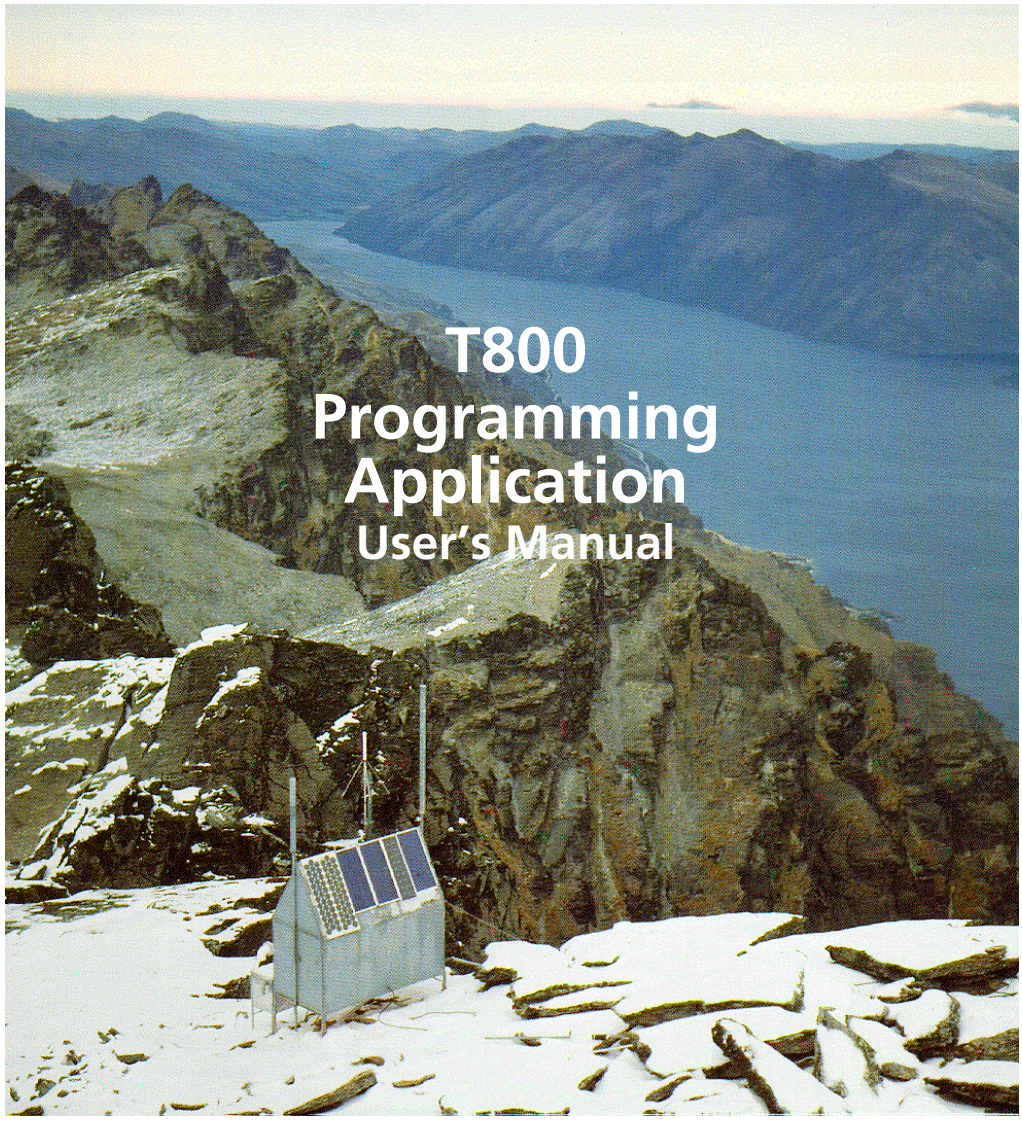
Radio Communications Supply &
Installation Specialist

Website
www.radiotronics.co.uk

Email
sales@radiotronics.co.uk

Telephone Numbers
0345 0 955 955
02087 190 180

Tait T800ii Programming Manual



T800 Programming Application

User's Manual

June 2001
439-80100-03

Contents

06/01 IPN: 439-80100-03 Copyright TEL 2001

Preface

The T800 Programming Application User's Manual describes how to use the PGM800Win application to configure Tait T800 modules, including the T803 Tone Remote. It is intended for use by Tait retailers, distributors, and customers.

Enquiries and Comments

Any enquiries regarding this manual as well as any comments, suggestions and notifications of errors, should be addressed to the Support Group Manager, Tait Electronics Limited, PO Box 1645 Christchurch, New Zealand.

