

COMMUNICATOR 1000C

User Manual



Wireless Matrix Communicator 1000C

Communicator 1000C User manual

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Regulatory Statements

Read and understand the entire manual and follow the safety instructions.

The following regulatory approvals apply for the **Communicator 1000C**:

- FCC FCC ID: **P51C1K02**
- IC IC ID: **1478A-C1K02**

The Wireless Matrix Communicator 1000C device emits radio frequency (RF) energy when transmitting. Operators should maintain a safe distance from radio when transmitting.

The Communicator 1000C meets the appropriate FCC requirements:

- Part 15 (Radio Frequency Devices)
- Part 22 (Cellular Telephones)
- Part 24 (Personal Communications Systems)

FCC Part 15 Compliance

This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

Modifications not expressly approved by Wireless Matrix USA, Inc. could void the user's authority to operate the equipment.

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

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

Other Safety Precautions

Read and understand the complete Installation Guide, including the Safety Precautions, prior to using the Wireless Matrix COMMUNICATOR 1000C Modem.



The following safety precautions must be observed during all phases of the operation, usage, service or repair of the Communicator 1000C unit.

1. The Communicator 1000C must be operated at the voltages described in the unit technical documentation.
2. The Communicator 1000C must not be mechanically or electrically changed or modified. Use of all connectors should follow the guidance of the Communicator 1000C technical documentation.
3. Replace fuse with same type and rating for protection against fire and damage.
4. The Wireless Matrix Communicator 1000C is a Radio Frequency (RF) generating device. Do not operate the unit when anyone is less 20cm of the antenna, as noted in the Antenna Installation section of this guide. This could result in personal injury.
5. Do NOT operate the Wireless Matrix Communicator 1000C unit in areas where explosives are in use as the RF frequency could interfere with the operation, causing hazardous conditions. Do NOT operate the Wireless Matrix Communicator 1000C unit in areas where two-way radio communications is prohibited.
6. Use discretion when determining the Wireless Matrix Communicator 1000C installation point. After installation, ensure that all systems are functioning properly. Consult vehicle dealer for further information.



1. **READ THIS MANUAL IN ITS ENTIRETY!**
2. Keep all original Packing Materials.
3. Use caution when installing screws or drilling through the body of the vehicle to avoid puncturing critical areas.
4. Install included grommets and weather sealant to protect cable integrity and weatherproofing the area of penetration.
5. Follow the instruction enumerated in the Installation Section of this guide to ensure proper hardware installation.
6. Ensure that the Wireless Matrix Communicator 1000C is installed in an area with sufficient overhead clearance where it will NOT collide with any other surfaces and in a location that will NOT affect the RF transmission.
7. Pay close attention to the electrical power installation requirements described in this guide. Failure to comply with the described section could result in serious damage to the electrical system of the vehicle.

General Description

The Wireless Matrix **Communicator 1000C** is a high-speed, easy-to-install, Secure Mobile Hotspot with CDMA cellular technology. This future-proof, state-of-the-art device provides router functionality between 802.11b/g, cellular, and a variety of local interfaces, including a Satellite Sidecar port for seamless connectivity with Wireless Matrix Satellite products. The Communicator 1000C reduces fleet operational costs by tracking and improving vehicle-centric metrics such as driver performance and safety behavior via Wireless Matrix's FleetOutlook web application. At the same time, the Communicator 1000C improves workforce productivity by enabling high-speed Internet/Intranet communications from a laptop or other computing device – all on a single wireless plan.

The Wireless Matrix **COMMUNICATOR 1000C** contains a CDMA Ev-DO transceiver, an 802.11 module and GPS receiver.

