Description of Equipment

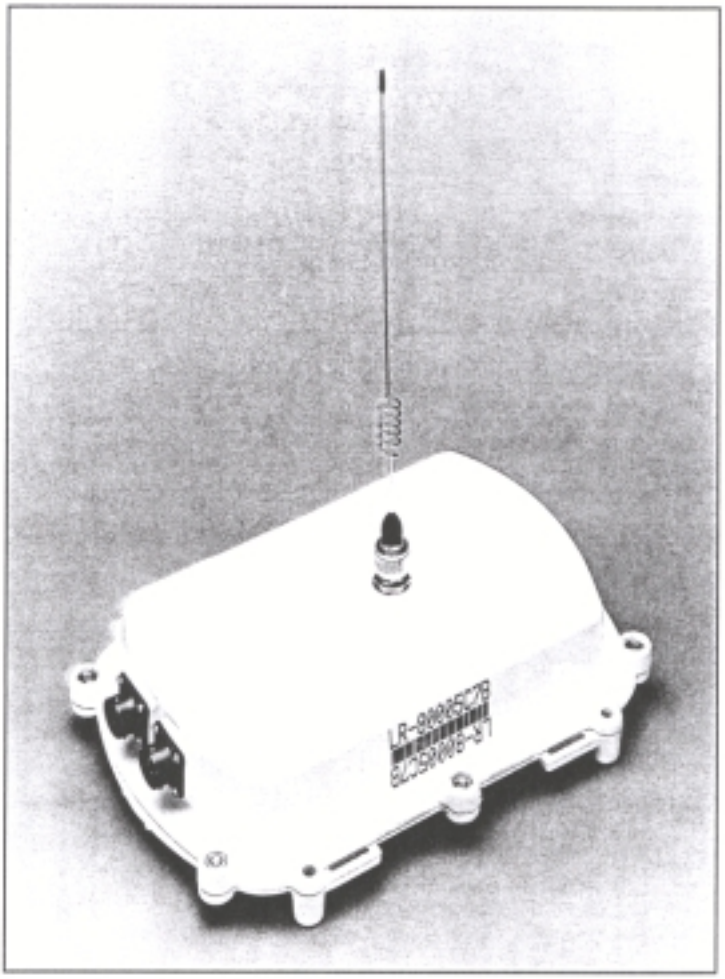
PRODUCT DESCRIPTION

The equipment that is being submitted to the FCC due to a change in identification is known as the Series II WanGate, Models 20037 (120 VAC), 20038 (120 VAC, w/ battery), 20060 (120 VAC or 240 VAC, w/ filter), 20061 (120 VAC or 240 VAC, w/ battery and filter), and Series II MicroRTU WanGate Radio Model 20058 (120 VAC, w/ battery). The following information was provided by Schlumberger Resource Management Services (RMS), Inc.

Series II WanGate Radio

The Metricom UtiliNet Series II WanGate communicates via RS-232 to end devices and is designed for outdoor mounting. It is commonly interfaced with such devices as remote terminal units (RTUs), programmable logic controllers (PLCs), and other intelligent end devices (IEDs). The WanGate supports two sets of RS-232 serial lines - one for UtiliNet LAN Packet Protocol (ULPP) and one for transparent data. The LAN Packet Protocol lines are used to communicate to devices which use UtiliNet LAN Packet Protocol (ULPP), such as a PC with configuration or diagnostic software, or an end device which has implemented ULPP. The transparent lines provide a general data port and are used to transport byte-oriented data, such as that generated by industry standard protocols.

The Series II WanGate Radio comes in a 120 VAC or 240 VAC version. It can also be ordered with battery backup and/or out-of-band filtering.



CAT# 20037 SERIES II WANGATE RADIO (120 VAC)

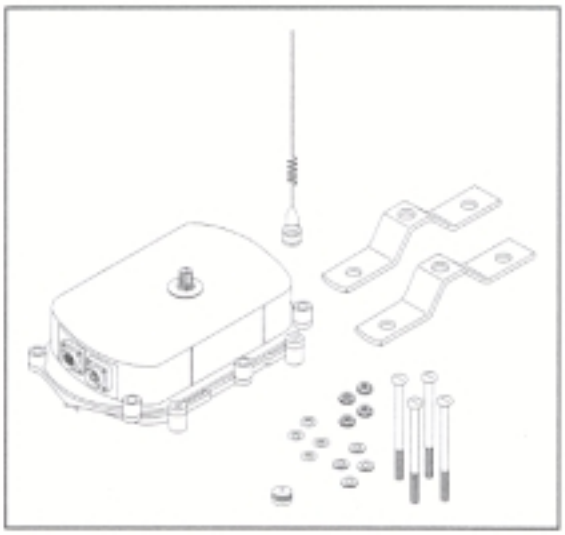
The Series II WanGate radio comes in a white, die-cast aluminum enclosure. It has two military-type connectors - one for AC power and one for RS-232 signal and DC power. The radio will operate on either AC or DC power. It can be switched between 120 VAC and 240 VAC by actuating a switch located inside the radio. 12 VDC can be applied through the same port that provides the RS-232 lines. RS-232 lines are provided for both ULPP and transparent communication. The radio comes with a standard N-Female antenna connector and mounting hardware.

Please specify your choice of power cable when ordering (CAT# 60079, CAT# 60075, or CAT# 60076). At least one programming cable should be ordered with WanGate radios for initial configuration (see CAT# 60073). If you are connecting the WanGate to an RS-232 end device, you will also need to order a signal cable (see CAT# 60071 and CAT# 60072).

Note: Series I WanGate cables are not compatible with Series II WanGate radios.

Included are the following:

- Series II WanGate Radio (120 VAC)
- Two mounting brackets
- Four flat washers
- Four split lock washers
- Four carriage bolts
- Four hex flange nuts
- Antenna, 3 dB gain, 915 MHz, N-Male
- M/S connector cap (for RS-232 connector if unused)
- Customer choice of power cable
- Reference mounting drawing



Drawing applies to all versions of WanGate Radios.

CAT# 20038 SERIES II WANGATE RADIO (120 VAC, W/BATTERY)

The Series II WanGate radio comes in a white, die-cast aluminum enclosure. It has two military-type connectors - one for AC power and one for RS-232 signal and DC power. The radio will operate on either AC or DC power. It can be switched between 120 VAC and 240 VAC by actuating a switch located inside the radio. 12 VDC can be applied through the same port that provides the RS-232 lines. RS-232 lines are provided for both ULPP and transparent communication. The radio comes with a standard N-Female antenna connector and mounting hardware.

A battery is provided for backup during a power outage. The battery is factory-installed into the radio enclosure.

Note: Disconnecting the power cable from the radio will also disconnect the battery.

Please specify your choice of power cable when ordering (CAT# 60079, CAT# 60075, or CAT# 60076). At least one programming cable should be ordered with WanGate radios for initial configuration (see CAT# 60073). If you are connecting the WanGate to an RS-232 end device, you will also need to order a signal cable (see CAT# 60071 and CAT# 60072).

Note: Series I WanGate cables are not compatible with Series II WanGate radios.

