Technical Support

TECHNICAL NOTE

Technical Note TN-842-AN

Direct Connect GPS via the TM8100

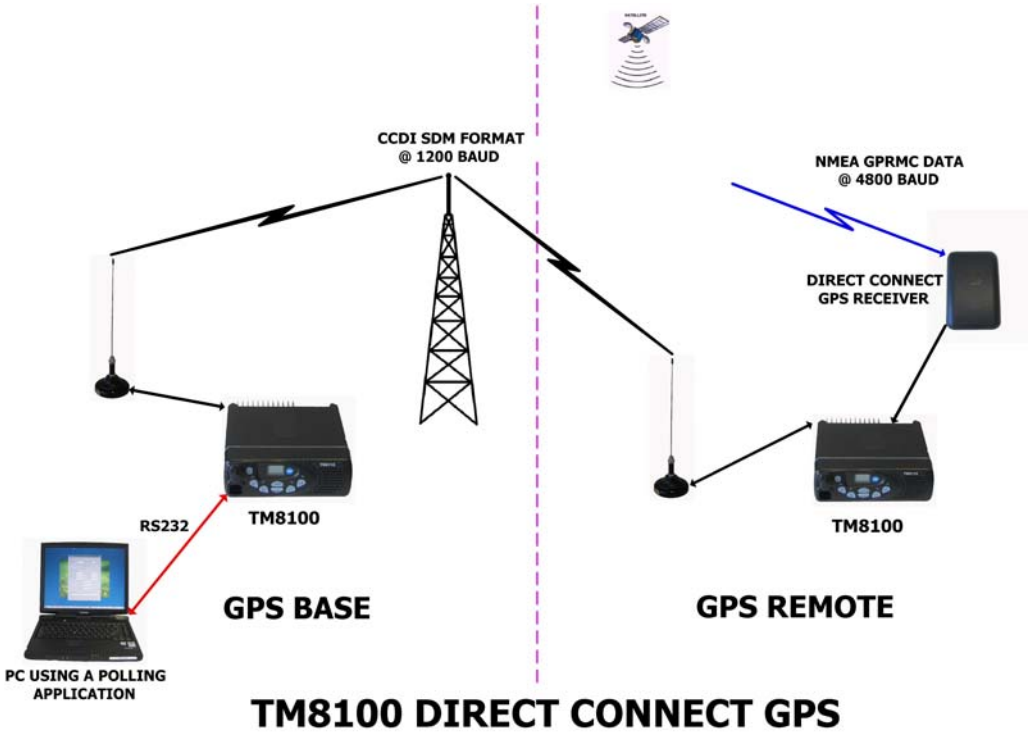
4th March 2004

Introduction

One of the advanced features of the TM8100 is its ability to support a vehicular location service. The TM8100 is able to process data received from a GPS receiver. (GPRMC NMEA 0183 format only). The radio can then be polled using a 3rd party application, and provide its current Position and velocity.

There are many applications that could make use of this feature, examples include:

- **AVL (Automatic vehicle location):** Any situation where there is a requirement to provide real time tracking of vehicles and/or keep track of members of a fleet. This could be either "manual" or "automatic" requests for a vehicles location. (This particular application is using manual polling)
  - Taxis / couriers.
  - Locating vehicles in emergency situations.
  - Environmental tracking for application of chemical fertilisers, crop spraying and pest control.
- **Asset tracking**
  - Traceability: locating where expensive equipment is currently being used.
  - Security: Actually locating stolen assets.
  - Real time user charging (Road tolling).



TM8100 DIRECT CONNECT GPS

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Operational Description

In the example above, the GPS base radio is controlled via a PC polling application. It polls the GPS remote radio using 1200 Baud CCDI SDM's.
The Remote radio processes incoming GPS data from the GPS receiver, packages it into an SDM and sends it over the air to the base, again as a 1200 baud CCDI SDM.
The data from the GPS unit to the radio is 4800 baud NMEA GPRMC format.
To reduce the "on-air" time the data is compressed, and not all portions of the RMC sentence is transmitted.
The base radio unpackages the data and feeds it via the serial port to the PC to be displayed in the polling application.