Physical Characteristics

- Overall dimensions: 6"x4"x1.5"
- External Cell/PCS, 802.11 and GPS antennas

RF

	Cell	PCS
TX	824-849MHz	1850-1910MHz
RX	869 to 894 MHz	1930-1990MHz
GPS	1575.42MHz	
802.11	2400-2473MHz	

Environmental

- Temperature range: -25°C to +60°C
- Non-hermetic enclosure for in-vehicle use

Power

- Power: 9 V - 36 VDC. (13.6V nominal)
- Maximum current draw: 5A,
 - 0.5A typical
 - 0.05A typical in sleep mode

Network:

CDMA

- Integrated module: Sierra Wireless MC5727
- CDMA 1X-Ev-DO Rev.A

802.11

- **B mode**
- **G Mode**

GPS

- 50-channel receiver with -160 dBm sensitivity
- Accuracy: <2.5m (CEP)
- Rapid Acquisition typically < 3 sec
- NMEA feed from any IP-based port

Connections:

Power Supply

1. PIN 1: Power
2. PIN 2: GND
3. PIN 3: Ignition, 0-36V range, typical current draw <1.5mA

Serial Connector (2x8 pins)

1. PIN 1: TX
2. PIN 2: GND
3. PIN 3: RX

RF Connectors

802.11 SMA –Reverse Polarity

Cell

1. **Main SMA**
2. **Aux SMA**

GPS SMC

Installation Instructions

The following instructions explain the processes for installing the COMMUNICATOR 1000C, antennas, and power cable. The installation process may vary slightly if the vehicle's design or accessories will not permit the execution of the steps outlined below. The process will also vary depending on the type of antenna and the location of the COMMUNICATOR 1000C. Antennas may be adhesive or magnetic-mounted to the roof with cabling routed through the door or drilling may be required to fasten them on.

Typical installations includes trucks or service vans



Communicator 1000C Installation Procedures

The average time for the Wireless Matrix COMMUNICATOR 1000C installation is less than one hour.

1. The Wireless Matrix COMMUNICATOR 1000C should be mounted in a dry and protected location
2. The Wireless Matrix COMMUNICATOR 1000C is mounted by using 4 screws into its base. To prevent damage during installation, care should be taken that the thread engagement of the mounting bolt be 1/2-inch or less.
3. Locate the desired installation location on the vehicle.
4. Place a piece of duct tape over the area to drill, for the antenna mount bolts and cable access (this will prevent the drill bit from sliding and damaging the interior surface).
5. Secure the COMMUNICATOR 1000C in place using 4 screws.
6. Plug in the black power connector on the power cable into the COMMUNICATOR 1000C. Connect the power input to the BATTERY+ and IGNITION wires under the dashboard. Attach the GROUND wire with a zip screw (grounding screw, # 8 x 1/2", stainless steel machine) to a metal grounding point convenient for servicing, under the dashboard. Use an existing power connection from previous GPS system installations if possible. If not, solder the connections using the following procedures:

- a. Carefully strip a small section of each wire (the battery, ignition, and ground wires) found in their respective locations under the dashboard in the vehicle.
 - b. Insert the end of each power cable wire through each corresponding vehicle wire, and wrap the end around the vehicle wire.
 - c. Solder the connection.
 - d. Wrap the connections with electrician tape, and then cinch a cable tie tightly around each connection, directly over the connection point.
 - e. Note that in the system diagram, the ignition wire is shown colored white, the battery wire is shown colored red, and the ground wire is shown colored in black, for ease of identification.
7. Insure that all the cables are secure and located at a distance from the driver's operational area.

External antennas

Communicator 1000C uses the following antennas:

