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USER MANUAL

GPS-COM & SUPERVISOR/REPEATER

GPS-COM /868 MHz code 83435

GPS-COM /915 MHz code 83436

Sup/Rep 868 MHz code 86288

Sup/Rep 915 MHz code 86289

USER MANUAL

GPS-COM

code 83435 & 83436

Supervisor/Repeater

code 86288 & 86289

April 2008

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GPS-COM + UltraRadiac

Supervisor/repeater

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1.   SYSTEM FUNCTIONAL DESCRIPTION

The GPSCOM system allows the UltraRadiac to communication wirelessly through a 915MHz (US) or 868MHz (EU) RF transceiver, sending both radiological and GPS position data. A standard GPSCOM system includes a set of GPSCOM-equipped URAD devices, up to 200 devices maximum per system, and one or more Supervisor/Repeater modules. The Supervisor/Repeater modules relay information between the host computer and the GPSCOM devices deployed in the field. To extend the communication range of the system, additional Repeater modules may be inserted between the computer and Supervisor module.

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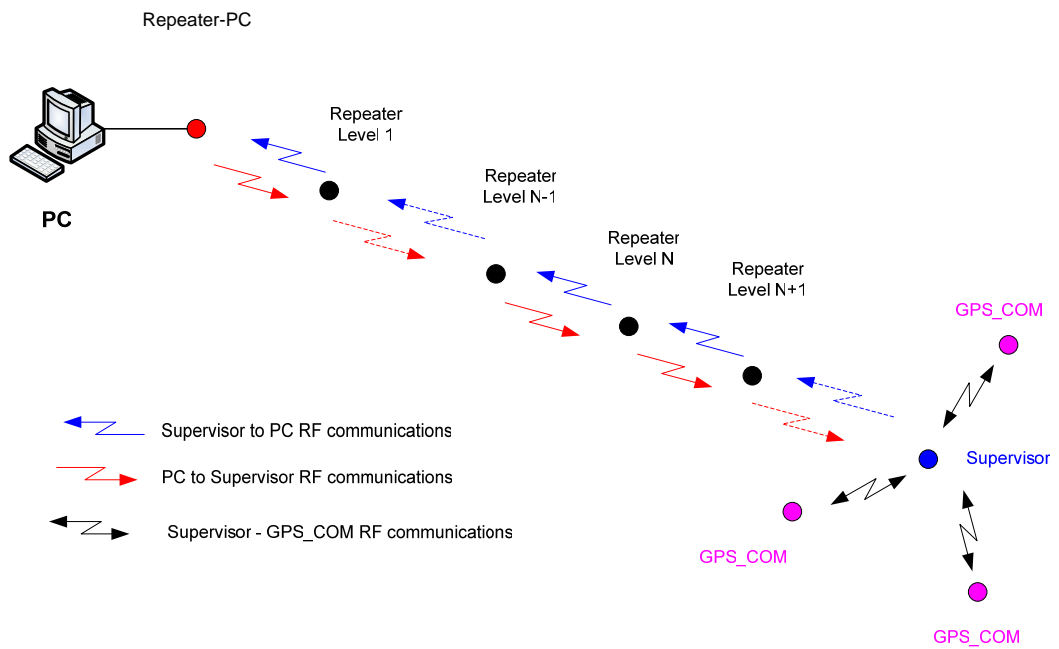
2. HARDWARE FEATURES

2.1. GPS-COM MODULE

This section describes the basic hardware features and functions of the GPS-COM handheld device.

GPSCOM	Control

Locking Mechanism:

The locking mechanism rotates to secure the URAD into position in the GPSCOM.

IrDA Communication Port:

The GPSCOM communicates with the URAD through the infrared transceiver located behind this window.

External Power Connector:

This connector accepts external power from the supplied 5V-2A AC/DC adapter to charge the GPSCOM internal battery.

Power Button:

Pressing and holding the power button momentarily will switch the GPSCOM on or off alternately, and only when the external power adapter is not connected.

Green, Orange, and Red "Battery" Status LEDs:

When the GPSCOM is in operation and is not connected to its external power adapter, the appropriate colored LED will blink to indicate the remaining capacity of the internal battery. When the GPSCOM is connected to its external power adapter, the appropriate colored LED will turn on steady to indicate the battery charging status.

Blue "Link" Status LED:

The Blue status LED indicates when the RF communication link with the Supervisor is active.

2.2. SUPERVISOR/REPEATER MODULE

This section describes the basic hardware features and functions of the Supervisor/Repeater module.

Supervisor/Repeater	Control Panel
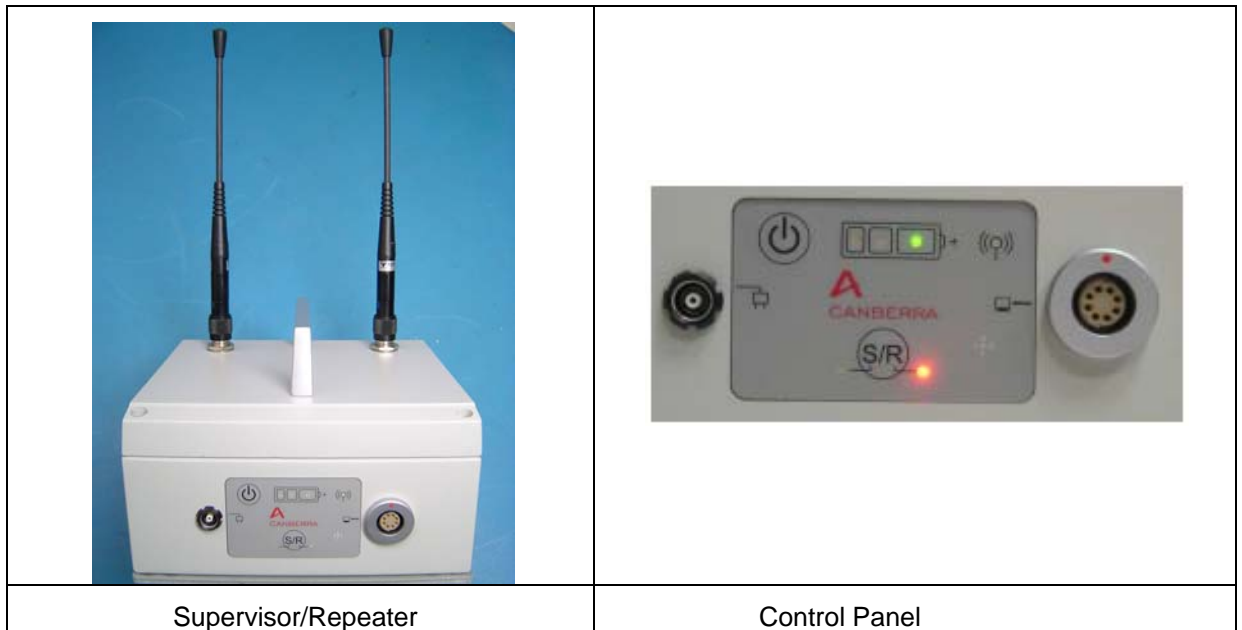
Tripod Mount:

The threaded insert on the base of the Supervisor/Repeater module allows for mounting the module on an optional tripod.

Magnetic Feet:

The three feet on the base of the module allow it to be magnetically mounted to most common steel or other ferromagnetic structures.

Data connector:

The data connector is a serial interface, which communicates with the host computer through the supplied Serial-to-USB data cable.

External Power Connector:

This connector accepts external power from the supplied 5V-5A AC/DC adapter to charge the internal battery.

Power Button:

Pressing and holding the power button momentarily will switch the Supervisor/Repeater module on or off alternately.

"S/R" Button:

Pressing and holding the power button momentarily will switch the Supervisor/Repeater module operating mode between Supervisor or Repeater.

Red "S/R" Status LEDs:

A corresponding Red status LED adjacent to the "S/R" button will turn on to indicate the module operating mode as either a Supervisor or a Repeater.

*Green, Orange, and Red "Battery" Status LEDs:*

When the Supervisor/Repeater is in operation and is not connected to its external power adapter, the appropriate colored LED will blink to indicate the remaining capacity of the internal battery. When the GPSCOM is connected to its external power adapter, the appropriate colored LED will turn on steady to indicate the battery charging status.

Blue "Link" Status LED:

The Blue status LED indicates when the Supervisor/Repeater module has been successfully connected to the GPSCOM network, either by direct connection to the host computer or through RF link to another S/R module.

3.   HARDWARE OPERATION

3.1.   GPS-COM MODULE

3.1.1.   Normal Power On/Off Sequence

The following procedure outlines the normal operating sequence of the GPSCOM with a URAD installed.

1) First, install and power on the URAD by pressing and briefly holding its ON/OFF button until its display activates.

2) Switch on the GPSCOM by pressing and briefly holding down the power button until all four status LEDs turn on.

3) Immediately after applying power, the GPSCOM will attempt to establish communication with the URAD. During this time, the status LEDs of the GPSCOM will follow the sequence below:

   a) Green LED turns off briefly to indicate that GPSCOM is initializing communication with URAD.
   b) Green LED turns back on to indicate that URAD has responded and the IR communication link is active. (Note that all four LEDs may remain on momentarily while initialization continues.)
   c) All four status LEDs then turn off briefly.

4) The GPSCOM will now indicate its remaining battery capacity by flashing the appropriate color status LED as follows:

> Green: greater than 33% capacity
> Orange: less than 33% capacity
> Red: less than 10% capacity

5) If an RF Supervisor is in operation, the GPSCOM will then automatically attempt to connect to it. Once the connection is established, the Blue status LED will turn on and remain steady. If no RF Supervisor is available, the Blue status LED will not turn on.

6) To switch off the GPSCOM, press and briefly hold the power button again until all four status LEDs turn on. After releasing the button, all four LEDS will be off and the GPSCOM will be powered off.

3.1.2. 3.1.2. Enabling the Program Mode

The following procedure outlines the steps necessary to change the internal firmware of the GPSCOM with no URAD installed.

1) Switch on the GPSCOM by pressing and briefly holding the power button until all four status LEDs turn on.

2) Immediately after applying power, the GPSCOM will attempt to communicate with the URAD, and only the Green status LED will turn off.

3) The Green status LED will remain off for approximately one minute, then all four status LEDs will turn off briefly. (Note that pressing and holding the power button for approximately 5 seconds during this one minute interval will cause a Reset of the GPSCOM, which will be indicated by a rapidly flashing Green status LED. Pressing the power button again until all four LEDs turn on will resume the communication link process. It is not possible to switch off the GPSCOM during either of these operating modes.)

4) The GPSCOM will now indicate its remaining battery capacity by flashing the appropriate color status LED as follows:

> Green: greater than 33% capacity
> Orange: less than 33% capacity
> Red: less than 10% capacity

5) The GPSCOM will now be in Program mode, allowing its firmware to be changed by a computer communicating with the GPSCOM through its IrDA data port.

6) When the firmware update is completed, switch off the GPSCOM by pressing and briefly holding the power button again until all four status LEDs turn on. After releasing the button, all four LEDS will be off and the GPSCOM will be powered off.

3.1.3. 3.1.3. Charging the Battery

The following procedure outlines the steps to charge the GPSCOM internal battery. Note that it is not possible to operate any of the GPSCOM functions while the external power adapter is connected. However, it is possible to interrupt the charging process at any time by disconnecting the external power adapter, and no damage to the internal battery will result.

7) Connect the supplied AC/DC power adapter to the GPSCOM, and connect the adapter to a 100-240V 50/60Hz outlet using the appropriate plug.

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8) The GPSCOM will automatically begin charging its internal battery, and will indicate the charge status by turning on the appropriate color LED as follows:

> Green = 100% capacity (charge complete)
> Orange = less than 99% capacity
> Red = less than 10% capacity

9) When charging is complete, the Green LED will turn on and the external power adapter may be disconnected.