Updates of Manual and Equipment

In the interests of improving the performance, reliability or servicing of the equipment, Tait Electronics Limited reserves the right to update the equipment or this manual or both without prior notice.

Copyright

Disclaimer

There are no warranties extended or granted by this manual. Tait Electronics Limited accepts no responsibility for damage arising from use of the information contained in the manual or of the equipment and software it describes. It is the responsibility of the user to ensure that use of such information, equipment and software complies with the laws, rules and regulations of the applicable jurisdictions.

Typographical Conventions

Shift-click means "Hold down the Shift key, move the mouse pointer to the correct place, then click on the leftmost mouse button."

Select File > Database > Custom Type means "Select the File menu (for example by clicking on the menu name in the menu bar), then select Database from the list that appears, then select Custom Type from the second list that appears."

Associated Documentation

When you configure some aspects of a T800 module, you may need to refer to the relevant T800 Service Manual. For the T803 Tone Remote there is currently a preliminary issue of the service manual, with a temporary revision package covering recent backplane changes (the full manual is in development). You can also refer to TN-621, Remotely Controlling and Monitoring Base Stations (included in the Appendix). PGM800Win comes with its own Help file containing reference information on the programme.

Publication Record

IPN	Date	Description
439-80100-00	8/97	For Version 2.00 of PGM800Win.
439-80100-01	6/00	For Version 3.00 of PGM800Win. Configuring the T803 Tone Remote Module added.
439-80100-02	12/00	For Version 3.11 of PGM800Win. Changes to Edit Channel Data form. Link Module command changed to Locate in Rack.
439-80100-03	06/01	For Version 4.00 of PGM800Win.

Part 1: Using the T800 Programming Application

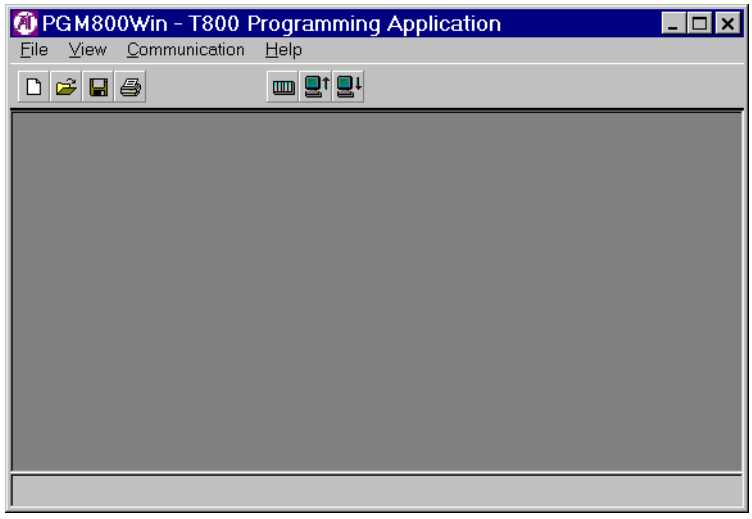
Welcome to PGM800Win, the Tait programming application for T800 base station equipment. PGM800Win makes it easy to enter channel information into T800 modules and to configure their operation. This part tells you how to get started and describes different ways of working with the application.

Topics

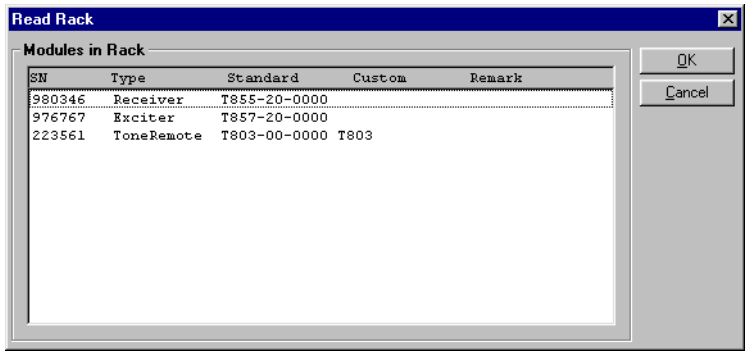
- Getting Started
- Basics of Operation
- Customising the Database

Getting Started

1. Connect one end of the T800-01-0002 programming cable to a serial port (for example COM1) on your computer.
2. Connect the other end of the programming cable to the channel rack. Use the RJ11 socket labelled 'Programming Port'. This is on the front of the speaker panel or T803 module. (Alternatively, if access to the rear of the channel rack is more convenient, connect it to the RJ11 socket on the backplane PCB).
3. From the Windows Start button, select Programs, then Tait Programming Applications, then T800 Programming Application. The main window appears.