Connection details (For GPS Rx)

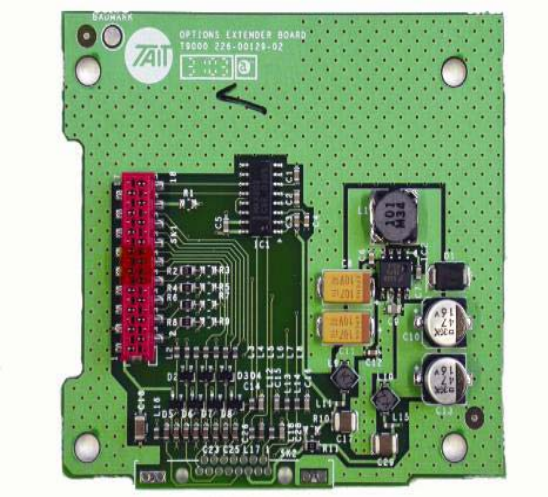
There are 3 points of connection required to the radio:

- Power for GPS Rx
- Ground
- Data input to the radio

The unit can be connected to any of the 3 serial ports on the radio access to these are via:

- Control Head (Microphone RJ45 or blank head DB9 connector)
- Control head connector (SMD HEADER)
- Auxiliary DB15
- Internal options.

NB: 13.8v is available from all 3 connectors to power the GPS unit – if the GPS unit uses another voltage an external regulator would be necessary. For units that require 5V, an options extender PCB (TMAA01-05) may be fitted that provides this voltage



Options Extender PCB

Table 1 below shows the connection points to the 3 available serial connectors on the radio. In this case a **GARMIN** GPS receiver was used. Other GPS receivers will have their own configurations.

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Connection	GPS Receiver (GARMIN)	8115 (RJ45)	8105 (DB9)	AUX (DB15)	Internal Options 18way micromatch	Control Head (18 Way SMD Header)
+13.8V	PIN 6 (RED)	2	6	8	1	2
GND	PIN 7 (BLACK)	6	8	15	3	6
RXD (Radio)	PIN 3 (WHITE)	7	4	3	17	7

Table 1: TM8100 - Direct Connect GPS Receiver Connection details

Radio Programming Details

Two data files (**Base.m8p & Remote.m8p**) have been created to go with this Product Information/Application Note. The programming details below reflect what has been set up in these two files. They are intended as a useful starting point.

The **BASE** and **REMOTE** TM8100's need to be configured so that they have unique data identities, can send and receive SDM's and that the supported GPS SDM format is selected. (Refer to FIG1 below).

1. Under the **DATA / SDM** tab, tick **SDM ENABLED**.
2. Choose a unique **UNIT DATA IDENTITY**
3. From the dropdown box for **GPS SDM** format select "**CCDI2 BINARY**".