3.2.   SUPERVISOR/REPEATER MODULE

3.2.1.   Normal Power On/Off Sequence

The following procedure outlines the normal operating sequence of the Supervisor/Repeater module.

1) For a Supervisor-PC or Repeater-PC, connect the Supervisor/Repeater module to the host computer USB port using the supplied data communication cable. Note that a Secondary-Repeater or Supervisor is operated as a standalone module, and would not be connected to a PC.

2) Switch on the Supervisor/Repeater module by pressing and briefly holding the power button until all four status LEDs turn on.

3) If external power is connected to the module, the Blue status LED will turn on briefly and the Supervisor/Repeater module will indicate its charging status by turning on the appropriate color LED as follows:

4) Green = 100% capacity (charge complete)

> Orange = less than 99% capacity
> Red = less than 10% capacity

If no external power is connected, all "Battery" and "Link" status LEDs will turn on briefly, followed by the battery level indicated by a blinking status LED as follows:
> Green: greater than 33% capacity
> Orange: less than 33% capacity
> Red: less than 10% capacity

5) The Supervisor/Repeater module will now also indicate its operating mode before it was last switched off, by turning on the corresponding Red "S" or "R" status LED next to the "S/R" button.

6) To change the mode between Supervisor or Repeater operation, press and momentarily hold the "S/R" button. All "Battery" and "Link" status LEDs will turn on briefly, then the status LEDs will indicate the battery level or charging status along with the new operating mode. (Note that when external power is connected, changing the S/R mode will also reset the module back to Charge mode and it will be necessary to switch power on again. When switched back on, the S/R module will be in the newly selected operating mode.)

7) The Blue status LED will only turn on after a "Start Network" command has been issued by the host computer and the S/R module has been successfully linked to the network, either by direct connection to the host computer or through RF link to another S/R module.

8) To switch off the S/R module, press and briefly hold the power button again until all four "Battery" and "Link" status LEDs turn on. After releasing the button, all status LEDS will be off and the S/R will be powered off.

9) If the external power adapter is connected, the S/R module will automatically enter Charge mode and the charging status will be indicated by a Red, Orange, or Green status LED according to the battery capacity as described in step 3 above.

3.2.2. **3.2.2. Enabling the Program Mode**

The following procedure outlines the steps necessary to change the internal firmware of the Supervisor/Repeater module.

1) Connect the S/R module to the host computer USB port using the supplied data communication cable.

2) Switch on the S/R by pressing and briefly holding the power button until all four "Battery" and "Link" status LEDs turn on.

3) Press and hold the power button again until the Green status LED blinks rapidly, and the Red "S" or "R" status LED turns off. This indicates that the S/R is now ready to receive a firmware change through the computer connected to the serial data connector.

4) When programming is completed, press and briefly hold the power button again until all four "Battery" and "Link" status LEDs turn on. The S/R module will now return to its normal operating mode, and the status LEDs will indicate the battery level or charging status along with the present operating mode.

5) To switch off the S/R module, press and briefly hold the power button again until all four "Battery" and "Link" status LEDs turn on. After releasing the button, all status LEDS will be off and the S/R module will be powered off.

3.2.3. **Charging the Battery**

The following procedure outlines the steps to charge the S/R internal battery. Note that it is possible to interrupt the charging process at any time by disconnecting the external power adapter, and no damage to the internal battery will result.

1) Connect the supplied AC/DC power adapter to the S/R, and connect the adapter to a 100-240V 50/60Hz outlet using the appropriate plug.

2) The S/R will automatically begin charging its internal battery, and will indicate the charge status with the appropriate color LED as follows:

>Green = 100% capacity (charge complete)
>Orange = less than 99% capacity
>Red = less than 10% capacity

3) When charging is complete, the Green LED will turn on and the external power adapter may be disconnected.

3.2.4. **Notes on Communication Operations**

Supervisor must not be turned off once communicating with GPSCOMs, otherwise entire network must be restarted.

Blue status LED must remain on at all times – if LED turns off, indicates communication fault.

If software is closed, Supervisor will continue to communicate with GPSCOM – it is not required to re-scan and re-start network.

Connection or disconnection of data cable will force reset of S/R microcontroller.

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4. STARTING & CONFIGURING THE GPSCOM SYSTEM

1) Refer to sections 3.1.1 and 3.2.1 above to connect and activate all Supervisor/Repeater and GPSCOM modules in the network, and select the appropriate operating mode for each S/R module.