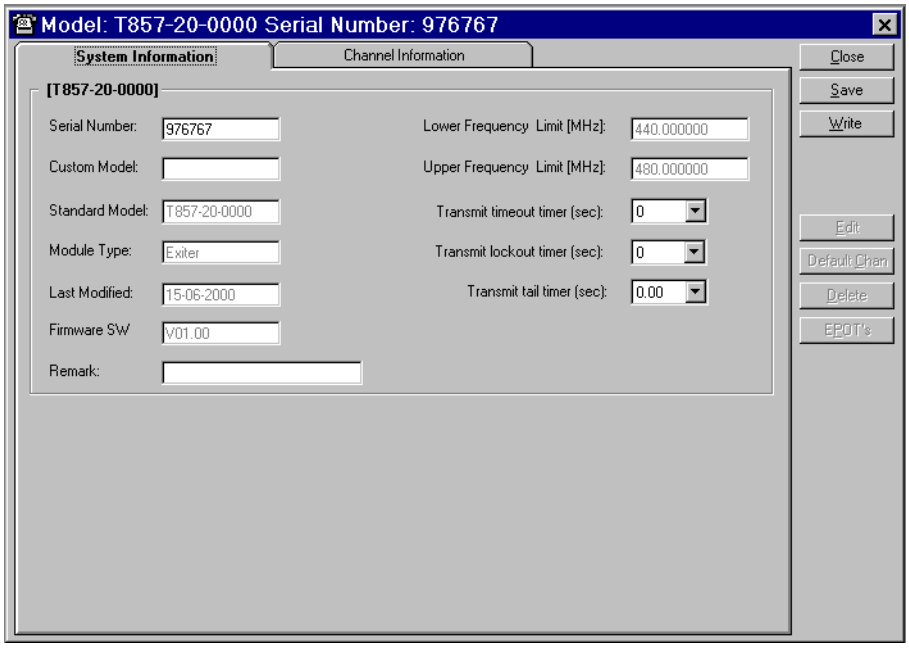
4. Select File > Preferences and specify the serial port that is connected to the rack (for example COM1).
5. Select Communications > Read Rack. The Read Rack form displays the modules found in the rack.



6. Select the module you want to programme and press the OK button. PGM800Win reads in the configuration information from the module and displays it on screen. The status bar at the bottom of the main window displays a Reading Module progress bar and the Supply LED on the module front panel flashes to indicate that this is happening.

Tip

Drag the mouse or use shift-click to select more than one module. This opens a form for each module, so that you can go from one module to the next without re-reading the rack.



7. Make the configuration changes that you want. (Parts 2 and 3 deal with this in detail.)
8. Press the Save button to save your changes to the database. The message 'Saving Record' appears briefly in the status area along the bottom of the window, together with a progress bar.
9. Press the Write button to write your changes to the module in the rack. The message 'Writing Module' appears in the status area, together with a progress bar. When these disappear, the module is programmed.
10. Press the Close button to close the form.

Basics of Operation

This section explains the different ways that you can use PGM800Win to work with configuration data. The most simple way is described in "Getting Started" on page 3. You can choose the way of working that is best for the tasks you have to do. Parts 3 and 4 of this manual assume the most simple way of working when describing procedures in detail, but you can adapt them for your requirements based on the information in this section.

Using the Calibration Test Unit

The T800-01-0010 Calibration Test Unit (CTU) has an RJ11 programming port similar to that on the speaker panel in a rack. If you use a CTU for calibrating and adjusting T800 modules, you can also use it for programming them using PGM800Win. Simply connect the lead from the PC to the CTU instead of the speaker panel. This enables you to programme a module on the test bench rather than at the site.

Working with Database Records.

In the method described in "Getting Started" on page 3, you read the rack and select a module. This obtains the configuration information and serial number from the module itself. PGM800Win also displays read-only information specific to the T800 model. It gets this from the database on your PC.

When you press the Save button, PGM800Win stores the information for that particular module in an individual record in another part of its database. This means that you can always use File > Open to select and view that record even if you don't have access to the module. You also have a backup copy if the information in the module becomes corrupted.

When you press the Write button, you overwrite the current configuration in the module with the configuration you have chosen.

Previous versions of PGM software stored information about particular modules as MCF files. PGM800Win Version 3.00 or higher lets you open these files. If you prefer, you can continue to store module configurations as MCF files rather than as records in the database.

Serial Number

Each T800 module has a serial number. It is printed under the bar code on the rear of the module chassis. When you read the rack and select a module, PGM800Win reads in the serial number. When you save a configuration record to the database or as a file, that serial number and the model type uniquely identify the record. This enables you to store backup copies of your module configuration on the PC.