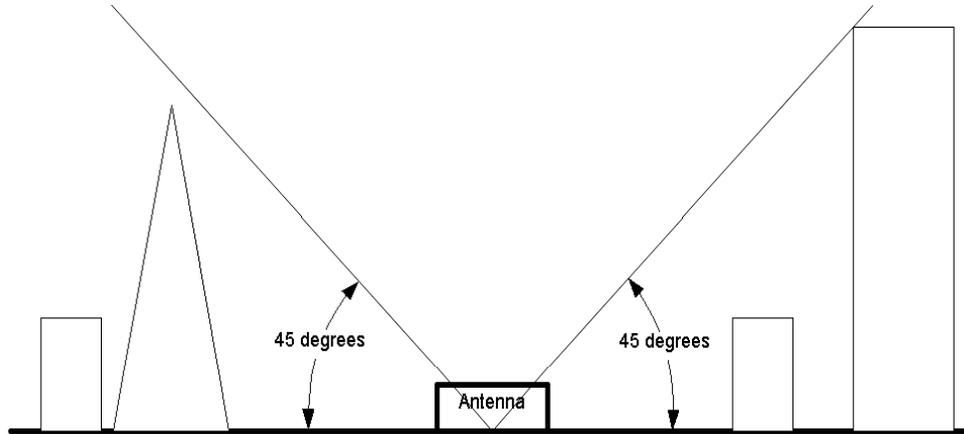
1. Antenna A -CELL band: $-1\text{dBi} \leq \text{gain} \leq 2\text{dBi}$
 -PCS band: $-1\text{dBi} \leq \text{gain} \leq 3\text{dBi}$
2. Antenna B -CELL band: $-1\text{dBi} \leq \text{gain} \leq 2\text{dBi}$
 -PCS band: $-1\text{dBi} \leq \text{gain} \leq 3\text{dBi}$
3. 802.11 antenna (monopole) $-1\text{dBi} \leq \text{gain} \leq 2.5\text{dBi}$
4. GPS patch antenna with internal LNA. $16\text{dBi} \leq \text{gain} \leq 26\text{dBi}$

Note: The max gain requirements for the antennas, does not include the cable losses. Antenna cable losses are: 1.3dB@ 850MHz, 1.9dB@1.9GHz and 2.3dB@2.45GHz

Antenna Installation

Ensure there is not a height obstruction. Mount the antennas so that they are level. Ensure that the antenna has as close to a 90° line-of-sight view of the sky as is possible. Stay away from any close tall metallic objects, as far as that is feasible. Verify that a straight line set at 45° degrees from the plane of the truck rooftop is clearing all surrounding metallic structures 360° in all directions. In other words, imagine an inverted 90° cone of unobstructed clearance with its vertex touching the antenna.

The transmit antennas must be positioned at least 20cm away from the driver's head. The two antennas must be kept 30cm apart.



Procedure if antennas require drilling:

1. Drill a 3/4" diameter hole for each antenna. Use existing mounting holes, if available. Otherwise, start by drilling a small pilot hole, and then use a universal drill bit to slowly enlarge the hole until the antenna connector can fit through. Clean the roof area where the antenna will mount to get a good seal. Use tar tape or silicone to ensure water tightness. Seat the antenna through the hole, making sure any gasket attached to antenna seals the entire perimeter.
2. Attach any nuts or bolts from the inside as necessary.
3. Attach antenna connectors to the COMMUNICATOR 1000C.

Procedure if antennas do not require drilling:

1. Attach adhesive or magnetic-mounted antenna in the desired location.
2. Run antenna cables through the driver-side A-pillar.
3. Attach antenna connectors to the COMMUNICATOR 1000C.

NOTE: DO NOT PUT ALL YOUR WEIGHT ON THE ROOF OF THE TRUCK OR APPLY EXCESSIVE DRILLING PRESSURE. You may inadvertently put dents in the roof. Stand on the edges of the doorway, or on top of the cowl of the hood.

Power Supply & Data Connectors

Use a 12V/5A min. power supply to power up the **Communicator 1000C**. Connect the red wire (Power) to +12V and the black wire (Ground) to GND. Connect the white wire (Ignition) to +12V to turn on the Communicator 100.

