

## **SRM9000 Simple Dispatcher – User Guide**

This application note describes how to set up a simple dispatcher system to send and receive data messages between a PC and SRM9000 Mobiles and SRP9100 Portable Radios.

The sample software described in this application note can be obtained free of charge from the TMC's website. <http://www.tmcradio.com>

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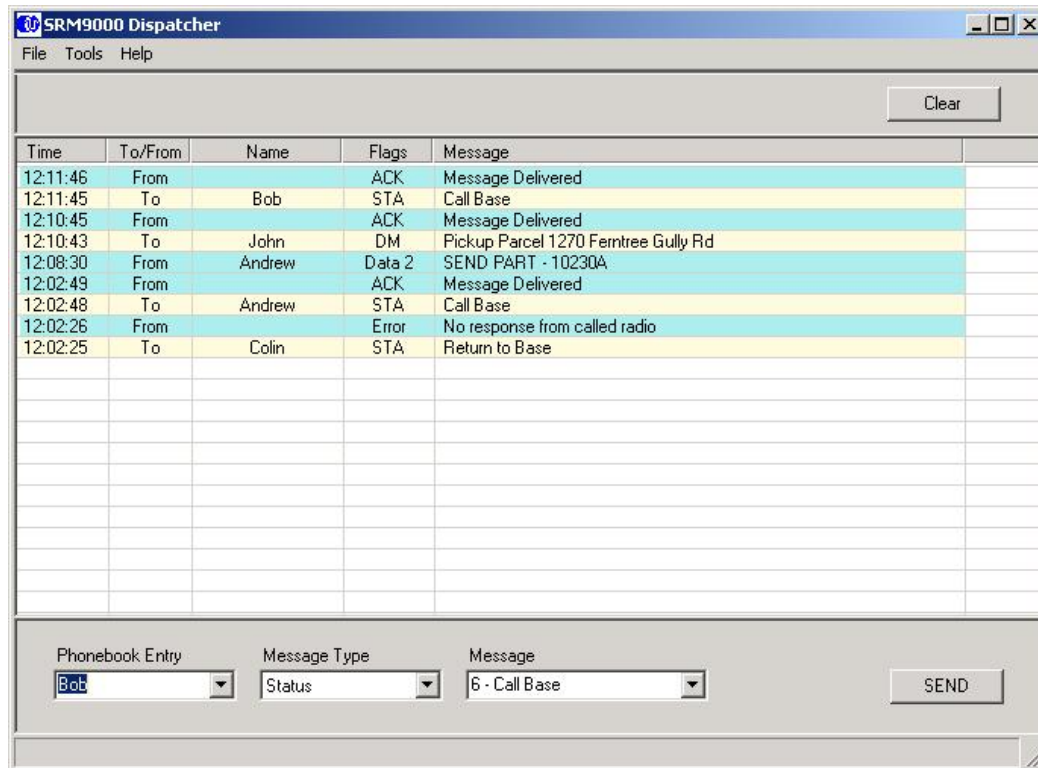
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# 1 Introduction

This application note describes how to set up the SRM9000 Simple Dispatcher system to communicate with mobiles and portables.

The software described in this application note can be obtained free of charge from the TMC's website: <http://www.tmcradio.com>



This is a very simple dispatcher to show users what can be done, and to form the basis of a custom made dispatcher. Because every customer has unique requirements, TMC Radio has made the source code freely available from our website.

TMC Radio hopes that customers will hire their own software programmers to modify the code to their exact requirements.

The program was developed using Microsoft VB.NET on a PC with Microsoft Windows XP operating system. The program's source code is not very long and could easily be understood and modified by a programmer with beginner/intermediate level VB.NET skills.

Version 2.00 of the Simple dispatcher can also be used with the Simoco AVL (GPS location mapping) software.