2) Open the RADACS software on the host computer. The RADACS Server window will open, followed by the RADACS GPSCOM Console window. The GPSCOM Network Wizard window will then open automatically to begin the network initialization process:
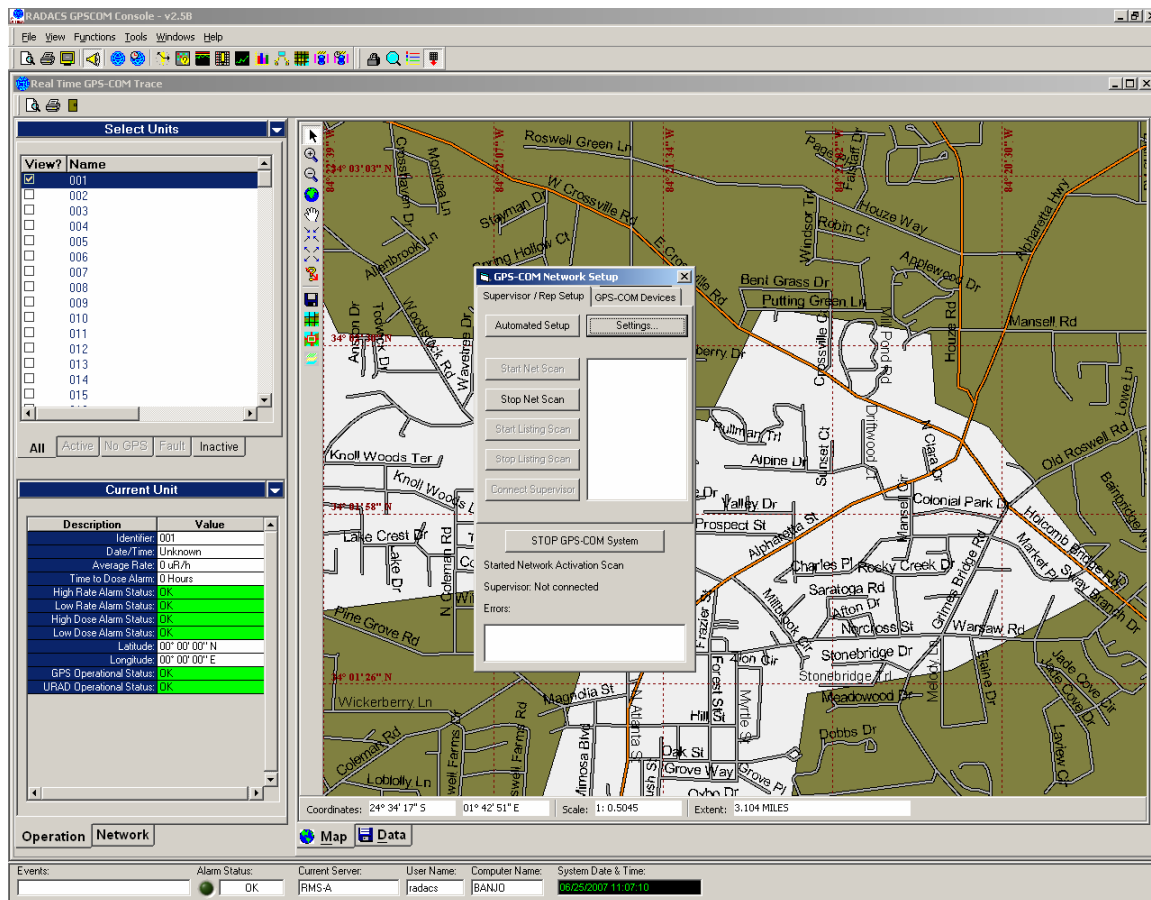
3) Click the "Start Net Scan" button in the GPSCOM Network Setup dialog box. After a moment, the Blue "Link" status LED on each Supervisor/Repeater module will turn on steady to indicate successful communication link to the network.

4) Next, click the "Stop Net Scan" button in the GPSCOM Network Setup dialog box, followed by the "Start Listing Scan" button. After a moment, the dialog box will list all of the detected Supervisor/Repeater modules along with their corresponding operating modes.

5) When the scan is complete, click the "Stop Listing Scan" button, followed by the "Connect Supervisor" button in the dialog box.
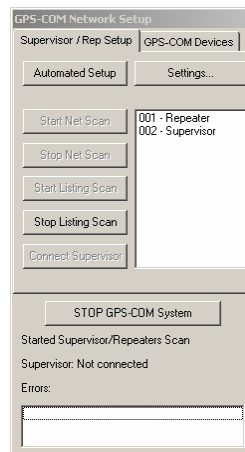
6) Once the Supervisor has successfully responded to the server, the Network Setup Wizard will automatically transition to the GPSCOM Devices tab. However if the Supervisor fails to respond, an error message will be displayed in the lower portion of the Network Setup dialog box.

7) In the GPSCOM Devices tab of the Network Setup dialog box, click the "Start Scan" button. After a few moments, the scan will progress and active GPSCOM modules will be displayed in the "Detected List":
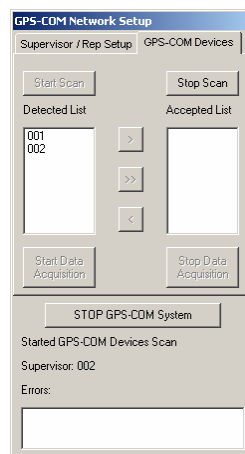
8) When the scan is complete, click the "Stop Scan" button in the dialog box. GPSCOM units may now be added to the "Accepted List" on the righthand side to accept them into the network. This is done either by selecting units individually and clicking the ">" button or by selected all units with the ">>" button in the dialog box. If a GPSCOM unit fails to join the network properly, an error message will be displayed in the lower portion of the Network Setup dialog box, and the unit will remain in the Detected List.

9) When all of the applicable GPSCOM units have been accepted into the network, click the "Start Data Acquisition" button in the Network Setup dialog box. This will initiate data transfer between the GPSCOM units and the Supervisor.

10) Upon successful initiation of the Data Acquisition mode, the Network Setup Wizard will close and operation will return to the RADACS GPSCOM Console window.

11) The Network Setup Wizard may be manually reopened at any time by clicking on the "Network" tab at the lower lefthand side of the RADACS GPSCOM Console window. The Network tab will be displayed

automatically if there is any change in the GPSCOM network status, including a newly detected GPSCOM unit or communication error between the computer and the Supervisor.

12) To stop the data acquisition process at any time, click the "Stop Data Acquisition" button in Network Setup. To stop the entire GPSCOM network at any time, click the "Stop GPSCOM System" button in Network Setup. Note that if the GPSCOM network is stopped, the Network Setup Wizard will default back to the "Supervisor/Repeater Setup" tab and the entire setup procedure beginning at Step 3 above must be repeated to restart the network again.

5.   SYSTEM OPERATION: VIEWING GPSCOM & URAD STATUS

1) Start the "Real-Time GPSCOM Trace" function, located in the RADACS GPSCOM Console "Functions" menu. Be sure that the "Start Data Acquisition" button in the Network Setup Wizard has also been selected to initiate data transfer between the GPSCOM units and the Supervisor.