You can edit the serial number on screen and save it but you cannot write a different serial number to the module; all module serial numbers are defined at manufacture and are unchangeable.

Deleting a Database Record

If you no longer need to maintain a database record for a particular module, you can delete it from the database. Follow these steps.

1. Select File > Database > Module Management. The Module Management form appears.
2. Select the row of the module you want to delete. Ensure that the serial number matches the module.
3. Press the Delete button.

Working with MCF Files

You can work with MCF (Modular Controller File) files instead of database records. This means that you store the configuration information for a module as a discrete file. You can for example copy this file to another PGM800Win user. Configuration information created by earlier versions of PGM800Win uses the MCF format. You can continue to maintain this information in the MCF format or integrate it into your database by creating a database record from each file.

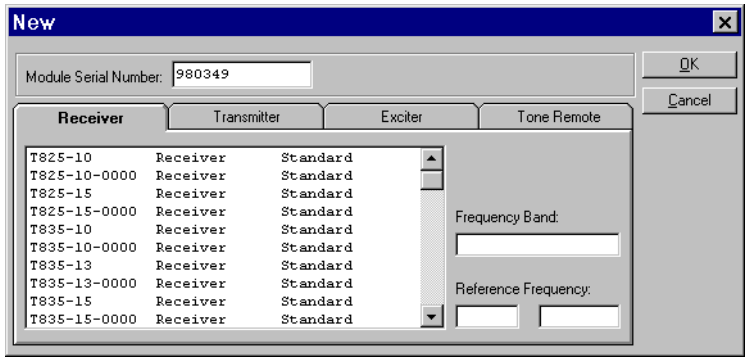
- To access the configuration information in a MCF file, select File > Open File.
- To create a MCF file from configuration information that you read in from a module, select File > Save File, enter a file name, then press the Save button.
- To create a database record from an MCF file, open that file and select File > Save. A record containing all the information in that file and uniquely identified by the module type and serial number is added to the database. To check that the record has in fact been created, select File > Open. The form should contain a new line for the record.

Creating New Database Records

You can create configuration records for T800 modules without accessing the module. All you need is the module's serial number and type. This enables you to do the programming in the office; at the site, you simply write the record to the module. It also enables you to quickly provide a number of modules with an identical or near-identical configuration; configure a record for one serial number, then keep altering the serial number and pressing the Save button.

To create a new configuration record, follow these steps.

1. Select File > New. The following form appears.



2. Select the tab for the module type (for example, Exciter).
3. Click on the model number. A four-digit suffix (for example -0000) indicates that the model is Series II.
4. Click on the OK button. The form closes and a form for that model opens.
5. Enter the serial number of the module you want to programme into the Serial Number box.
6. Make the configuration changes that you want. (Parts 2 and 3 deal with this in detail.)
7. Press the Save button to save your changes to the database.
8. If you want to work with a separate file, select File > Save File and save the configuration information as a MCF file.
9. Press the Close button to close the form.

When you arrive at the site, do the following:

1. Connect your computer to the rack.
2. Open the configuration record or MCF file.
3. Select Communications > Write Module. PGM800Win writes the information to the module in the rack that has the same serial number and module type as the configuration record or MCF file.

Programming Series I Modules

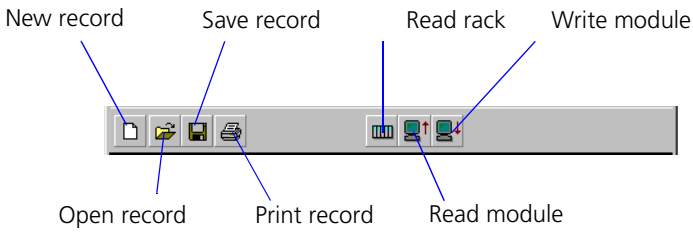
PGM800Win supports the programming of Tait T800 Series I modules, but you cannot programme by connecting to the rack's programming port. Instead, you use an EPROM programmer to write the configuration information to the module's EPROM. Follow these steps.

1. Follow the instructions in "Creating New Database Records" on page 6 to create a record for the module without reading it from the EPROM.

2. Use File > Save EPROM File to convert the record into the appropriate format. In the Save As Type box, choose T800 BIN file or T800 HEX file, whichever suits the EPROM programming device best.
3. Use the EPROM programmer to programme the module.

Using the Toolbar

The toolbar gives you quick access to commonly used commands. For example, instead of selecting Communications > Read Rack, click on the Read Rack icon in the toolbar. Each icon on the toolbar has a tooltip indicating its function. Position the mouse pointer over the icon and hold it for a time; a little box pops up containing the tooltip.