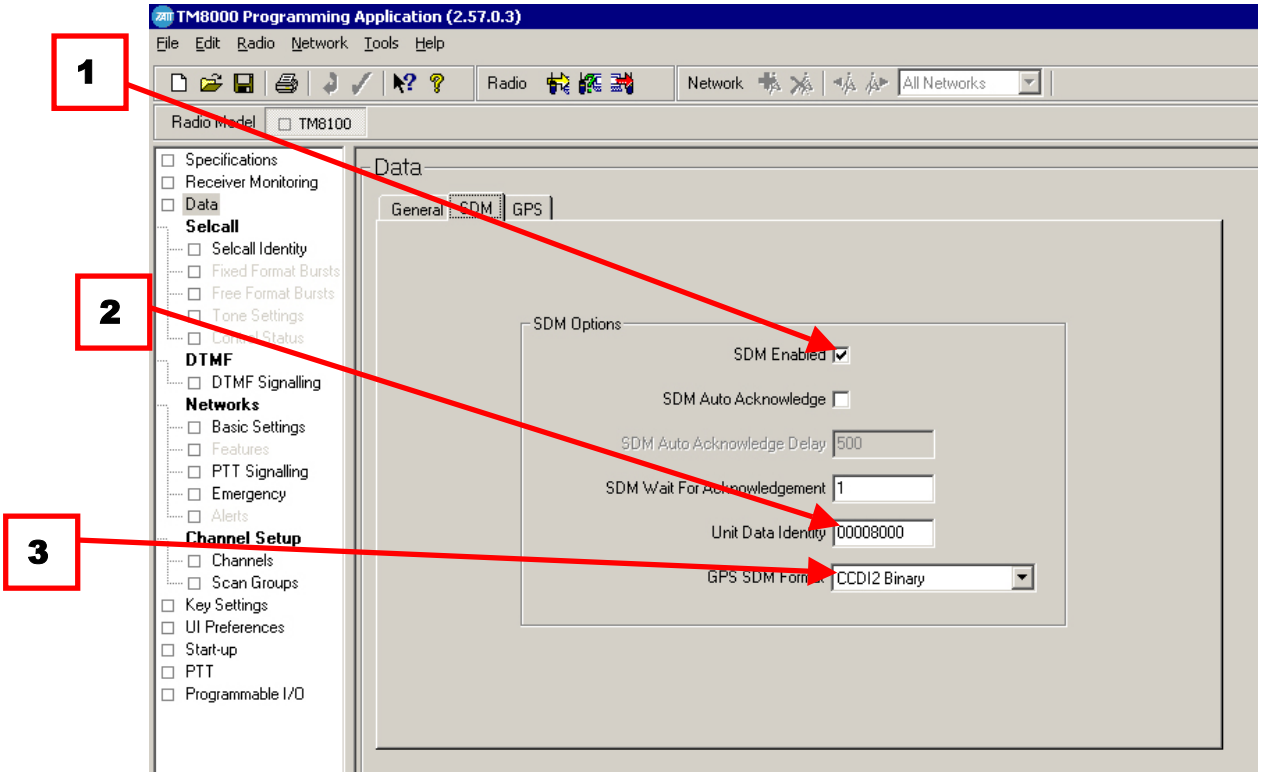

Fig 1: Base radio

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The **REMOTE** TM8100 also requires “GPS processing” to be enabled and configured. (Refer to FIG 2 below).

1. Under the **DATA/GPS** tab tick ”**GPS POSITION REPORTING ENABLED**”.
2. Select the serial port that will be used to connect the GPS receiver and the baud rate (Usually 4800 from most GPS receivers).
3. Select **NMEA STRING TYPE – GPRMC**. (This the only format the TM8100 currently supports).
4. Select whether you want the poll response from this radio to go out on the current channel or another dedicated one.
5. Insert the data identity of the base radio in the **DISPATCHER ADDRESS** field.
6. As the transfers being described are poll/response based, the use of SDM Auto Acknowledge adds additional signalling which is largely redundant. Thus it is recommended that auto acknowledgment facility is disabled.
7. **POLL RESPONSE DELAY TIME** and **LEAD IN DELAY** can be configured to suit the particular radio system in use.