2) The "Select Units" window on the lefthand side of the main console will display a list of GPSCOM units in the network. The units listed will vary depending on their operational status and the corresponding tab selected along the bottom edge of the Selected Units window:

> *All:* all units defined in the network, regardless of operating status
> *Active:* units supplying both measurement and GPS position data
> *No GPS:* units supplying measurement data, but no valid GPS position data
> *Fault:* units supplying GPS position data, but no measurement data (i.e. URAD off)
> *Inactive:* units not supplying any measurement or GPS data (i.e. GPSCOM off or out of range)

3) Click on a unit to highlight it in the Select Units list. The "Current Unit" window immediately below will display more detailed information about the status of the selected URAD and GPSCOM device including measurements, GPS position and time data, as well as any fault or alarm conditions that may exist.
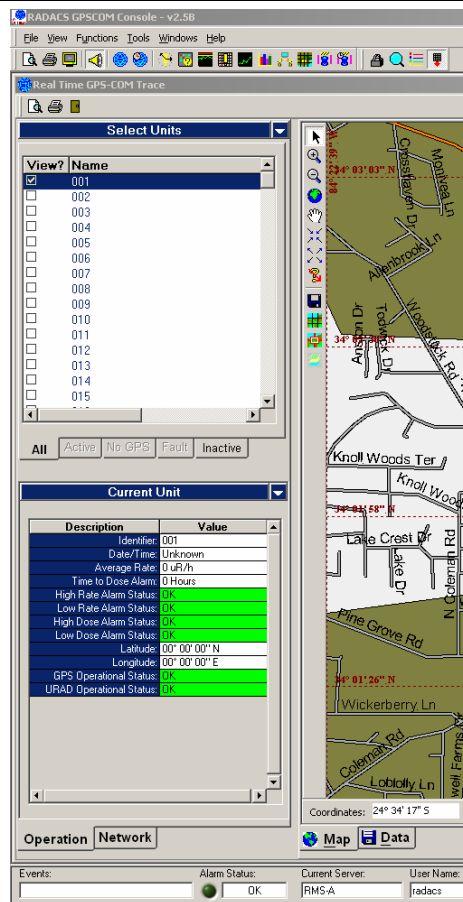
6. SYSTEM OPERATION: MAP & DATA VIEWS

The two primary methods for displaying GPSCOM system status in the RADACS GPSCOM Console are the Map and Data views provided through the Real-Time GPSCOM Trace function. The following sections describe the operation of these two information displays.

6.1. 6.1. MAP VIEW

1) If it is not already running, start the "Real-Time GPSCOM Trace" function, which is accessed through the RADACS GPSCOM Console "Functions" menu. Be sure that the "Start Data Acquisition" button in the Network Setup Wizard has also been selected to initiate data transfer between the GPSCOM units and the Supervisor.

2) The main portion of the Real-Time GPSCOM Trace window will display the Map View, which is also available by clicking on the "Map" tab along the lower edge.

3) Click the "Active" tab along the lower edge of the "Select Units" window on the lefthand side. To view a specific unit on the map, click the checkbox to the left of this unit's name in the "Select Units" listing.

4) An icon containing the name of each unit will be displayed on the map, indicating the GPS position of all units selected for view in the "Select Units" list. The color of each icon represents the radiological alarm status of the corresponding URAD unit as follows:

  Green: No Alarm
  Yellow: Low Rate Alarm

Red: High Rate Alarm

Red (Blinking): High or Low Dose Alarm

5) To remove specific units from the map view, click the checkbox adjacent to each unit in the "Select Units" list again to de-select them.
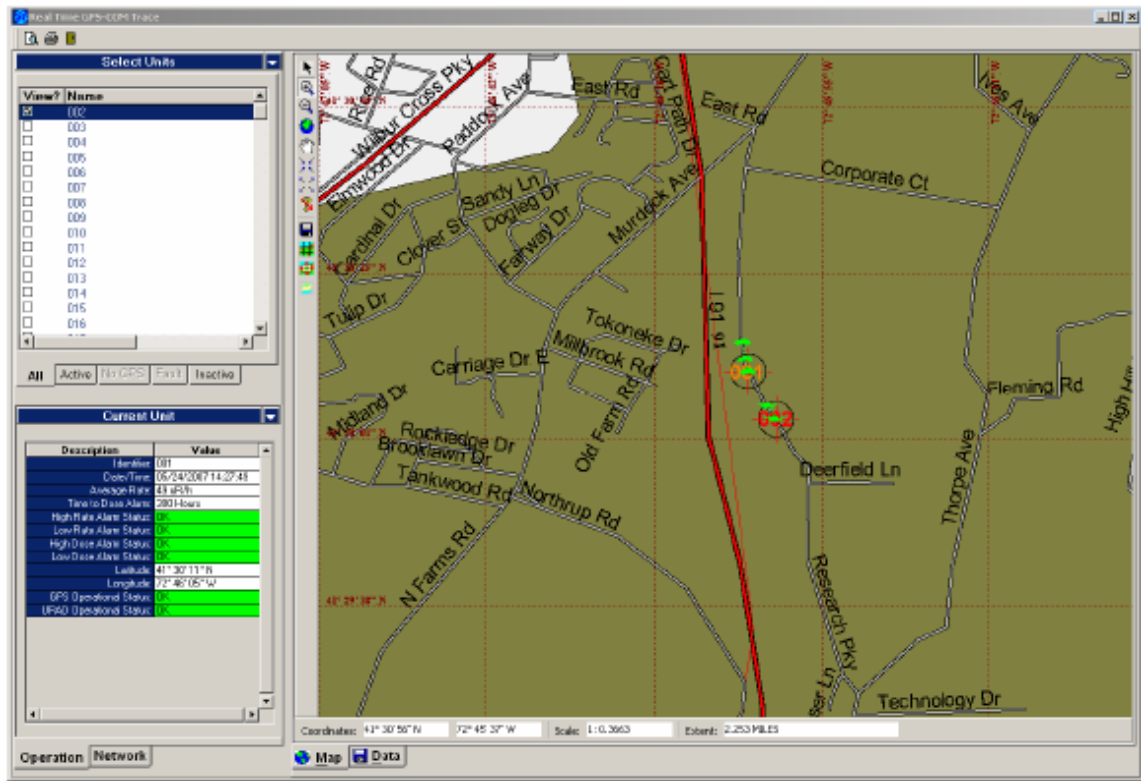
6.2.   DATA VIEW

1) The Data View is accessed by clicking on the "Data" tab along the lower edge of the main portion of the Real-Time GPSCOM Trace window.

