an assistant hold the cable. Leave six (6) feet (1.8m) of slack cable beyond the starting and ending point for connection to the electronics. **DO NOT:** kink the cable by tying a knot in it.

Hold the pipe with one hand on each side of the reel. Walk backward along the fence line, allowing the cable to unreel and drop onto the ground. (The reel will spin on the pipe.) **DO NOT:** allow the cable to dispense off the side of the reel! This will put a spiral twist into the sensor cable resulting in damage.

DO NOT: put the cable reel on a stand and "pull" the cable off the reel. This puts unnecessary strain on the cable.

The cable **SHOULD BE** completely unreeled adjacent to the fence prior to mounting on the fence. If the cable is not close to the fence and must be pulled or dragged into position before mounting, be aware that the sense wires may be sucked into the keyways. If the cable has been pulled or dragged to the fence, pulling the sense wires back out may be required for proper operation. See section 4.2.4.

DO NOT: allow the ends of the cable to get wet.

4.1.4 Shaking the Cable while Pulling the Sense Wires

In order to relieve any binding that may have occurred during the reeling of the cable, the following steps must be performed on each end of the cable.

This part of the procedure requires two people.

CAUTION - When pulling the sense wires **DO NOT** exceed 3 pounds of pressure or the sense wires may break.

Once the cable is completely unreeled in a straight line on the ground, remove the tie-wraps that secured it to the fence (if used) and remove the end caps temporarily. Trim back the braid and foil as shown in Figure 4.1. Have one person hold the jacketed portion of the cable. Slowly pull one of the sense wires from the cable until you feel a slight resistance, then release the pressure to allow the Sense Wire to "spring back" into the cable. Repeat for the second sense wire. Do not be alarmed if all of the wire pulled does not return into the cable, it will be trimmed later. If more than 24 inches (610mm) of sense wire is exposed, and resistance is felt, stop pulling on that wire and immediately check the other end of the cable. If either of the sense wires has disappeared back into the cable do not continue pulling on that sense wire.

While still being held in the same manner as above gently reapply pressure to both sense wires until a slight resistance is felt on both. Maintain this pressure on the sense wires and have the second person begin to gently shake the cable from side to side while walking away from the first person. Be sure the hand holding the jacket, not the sense wires, is supporting the weight of the cable while the second person is shaking the cable. Stop shaking the cable when you have reached the mid-point along the length of the cable. Release the pressure on the sense wires to allow them to "spring back" into the cable. Do not be alarmed if all of the excess wire pulled does not return into the cable.

Repeat the above procedure on the opposite end of the cable. Once these steps have been completed, trim off the stripped ends (including any excess Sense Wire), replace the protective rubber end caps, and attach the MicroPoint cable to the fence.

4.2 Where to Start…

Start at each end and work back to the feed point (i.e. the Processor Module II [PM II] with the communications connection) cable section by cable section. Leave the feed point PM II to the last. The ending point of the first cable section will determine the starting location of the next cable. Be sure to leave six (6) feet (1.8m) of slack cable on each end of each cable to allow for connections to the components. At the completion of this process all excess cable should be at the feed point PM II. In some cases cable lengths will be less than 200 meters (656 feet) because the next PM II or LU II needs to be positioned at a particular location.

The MicroPoint™ Cable must be installed at a point on the perimeter where the end point of the cable is exactly defined; otherwise, the installation may come up short. Remember **No section of Sensor Cable can be longer than 220 meters** (722 feet). The PM II will NOT recognize any signals beyond the 220 meters (722 feet) point. **THERE ARE NO EXCEPTIONS.** Do not try to splice in additional cable to fill any gaps, no matter how short they are.

4.2.1 Attach the Cable to the Fence

The cable can be attached to the fence at various heights. Figure 4.2 gives the recommended mounting height versus fence height. These heights may change per individual site requirements or specifications and may also require a second run of cable.

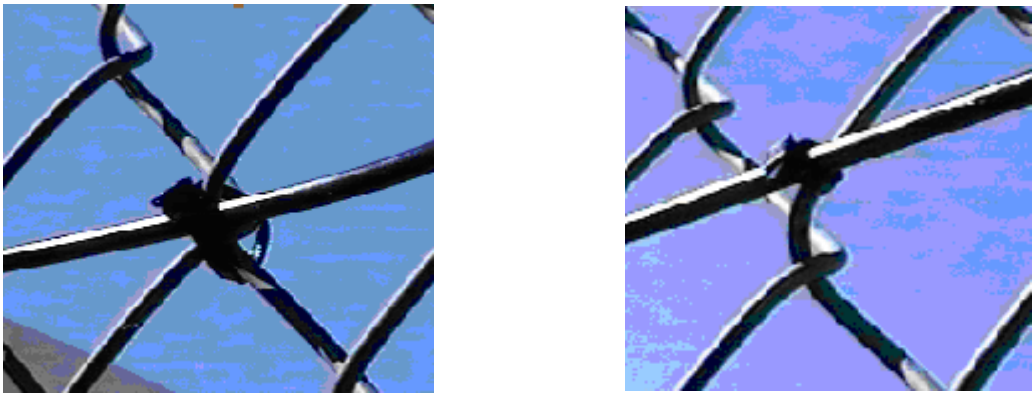
Fence Height		Cable Height	
Feet	Meters	Feet	Meters
6-8	1.8-2.4	4	1.2
10-12	3.0-3.6	5	1.5
14	4.3	6	1.8

Table 4.2 Cable Height vs. Fence Height

Leave at least six (6) feet (1.8m) of slack on each end of the MicroPoint™ Cable. This extra cable will be used to make terminations and drip loops. Keep the end caps on the cable ends throughout the cable installation process.

If the fence has a mid-rail, the MicroPoint Cable should be mounted below the mid-rail.

The cable must be attached to the fence using plastic or metal tie wraps. A variety of tie wraps are available from Southwest Microwave, Inc. The tie wraps must be placed through the fence fabric **perpendicular to the MicroPoint Cable**. The tie wrap goes around two (2) fence wires at their intersection as shown in Figure 4.3. This prevents the tie wraps from putting small kinks in the sensor cable at each tie point. **Check the fabric intersections for protrusions that may damage the cable.**



CORRECT **INCORRECT**

Figure 4.3 - Tie Wrap Cable to Fence Fabric

Tie wraps must be placed approximately every nine (9) inches (228mm) along the fence (typically every third fence diamond). Cut off the ends of the tie wraps.

Attaching the cable around fence posts requires care. In most cases the cable is on the "post side" of the fence fabric. Be sure to avoid sharp bends in the cable. As shown in Figure 4.4 leave enough slack around the post so there is a one (1) inch (25mm) gap between the MicroPoint™ Cable and the post. This slack prevents damage to the cable when someone climbs on the fence and pulls the fabric away from the fence post.

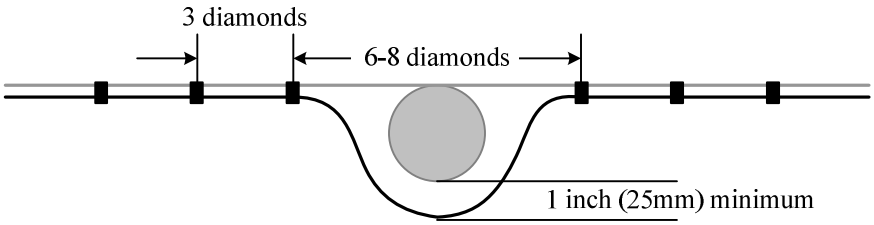


Figure 4.4 - Wrap Cable around Fence Post

4.2.2 Working Around Gates

4.2.2.1 Small Swing Gates

For small swing gates the MicroPoint Cable should be attached to the gate as shown in Figure 4.5. This figure also shows a Splice Unit (SU) which is used for ease of installation. A Splice Unit (SU) is used when the gate occurs more than 50 feet (15 meters) from the end of a cable to avoid pulling long lengths of cable through the conduit.