Included are the following:

- Series II WanGate Radio (120 VAC, w/battery)
- Two mounting brackets
- Four flat washers
- Four split lock washers
- Four carriage bolts
- Four hex flange nuts
- Antenna, 3 dB gain, 915 MHz, N-Male
- M/S connector cap (for RS-232 connector if unused)
- Customer choice of power cable
- Reference mounting drawing

CAT# 20064 SERIES II WANGATE RADIO (240 VAC)

The Series II WanGate radio comes in a white, die-cast aluminum enclosure. It has two military-type connectors - one for AC power and one for RS-232 signal and DC power. The radio will operate on either AC or DC power. It can be switched between 120 VAC and 240 VAC by actuating a switch located inside the radio. 12 VDC can be applied through the same port that

provides the RS-232 lines. RS-232 lines are provided for both ULPP and transparent communication. The radio comes with a standard N-Female antenna connector and mounting hardware.

Please specify your choice of power cable when ordering (CAT# 60079, CAT# 60075, or CAT# 60076). At least one programming cable should be ordered with WanGate radios for initial configuration (see CAT# 60073). If you are connecting the WanGate to an RS-232 end device, you will also need to order a signal cable (see CAT# 60071 and CAT# 60072).

Note: Series I WanGate cables are not compatible with Series II WanGate radios.

Included are the following:

- Series II WanGate Radio (240 VAC)
- Two mounting brackets
- Four flat washers
- Four split lock washers
- Four carriage bolts
- Four hex flange nuts
- Antenna, 3 dB gain, 915 MHz, N-Male
- M/S connector cap (for RS-232 connector if unused)
- Customer choice of power cable
- Reference mounting drawing

CAT# 20065 SERIES II WANGATE RADIO (240 VAC, W/BATTERY)

The Series II WanGate radio comes in a white, die-cast aluminum enclosure. It has two military-type connectors - one for AC power and one for RS-232 signal and DC power. The radio will operate on either AC or DC power. It can be switched between 120 VAC and 240 VAC by actuating a switch located inside the radio. 12 VDC can be applied through the same port that provides the RS-232 lines. RS-232 lines are provided for both ULPP and transparent communication. The radio comes with a standard N-Female antenna connector and mounting hardware.

A battery is provided for backup during a power outage. The battery is factory-installed into the radio enclosure.

Note: Disconnecting the power cable from the radio will also disconnect the battery.

Please specify your choice of power cable when ordering (CAT# 60079, CAT# 60075, or CAT# 60076). At least one programming cable should be ordered with WanGate radios for initial configuration (see CAT# 60073). If you are connecting the WanGate to an RS-232 end device, you will also need to order a signal cable (see CAT# 60071 and CAT# 60072).

Note: Series I WanGate cables are not compatible with Series II WanGate radios.

Included are the following:

- Series II WanGate Radio (240 VAC, w/battery)
- Two mounting brackets
- Four flat washers
- Four split lock washers
- Four carriage bolts
- Four hex flange nuts
- Antenna, 3 dB gain, 915 MHz, N-Male
- M/S connector cap (for RS-232 connector if unused)
- Customer choice of power cable
- Reference mounting drawing

CAT# 20060 SERIES II WANGATE RADIO (120 VAC OR 240 VAC, W/FILTER)

The Series II WanGate radio comes in a white, die-cast aluminum enclosure. It has two military-type connectors - one for AC power and one for RS-232 signal and DC power. The radio will operate on either AC or DC power. It can be switched between 120 VAC and 240 VAC by actuating a switch located inside the radio, **but is shipped for 120 VAC**. 12 VDC can be applied through the same port that provides the RS-232 lines. RS-232 lines are provided for both ULPP and transparent communication. The radio comes with a standard N-Female antenna connector and mounting hardware.

A filter is provided for attenuation of out-of-band interference. The filter is factory-installed into the radio enclosure. This band-pass filter attennuates out-of-band signals and is used to reject interference from sources such as paging and cellular phone. Only sites that exhibit interference from out-of-band sources require this filter. As a side note, UtiliNet radios are designed to be in-band interference tolerant and in-band interference has rarely ever been a problem.

Please specify your choice of power cable when ordering (CAT# 60079, CAT# 60075, or CAT# 60076). At least one programming cable should be ordered with WanGate radios for initial configuration (see CAT# 60073). If you are connecting the WanGate to an RS-232 end device, you will also need to order a signal cable (see CAT# 60071 and CAT# 60072).

Note: Series I WanGate cables are not compatible with Series II WanGate radios.

Included are the following:

- Series II WanGate Radio (120 VAC, w/filter)
- Two mounting brackets
- Four flat washers
- Four split lock washers
- Four carriage bolts
- Four hex flange nuts
- Antenna, 3 dB gain, 915 MHz, N-Male

- M/S connector cap (for RS-232 connector if unused)
- Customer choice of power cable
- Reference mounting drawing

CAT# 20061 SERIES II WANGATE RADIO (120 VAC OR 240 VAC, W/BATTERY, W/FILTER)

The Series II WanGate radio comes in a white, die-cast aluminum enclosure. It has two military-type connectors - one for AC power and one for RS-232 signal and DC power. The radio will operate on either AC or DC power. It can be switched between 120 VAC and 240 VAC by actuating a switch located inside the radio, **but is shipped for 120 VAC**. 12 VDC can be applied through the same port that provides the RS-232 lines. RS-232 lines are provided for both ULPP and transparent communication. The radio comes with a standard N-Female antenna connector and mounting hardware.

A battery is provided for backup during a power outage. The battery is factory-installed into the radio enclosure.

Note: Disconnecting the power cable from the radio will also disconnect the battery.

A filter is provided for attenuation of out-of-band interference. The filter is factory-installed into the radio enclosure. This band-pass filter attennuates out-of-band signals and is used to reject interference from sources such as paging and cellular phone. Only sites that exhibit interference from out-of-band sources require this filter. As a side note, UtiliNet radios are designed to be in-band interference tolerant and in-band interference has rarely ever been a problem.

Please specify your choice of power cable when ordering (CAT# 60079, CAT# 60075, or CAT# 60076). At least one programming cable should be ordered with WanGate radios for initial configuration (see CAT# 60073). If you are connecting the WanGate to an RS-232 end device, you will also need to order a signal cable (see CAT# 60071 and CAT# 60072).

Note: Series I WanGate cables are not compatible with Series II WanGate radios.

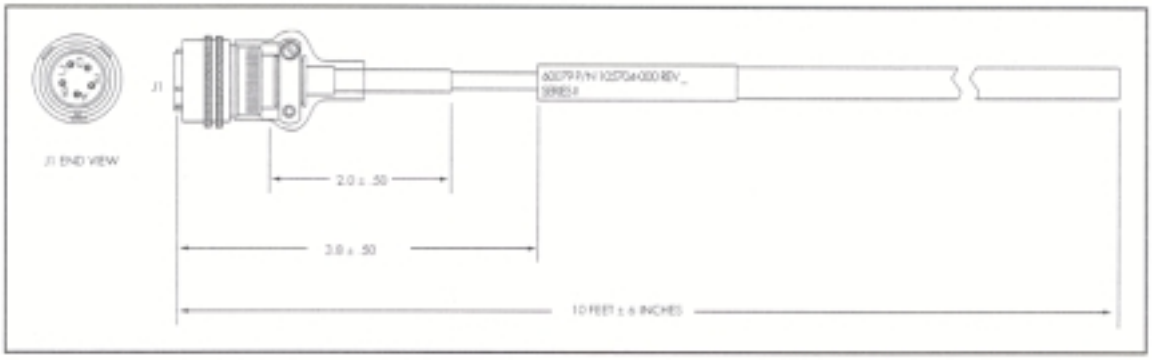
Included are the following:

- Series II WanGate Radio (120 VAC, w/battery, w/filter)
- Two mounting brackets
- Four flat washers
- Four split lock washers
- Four carriage bolts
- Four hex flange nuts
- Antenna, 3 dB gain, 915 MHz, N-Male
- M/S connector cap (for RS-232 connector if unused)
- Customer choice of power cable
- Reference mounting drawing

CAT# 60079 AC POWER CABLE, 10' UNTERMINATED #16 SJO

This Series II WanGate AC power cable is 10 feet long and has #16 wires within an SJO cable.