2) Click the "Active" tab along the lower edge of the "Select Units" window on the lefthand side. To enable viewing data from a specific unit, click the checkbox to the left of this unit's name in the "Select Units" listing.

3) Next, select the appropriate unit from the "Sensor" dropdown box at the top of the Data View window. The time-tagged measurement and GPS position data from this unit will be displayed in the table below.

4) To select a different unit in the Data View, repeat steps 2 and 3 above for the specific unit.

5) Clicking the checkbox adjacent to each unit in the "Select Units" list again will disable viewing the data for those units.
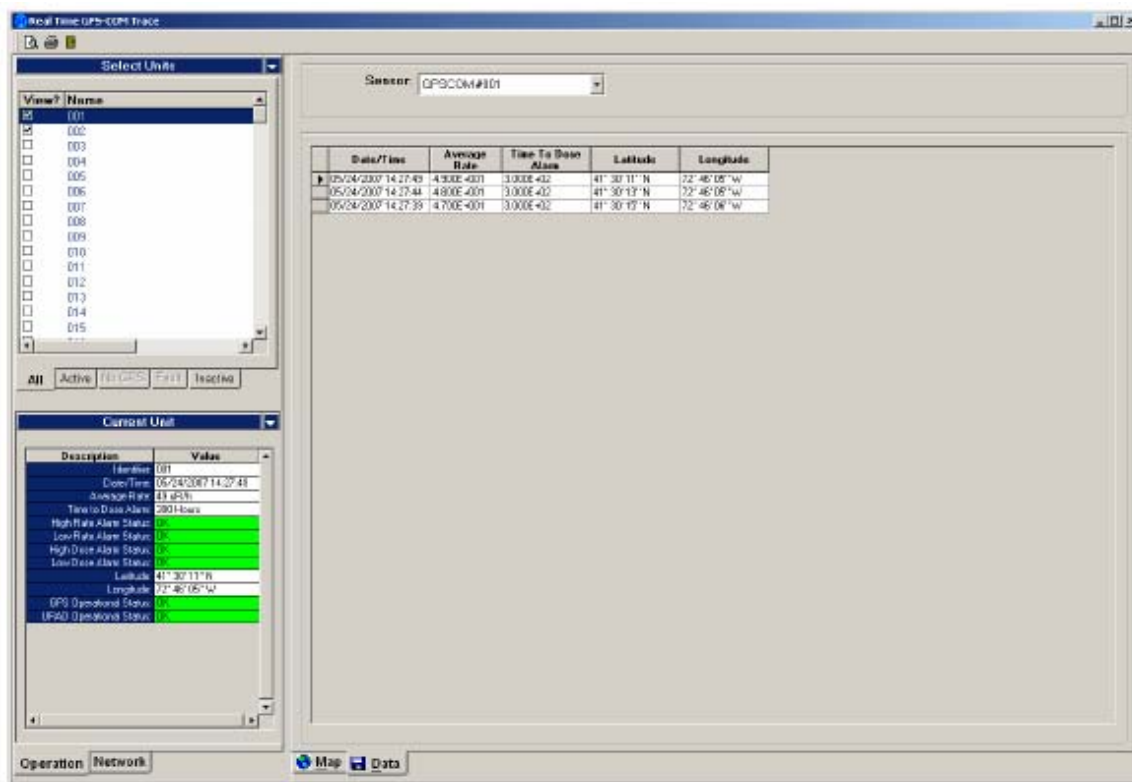
7. SYSTEM OPERATION: DYNAMIC GPSCOM DEVICE CONNECTIONS

The RADACS-GPSCOM network is capable of connecting and disconnecting GPSCOM devices during normal system operation. This functionality is particularly important for detecting new devices as they appear on-site, or as they are transitioned between different sites and networks. The following procedures describe the operation of the system in each case.

7.1. CONNECTING GPS-COM DEVICES

1) When a new GPSCOM device is switched on and enters communication range, it is automatically detected by the Supervisor module.

2) The Supervisor notifies the RADACS server of the newly detected device, and alerts the system user of this change in network status by automatically opening the Network Setup Wizard. The Network Setup tab will appear on the lefthand side of the Real-Time GPSCOM Trace window on the RADACS GPSCOM Console.

3) The newly detected device will be displayed in the "Detected List." The system user must click on this unit in the list to select it, and then accept it into the network by clicking the ">" button.

4) In the event that the network already contains its maximum of 200 active GPSCOM devices, the user interface will report an error and request the system user to select a unit to remove from the "Accepted List" before adding the newly detected device.

5) The Supervisor module will then attempt to connect the new unit to the network. If the connection is successful, the new unit will then be added to the "Accepted List" of units. If the connection fails, a failure message will be displayed in the Errors section at the lower portion of the Network Setup dialog box and the unit will remain in the "Detected List."

7.2.	**7.2. DISCONNECTING GPSCOM DEVICES**

In order for a GPSCOM device to transition from one network to another, it must first be disconnected from its present network. This functionality provides a means for assigning GPSCOM units to individual networks, and allows multiple GPSCOM systems to operate within close proximity to one another if necessary.
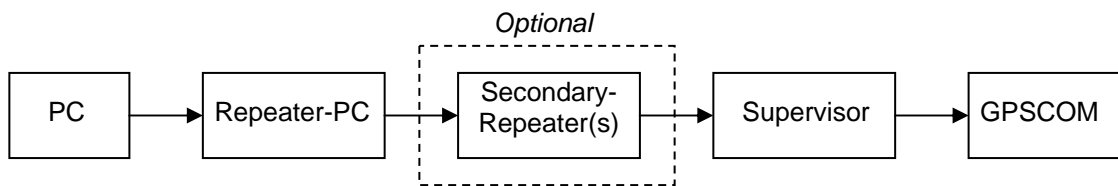
1) To disconnect a specific GPSCOM device from the network, first click to select the unit name in the "Accepted List" on the Network Setup tab of the Real-Time GPSCOM Trace window.

2) Next, move the unit from the "Accepted List" to the "Detected List" by clicking the "<" button.