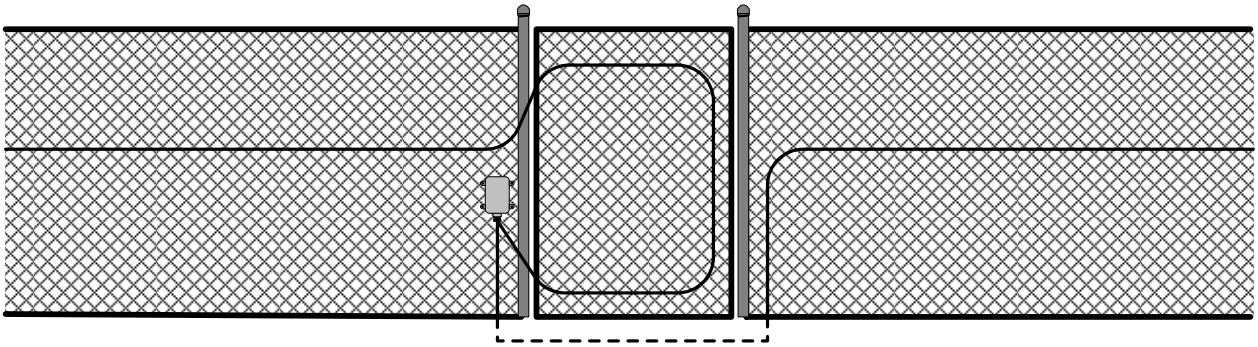


Figure 4.5 - MicroPoint Cable on a Small Swing Gate

The cable is approximately vertical at the gate hinge so that it twists the cable as opposed to bending the cable as the gate is opened. Be sure to leave enough slack to allow the gate to open fully. The cable is buried in conduit below the gate and continues on the other side of the gate. At minimum, a 3/4 inch (19 mm) diameter conduit should be used to pull the cable underneath the gate. Be very careful not do damage the cable pulling it through the conduit. The conduit should be sealed, after cable installation, to prevent the cable from sitting in water.

4.2.2.2 Double Swing Gates

For small double swing gates the MicroPoint Cable should be attached to the gate as shown in Figure 4.6. This figure also shows a Splice Unit (SU) which is used for ease of installation. A Splice Unit (SU) is used when the gate occurs more than 50 feet (15 meters) from the end of a cable to avoid pulling long lengths of cable through the conduit.

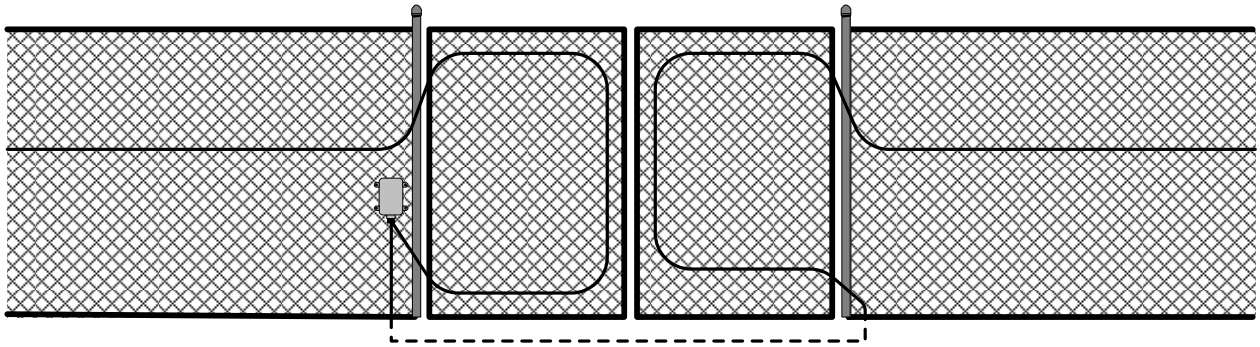


Figure 4.6 - MicroPoint Cable on a Double Swing Gate

4.2.2.3 Double Swing Gates with Termination Units

When the perimeter loop closes at a small double swing gates the Termination Unit II's (TU II's) can be used to terminate the system. The typical configuration for installing the TU II's is shown in Figure 4.7. This avoids the need for trenching under the gate and pulling the cable through the conduit.

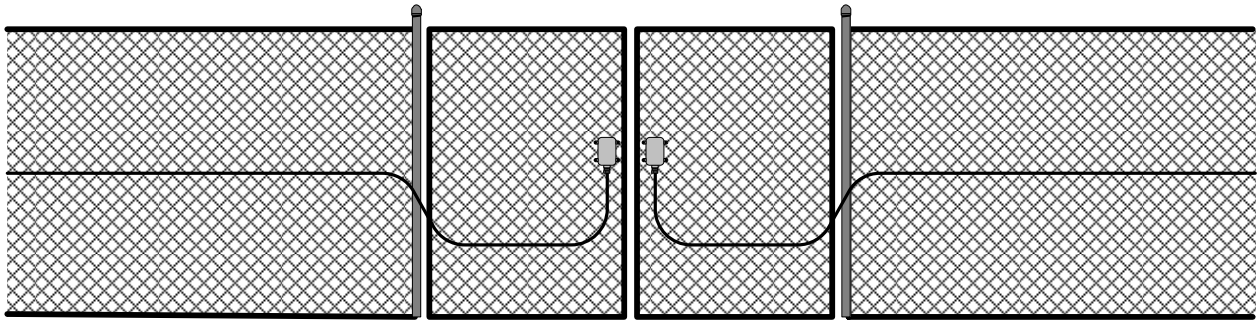


Figure 4.7 - MicroPoint Cable and Termination Unit II's on a Double Swing Gate

When installing the cable in conduit under the gate try and make sure the conduit is dry so when the MicroPoint™ cable is pulled through the conduit water in not induced into the keyways of the cable. After the cable has been routed, seal the ends of the conduit to prevent water ingress.

4.2.2.4 Sliding Gates

It is usually desirable to use an auxiliary sensor such as a microwave link at a sliding gate. There is no positive method of attaching the cable to a sliding gate without damaging the cable when the gate opens and closes. The cable should be routed under roadways as shown in Figure 4.8 or overhead if there is fencing or other structures available. (Note: With MicroPoint™ Cable it is not necessary to splice in an inactive cable. Just continue with MicroPoint Cable and set that section to "Inactive"). In Figure 4.8 the microwave sensor is connected to a PM II for power, alarm and tamper.

At minimum, a 3/4 inch (19 mm) diameter conduit should be used to pull the cable underneath the gate. Be very careful not do damage the cable pulling it through the conduit. The conduit should be sealed, after cable installation, to prevent the cable from sitting in water.