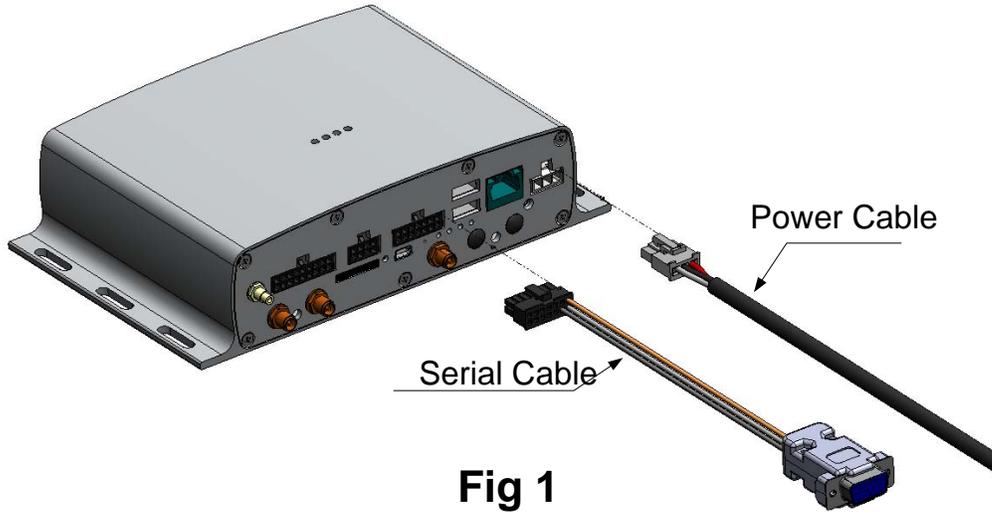


Fig 1

See Figure 1 for the cable connections and Figure 2 for the Power Cable details

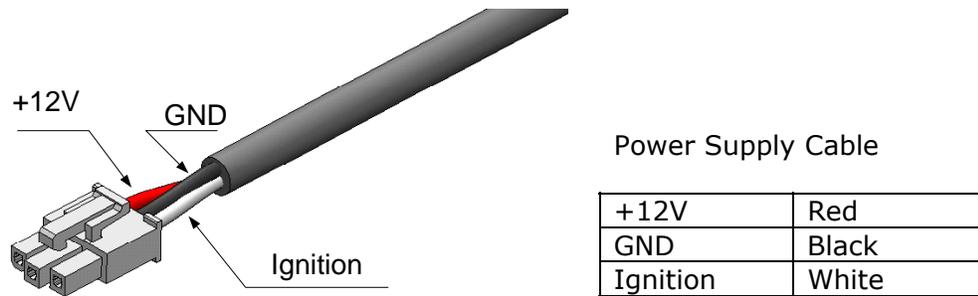


Fig. 2

Two 5A fuses are used on the +12V and ignition lines

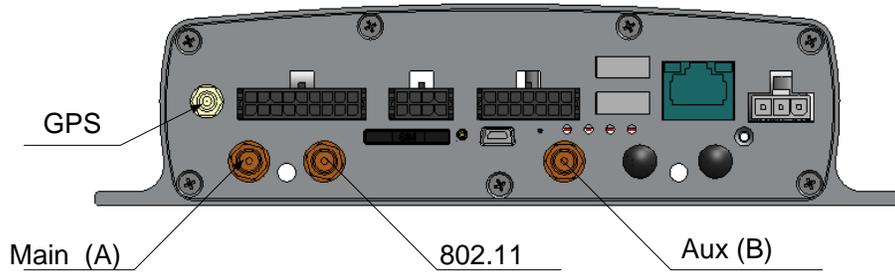


Fig. 3

Fig. 3 shows the RF Connectors

Connection Procedure

To operate and test this unit, a Power Supply Cable shown in fig.2 and a Serial Cable will be needed.

Connect the Serial cable terminated with a DB9 connector to a PC.

Connect the power supply cable to a 12V power supply (+12V wire and ignition wire connected together). The power supply should be capable of handling at least 5A@ 12V.

Please note that Communicator 1000C has internal super-capacitors, which will cause the unit to take up to 1A for the first 20 seconds and then up to 5A for 15 seconds at initial power up. After the super-caps are fully charged, the current drops in receive mode under 400mA.

Use a serial modem interface like ZOC, HYPERTERMINAL or PROCOMM PLUS with the following settings: 115200 baud, 8 bits, No parity, 1 stop bit, Flow Control: None.