3) The Supervisor module will then attempt to disconnect the unit from the network. If the disconnection is successful, the new unit will then be moved to the "Detected List." If the operation fails, a failure message will be displayed in the Errors section at the lower portion of the Network Setup dialog box.

4) Once the unit has been disconnected from the network, the Blue "Link" status LED on the GPSCOM unit will turn off. Note that a wait time of up to two minutes is required before reconnection to the same or a different network can occur.

8. SYSTEM OPERATION: DYNAMIC SUPERVISOR/REPEATER MODULE CONNECTIONS

The RADACS-GPSCOM network allows for removal and insertion of Repeater modules if necessary to extend the communication range of the system. The sections below describe the response of the system and the required user interaction for different configurations and events.

8.1. INSTALLING OR REMOVING REPEATER MODULES

In a system utilizing at least one Repeater module (Repeater-PC) and a Supervisor module, the communication link established between GPSCOM devices and the Supervisor module is not affected by adding or removing the Repeater-PC or Secondary-Repeater modules. All communication data for the system is stored in the Supervisor, which will remain linked with the GPSCOM devices. Data flow from the GPSCOM devices to the host computer will be momentarily interrupted if a Repeater module is removed, but system operation will restore itself automatically once the communication chain has been re-established.


```
                              Optional
                         ┌ ─ ─ ─ ─ ─ ─ ─ ┐
┌──────┐   ┌──────────┐  │ ┌──────────┐ │   ┌────────────┐   ┌─────────┐
│  PC  │──▶│Repeater-PC│─▶│ │Secondary-│ │──▶│ Supervisor │──▶│ GPSCOM  │
└──────┘   └──────────┘  │ │Repeater(s)│ │   └────────────┘   └─────────┘
                         │ └──────────┘ │
                         └ ─ ─ ─ ─ ─ ─ ─ ┘
```

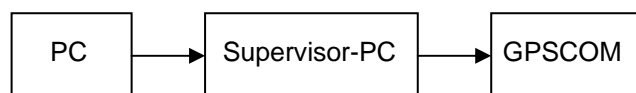### 8.2. REMOVAL OF A REPEATER-PC OR SECONDARY-REPEATER MODULE

1) Follow the steps in section 3.2.1 above to switch off and remove either a Secondary-Repeater or Repeater-PC module.

2) All Repeater modules between the computer and the Repeater that has been removed will remain in the network, and their Blue "Link" status LEDs will stay on. All Repeater modules after this point, along with the Supervisor, will become disconnected and their "Link" status LEDs will turn off.

8.2.1. Insertion of a Repeater-PC or Secondary-Repeater Module

3) Follow the steps in section 3.2.1 above to install a new Secondary-Repeater module.

4) The Blue "Link" status LED of the newly installed Secondary-Repeater module will turn on to indicate when it has been successfully synchronized and linked to the network.

5) If any downstream Repeaters and the Supervisor had been previously disconnected, their Blue "Link" status LEDs will turn back on once the have automatically reconnected to the network.

8.3. INSTALLING OR REMOVING SUPERVISOR MODULES

In a system containing only a Supervisor-PC module, it is not possible to insert additional Repeater modules once the system is in operation without restarting and reconfiguring the system to some extent. In this case, proper functionality of the system requires the system operating data and GPSCOM communication table stored in the Supervisor to be reset. This occurs whenever the serial data cable is disconnected from the Supervisor-PC, and the role of the module changes from Supervisor-PC to standalone Supervisor.

```
┌────────┐      ┌──────────────┐      ┌───────────┐
│   PC   │ ───▶ │ Supervisor-PC│ ───▶ │  GPSCOM   │
└────────┘      └──────────────┘      └───────────┘
```

8.3.1. Removal of a Supervisor-PC or Supervisor Module

1) Follow the steps in section 3.2.1 above to switch off and remove either a Supervisor-PC or Supervisor module.

2) Any Repeater modules in the system will remain connected in the network, and their Blue "Link" status LEDs will stay on. The Supervisor however will become disconnected from the network once it has been switched off, and all system data in the Supervisor will be lost.

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8.3.2. Insertion of a Supervisor-PC or Supervisor Module

1) Follow the steps in section 3.2.1 above to install a new Supervisor module.

2) To restart the GPSCOM network, there are three possible procedures:

   a) Shutdown and restart all the GPSCOM devices. Follow steps 3-9 in section 4 above to place the Supervisor module into network scan/search mode, then scan and connect all GPSCOM devices. This solution is the most straightforward, but may require a significant length of time if the system contains a large number of GPSCOM devices.

   b) If all of the identifiers of the GPSCOM devices previously connected are known are still stored in the PC and GPSCOM-RADACS software, the following procedure may be used: Place the Supervisor module into standby mode. Send a "connect" frame from the PC to each GPSCOM previously connected. This solution is quick, but requires that the PC has stored the identifiers of the connected GPSCOM devices.

   c) Change the network number ID of the new Supervisor and all of the Repeaters in the system. This solution requires the reconfiguration of all the Repeaters and Supervisor, and imposes the retrieval of all of the deployed modules. It is therefore only practical in a network which contains only one or two Repeaters maximum.

9. POWERING OFF THE SYSTEM

The following procedure describes the steps necessary to close the GPSCOM data and network connections and power down the system hardware.

1) On the Network tab of the Real-Time GPSCOM Trace window, click the "Stop Data Acquisition" button to end data transfer between the GPSCOM units and Supervisor module.

2) Next, click the "Stop GPSCOM System" button to stop all communication in the GPSCOM network.

3) To switch off each Supervisor/Repeater module, press and briefly hold the power button until all four status LEDs turn on. After releasing the button, all status LEDS will turn off and the module will be powered off.

4) To switch off each GPSCOM unit, press and briefly hold the power button until all four status LEDs turn on. After releasing the button, all four LEDS will turn off and the GPSCOM will be powered off.

10. MAINTENANCE & SERVICE INFORMATION

This section describes the necessary maintenance of the GPSCOM hardware, and provides repair and service contact information.