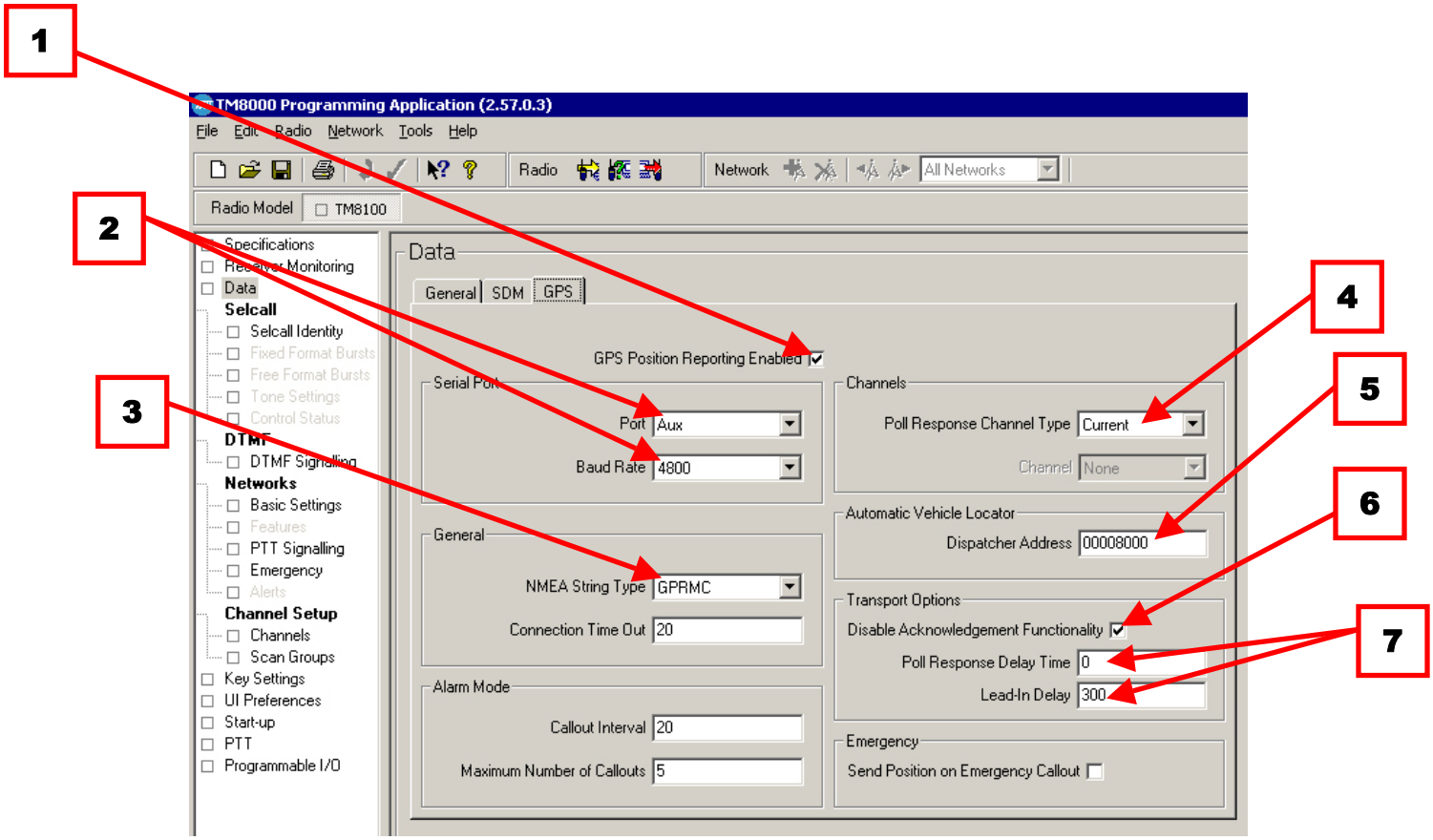

Fig 2: Remote Radio

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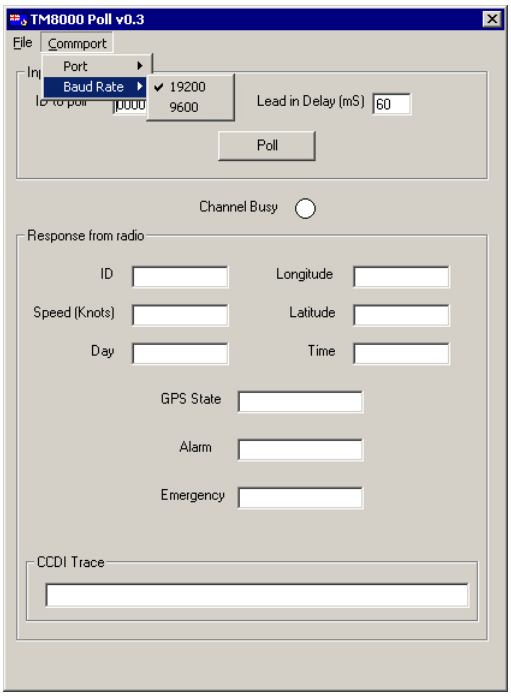
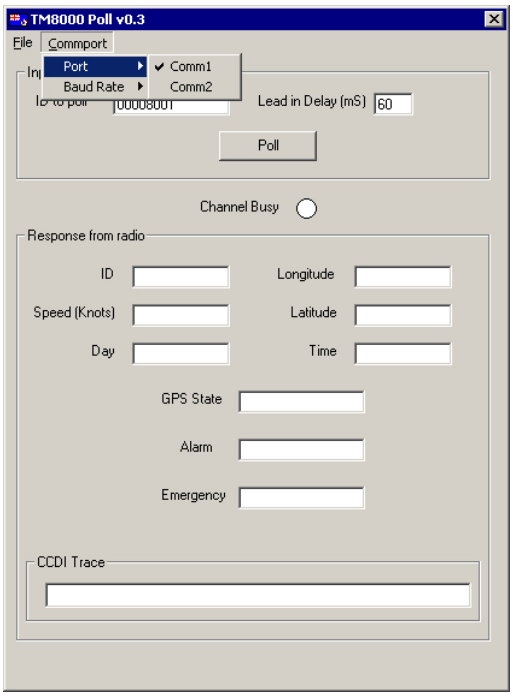
Radio Polling

A windows based simple polling application (**Called "TM8000.exe"**) is also provided with this information note. Load the application on the PC that will be used with the **BASE** radio.