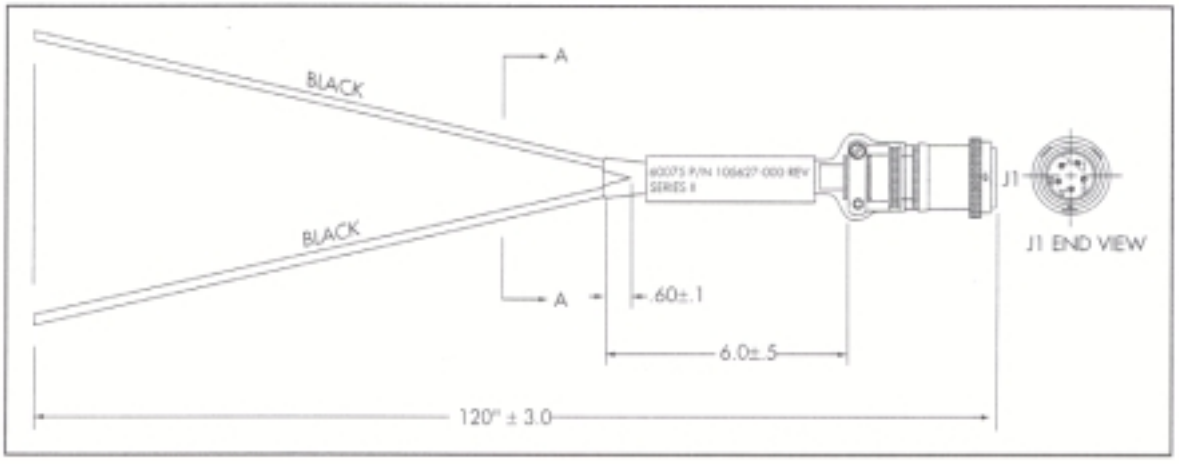
Note: Disconnecting the power cable from the radio will also disconnect the battery in a battery-backed Series II WanGate radio.



CAT# 60075 AC POWER CABLE, 10' UNTERMINATED #10 TWO WIRES

This Series II WanGate AC power cable is 10 feet long and is split into two #10 wires.

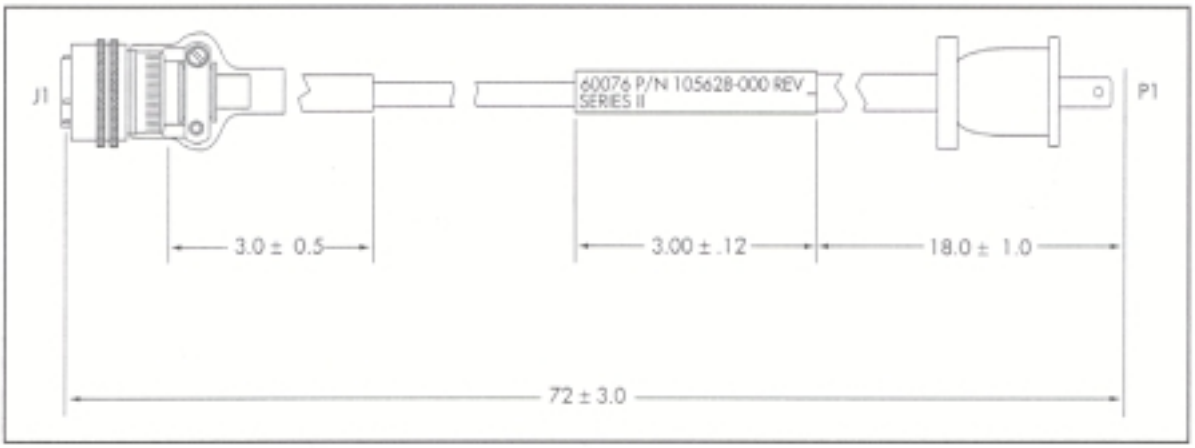
Note: Disconnecting the power cable from the radio will also disconnect the battery in a battery-backed Series II WanGate radio.



CAT# 60076 AC POWER CABLE, 6' TERMINATED AC PLUG

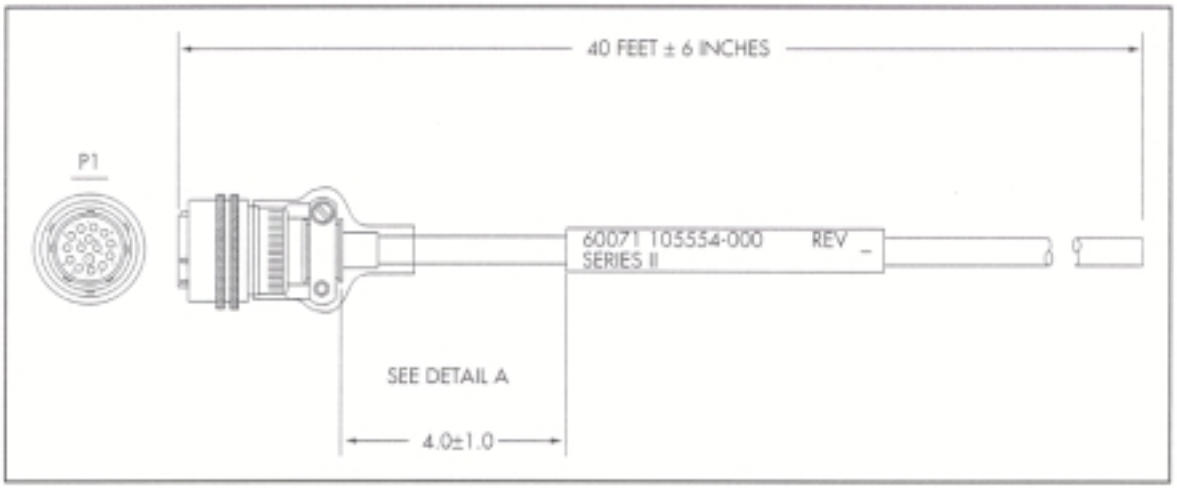
This Series II WanGate AC power cable is 6 feet long and terminates in an AC plug. It is used to plug into an AC outlet. Since the WanGate is usually wired directly to AC with one of the unterminated cables (see CAT# 60079 and CAT# 60075) in a final installation, this cable is typically only used for demonstration and test purposes.

Note: Disconnecting the power cable from the radio will also disconnect the battery in a battery-backed Series II WanGate radio.