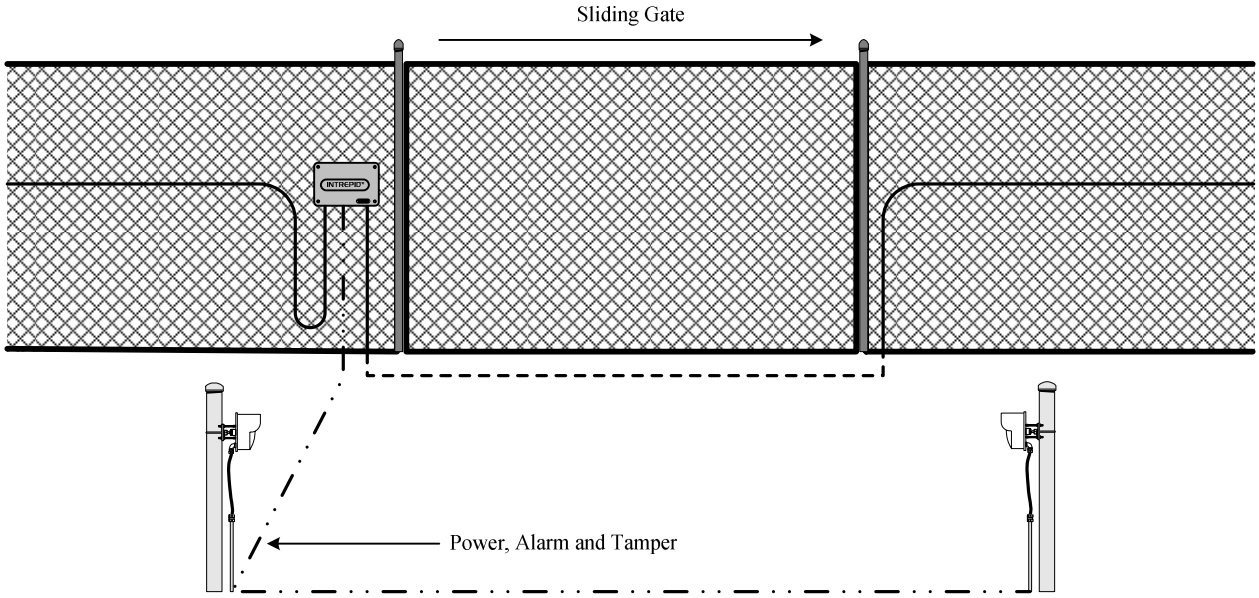


Figure 4.8 - Sliding Gate with Microwave

4.3 Processor Module II, Link Unit II and Termination II Installation

4.3.1 Mounting Processor Module II's Link Unit II's and Termination Unit II's on Fence

Each PM II and LU II includes two (2) J-bolts, two (2) standoffs, two (2) thumb screws and two (2) washers as shown in Figure 4.9. Insert the J-bolt (threaded end) through opposite corner holes in the back of the enclosure. Slip the standoff over the threaded end of the J-bolt from the front of the enclosure. Secure the thumb screw with washer to the J-bolts and leave loose so they can be hooked through the fabric. Attach the PM II or LU II to the fence as shown in Figure 4.10. Once hooked, tighten down the thumb screws. Keep the enclosure level. *Alternatively the enclosure can be mounted to a flat surface using screws or mounted to the fence post using Unistrut*.

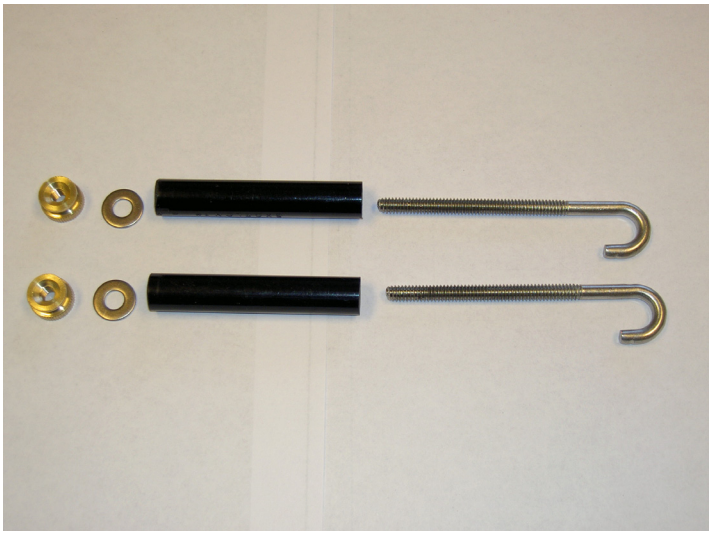


Figure 4.9 - Processor Module II or Link Unit II J-bolts

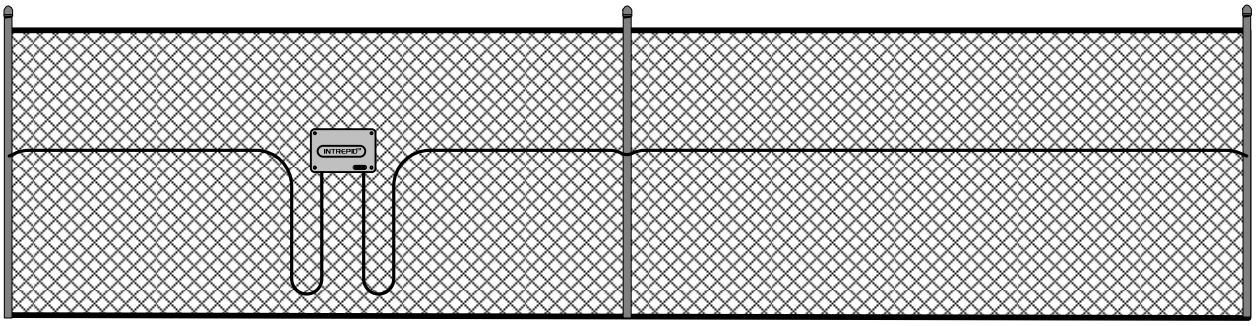


Figure 4.10 - PM II, LU II, TU II on Fence

As you tighten the J-bolt make sure that the "hook end" is not striking the plastic enclosure and is free to pull tight against the wire mesh. **DO NOT OVER TIGHTEN THE J-BOLTS**. This will cause the enclosure to bend slightly making the lid hard to remove and install.

4.3.2 TU II or Splice Unit (SU) Mounting

If TU II's and/or SU's are used in the system they are attached to the fence fabric with four tie wraps, one on each eyelet on the four-corners of the box as shown in Figure 4.11.

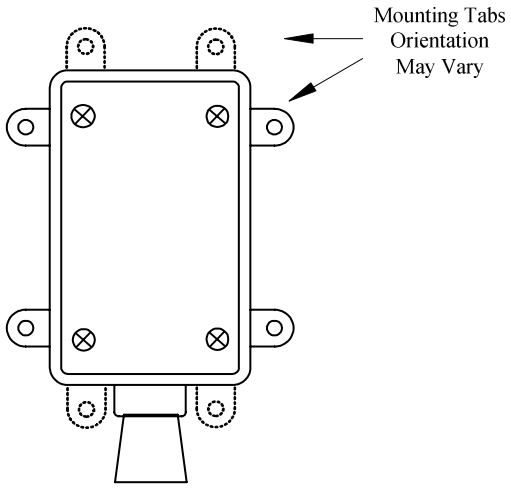


Figure 4.11 – TU II or SU Mounting

4.4 Auxiliary Sensors, AIM II and ROM II

If auxiliary sensors are being used, refer to the manual for that sensor type for installation requirements. If the AIM II or ROM II is being used refer to their individual manual for installation requirements.

4.5 Feed Point Connections to PM II and Grounding

The point on the perimeter where power and data is connected to the PM II is called the Feed Point. At the feed point use at minimum a ¾ inch (20mm) conduit to protect the power and data wires that are to be connected to the PM II.