- Set up the Com port that will be used to connect to the radio, as well as the baud rate.



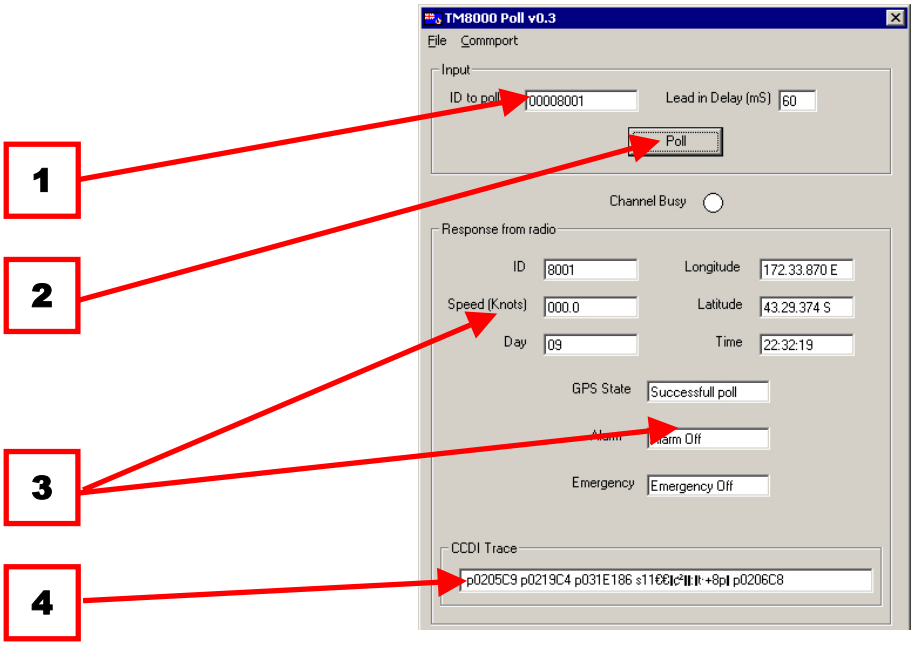


STEPS:

1. To poll the remote radio, input that radios Data identity into the **ID TO POLL** field.
2. Click the **POLL** button.

RESULTS:

3. If a successful poll occurs GPS data will appear in the boxes under "**RESPONSE FROM THE RADIO** and the **GPS STATE** field will read "**SUCCESSFUL POLL**".
4. In addition the actual received GPS data in the SDM packetized form will be shown in the **CCDI TRACE** field