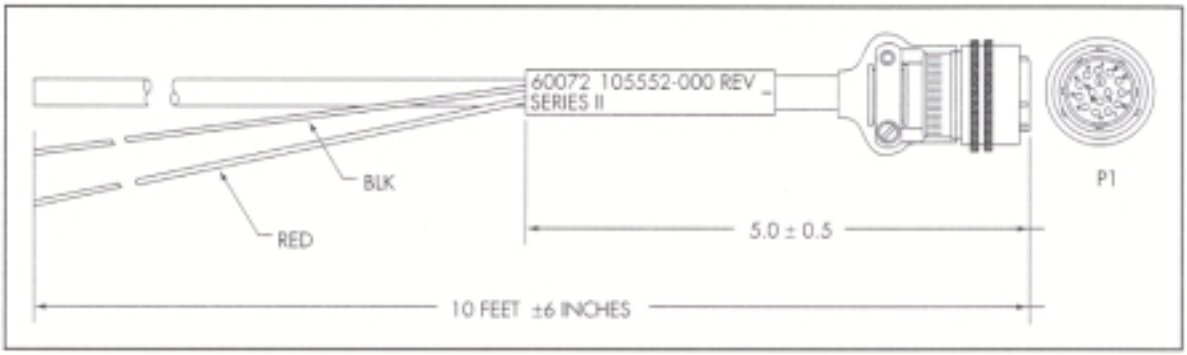
CAT# 60071 RS-232 SIGNAL & DC POWER CABLE, 40' UNTERMINATED

This Series II WanGate cable connects to the RS-232 port of the radio and provides access to the RS-232 lines for both UtiliNet LAN Packet Protocol communication and transparent data. In addition, it also furnishes the lines to power the Series II WanGate with 12 VDC. It is 40 feet long and unterminated.



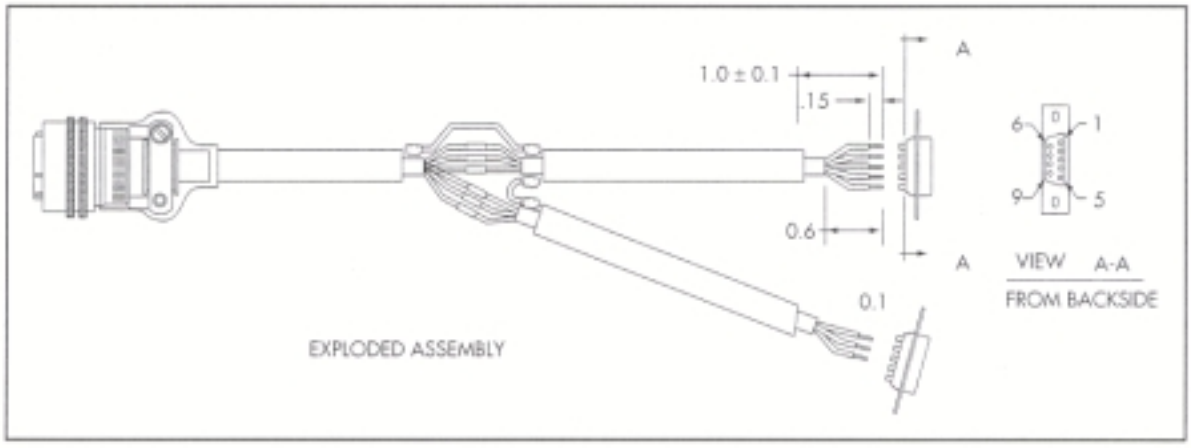
CAT# 60072 RS-232 SIGNAL & DC POWER CABLE, 10' UNTERMINATED

This Series II WanGate cable connects to the RS-232 port of the radio and provides access to the RS-232 lines for both UtiliNet LAN Packet Protocol communication and transparent data. In addition, it also furnishes the lines to power the Series II WanGate with 12 VDC. It is 10 feet long and unterminated.



CAT# 60073 RS-232 PROGRAMMING CABLE, 6' TERMINATED TWO DB-9

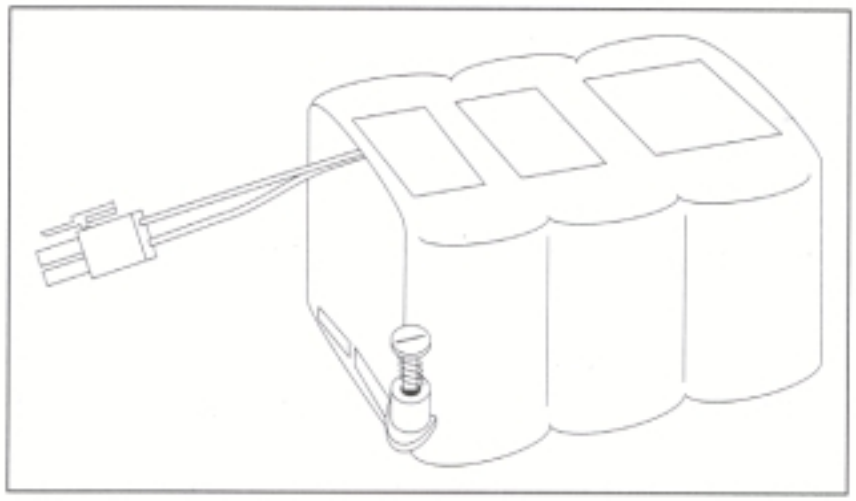
This Series II WanGate cable connects to the RS-232 port of the radio and provides access to the RS-232 lines of both the UtiliNet LAN Packet Protocol Port and Transparent Port. It is 6 feet long and terminated in two Female DB-9 connectors for easy connection. It is typically used to connect the Series II WanGate radio to a computer for the initial configuration and can also be used for test purposes. At least one programming cable should be ordered with WanGate radios for initial configuration of the radios.