A typical feed point connection is shown in Figure 4.12. Flexible conduit is used from the PM II to a JB70A surge/lightning protection module junction box on the nearest post and rigid conduit is used from this junction box to the control room. The conduits would have the power and data communications wires. This flexible conduit enters the enclosure from the bottom at one of the three small pilot points. Use a "Knockout Punch" or a "Multi-Diameter Step Drill" to create the correct size opening in the enclosure to accommodate the conduit or gland fitting.

Shielded twisted stranded pair cable should be used to connect the controller's data communications to the PM II. A 22 or 24 AWG 4-pair cable wire such as Belden 8306 or equivalent should be used. Note that use of larger conductors is not recommended. The higher capacitance and resistance of a cable can affect the data transmission.

The wire size for the power supply would be determined by the type of supply being used (12, 24 or 48 VDC) and the distance the supply is located from the PM II.

An earth ground must be used at this location and only at this location. All other PM II's must not be earth grounded. The earth ground should be connected to the JB70A or to an equivalent type surge/lightning protection device.

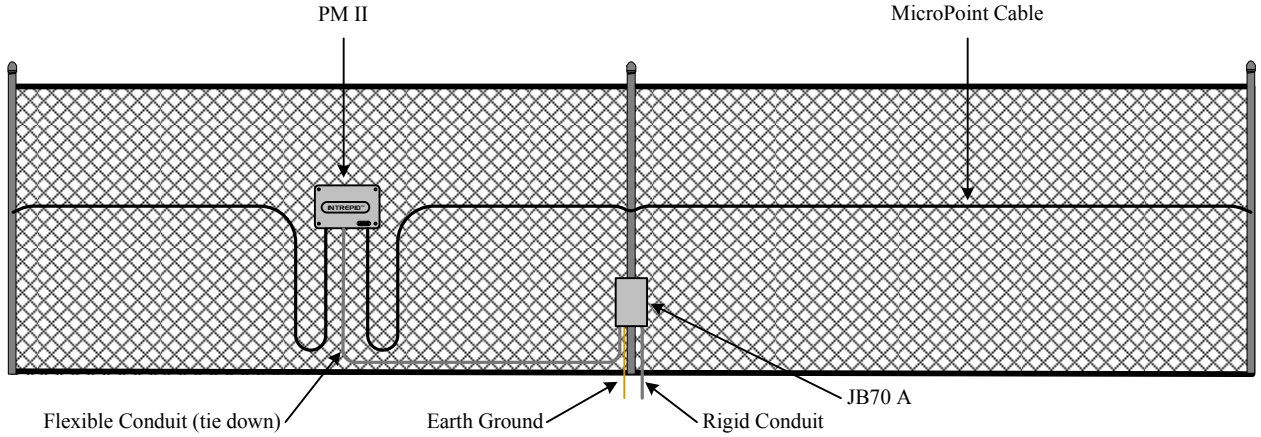


Figure 4.12 – Feed Point

5. Hardware Connections

This chapter will cover the connections to the hardware which include the preparing and termination of the MicroPoint™ cable, power connections, data communication connections, auxiliary sensor connections and setup/service connection.

5.1 Connecting the MicroPoint Cable

5.1.1 Connecting the MicroPoint Cable to Processor Module II, Link Unit II and Termination Unit II

Loosen the four (4) screws on the front corners of the enclosure and remove the cover.

There are four (4) locations on the bottom of the enclosure for placement of the MicroPoint cable for the PM II and LU II. These locations need to be drilled out for inserting the cable into the enclosure. They can also be drilled to mount a conduit or gland. There are three (3) locations that can be drilled for conduits or glands that will bring in power wires, communication wires, auxiliary sensor wires and an earth ground. The bottom of the enclosure also has two (2) weep holes. Only drill out the required number of holes. ***Before any holes are drilled please remove the circuit board from the enclosure.***

The tools required to prepare and terminate the MicroPoint cable are:

- Small blade screwdriver.
- Pair of good quality side cutters.
- Utility knife.
- Pen or other similarly pointed object.

Following are the instructions for properly preparing and terminating the MicroPoint cable. The sequence with which the connections are made is very important.

A) Place the Cable Through the Enclosure

Pull about two (2) feet (610 mm) of each cable up through the holes in the bottom of the enclosure and let them hang out the front of the enclosure. There must be at least nine (9) inches (229 mm) of slack cable to be able to make the connection. In the case of a Termination Unit II, pull the cable through the gland at the bottom of the gray plastic enclosure. In the case of a Splice Unit, place the rubber stopper over the cable and pull the cable and stopper into the large hole in the bottom of the gray plastic enclosure.

B) Remove the Strain Relief Block

Remove the Strain Relief block (which is also the cable jacket stripping tool) from the circuit board by unscrewing the two (2) thumb screws. The two smaller screws hold the stripper tool blade in place. Do not loosen these screws.

C) Removing the Cable Jacket

While holding the cable insert the end of the MicroPoint™ Cable into the larger center hole on the rear of the Strain Relief block (the opposite side from the blade and the screws). Spin the Top in a clockwise direction as shown in Figure 5.1. About 25 turns are required to remove about three (3) inches (76.2mm) of cable jacket.

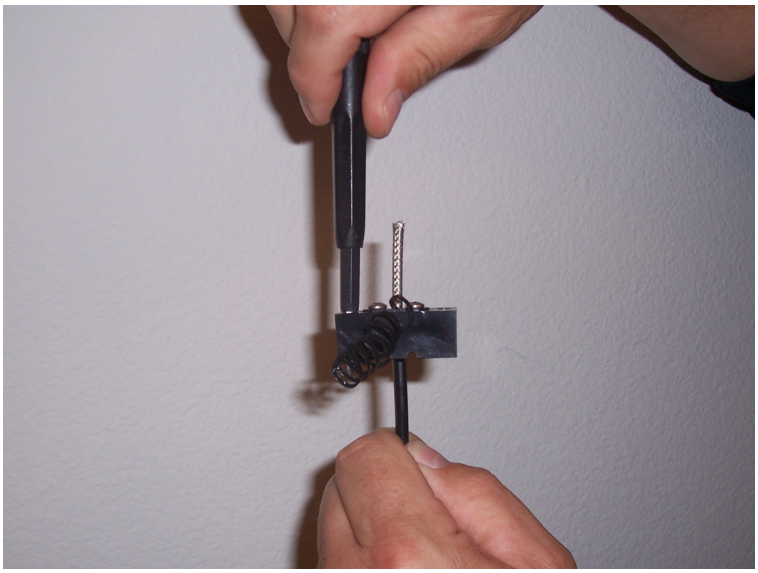
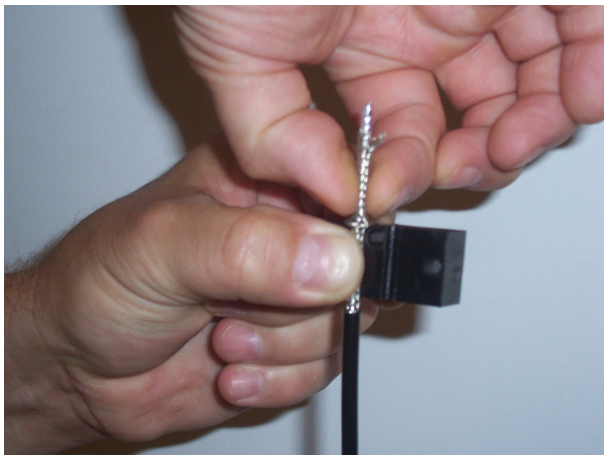


Figure 5.1 – Removing the Cable Jacket

D) Cutting the Braid

Once the jacket has been removed, the braid will be exposed. Lay the exposed braid into one of the two groves on the backside of the strain relief and measure one block width from the end of the jacket. Holding the block on the cable, push back the braid to bunch it up at the edge of the block as shown in Figure 5.2. Taking the block away you should have a bunched up band of braid exactly one block width from the jacket. Use the side cutters to cut the braid where it is bunched. This leaves one block width, 7/8 to one inch (22 to 25 mm). Be sure not to drop any of the wire strands onto a circuit board. Smooth out the braid making sure that the braid has been cut cleanly leaving no extra long strands.