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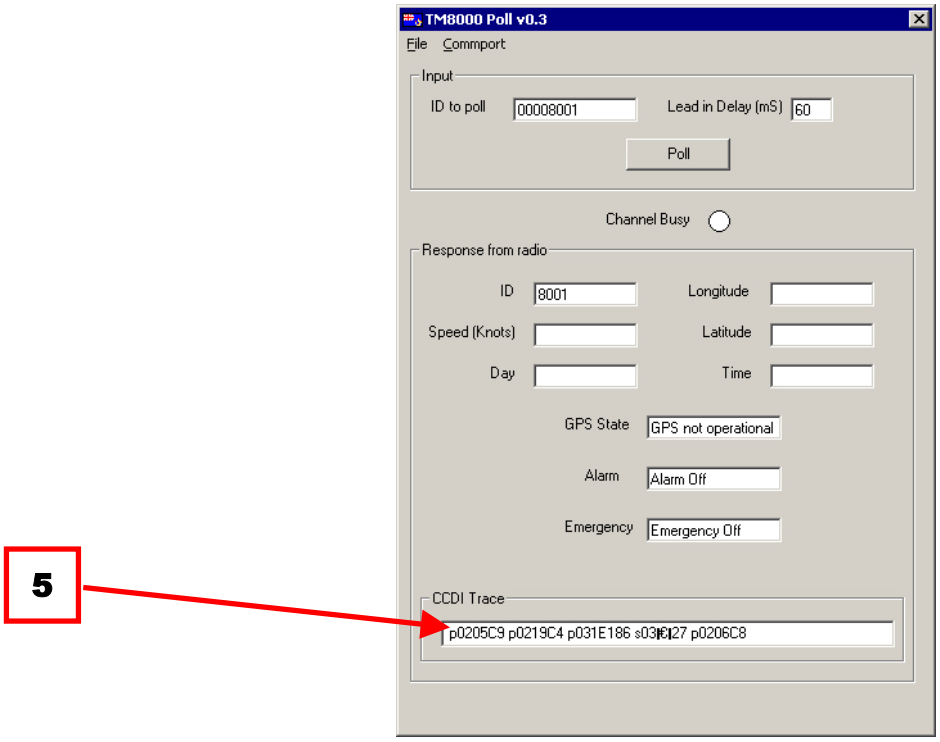
5. If Polling is unsuccessful the message **GPS NOT OPERATIONAL** is displayed in the **GPS STATE** field. (Note that the information in the **CCDI TRACE** will appear a little distorted due to the fact that the display is in ASCII, but the actual information is Hexadecimal).



Other Features

When using GPS there are a number of additional options:

Alarm Mode

1. A radio with a direct connect GPS Rx can be programmed to go into an alarm state, which is initiated via one of the programmable I/O lines (Called "**ACTIVATE ALARM MODE**").
2. Once activated the radio will begin sending the current GPS location at the **CALLOUT INTERVAL**. (See Fig 3)
3. The number of times this location is sent can be either set for indefinitely, or a set number between 1 and 250 times.
   (The channel that is used is designated as either the current one, or another specific channel that is outlined in the emergency page of the TM8100 programming application. (See Fig 3)

4. If the **SEND POSITION ON EMERGENCY CALLOUT** box is ticked: GPS location information will be sent immediately following the emergency callout sequence. Part of the location data sent will indicate that the radio is in emergency (See Fig 3)

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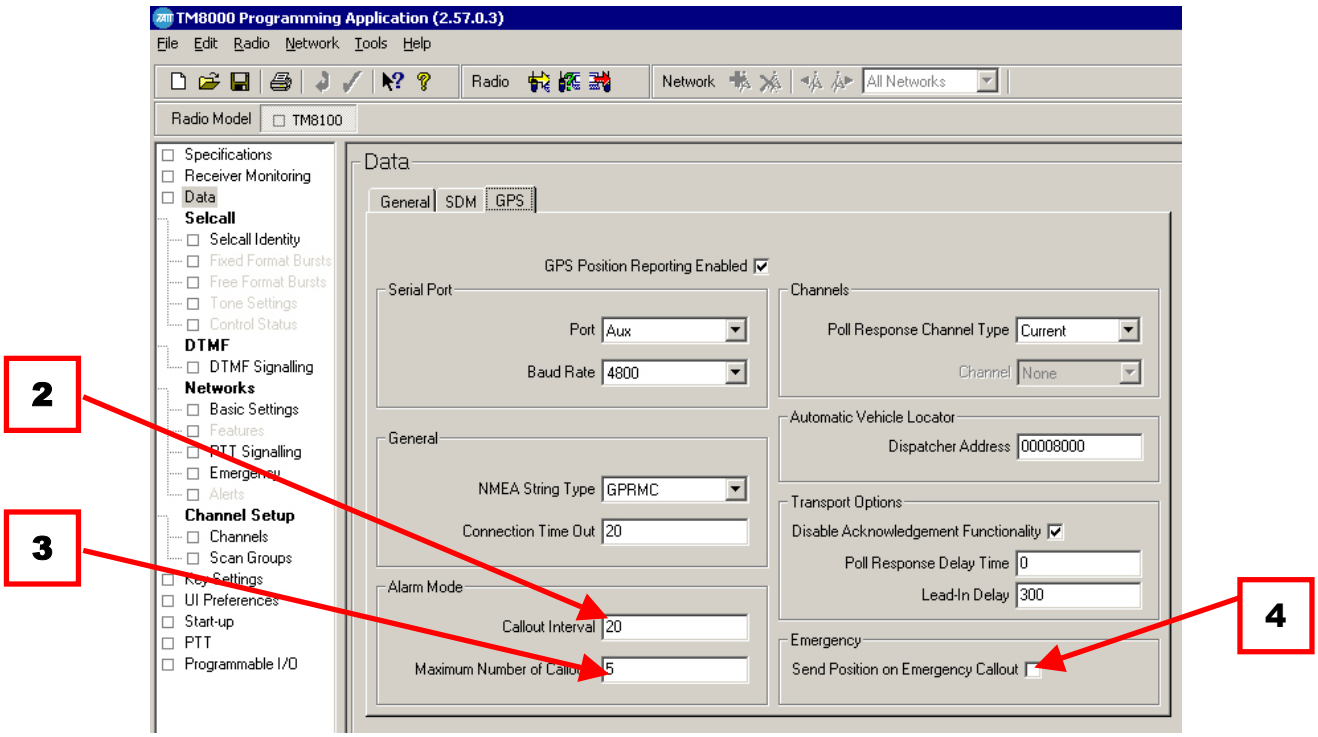