## 2 Requirements

The equipment required to set up the simple Dispatcher system is as follows:

### Hardware:

- 1 x SRM90x0 Mobile Radio or SRP9130 Portable
- 1 x SRM9000 Mobile Radio (Dispatcher)
- 1 x PC, Pentium class >500MHz CPU
- 1 x Field Personality Programmer (FPP) lead (MA-PROGLEAD)

### Software:

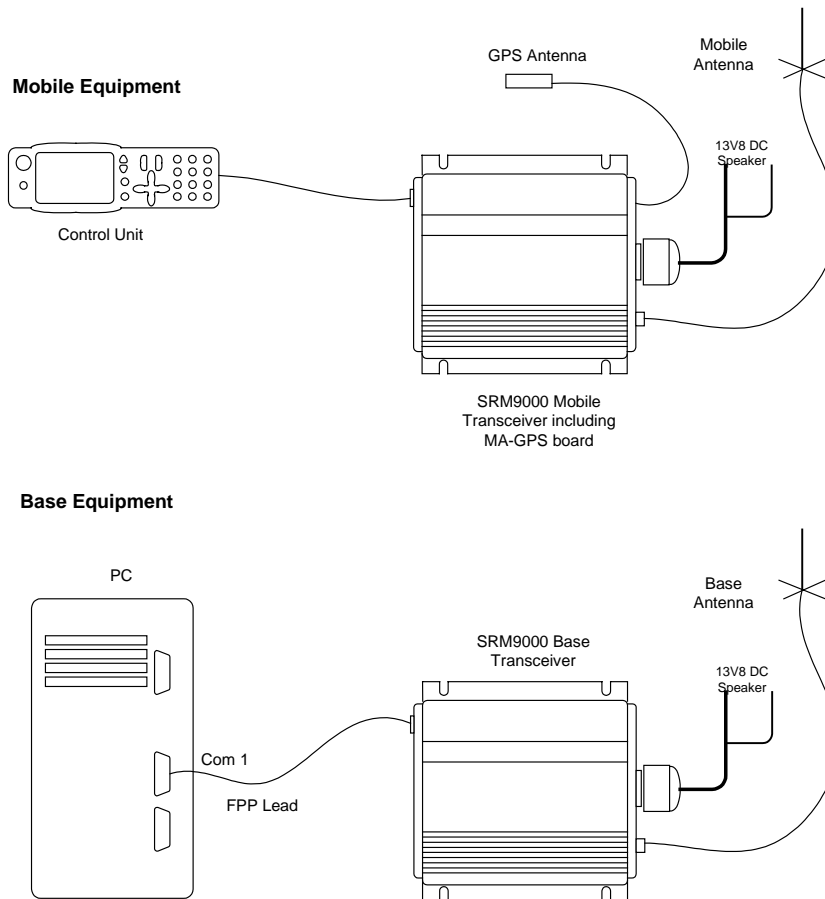
- PC Operating System: Microsoft Windows XP
- 1 x SRM9000 Field Personality Programmer (FPP) (10750)
- 1 x Installation package of the 'Simple Dispatcher' application

### Optional Hardware and Software for GPS AVL Systems:

- Either 1 x GPS Option Board (MA-GPS) including GPS receiver and antenna
- Or 1 x ASIG Option Board (MA-ASIG) including GPS receiver and antenna
- Note: GPS engines must be configured to report NMEA-RMC format.
- Simoco SRS500 AVL Software Package.

Note that a control head or microphone is not required for the dispatcher radio, although it is recommended to have one available for checking radio channel and to confirm the radio link with a voice check.

### 2.1 Block Diagram



## 2.2 Dispatcher Installation

Unzip the install files to a temporary directory, then double click on the install.exe program.

Note: This application requires "Microsoft .NET Framework 1.1 Redistributable". This is a component of the windows operating system used to run the latest windows based applications. The installation program will tell you if your PC does not have it.