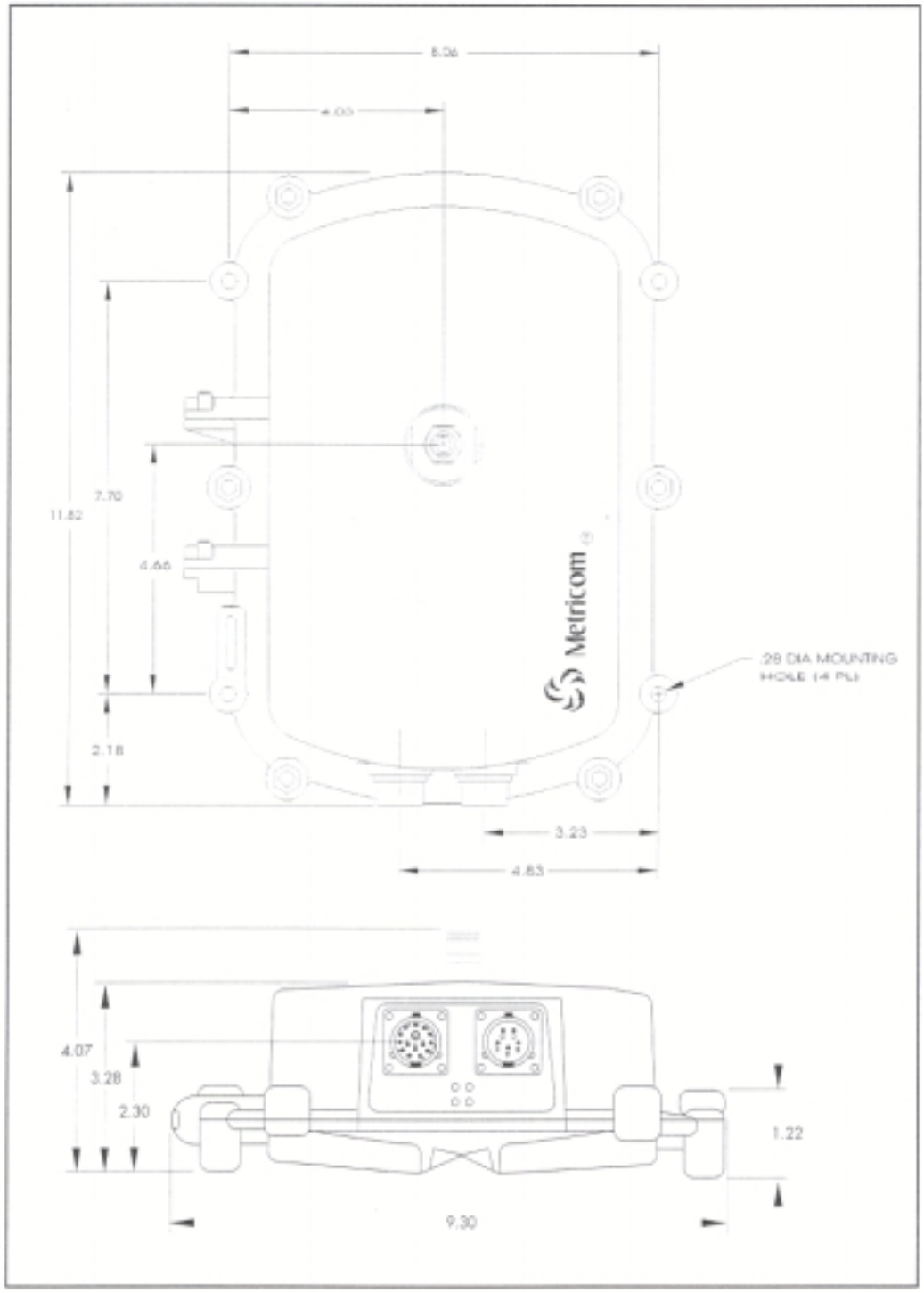
CAT# 80029 BATTERY

A battery is provided for backup during a power outage. If a Series II WanGate radio is initially ordered without a battery, the battery can be ordered separately later. This item can also be ordered as a replacement battery.

Note: Disconnecting the power cable from the radio will also disconnect the battery.



UtiliNet Series II WanGate Radio



UtiliNet Series II WanGate Specifications

Data Ports/Formats

UtiliNet LAN Packet Port	
Serial Interface	RS-232C
Data Rate	1200 or 9600 bps (N, 8, 1, FDX)
Protocol	UtiliNet LAN Packet Protocol
Transparent Port	
Serial Interface	RS-232C
Data Rate	300, 600, 1200, 2400, 4800, or 9600 bps
Parity	Odd, Even, or None
Data Bits	7 or 8
Stop Bits	1 or 2
Duplex	FDX
Protocol	Any Asynchronous Byte-Oriented Protocol

Power

120 VAC Operation	
Input Voltage Range	96 - 144 VAC
Input Current (receive avg)	50 mA
Input Current (RF transmit max)*	83 mA
Input Current (battery charging)*	34 mA
240 VAC Operation	
Input Voltage Range	192 - 288 VAC
Input Current (receive avg)	25 mA
Input Current (RF transmit max)*	42 mA
Input Current (battery charging)*	17 mA
12 VDC Operation	
Input Voltage Range	10.5 - 16.0 VDC
Input Current	100 mA
Input Current (RF transmit max)*	260 mA
Noise & Ripple Allowed @ 12 VDC (max)	200 mV p-p

Agency Approvals

FCC	Certified Part 15.247

Mechanical

Interface Connections	
Power	Military Style
Data Port	Military Style
Antenna	"N" Type, Female
Enclosure (outdoor)	Die-Cast Aluminum/Epoxy Powder Paint
Weight	5 lbs. 8 oz.
Size	11.82"W x 9.30"D x 4.07"H

Environmental (additional)

Rain Tightness	4"/hour Rainfall at 70 MPH per Mil Std. 810E, Method 506.3, Procedure I, Blowing Rain
Salt Spray	Per ASTM B117-85, 5 Days

Optional Battery Pack

Capacity	2.5 Amp Hours
Battery Autonomy @ Max Duty Cycle	24 hours @ 23 degrees Celcius
Battery Life	3 - 6 years
Weight	2 lbs. 8oz.

Installation Notes

Pre-torque each WanGate radio enclosure bolt to 25+/-5 In. lbs., alternating from side-to-side and from top-to-bottom. Repeat this pattern torquing bolts to 45+/-5 In. lbs.

* Maximum transmit duty cycle is estimated to be 15%

UtiliNet Series II Radio General Specifications

General

Frequency Range	902 - 928 MHz
Channels	240, 25 kHz wide
Channel Spacing	100 kHz
Raw RF Data Rate	9600 bps
Spreading Technique	Frequency Hopping
Hopping Technique	Pseudo Random, Asynchronous
Hopping Patterns	65,536 (Unique per Network)
Network Address	Latitude/Longitude Coordinates

Receiver

Type	Double Conversion Superheterodyne; 1st IF 45 MHz, 2nd IF 455 kHz
Dynamic Range	-104 to -20 dBm
Packet Error Rate	$1x10^{-2}$ ($1x10^{-6}$ BER)
IF Selectivity	6 dB down @ 30 kHz
45 MHz IF Rejection	< 90 dB
Frequency Stability	2.5 ppm (0.00025%) @ -30 to +75 degrees C 5 ppm (0.0005%) @ -40 to +85 degrees C

Transmitter

RF Output Min (at antenna connection)	+17 dBm (50 mW)
RF Output Typical	+20 dBm (100 mW)
Out-of-Band Spurious Radiation	< -55 dBc (1 kHz bandwidth)
Deviation	±5.5 kHz ± 10%
Modulation Bandwidth	25 kHz
Modulation	Standard FSK
Output Impedence	50 Ohms
Frequency Stability	2.5 ppm (0.00025%) @ -30 to +75 degrees C 5 ppm (0.0005%) @ -40 to +85 degrees C

Processing

CPU	NEC V25
Clock Speed	8 MHz
Memory	
ROM	256 KBytes
DRAM	128 KBytes
EEPROM	512 Bytes
FLASH RAM	512 KBytes
Programming Language	Metricom Device Control Word (MDCW)

Environmental

Operating Temperature Range	-40 to +60 degrees Celcius
Storage Temperature Range	-40 to +85 degrees Celcius
Operating Vibration	FCC Part 68D, Paragraph 302 Modified
Operating Shock	20 g, 11 ms, Half Sine per Mil Std. 802
Humidity	Mil Std. 202F, Method 106 Modified,10 Days

EMI & Power/Control Susceptibility

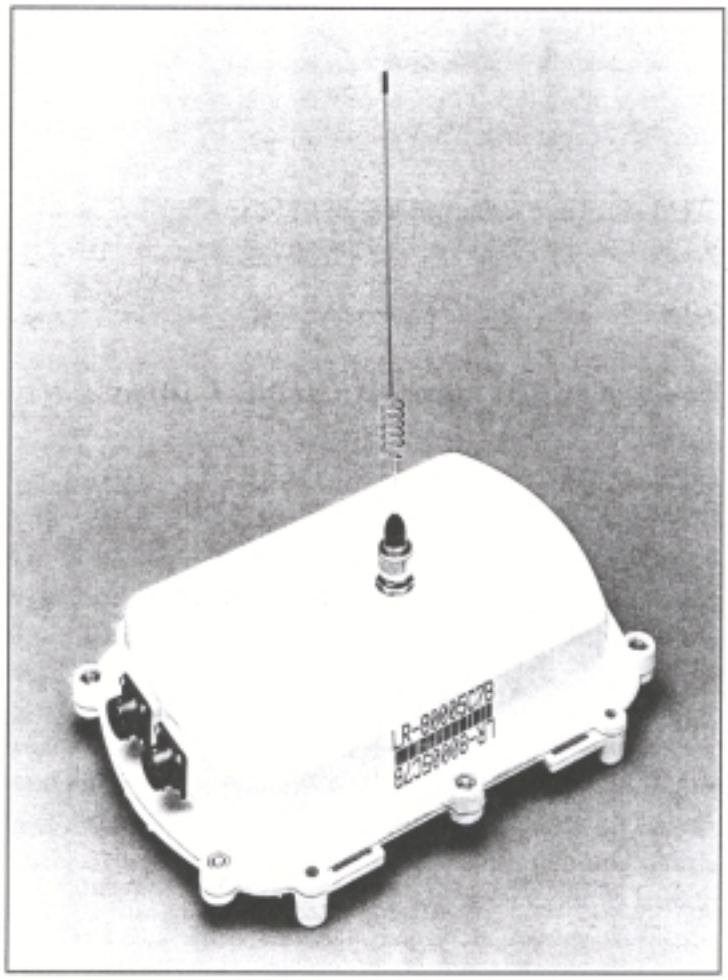
Electromagnetic Radiation	FCC Class B, Part 15.247
Electromagnetic Susceptibility	ANSI C37.90.2 Modified
Surge Withstanding Capability	ANSI C37.90.1 and ANSI C62.41
Electrostatic Discharge	MIL Handbook 263 and IEC 801.2