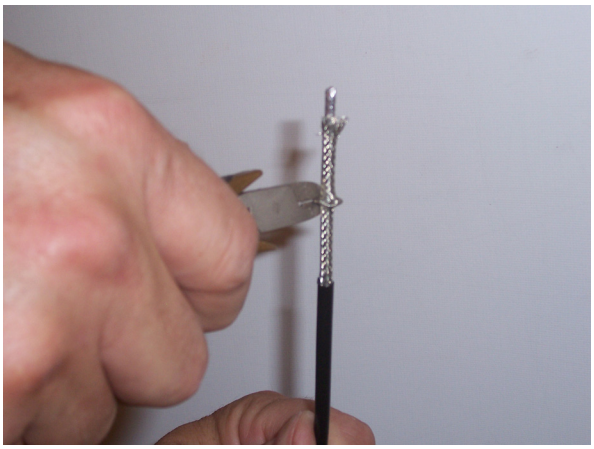


Figure 5.2 – Removing the Braid

E) Cutting the Foil

At this stage there should be approximately two inches (50.8 mm) of foil exposed as shown in Figure 5.3. The foil should be trimmed back so that it extends just above the braid.

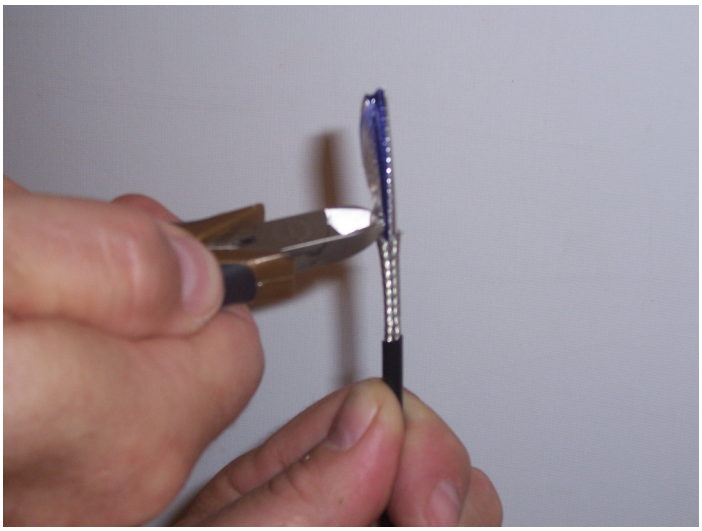


Figure 5.3 – Removing the Foil

F) Cutting the Mylar

At this point the Mylar sheath should be exposed. From the bag that contained the J-bolts, find the small black cable ties. The cable tie should be attached just above the foil as shown in Figure 5.4. Using a knife carefully cut into the Mylar in a ring approximately ¼ inch (6.3mm) from the end of the braid. Be careful not to cut too deep as the sense wires may be cut. Using the tip of the knife cut the Mylar longitudinally from the scored ring to the end. Once again be careful not to cut too deep to damage the sense wires. The Mylar sheath should peal off at this stage. This will leave approximately 1.5 inches (38mm) of core exposed.

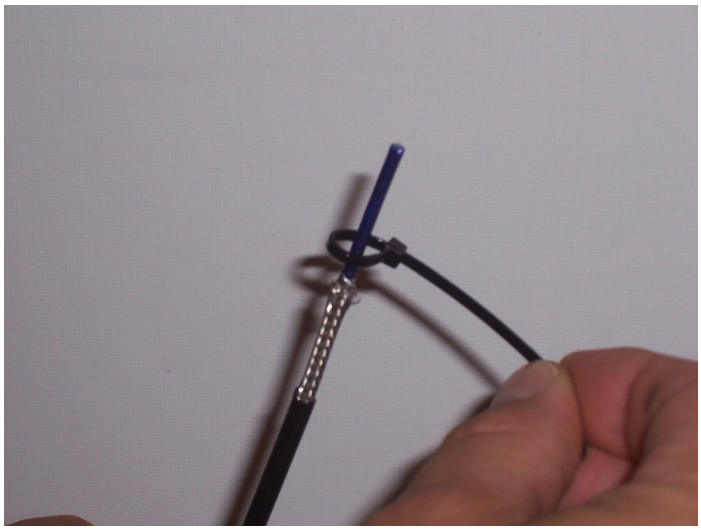


Figure 5.4 – Removing the Mylar

G) Preparing the Center Conductor

Flick the core to expose the sense wires and move them away from the core. Lay the braid of the prepared cable onto the braid of the circuit board where the strain relief is positioned. The end of the core should extend over the terminal block by approximately one (1) inch (25mm). With the side cutters, cut the core so that it reaches to the center of the terminal block screws. Use the knife to strip off approximately ¼ inch (6.3mm) of the dielectric. Cut around the dielectric down to the center conductor then twist off the severed dielectric leaving an exposed center conductor for insertion into the terminal block as shown in Figure 5.5 and 5.6. Trim to required length.