The install program will automatically direct you to a page on the Microsoft website to enable you to download the required software. Microsoft however, have hidden the required download link on another web page. The easiest way to get the ".NET Framework Redistributable" is to download it from the TMC Radio website:

1. Goto [www.tmcradio.com](http://www.tmcradio.com)
2. Select menu "Mobiles" then menu "Technical"
3. Look for application note A9K-705
4. Download and Save "DotNetFx.exe" to your harddisk
5. Run the "DotNetFx.exe" installation program
6. Then Re-run the "Simple Dispatcher" Install.exe

Note: The download file from Microsoft is 24MB and requires 150MB hard disk space!

To run the Dispatcher application:

- Click on the Windows START button
- Select Programs
- Select TmcRadio
- Select Dispatcher

## 2.3 Radio Software

The SRM9000 radio must have V5.25 Radio code or later. To check, connect FPP programming cable to the mobile and select menu OPTIONS then RADIO INFORMATION.

If the radio doesn't have the latest radio code, then use the FPP (V3.30 or later) to read the configuration from the radio, then re-write the configuration back into the radio. The FPP should automatically upgrade the radio code to the latest version.

## 2.4 Radio Configuration Settings

Very few changes are required to the FPP's default configuration to enable the radios to work in the dispatcher system.

### 2.4.1 PMR Radio Configuration

#### Dispatcher Radio

Run FPP  
Select file new  
Change the Frequency Band to match the Band of your radios.  
Add channel frequencies that you are authorised to use.  
On the Data/GPS page set Own Data Address to 1

#### Vehicle Radio

Run FPP  
Select file new  
Change the Frequency Band to match the Band of your radios.  
Add channel frequencies that you are authorised to use.  
On the Data/GPS page set Own Data Address of each radio to a unique number.  
On the Data/GPS page set Dispatcher Address to 1  
On the Menus page add a "Send Message" menu.

Note: The FFSK Lead-In Delay must be the same for both the Dispatcher and Vehicle radio configurations.

### 2.4.2 Trunk Radio Configurations

#### Dispatcher Radio

Run FPP  
Select file new  
Load your Network File.  
On the Radio Identity Form, Enter the Radio's Identity.

#### Vehicle Radio

Run FPP  
Select file new  
Load your Network File  
On the Radio Identity Form, enter the Vehicle's Radio Identity.  
On the Radio Identity Form, enter the Dispatcher Identity. (Same as the dispatcher's Radio Identity)  
On the Status Form enter some Status Messages  
On the Menus page add a "Send Message" menu.

If your radio has a GPS option board, then define the 'GPS Poll Request' on the Status Form (Default is 29). This number must correspond to the Poll Request Status number in the Simple Dispatcher's option menu.

For SRP9100 Portables set the function buttons to:

F1 – Menu  
F2 – Channel Down  
F3 – Channel Up  
F4 –  
F5 – Reset

### 3 Operation

The Dispatcher can be set up to operate as a PMR Radio Dispatcher or a Trunk Radio Dispatcher. Both modes allow Status and Short data messages to be sent and received from/to the dispatcher application.

The dispatcher has a phonebook where all radio idents and associated names are defined. There is also a Status list of 30 Status numbers and their corresponding messages.

To send a message to a radio, select a Phonebook entry, Message type (Status or Data Message) and then select a Status message or enter a short data message. Finally press the SEND button.

The dispatcher will insert the message in the Dispatcher list and inform you whether the message was successfully delivered to the called radio. All entries are also written to a log file.

The Dispatcher can also receive status and data messages and display them in the dispatcher list.

When a message is received, the application checks the caller's number and looks up the phone book to find the corresponding name. If a status number is received the application will look up the status list to find the corresponding message. The dispatcher will display the name and message instead of the number if they exist.

#### 3.1 PMR Dispatcher

	PMR	Notes
Phonebook Number	1 – 65000 65501 - 65516 65535	Call Individual radios Group Call Group Call to all radios
Phonebook Name	20 Characters	
Status Number	1 - 30	Vehicle radios can receive status numbers, but cannot send them.
Status Message	24 Characters	
Data Message	237 Characters	
GPS Poll Request		Received GPS data from the radio can be linked to the Simoco AVL system.
Message Job No		Not Implemented

#### Status Numbers

Status numbers sent by the dispatcher will be displayed on the vehicle radio's control head. The FPP 'Selcall Status' list is used to display the status message corresponding to the received status number.