10.1. INTERNAL LITHIUM-ION BATTERIES

The GPS-COM handheld units and Supervisor/Repeater modules each contain a high-capacity Lithium-Ion rechargeable battery pack for portable operation. Similar to all rechargeable batteries, the chemistry of Lithium-Ion cells is such that they have an inherent self-discharging quality, which causes them to slowly lose their energy even while in storage. For this reason, the internal batteries of GPSCOM hardware should always be maintained in a charged state. Recharging the batteries before they have been fully discharged does not present any damage to Lithium-Ion cells, since their internal "memory effect" is minimal.

After each use, both GPSCOM and Supervisor/Repeater units should be recharged according to the procedures in sections 3.1.3 and 3.2.3. Charging must be performed only within the ambient temperature range listed in the Specifications section below.

10.2. REPLACEMENT COMPONENTS

The following components are available for direct replacement through the Canberra Service department:

GPSCOM Devices:

AC/DC Power Adapter (5V@2A):   TR15RA050 from CINCON ELECTRONICS CO., LTD

Supervisor/Repeater Modules:

AC/DC Power Adapter (5V@5A):   TR30RA050 from CINCON ELECTRONICS CO., LTD

RF Antenna: code 85969

Antenna must not be removed nor replaced by another one.

11. DECLARATION OF CONFORMITY

11.1. EUROPE

Concerns RF868MHz devices

RF868MHz devices are compliant with the european **R&TTE 1999/5/CE** directive.

Complete declarations are available on request at

CANBERRA

ZI des Vauzelles

37600 LOCHES

FRANCE

11.2. US – FCC

Concerns RF915MHz devices.

These devices comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference, and (2) these devices must accept any interferencereceived, including interference that may cause undesired operation.

These equipments have 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. These equipments generate use 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 these equipments do 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's by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the 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.

The user may find the following booklet, prepared by the Federal Communications Commission, helpful: How to identify and Resolve Radio/TV Interference Problems. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

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Pursuant to Part 15.21 of the FCC Rules, any changes or modifications to these equipments not expressly approved by CANBERRA may cause, harmful interference and void the FCC authorization to operate these equipments.

Operator may keep the equipment antenna at more than 20 cm from the body.

Supervisor/Repeater 915MHz can be used with a Class B Personal Computer and is also certified under DoC "Declaration of Conformity" procedure.

12. SPECIFICATIONS

12.1. GPSCOM HANDHELD DEVICE

Environmental:

Operating Temperature Range	-20°C to +60°C
Storage Temperature Range	-30°C to +70°C
Humidity	0 to 95% at +35°C
Altitude	12000m (in transport only)
Specification	IP67

Input Voltage:

Operating Range	+4.5 to +5.5VDC
Maximum current	2A
Protection	Polarity inversion
	Disturbance (CEM)
	Overvoltage (up to 12VDC)
Connector	Fischer DEU 102 A002

Use only the power supply provided with the GPS Com:

Manufacturer: CINCON ELECTRONICS CO., LTD

Model: TR15RA050

Input: 100-240 V, 47-63 Hz, 0.4 A

Output: 5 Vdc, 2 A

Caution: The plug of the direct plug-in power supply is used as the disconnect device, it shall remain accessible after installation.

Internal Battery:

Type	Lithium-Ion
Operating time	30 hours minimum
Charging time	8.5 hours at -10°C

	7.5 hours at +50°C
Lifetime	300 cycles

CAUTION: Risk of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions

Communication:

Infrared	
Compatibility	IRDA 1.4
Connection Speed	9600 baud
GPS	
Number of Channels	16
Precision	5 m (SEP)
Radio	
Frequency	915 MHz (US), 868 MHz (EU)
Range	1000 m (unobstructed)
	300 m (inside building)

Enclosure:

Dimension	
Length	200 mm
Width	90 mm
Height	41 mm
Weight	372 g (0.82 lb)
Material	ABS PC
Color	Black
Cleaning Resistance	Alcohol (90% solution)

Certifications & Approvals:

CEM/Radio 868MHz	ETSI EN300-220-1 (EU), receiver class 3
	ETSI EN301-439-3 (EU)
	NF EN61326 (EU)
CEM/Radio 915MHz	FCC 15-247 (US) FCC ID: VPMGPSC915 for GPS COM,
Electrical Safety 868MHz	NF EN60950 (EU)
Shock & Vibration	
Specification	IEC 60068
Resistance	10m/s^2 (10-500Hz, 3-axis, 10 hours)
RoHS	Compliant

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12.2. SUPERVISOR/REPEATER MODULE

Environmental:

Operating Temperature Range	-20°C to +60°C (on battery)
	-20°C to +50°C (battery charging)
Storage Temperature Range	-40°C to +80°C
Humidity	0 to 95% at +35°C
Altitude	12000m (in transport only)
Specification	IP66

Input Voltage:

Operating Range	+4.5 to +5.5VDC
Maximum current	5A
Protection	Polarity inversion
	Overvoltage (up to 24VDC)
Connector	Fischer DEU 104 A066

Use only the power supply provided with the GPS Com:

Manufacturer: CINCON ELECTRONICS CO., LTD

Model: TR30RA050

Input: 100-240 V, 47-63 Hz, 0.8 A

Output: 5 Vdc, 5 A

Internal Battery:

Type	Lithium-Ion
Operating time	70 hours minimum
Charging time	13 to 17 hours
Lifetime	300 cycles

CAUTION: Risk of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions

Communication:

Frequency	915 MHz (US), 868 MHz (EU)
Range	1000 m (unobstructed)
	300 m (inside building)

Dimensions

Length	160 mm
Width	160 mm
Height	80 mm
Material	Aluminium alloy
Color	beige
Cleaning Resistance	Alcohol (90% solution)

Certifications & Approvals:

CEM/Radio 868MHz	ETSI EN300-220-1 (EU),
	ETSI EN301-439-3 (EU)
	NF EN61326 (EU)
CEM/Radio 915MHz	FCC 15-247 (US) FCC ID: VPM-RS-915
Electrical Safety 868MHz	NF EN60950 (EU)

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