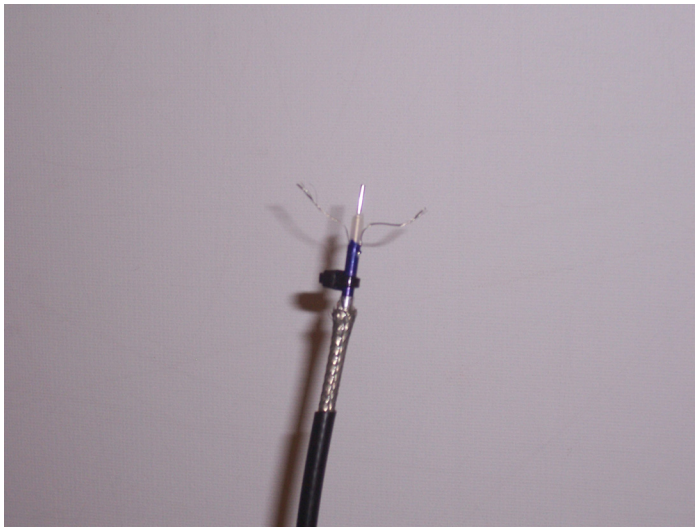


Figure 5.5 – Prepared Cable

Micropoint Cable Stripping Diagram

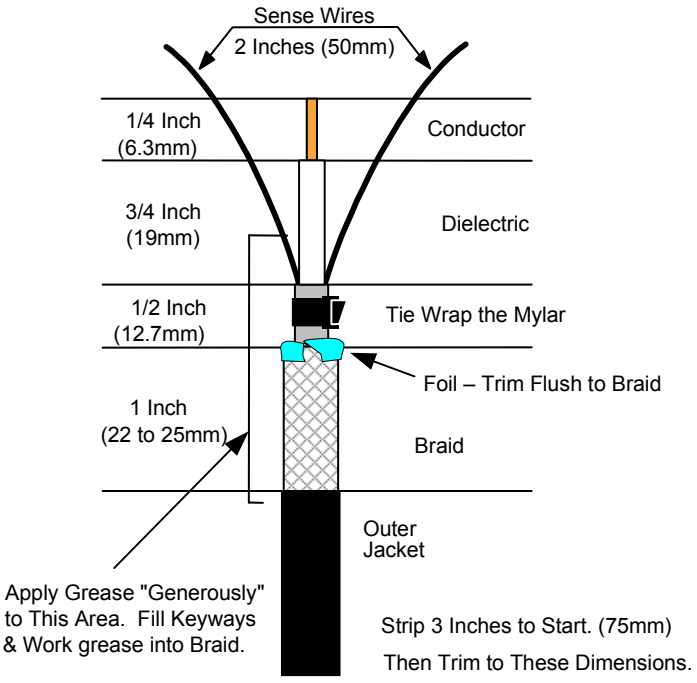


Figure 5.6 – Stripping Diagram

H) Connect the Center Conductor and Sense Wires

The center conductor is inserted into the center of the three position terminal strip. When inserted the jacket should be aligned with the bottom of the braid of the strain relief position. The braid from the cable should cover the entire braid of the strain relief position. The Mylar Sheath should enclose the Sense Wires for ¼ inch (6.3mm). The dielectric should extend to just before the terminal strip. Twist the cable so that the Keyways are generally in the plane of the circuit card. Don't worry if they don't align perfectly. Tighten the screw to secure the Center Conductor in the Terminal Strip.

Fold the Sense Wires forward making sure that there are no strands connecting the sense wire to the braid. Take one Sense Wire and fold it at a point so that when it is installed in its' terminal position it has slack. Place the folded end into the terminal strip and tighten down the screw. The reason for folding back the sense wire is to avoid loose ends catching as it is inserted and to provide a larger (double) diameter wire with which to work. Repeat the same process for the second Sense Wire.

Above each cable terminal strip on the PM II are three (3) LED's. The two (2) Green LED's are for status of the FSK transmit and receive signal. The Yellow LED indicates a cable fault condition.

Figure 5.7 shows the center conductor and sense wires connected to the MicroPoint™ cable terminal strip.

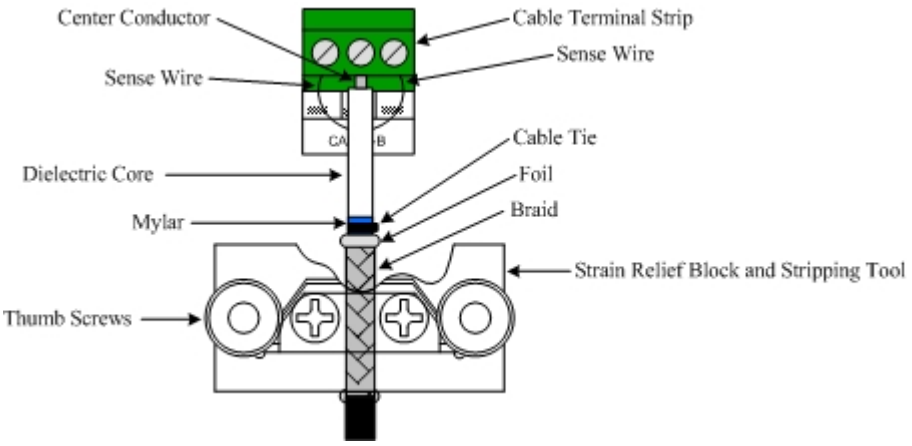


Figure 5.7 – Terminated MicroPoint Cable

I) Sealing the Cable

Cover the expose end of the cable with the supplied Dielectric Grease as shown in Figure 5.6. The grease should be applied to above the point where the sense wires leave keyways all the way down to the bottom of the exposed braid. This covers up the keyways so as to prevent them from "sucking" air and letting water or moisture into the keyways. Moisture or water in the keyways will prevent the cable from operating properly. This grease is designed to remain viscous at low temperatures and not to react with the metals and plastics involved.

J) Final Inspection

Check the connection carefully. Dress the sense wires so they are neat. Make sure that there are no strands of wire left on the circuit card. Make sure that all three terminal strip screws are tight. Make sure the dielectric grease is covering the correct area of the cable. Make sure that the Strain Relief Block is tightly secured.

5.2 Processor Module II (PM II) Connections

5.2.1 Power Connection to the Processor Module II (PM II)

The PM II operates from 10.5 to 60 VDC @ 13 watts. For common power supplies the current draw for a single PM II during normal operation is: 12 VDC at 580mA, 24 VDC at 300mA and 48 VDC at 160mA. Figure 5.8 shows the typical voltage drop for a 500 foot (152.4m) length of cable using various wire gauges. *Voltages in red will not work.*

	Gauge	10	12	14	16	18	20	22	24
PM II	**12 VDC**	0.58	0.92	1.46	2.33	3.70	5.86	9.40	14.9
PM II	**24 VDC**	0.30	0.48	0.76	1.21	1.92	3.03	4.85	7.71
PM II	**48 VDC**	0.16	0.25	0.40	0.64	1.02	1.62	2.60	4.11

Figure 5.8 – Voltage Drop versus Wire Gauge

Input DC power connects to the "EXT POWER" Terminal Block 2 (TB2) on the PM II as shown in Figure 5.9. The left terminal is the input for the 10.5 to 60 VDC from the power supply and is shown as "Vin". The right terminal is for the ground from the power supply and is shown as "GND". The center terminal provides a DC output which is the same as the DC input and is shown as "Vout".

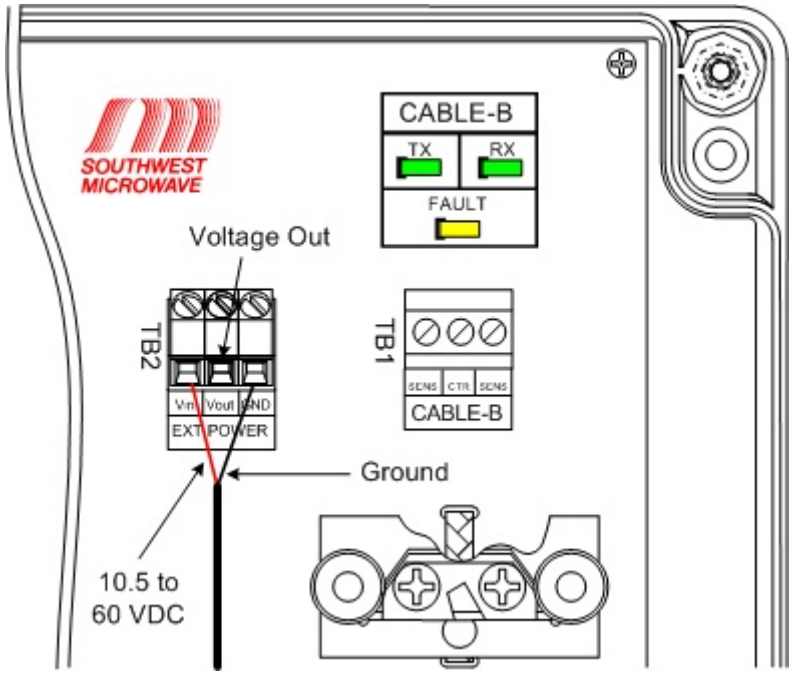


Figure 5.9 – 10.5 to 60 VDC Input Terminal Strip

5.2.2 Communication Connections to the Processor Module II (PM II)

There are three (3) communication ports on the PM II. Communications Port "COMM 1" is for a RS232 connection using a serial dB9 cable. This port is used with the UIST II for setup and diagnostics of the PM II.