Series II MicroRTU WanGate Radio

The Metricom UtiliNet Series II MicroRTU WanGate is a Series II WanGate-type radio with specialized cabling that allows I/O from outside the radio to be brought into an RTU mounted inside the WanGate radio enclosure. The radio is intended for an integrator, who would purchase or develop an RTU separately to integrate with the MicroRTU WanGate which would provide a complete RTU and radio communication package. This is often desirable and cost effective at a site with a low I/O point count.

The Series II MicroRTU WanGate is housed in a WanGate radio enclosure and is thus designed for outdoor mounting. Also inside the enclosure is a battery to provide backup during a power outage.

Note: Disconnecting the power cable from the radio will also disconnect the battery.



The Series II MicroRTU WanGate can provide 12 VDC and up to 120 mA of power to an RTU that fits inside the enclosure. 16 unterminated I/O lines run from inside the radio through the military connector to the outside of the radio for I/O to the RTU. If the radio is to be powered by DC rather than AC, two of these lines must be used to provide 12 VDC into the radio.

The radio supports two sets of RS-232 serial lines - one for transparent data and one for UtiliNet LAN Packet Protocol (ULPP). The transparent lines provide a general data port and are used to transport byte-oriented data (such as that generated by industry standard protocols) to and from the RTU within the radio enclosure. The LAN Packet Protocol lines are used to communicate to devices which use UtiliNet LAN Packet Protocol (ULPP), such as a PC with configuration or diagnostic software.

Wired pigtails for the radio's Transparent Port (TP) Tx, Rx, and GND lines are available to be wired directly from inside the radio to the RTU. Automatic modem control is not used. However, RTS and DTR states can be read and CTS and DSR controlled from DCW programs in the radio. Although wires are not provided, these control lines are accessible and can be wired, if required, to the RTU. CTS and DSR default to HIGH states.

One line of RTUs that has been found to integrate well into the Series II MicroRTU WanGate is the DGH data acquisition modules. These are small, low-cost modules that come in a variety of models with differing I/O capability. They communicate in either DGH or Modbus protocol.

The Series II MicroRTU WanGate radio can be ordered for 120 VAC or 240 VAC, but also can be switched between 120 VAC and 240 VAC by actuating a switch located inside the radio.

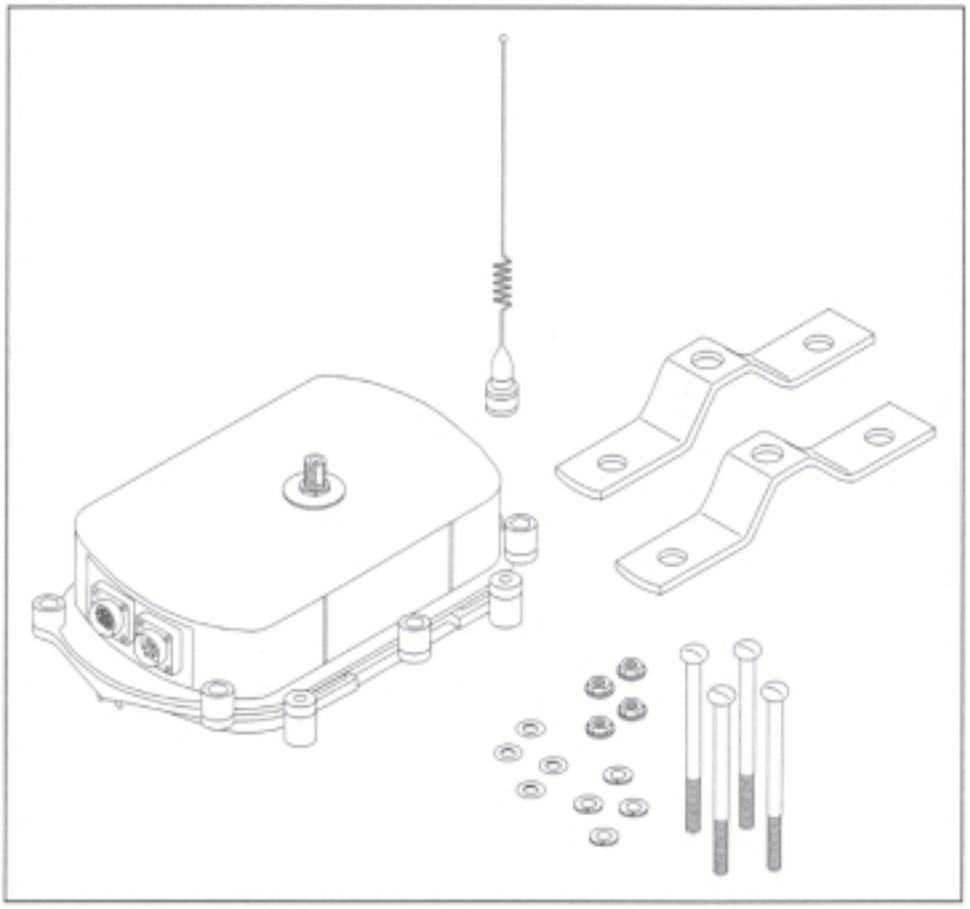
CAT# 20058 SERIES II MICRORTU WANGATE RADIO (120 VAC, W/BATTERY)

The Series II MicroRTU WanGate radio comes in a white, die-cast aluminum enclosure. It has two military-type connectors - one for AC power and one for RS-232 LAN Packet Protocol to the radio and I/O to an internal RTU. The radio will operate on either AC or DC power (although DC power will require use of two of the I/O lines and additional wiring). It can be switched between 120 VAC and 240 VAC by actuating a switch located inside the radio. The radio comes with standard N-Female antenna connector and mounting hardware.

The MicroRTU WanGate uses the same power cables and battery as the WanGate radio. Please specify your choice of power cable when ordering (CAT# 60079, CAT# 60075, or CAT# 60076). An unterminated RS-232 signal & I/O cable is also included with your order (see CAT# 60084). At least one programming cable should also be ordered separately with MicroRTU WanGate radios for initial configuration (see CAT# 60085).

Included are the following:

- Series II MicroRTU WanGate Radio (120 VAC, w/battery)
- Two mounting brackets
- Four flat washers
- Four split lock washers
- Four carriage bolts
- Four hex flange nuts
- Antenna, 3 dB gain, 915 MHz, N-Male
- Customer choice of power cable
- RS-232 signal & I/O cable, 10' unterminated (see CAT# 60084 for additional cables)
- Reference mounting drawing



Drawing applies to all versions of MicroRTU WanGate Radios.