Currently vehicle radios cannot send Status Data Messages to the dispatcher.

#### Response to GPS Poll Requests

The Simple Dispatcher software writes received GPS data to a file 'RadioGpsData.txt'. This data can then be modified and presented to the user's own AVL software in the required format.

If the 'Simoco AVL' option is enabled in the AVL Options menu, then GPS data can be displayed on the Simoco AVL application.

### 3.2 Trunk Dispatcher

	Trunk	Notes
Phonebook Number	20-99, 200-998	
Phonebook Name	20 Characters	
Status Number	1 – 30	
Status Message	12 Characters	
Data Message	100 Characters	25 Characters for SDM 100 Characters for EDM
GPS Poll Request		Received GPS data from the radio can be linked to the Simoco AVL system.
Message Job No		Not Implemented
NPD Calls	237 Characters	

#### Restrictions

The simple dispatcher cannot:

- Call out-of-fleet numbers.
- Display received job numbers

#### Status Numbers

The simple Dispatcher only has one status message list that applies to both sent and received status messages.

#### Response to GPS Poll Requests

The Simple Dispatcher software writes received GPS data to a file 'RadioGpsData.txt'. This data can then be modified and presented to the user's own AVL software in the required format.

If the 'Simoco AVL' option is enabled in the AVL Options menu, then GPS data can be displayed on the Simoco AVL application.

#### Data Messages

Trunk data messages are limited to 100 characters and are sent to the destination radio on the trunk network's control channel. If the network is very busy it may reject data messages during these periods.

If you cannot send data messages, check with your network provider that SDM/EDM data messages have been enabled, and that your network file is configured to allow it.

#### NPD Call

An alternative to short data messages is an NPD call. This allocates a traffic channel between the dispatcher and the called radio. Once the traffic channel is allocated, data of any type and length (237 bytes at a time) can be sent on the traffic channel.

The duration of the NPD call is determined by your network provider.





## 4 Troubleshooting

This section leads you through some tests to help you establish and fix any problems you may have.

### 4.1 Step 1 – Check Link between Dispatcher Radio and Vehicle

Establish voice communications between the dispatcher radio and the vehicle radio. This can be done by disconnecting the dispatcher radio's serial lead and replacing it with a control head and microphone.

If you cannot hear voice transmissions from one radio to the other:

- Check that 13V power supply is connected to both radios.

- Check that both radio's power supplies can supply enough current during transmit.

  - 1 Watt transmission requires about 2 Amps.

  - 25 Watt transmission requires about 6 Amps.

- Check that the radio's antennas are connected.

- Check that the radio antennas are not too close to the radio body and cables

- Check that the antennas are properly earthed.

For PMR radios check the channel frequencies:

- Dispatcher Radio Transmit Frequency = Vehicle Radio Receive Frequency

- Dispatcher Radio Receive Frequency = Vehicle Radio Transmit Frequency

For Trunk radios check:

- Radios acquire network service

Once you have established that the radios can talk to each other, remove the controller and microphone from the base radio and reconnect the serial cable to the PC.

### 4.2 Step 2 - Check Link between Application and Dispatcher Radio

If the dispatcher program cannot establish a serial communications link with the radio:

- Check cable between PC and Dispatcher radio is connected.

- Check Dispatcher radio is switched on.

- Check correct COM port selected. (Menu Tools\Options\ Com Port )

Note: if you change the COM port, you must restart the dispatcher application.

### 4.3 Step 3 – Check Invalid or No GPS Data

If your radio is fitted with a GPS option board, and the Dispatcher and Vehicle radios appear to be communicating, however there is invalid or no GPS data being displayed in the table, then check that the GPS engine is receiving satellite data.