While the instructions in this manual use the menu commands, you will increasingly use toolbar icons instead of the pulldown menus, as you become more familiar with PGM800Win.

Printing Configuration Information

You can easily print the configuration information for any module, to provide you with a paper record.

- With an open database record, select File > Print.

Locating a Module in a Rack

If you are unsure which module in the rack that the current configuration information applies to, select Communication > Locate in Rack. The Supply LED on the front panel of the module (or MODE LED, if the module is a T803) flashes.

Backing Up the Database

Tait recommends that you follow good practice and make backups of the PGM800Win database at regular intervals or after making significant changes. The database file is pgm800.mdb and it is located in the main programme directory. (If you have any difficulty, select File > Database > Import Standard Model to display the path and filename of the database that the programme is using.)

For details on how to back up the file, see your Windows documentation.

Note

If you remove PGM800Win or install a new version over your existing version, all programme files are deleted or overwritten. ***This includes the database file.*** *If you created any custom models or saved configuration records for particular modules, it is essential that you back up the database before uninstalling or upgrading.*

Customising the Database

PGM800Win operates with a database that contains a set of standard models. These models define all the available T800 modules. If Tait develops further T800 modules, you can obtain an updated database with definitions for the new modules and import them into your database. If you have a customised variation of a Tait module, for example with a different frequency range, you can customise a standard model and add that definition to the database.

Importing New Models

If you receive an updated database file from Tait, you can add any new standard models contained in it to your current database. Follow these steps.

1. Copy the database file to your PC's hard drive.
2. Run PGM800Win and select File > Database > Import Standard Models.
3. Press the Browse button and locate the new database file.
4. Press the Open button. Any additional records in the database file are imported into your PGM800Win database.

Defining a Custom Model

If you have a T800 module that has been customised so that its properties are different from the standard model, you can add it to the database list of available models. Follow these steps.

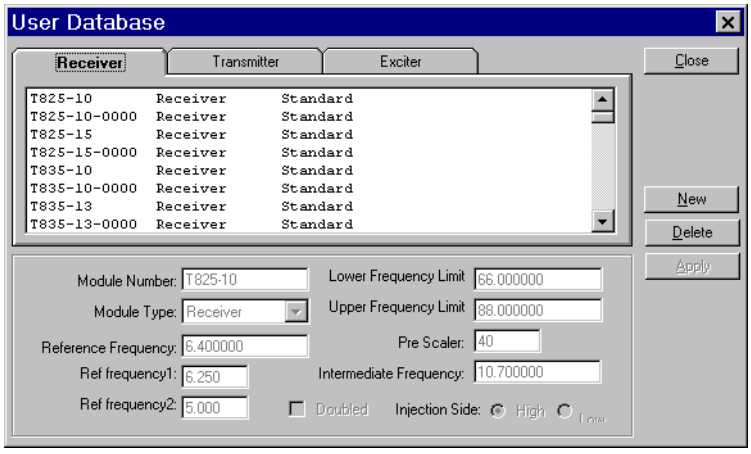
Custom Models

PGM800Win allows you to add custom models to its database. Tait provides this feature as a service to customers with non-standard modules.

Caution: Defining custom models is a feature for advanced users only. It may cause problems because it lets you programme values that the module cannot correctly implement. Tait gives no guarantees and does not offer support for the feature. Use it at your own risk.

1. Select File > Database > Custom Models.

The User Database form appears.



2. Select the T-number of the module that has been customised, then press the New button.
3. Enter a name or number into the Module Number box to identify your custom model.
4. Edit the other information in the form to reflect the changes that customisation has made.
5. Press the Apply button. The custom model appears in the form.

Importing Custom Models

If another PGM800Win user has defined a custom model, you can import that model into your database, for example so that you can configure another module that has been customised in the same way. Follow these steps.

1. Copy the user's database file to your PC's hard drive.
2. Run PGM800Win and select File > Database > Import User Models.
3. Press the Browse button and locate the new database file.
4. Press the Open button. Any new records in the database file are added to your PGM800Win database.

Part 2: Programming Receiver, Transmitter, and Exciter Modules

This part describes how to configure all Tait T800 modules except for the T803 Tone Remote. The procedure is generally similar for receivers, exciters, and transmitters, except that each has some configuration items that are specific to it.