CAT# 20063 SERIES II MICRORTU WANGATE RADIO (240 VAC, W/BATTERY)

The Series II MicroRTU WanGate radio comes in a white, die-cast aluminum enclosure. It has two military-type connectors - one for AC power and one for RS-232 LAN Packet Protocol to the radio and I/O to an internal RTU. The radio will operate on either AC or DC power (although DC power will require use of two of the I/O lines and additional wiring). It can be switched between 120 VAC and 240 VAC by actuating a switch located inside the radio. The radio comes with standard N-Female antenna connector and mounting hardware.

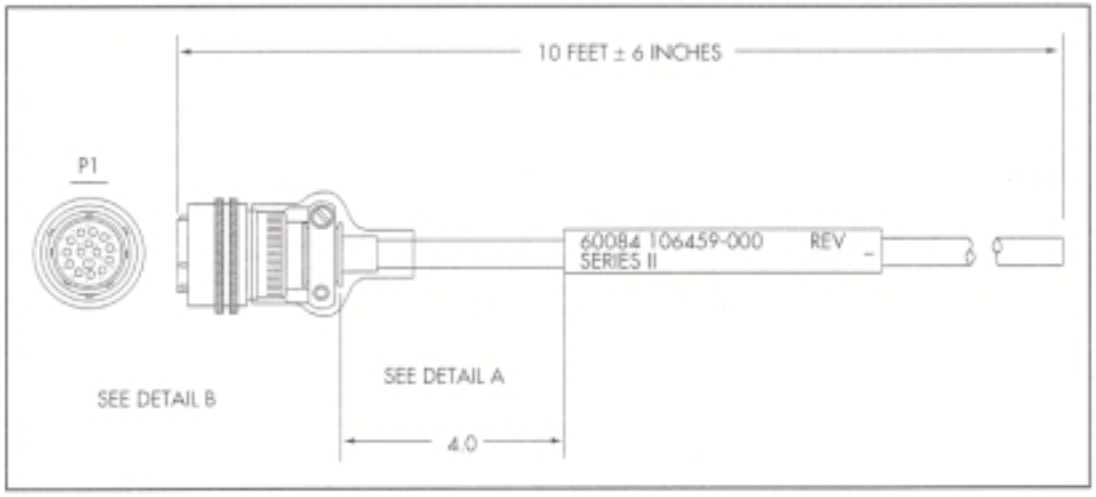
The MicroRTU WanGate uses the same power cables and battery as the WanGate radio. Please specify your choice of power cable when ordering (CAT# 60079, CAT# 60075, or CAT# 60076). An unterminated RS-232 signal & I/O cable is also included with your order (see CAT# 60084). At least one programming cable should also be ordered separately with MicroRTU WanGate radios for initial configuration (see CAT# 60085).

Included are the following:

- Series II MicroRTU WanGate Radio (240 VAC, w/battery)
- Two mounting brackets
- Four flat washers
- Four split lock washers
- Four carriage bolts
- Four hex flange nuts
- Antenna, 3 dB gain, 915 MHz, N-Male
- Customer choice of power cable
- RS-232 signal & I/O cable, 10' unterminated (see CAT# 60084 for additional cables)
- Reference mounting drawing

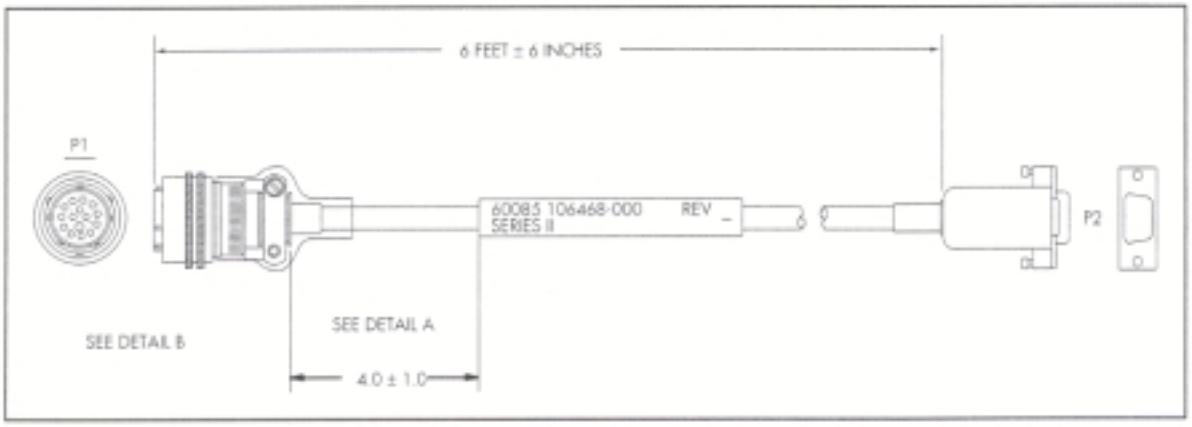
CAT# 60084 RS-232 SIGNAL & I/O CABLE, 10' UNTERMINATED

This Series II MicroRTU WanGate cable connects to the RS-232 & I/O port of the radio and provides access to the UtiliNet LAN Packet Protocol Port of the radio and I/O lines to the RTU. If desired, two of the I/O lines can be used to input 12 VDC power to the radio and RTU. It is 10 feet long and unterminated.