Note: Make sure that an antenna is always connected during transmit mode. This is very important as the PA in the CDMA or the 802.11 cards might be damaged without a proper load.

Once the Communicator 1000C is properly connected, turn the power supply on and wait for the unit to boot-up. At the end of the boot-up sequence the user has to log in.

Communicator 1000C supports a large array of AT commands. Here are the more common ones:

AT <CR>	Return AT OK
AT &V	Verbose mode
AT~NAMVAL?0	Display the modem phone number (e.g. 650-237-4000)
AT+GSN	Get the ESN Number of the module
AT~PREV	Protocol Revision
AT!RSSI?	RSSI valued
AT+CSQ?	Signal Quality
AT!PDS?	Query Packet Data State: 1=> PPP connected. 0=> PPP inactive.
AT+CDV*22899	Activate modem
AT!STATUS	Get Modem status
AT+CMIP?	Mobile Station IP Address

AT\$QCMIP	Query Mobile IP Behavior
AT+CBIP?	Get Base Station IP Address
ATDT#777	Makes a data call

System Verification List

To verify the Wireless Matrix COMMUNICATOR 1000C System is operational; follow this checklist:

1. Verify the power source output is 9 to 36 volts. Check if the Power LED on the top of the unit is on.
2. Verify antenna connectivity. The LEDs for GPS, Cell and WLAN should be on.
3. Attempt to send a message to the host or have the host send a message to the vehicle.

Potential Problems

The most common problems with the Client Side Computer / laptop (CSC) are power connections and configuration. PLEASE consult your information services department for details in configuring your CSC.

Table 1 lists potential problems with the CSC and suggestions to correct the problems.

Table 1. Symptom and Suggestions for Potential Problems

Symptom	Suggestions
Power is on, but the <i>CSC</i> application will not connect to the remote host.	a. Check that the power cable is properly connected to the COMMUNICATOR 1000C and the power source.
	b. Using the multi meter, verify power is 11-16 volts when the vehicle is on.
	c. Check that the vehicle ignition is on and the ignition sensor is connected properly.
	d. If the problem persists, test the cable for continuity and/or damage.
	e. Check that your <i>CSC</i> is connected properly via either Ethernet, serial, or 802.11.
	f. Check that the <i>Wireless Matrix COMMUNICATOR 1000C Cable</i> is properly connected.
	g. Contact your service provider and verify that the <i>Wireless Matrix COMMUNICATOR 1000C</i> unit is commissioned and authorized for use.

Warranty

Wireless Matrix warrants that upon shipment to Customer from supplier's facility and for the Warranty Period, hereinafter defined, the Equipment shall be free from defective materials and faulty workmanship and capable of accessing the Service ("Good Working Order"). The warranty provided herein shall not apply to (i) hardware normally consumed in operation such as fuses, cables, or mounting brackets, (ii) defects which, due to no fault of Wireless Matrix, are the result of improper use or maintenance of the Equipment, (iii) improper operation of the Equipment used with other equipment, (iv) Equipment which, due to no fault of Wireless Matrix, has been subjected to any kind of detrimental exposure or has been involved in any accident, fire, explosion, Act of God, or any other cause not attributable to Wireless Matrix, (v) any Equipment which has been altered or repaired by any party other than Wireless Matrix without Wireless Matrix's prior consent, (vi) any Equipment sealed against the weather whereby the seal has been broken without Wireless Matrix's prior consent, or (vii) any Equipment hardware or software, including any revisions provided by Wireless Matrix, which has been improperly stored, installed or implemented. Customer shall de-install and return (unless otherwise directed by Wireless Matrix) the failed Equipment to Wireless Matrix. Wireless Matrix shall return the Equipment, or a new or reconditioned unit, at Wireless Matrix's option, free of charge to Customer via best way ground, unless otherwise specified by Customer (with additional costs thereof to Customer's account), during the one year from shipment ("Warranty Period"). Wireless Matrix's warranty obligation is limited to restoring the Equipment to Good Working Order. The repaired or replacement Equipment is warranted for the remainder of the original Warranty Period.