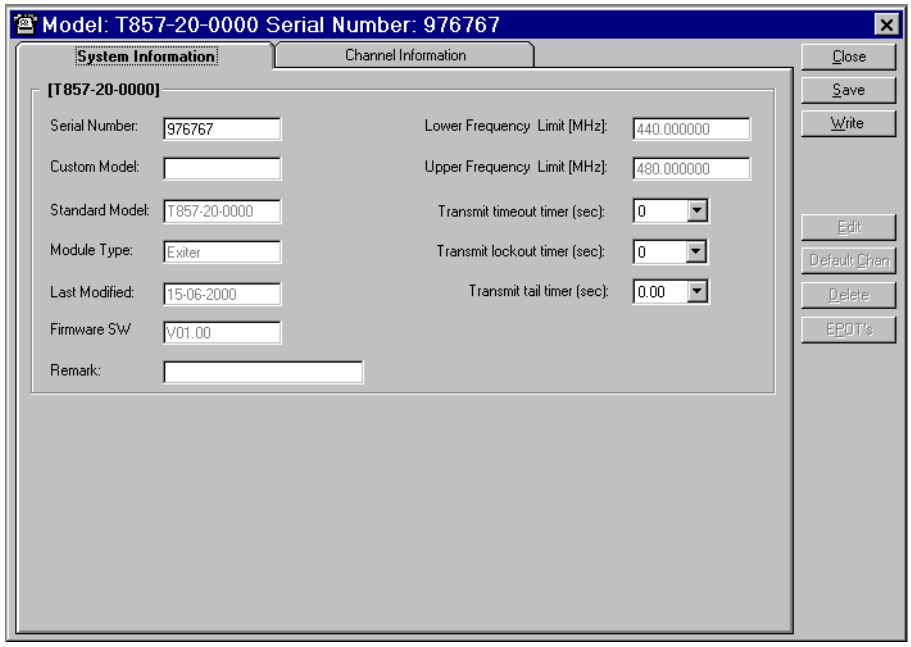
Topics

- Viewing System Information
- Defining Transmit Timers
- Assigning Frequencies to Channel Numbers
- Adjusting EPOTs

Viewing System Information

PGM800Win can display basic information about any T800 module. This information comes from the programme's own database and is not read from the module. The database has a model for each Tait product with a T-number and PGM800Win uses this information. For example, if you try to enter a channel frequency that is lower than the lower frequency limit defined in the model, it will be rejected.

- Use any of the methods described in Part 1 to load the configuration information for the module. PGM800Win displays a form with a System Information tab.



The System Information tab contains the following read-only information.

Item	Description
Custom Model	If you are working with a customised module, this box contains the name that was given to it.
Standard Model	Tait T-number for the module.
Module Type	The type of module; whether it is a receiver, transmitter, or exciter.
Last Modified	Date when the database's information about the module was last changed. Format is DD-MM-YYYY.
Firmware SW	Indicates the firmware version that PGM800Win expects to be in the module.
Lower Frequency Limit (MHz)	Indicates the lowest channel frequency that the module can be programmed for.
Upper Frequency Limit (MHz)	Indicates the highest channel frequency that the module can be programmed for.
Injection side	Indicates whether the VCO injects a frequency that is above or below the received frequency. (Receiver only)
Intermediate Frequency (MHz)	Indicates the frequency used for the first intermediate frequency stage. This is the difference between the received frequency and the VCO's frequency.

Defining Transmit Timers

If the module is a transmitter or exciter, you can define values in seconds for the following timers.

Timer	Description
Transmit timeout	Sets the maximum continuous transmission time. When the timer has timed out, transmission ceases. The transmitter/exciter must be keyed again and the transmit lockout timer must have timed out before transmission resumes.
Transmit lockout	Sets the period of time that must elapse after a timeout before the transmitter/exciter can re-transmit. Once the timer has timed out, the transmitter/exciter can be keyed again.
Transmit tail	Sets the period of time during which the transmitter/exciter stays keyed after the key source has been removed.

Assigning Frequencies to Channel Numbers

Each T800 module must operate on a defined frequency. PGM800Win lets you assign many frequencies to the module (one for each of the channel numbers available in a T800 module). When the module is instructed to select a channel number, it transmits or receives on that frequency.

If the system requires that the module change its operating frequency, or if you want to pre-programme a number of operating frequencies into the module, you must assign frequencies to a number of channels. Even if the module will only operate on a single pre-defined frequency, it is good practice to define frequencies for a set of channels. This means that you can more easily swap modules or replace a faulty module with a spare.

You select the channels you want to assign frequencies to, define a starting channel number, a starting frequency and a frequency step. PGM800Win automatically assigns the correct frequencies to the channels. You can do this to any contiguous block of channels.