If you have an SRM9030 Control Head: Enter the keypad sequence **\*56#**. This toggles a test function to show the GPS Location information in the form:

HH:MM:SS

TTMM.MMM N/S XXX

GGGMM.MMM E/W YYY

Hours, Minutes, Seconds (GMT)

Latitude in Deg (TT) and Minutes (MM.MMM) Nth or Sth

Longitude in Deg (GGG) and Minutes, East or West

XXX = seconds since loss of signal.

YYY = Speed in km/h

With the GPS Antenna in an open area (in view of at least one GPS Satellite), observe the display and check that the HH:MM:SS field is changing every second.

If more than two satellites are visible, then the Latitude and Longitude information should appear and the XXX parameter should disappear.

Some GPS engines return random data or last valid data until they acquire new positioning data from the satellites. After switching the radio on, you should wait a few minutes for the GPS to acquire new satellite data.

Note: The "GPS Test Display" may interfere with normal display functionality. The radio may need to be switched off/on to restore normal operation when the function is turned off.

If the Simoco AVL application is used with this dispatcher, then the GPS Engine must provide the radio with serial data in the format NMEA-0183-RMC. This format sends Lat, Long, Speed, and Heading.

Note TMC Radio has also distributed GPS Engines that provide data in NMEA-GGA format. GPS engines configured in this format will not work with Simoco or Datalink AVL, and must be reprogrammed to NMEA-RMC. The format can only be changed by a Simoco service centre.

#### **4.4 Other Checks**

The channel bandwidth (12.5kHz/25kHz) must be the same for both the dispatcher radio and the vehicle radios. This is especially important if sending data at 2400 baud FFSK.

If testing the radios on a test bench, make sure the dispatcher and 'vehicle' radios are transmitting at low power (1-5W) and are separated by at least 2 metres.

If your radio has been configured as a dual mode radio (PMR and Trunking), make sure the radio's current mode matches the Dispatcher's mode.

The FFSK Lead-In Delay must be the same for both the dispatcher radio and all the vehicle radios.

Using the FPP, select menu OPTIONS then RADIO INFORMATION and check the radio has the latest version of radio software. The SRM9000 radio must have V5.25 Radio code or later.

## 5 Further Information

Serial commands for controlling the radio can be downloaded from the TMC Radio website.

Serial overview and MAP27 compliance: 9000\_Serial\_Control\_Rev101.PDF  
 Serial commands document: 9000\_Ser\_Cmds\_Def\_Vxxx.PDF

Also check the TMC website for further information or other application notes relating to the SRM9000 radio.

<http://www.tmcradio.com>

## 6 Glossary

	Description
AVL	Automatic Vehicle Location – The AVL Application receives GPS location coordinates and displays the location on a virtual map.
CTCSS	Continuous Tone Controlled Squelch System
DLL	Dynamic Link Library. Common library function available to all window applications.
DTE	Data Terminal Equipment. ie. A device connected to the SRM9000 radio such as a control head or PC.
FFSK	Fast Frequency Shift Keying
FPP	Field Personality Programmer. Term used to describe the SRM9000 configuration programmer.
GPS	Global Positioning System.
MAP27	International serial protocol standard for communications with mobile radios.
MSB	Most significant Bit. (Bit 7 of a Byte) (10000000)
NMEA	National Marine Electronics Association
NMEA 0183	International standard for data exchange between navigational devices.
NPD	Non-Prescribed-Data. A trunk call type which assigns a traffic channel between two radios over which unformatted data can be sent.
PC	Personal Computer.
PMR	Private Mobile Radio
PTT	Microphone Push-To-Talk
RSSI	Received Signal Strength Indicator. The SRM9000 reports RSSI in dBm, where –120 dBm is near the limit of the weakest signal strength at which the radio can reliably decode data.
SDM/EDM	Short Data Message (25 characters) Extended Data Message (100 characters) Messages are sent over the trunk control channel.
Trunk	Trunk radios operate on a network, where a trunk system controller (bases) allocate traffic channels between radios.