Fig 3: Alarm Mode

GPS/ANI

1. GPS location information can also be sent as a leading or trailing ANI on any one of the 3 PTT's. (See Fig 4)

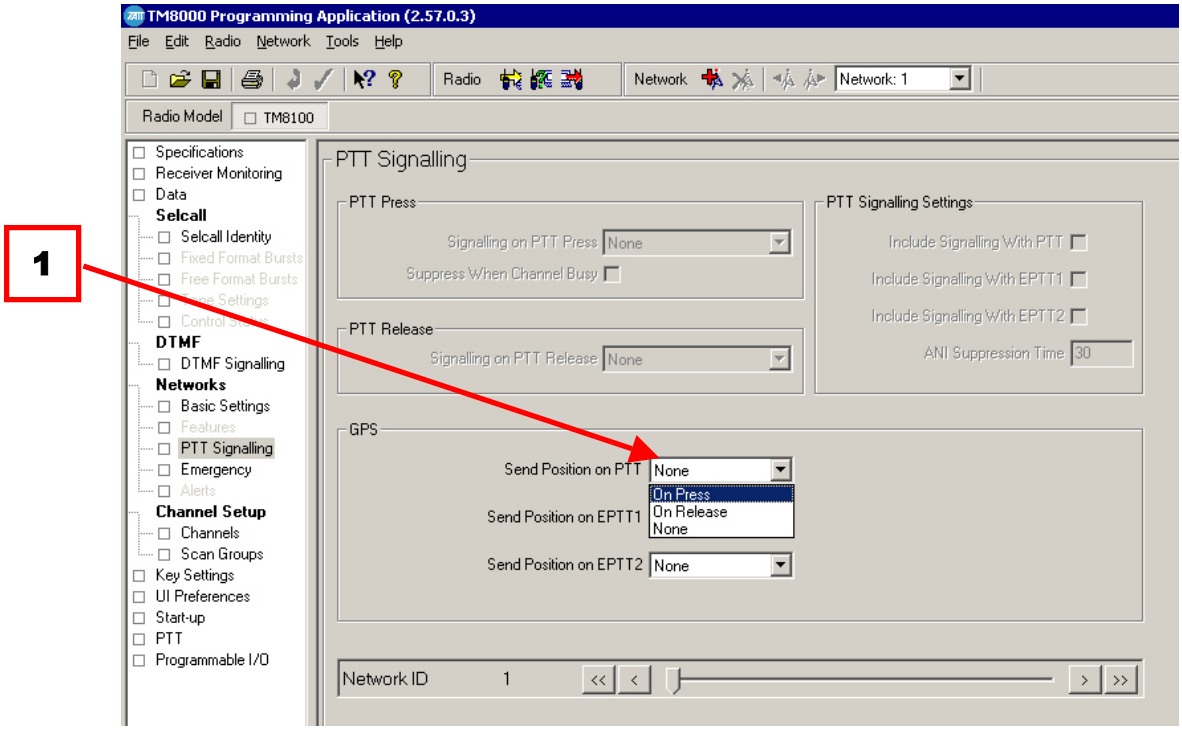

Fig 4: GPS ANI

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Document History	Original Version	4th March 2004	MJB

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