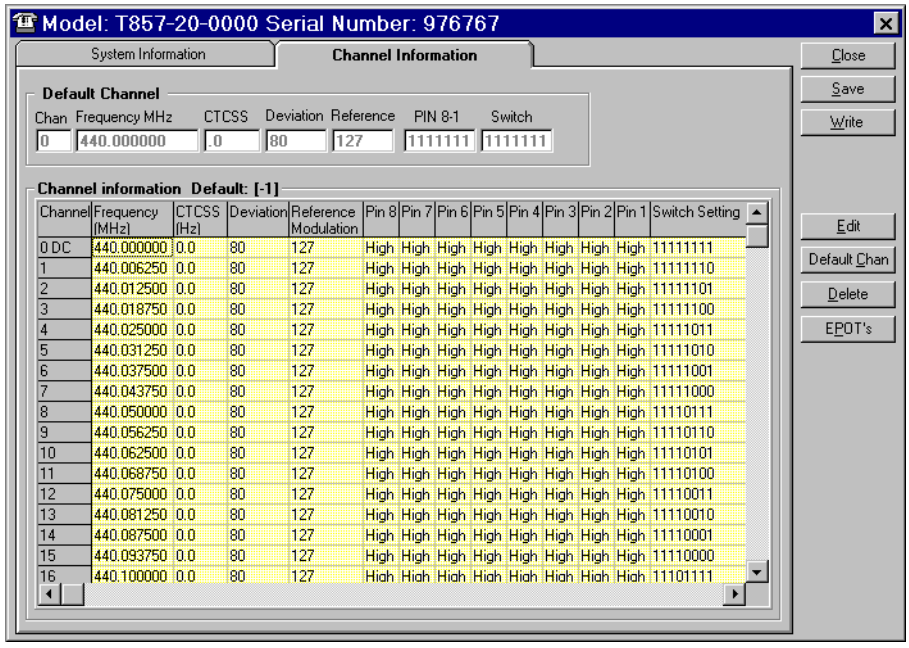
To assign frequencies to a block of channels, follow these steps.

1. Open the configuration information for the module and click on the Channel Information tab.

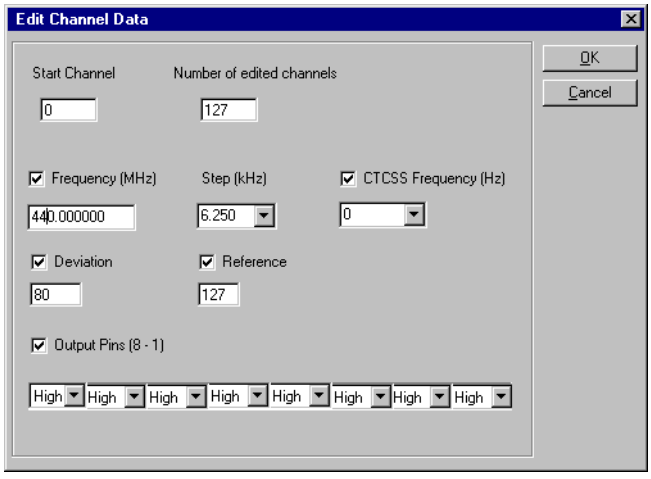
Prohibited Frequencies

Special regulations (currently only in the USA) require that radio equipment is not allowed to be programmed for or operated in a specified frequency range. You therefore cannot use PGM800Win to assign a prohibited frequency. For example, you cannot programme a T856-16-0000 in the range 406 to 406.1 Mhz.

If you have a legitimate requirement to operate equipment on a prohibited frequency, contact Tait. Radio equipment can be programmed in the factory with these frequencies.



2. Select the rows of the channels you want to programme.
   - To select a single row, click on its left-most cell (the cell in the Channel column)
   - To select multiple rows, click on the first row in the Channel column, then shift-click the last row.
   - To select all rows, click on the title (topmost) cell of the Channel column.
3. Click on the Edit button. The Edit Channel Data form appears.



4. In the Step box, select a frequency step from the drop-down list. This defines the frequency gap between the channels you selected. For example, if you select a frequency step of 10.000 kHz, each channel will be 10 kHz apart.
5. In the Frequency box, enter the frequency of the channel with the lowest channel number. By default, this box shows the lowest available frequency. The frequency must be valid for the module and for the selected step.
6. If you only want to define the frequency for the selected channels, clear all checkboxes other than Frequency (MHz).
7. If you want to configure other aspects of the channel, see "Configuring Channels" on page 18 and "Copying EPOT Values to Other Channels" on page 21.

CAUTION: When you write your changes to the module, you overwrite any existing settings. If you do not want to overwrite the CTCSS frequency, deviation, reference, or output pin settings, ensure that the corresponding checkboxes are cleared.

8. When you have made your changes, press OK. This closes the Edit Channel Data form and enters the changes into the Channel Information tab.
9. Save your changes and write them to the module.