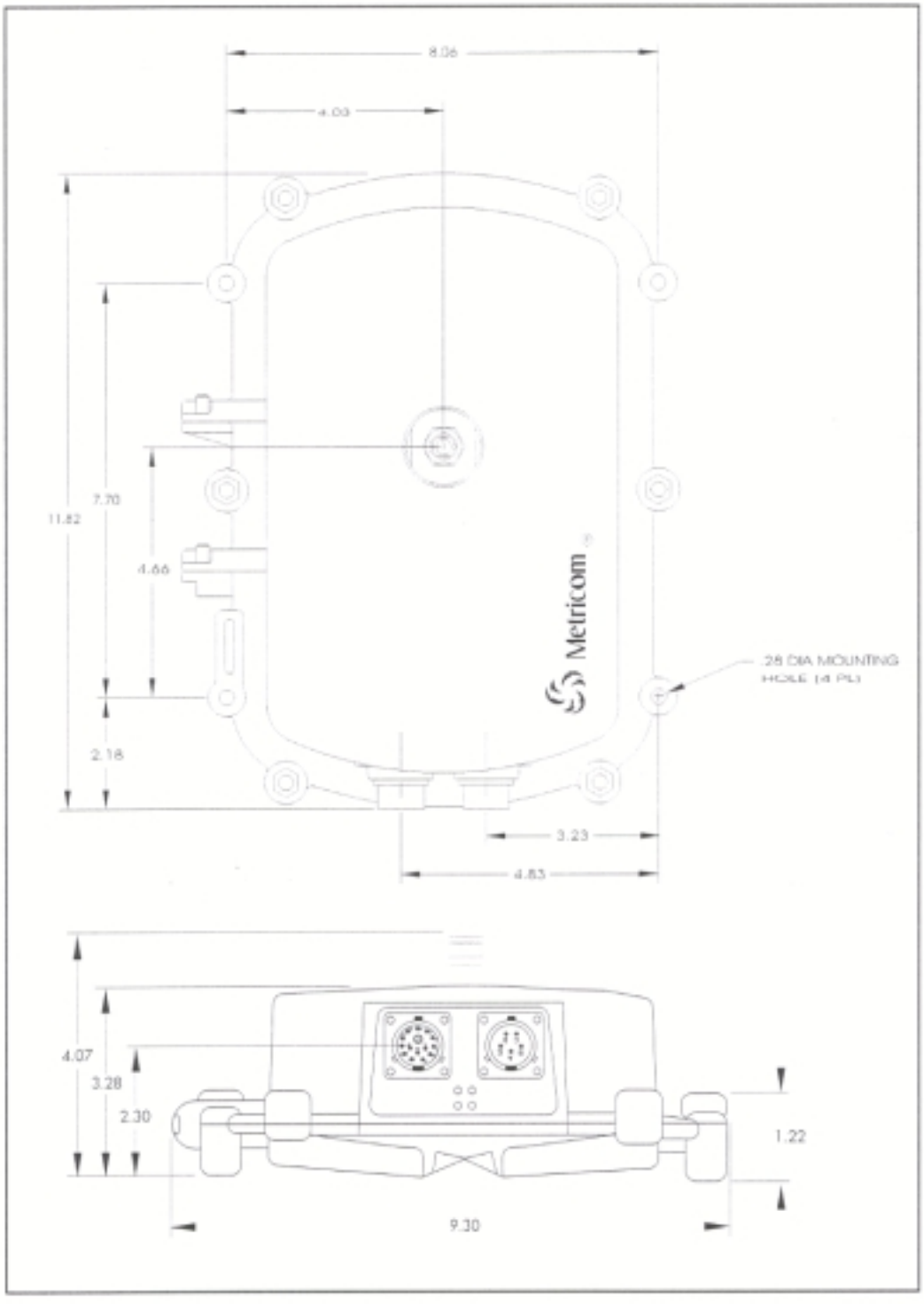


CAT# 60085 RS-232 PROGRAMMING CABLE, 6' TERMINATED DB-9

This Series II MicroRTU WanGate cable connects to the RS-232 & I/O port of the radio and provides access to the UtiliNet LAN Packet Protocol Port for initial configuration and/or diagnostics. It is 6 feet long and terminated in a Female DB-9 connector for easy connection. At least one programming cable should be ordered with MicroRTU WanGate radios for initial configuration of the radios.



UtiliNet Series II MicroRTU WanGate Radio



WanGate Radio (120 VAC, 120 VAC, w/ battery, 120 VAC or 240 VAC w/ filter, 120 VAC or 240 VAC w/ battery & filter) & MicroRTU WanGate Radio (120 VAC, w/battery)

UtiliNet Series II MicroRTU WanGate Specifications

Data Ports/Formats

UtiliNet LAN Packet Port	
Serial Interface	RS-232C
Data Rate	1200 or 9600 bps (N, 8, 1, FDX)
Protocol	UtiliNet LAN Packet Protocol

Power (indepedent of RTU)

120 VAC Operation	
Input Voltage Range	96 - 144 VAC
Input Current (receive avg)	50 mA
Input Current (RF transmit max)[1]	83 mA
Input Current (battery charging)[1]	34 mA
240 VAC Operation	
Input Voltage Range	192 - 288 VAC
Input Current (receive avg)	25 mA
Input Current (RF transmit max)[1]	42 mA
Input Current (battery charging)[1]	17 mA
12 VDC Operation[2]	
Input Voltage Range	10.5 - 16.0 VDC
Input Current	100 mA
Input Current (RF transmit max)[1]	260 mA
Noise & Ripple Allowed @ 12 VDC (max)	200 mV p-p

Agency Approvals

FCC Certified Part 15.247

Mechanical

Interface Connections	
Power	Military Style
Data Port	Military Style
Antenna	"N" Type, Female
Enclosure (outdoor)	Die-Cast Aluminum/Epoxy Powder Paint
Weight	5 lbs. 8 oz. + Battery Pack + RTU
Size	11.82"W x 9.30"D x 4.07"H

Internal RTU Provisions

Data Ports/Formats	
Serial Interface	RS-232C
Data Rate	300, 600, 1200, 2400, 4800, or 9600 bps
Parity	Odd, Even, or None
Data Bits	7 or 8
Stop Bits	1 or 2
Duplex	FDX
Protocol	Any Asynchronous Byte-Oriented Protocol
Power	
Supply Voltage Range	10.5 - 17.5 VDC
Supply Current (max)	120 mA[3]
Mechanical	
Interface Connections	wire pigtail, 24 AWG, Teflon
Size (max)	4.50"W x 3.25"D x 0.85"H
I/O Lines	16
Battery	
Battery Autonomy @ Max Duty Cycle (w/ RTU[4])	12 hours @ 23 degrees Celsius

Installation Notes

Pre-torque each WanGate radio enclosure bolt to 25+/-5 In. lbs., alternating from side-to-side and from top-to-bottom. Repeat this pattern torquing bolts to 45+/-5 In. lbs.

1 Maximum transmit duty cycle is estimated to be 15%
2 Requires using two of the I/O lines for the 12 VDC input and wiring to an internal connector
3 Short-circuit protected
4 Assuming RTU @ 100 mA

UtiliNet Series II Radio General Specifications

General

Frequency Range	902 - 928 MHz
Channels	240, 25 kHz wide
Channel Spacing	100 kHz
Raw RF Data Rate	9600 bps
Spreading Technique	Frequency Hopping
Hopping Technique	Pseudo Random, Asynchronous
Hopping Patterns	65,536 (Unique per Network)
Network Address	Latitude/Longitude Coordinates

Receiver

Type	Double Conversion Superheterodyne; 1st IF 45 MHz, 2nd IF 455 kHz
Dynamic Range	-104 to -20 dBm
Packet Error Rate	$1x10^{-2}$ ($1x10^{-6}$ BER)
IF Selectivity	6 dB down @ 30 kHz
45 MHz IF Rejection	< 90 dB
Frequency Stability	2.5 ppm (0.00025%) @ -30 to +75 degrees C 5 ppm (0.0005%) @ -40 to +85 degrees C

Transmitter

RF Output Min (at antenna connection)	+17 dBm (50 mW)
RF Output Typical	+20 dBm (100 mW)
Out-of-Band Spurious Radiation	< -55 dBc (1 kHz bandwidth)
Deviation	±5.5 kHz ± 10%
Modulation Bandwidth	25 kHz
Modulation	Standard FSK
Output Impedence	50 Ohms
Frequency Stability	2.5 ppm (0.00025%) @ -30 to +75 degrees C 5 ppm (0.0005%) @ -40 to +85 degrees C

Processing

CPU	NEC V25
Clock Speed	8 MHz
Memory	
ROM	256 KBytes
DRAM	128 KBytes
EEPROM	512 Bytes
FLASH RAM	512 KBytes
Programming Language	Metricom Device Control Word (MDCW)

Environmental

Operating Temperature Range	-40 to +60 degrees Celcius
Storage Temperature Range	-40 to +85 degrees Celcius
Operating Vibration	FCC Part 68D, Paragraph 302 Modified
Operating Shock	20 g, 11 ms, Half Sine per Mil Std. 802
Humidity	Mil Std. 202F, Method 106 Modified,10 Days

EMI & Power/Control Susceptibility

Electromagnetic Radiation	FCC Class B, Part 15.247
Electromagnetic Susceptibility	ANSI C37.90.2 Modified
Surge Withstanding Capability	ANSI C37.90.1 and ANSI C62.41
Electrostatic Discharge	MIL Handbook 263 and IEC 801.2