Return Policy

If the troubleshooting process in the Potential Problems section of this guide determines the modem to be defective, return the unit to Wireless Matrix for repair. Contact your service provider and request a Return Material Authorization (RMA) number. To receive an RMA number, be prepared to provide:

1. Customer Address
2. Contact Name and Phone Number
3. Serial Number
4. P.O # (If unit is out of Warranty)
5. Brief description of the problem

Please fill out the RMA form included in this manual and send it in the box with the unit. To speed the handling process, please also mark the RMA number on the shipping label. Please return the unit in its original packing to avoid damage. Ship the unit to:

Wireless Matrix Corporation

ATTN: RMA # _____
c/o Danzas Air and Ocean
1689 Grant Avenue
Blaine, WA 98230



Returned Materials Authorization (RMA)

RMA #: _____ Date: _____

ALL INFORMATION MUST BE COMPLETE

CUSTOMER:

Customer Name:	_____
Dept/Branch/Unit #:	_____
Ship To Address:	_____

Contact Name:	_____
Contact Phone #:	_____
Contact Fax #:	_____
Contact Email:	_____

FAULTY UNITS TO BE RETURNED:

Select Wireless Matrix Modem Type:	Complete the following applicable fields for your modem type:
<input type="checkbox"/> SDM 1000	MIN#: _____
<input type="checkbox"/> SDM 1100	Electronic Serial #: _____
<input type="checkbox"/> SDM 1200	X.121 Address: _____
<input type="checkbox"/> SDM 1220	IP Address: _____
<input type="checkbox"/> SDX 1000	Transceiver Unit Serial #: _____
<input type="checkbox"/> SDX 1100	Antenna Unit Serial #: _____
<input type="checkbox"/> MBS 1000	Market Partner ID or Customer Alias #: _____
<input type="checkbox"/> MBS PRO	RTU: _____
<input type="checkbox"/> MBS 1000-2	_____

DETAILED PROBLEM DESCRIPTION:

Email RMA Form To: RMA@wrx-us.com

or

Fax RMA Form To: (604) 439-2447

Packing Instructions:

- Pack the unit with at least 2 inches of protective padding on all sides around the unit.
- Place one copy of RMA form inside box
- Place one copy of the RMA form on the outside of the box with the packing slip.

Ship To:
 Wireless Matrix Corporation
 RMA # _____
 c/o DHL Danzas Air & Ocean
 1689 Grant Avenue
 Blaine, WA 98230 USA
 ESN/MIN # _____

(Form continued on reverse side)

RMA form (continued)

RMA Form

BELOW IS FOR COMPLETION BY WIRELESS MATRIX

Dead on Arrival In Warranty Out of Warranty (please supply Purchase Order)

Replacement Unit(s)

Transceiver Serial #	Antenna Serial #

Date Received	Failure Type (Category & Code)	Date Shipped

Problem Description and Actions Taken (Factory use Only)	Date/Tech Initials

APPENDIX - Communicator 1000C Component List

Wireless Matrix Communicator 1000C Component Name	Part Number
Wireless Matrix Communicator 1000C	917-002-xxxx
Power Cable	800-120-0243
Main Antenna	QT10
Auxiliary Antenna	FG-TC-21XLSMA-MG4
Serial cable	
Required Components	
Cordless Drill	
Cable Connectors and Butt End Connector	
5/16-inch and 1/2-inch Drill Bits	
Clear Silicone - Outdoor Sealant	
Socket Set	
Laptop (CSC)	
Recommended Tools & Supplies	
RS-232 Pin Extractor	
Wire Stripper/Crimp Tool	
Wire Cutter	
Split Loom (Wire Organizer)	
<i>DB9/Male to DB9/Female, 4-foot (CSC, DB9 Straight Through Extension Cable)</i>	
Cable Ties (Tie Wraps)	
Duct Tape	
Multi-Meter (for Power and Continuity Testing)	