There are Green LED's above each terminal to indicate the "transmit and receive" status of the data signal.

Communications Ports “COMM 2” and “COMM 3” are for a RS422 connection from a controller and to the next device in the line. The RS422 connections are: TX +, TX -, Shield, RX + and RX -.

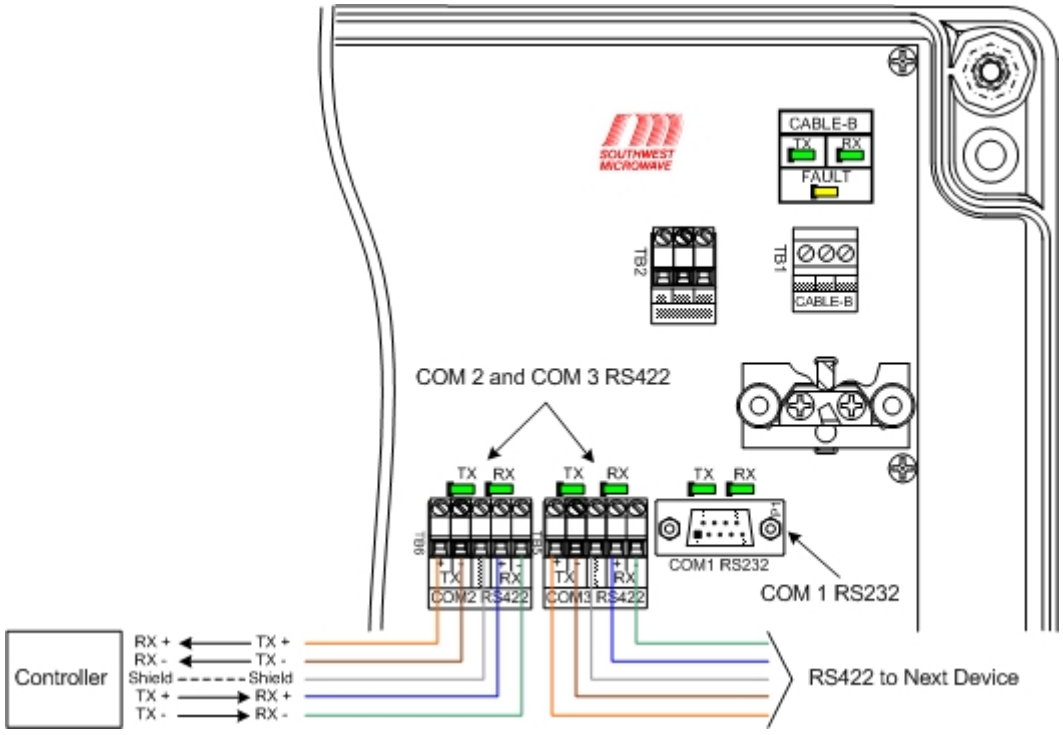


Figure 5.10 – Communication Ports

5.2.3 Auxiliary Input and Output Power Connections to the Processor Module II (PM II)

There are four (4) auxiliary inputs on the PM II for bringing in alarm and tamper contacts from auxiliary devices such as microwave sensors, IR sensors and gate contacts. There is also a 12 VDC 150mA terminal to provide power, if necessary, to these auxiliary devices. These terminals are shown in Figure 5.11.

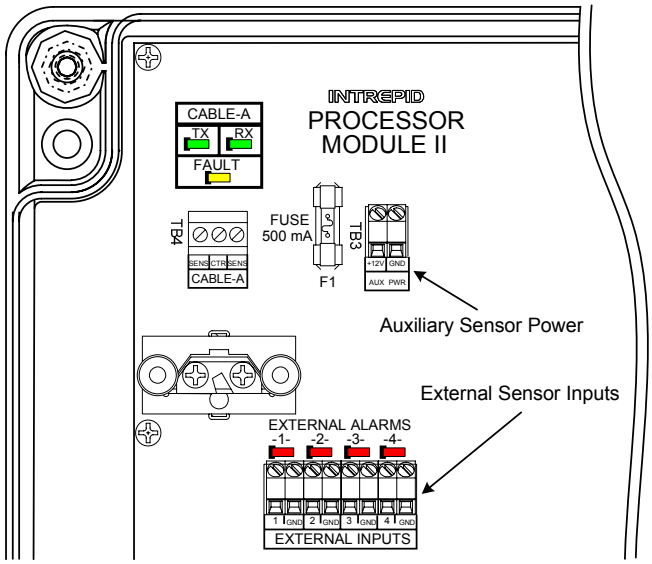


Figure 5.11 – Auxiliary Sensor Connections

There are four (4) red LED's, above each input, to indicate when an auxiliary sensor has gone into an alarm condition.

5.2.4 Addressing the Processor Module II (PM II)

Switch S1 is used to set the address of the PM II which is used for the alarm polling by one of the INTREPID™ controllers (RCM II, CM II, GCM II, PSM or SDK). The address can be set from 0 to 239. Switch S1, as shown in Figure 5.12, is set by using the **LSB (Least Significant Bit)** as the binary reference starting point for address 1.

Figure 5.12 – PM II Address Switch

5.3 Splicing the MicroPoint Cable

When necessary, damaged MicroPoint™ cable can be repaired using a Splice Unit (SU). SU's may also be used at gates to avoid pulling extensive lengths of MicroPoint cable through conduits that transverse under the gate. During the initial site installation it is not recommended to use SU's to "use up" extra cable. If more than three (3) SU's are needed to repair a cable it is recommended that the cable be replaced.

The MicroPoint Cable connections to a SU are the same as to a TU II except there are two cables. Before preparing the MicroPoint Cable ends pull both cables through the rubber stopper and through the opening in the bottom of the utility box as shown in Figure 5.13. Make sure that the stopper is on the cable in the right orientation so that it will fit into the hole in the bottom of the utility box (smaller end towards the box). Refer to Section 5.1.1for how to make the MicroPoint Cable terminations.

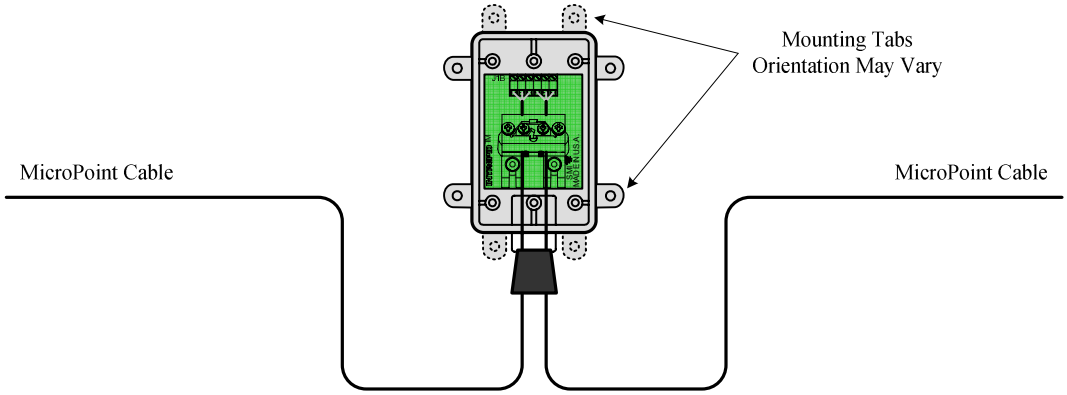


Figure 5.13 – Splice Unit (SU) Connections

5.4 *Typical Wiring Diagram*

Figure 5.14 shows a typical wiring diagram from the control room to the feed point PM II on the perimeter.

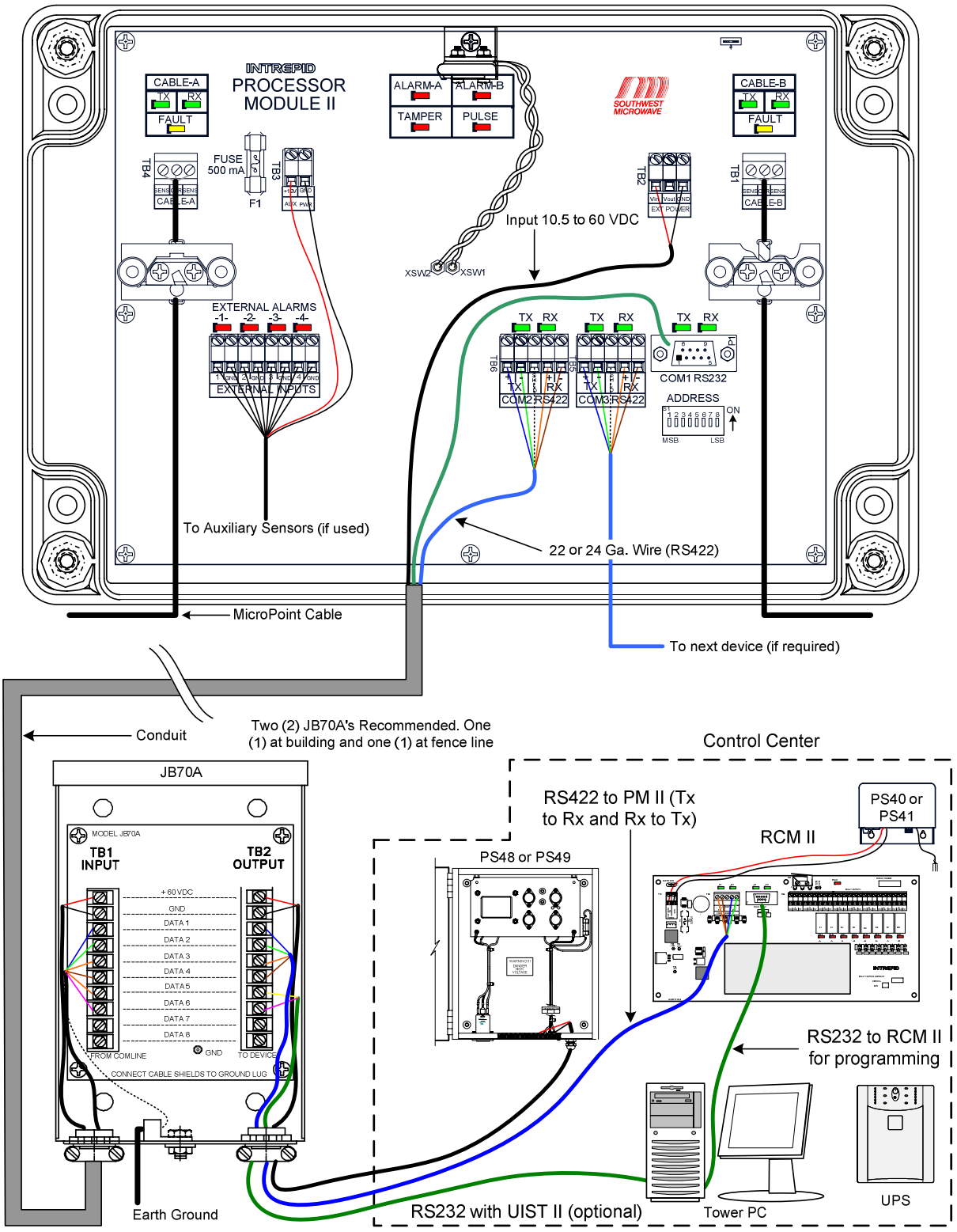


Figure 5.14 – Typical Wiring Diagram

6. Alarm Reporting

There are three (3) ways to interface to the MicroPoint™ Processor II: (1) Relays, (2) Graphic Map, and (3) Serial Communications.

6.1 Relay Outputs

There are two (2) controllers that can configure the MicroPoint Processor II to report alarm activity to relays only. The controllers are the Relay Control Module II (RCM II) and the Control Module II (CM II).

Configuration setup of the RCM II can be found in the Relay Control Module II Manual and configuration setup of the CM II can be found in the Control Module II Manual. If RCM II or CM II controllers were purchased with the system, these documents would have been included.

6.2 Graphic Map and Relay Outputs

There are two (2) controllers that can configure the MicroPoint Processor II to report alarm activity to a graphic map and to relays. The controllers are the Graphic Control Module II (GCM II) and the Perimeter Security Manager (PSM).

Configuration setup of the GCM II can be found in the Graphic Control Module II Manual and configuration setup of the PSM can be found in the Perimeter Security Manager Manual. If GCM II or PSM controllers were purchased with the system, these documents would have been included.

The Perimeter Security Manager (PSM) is a Windows XP™ based software package that displays alarms on a custom graphical map and provides the operator with various Alarm Management features. This software requires a PC running Windows XP Professional or Windows 7 (32 bit system), a processor with 266 MHz or higher, 512 MB of internal memory, 40 GB hard drive, CD ROM, sound card and speakers, and a RS232 comport.

6.3 Serial Communications – INTREPID™ Polling Protocol II

6.3.1 Introduction

The MicroPoint Processor II operates as a polled device. If the PM II receives a valid polling command to its unique address, then the PM II will respond by providing the alarm status of each individual cell, plus the status of the Cable Faults, Tamper Alarm, Service Alarm and Communications Failure.

The INTREPID™ Polling Protocol II Customer Development Document is provided to customers who wish to create their own interface to the MicroPoint II Sensor. This can be used to develop a driver to incorporate MicroPoint II directly into a preferred or custom Alarm Management System. The INTREPID Polling Protocol II Specifications for Third Party Vendors (or SDK), is available by request from Southwest Microwave, Inc.

7. Maintenance

The MicroPoint™ II system requires very little maintenance. The periodic maintenance which should be done at least every six (6) months includes:

- Inspect the MTP II for any physical damage, water damage, corrosion and ingress of insects.
- Inspect the MicroPoint cable, data, and power connections to the PM II and ensure they are tight.
- Inspect the MicroPoint cable to ensure the termination(s) has sufficient dielectric grease.
- Inspect the cable ties securing the MicroPoint cable to the fence. Replace any that are loose or broken.
- Check the earth ground for continuity and corrosion.
- Observe the LED's on the PM II for proper operation.
- Check the input power at the PM II for correct voltage. Check battery status (if used).
- Inspect the fence for vegetation on the fence, debris against the fence, erosion under the fence and loose fabric and support ties. Correct as necessary.
- Every month or on regular intervals, the alarm buffer from the PM II should be downloaded using the UIST II, saved, evaluated and appropriate adjustments made to the threshold or incremental threshold as necessary. Clear the buffer after evaluation.
- With the UIST II software, the Input Display, Max Peak Holds Display and Clutter Display should be viewed to ensure proper readings.