Frequency Fills

Previous versions of PGM800Win had a Frequency Fill button on the toolbar. This version can also fill frequencies but it does not have a Frequency Fill button. Instead of pressing this button, you select rows in the channel table, then press the Edit button.

Checkboxes

The checkboxes in the Edit Channel Data form let you enable or disable the editing of channel data. When a checkbox is selected, the items it applies to can be edited. This will alter the settings in the Channel Information tab when you press OK.

By default, all checkboxes are selected. If you do not want to overwrite existing channel data, ensure that the corresponding checkboxes are cleared.

Setting a Default Channel Number

You can specify a default channel number. This is the channel that the module operates on when it is not instructed to use another channel.

1. Select a row in the table of channels. For example, to select channel 3, click on the cell in the Channel column that is labelled 3.
2. Press the Default Channel button. The row you selected now has DC alongside the channel number and its information appears above in the Default Channel frame.

NOTE: The default channel setting is overridden if SW1 on the backplane specifies a channel number between 0 and 127 (DIP switch CH7 is ON).

Configuring Channels

As well as assigning frequencies to channel numbers, you can do the following:

- Assign a CTCSS frequency to the channel number.
- Configure the module's general purpose digital outputs, if the system uses them.
- Ascertain the correct DIP switch settings for any channel number, to help you select a channel using backplane DIP switches.

The following instructions assume that you have selected the channel numbers as described in "Assigning Frequencies to Channel Numbers" on page 15, and pressed the Edit button to open the Edit Channel Data form.

Setting the CTCSS Frequency

1. In the Edit Channel Data form, select a CTCSS frequency from the drop-down list. This assigns that frequency to the selected channel numbers.
2. If you do not want to overwrite other settings, ensure that all checkboxes other than CTCSS Frequency are cleared.
3. Press OK, then save your changes and write them to the module.

Configuring Microcontroller Pin Outputs

Tait T800 modules have eight general purpose digital output lines, numbered Pin 1 to Pin 8. These are open drain connections. Generally, three of them are accessible at the 2nd D-range connector at the rear of the T800 module. They can be used to switch external equipment on or off. For more information, see the Microcontroller section for your module in the relevant T800 Service Manual.

If you have made use of these connections, you need to configure them for your application. For example, you can have the output on Pin 1 set to high when the channel is operating on channel number one, but set to low when the channel is operating on channel number 2.

1. Select the channel(s) you want to configure the pin outputs for.
2. Press the Edit button. The Edit Channel Data form appears.
3. For each pin that the system uses, specify whether the output will be high or low.
4. If you do not want to overwrite other settings, ensure that all checkboxes other than Output Pins are cleared.
5. Press the OK button.

Viewing the DIP Switch Settings For a Channel Number

The right-most column of the Channel Information tab displays the DIP switch settings for each channel. This provides an easy way to determine the correct DIP switch setting if you want to set the channel number externally, for example using the backplane DIP switches.

The DIP switch setting is the twos complement of the channel number; to select channel 0, you turn all DIP switches ON, to select channel 1, you turn all DIP switches on, except for the least significant switch, and so on.

Adjusting EPOTs

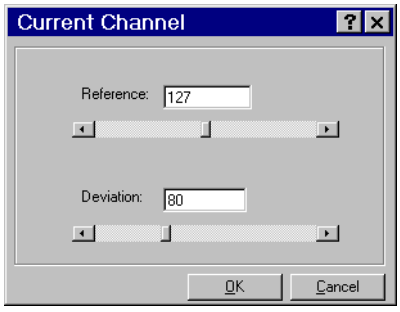
T800 Transmitters and Exciters have electronic potentiometers (EPOTs) for Reference Modulation and for Deviation. PGM800Win lets you adjust the potentiometer settings. You can set each channel individually, or determine the correct values for the middle channel, then copy those values to other channels.

Note

Only adjust EPOTs as part of a test/adjustment procedure. Follow the instructions in the T800 Service Manual for your module.

Adjusting the EPOTs for a Channel

1. Set up your test equipment.
2. Run PGM800Win and open the configuration information for the module.
3. Make the channel to be adjusted the default channel.
4. Follow the instructions in the T800 Service Manual for Modulator Adjustment. When the instructions tell you to adjust the Reference Modulation EPOT setting, press the EPOTs button. The Current Channel form appears.



5. Use the slider or enter a number to adjust the Reference value.
6. Press the OK button. The new values appear in the row for the default channel. They are immediately sent to the module; you don't need to press the Write button.
7. Continue adjusting the Reference Modulation EPOT until you have the correct setting.
8. Repeat the above steps for the Deviation EPOT using the T800 Service Manual's instructions for the limiter adjustment procedure.

Copying EPOT Values to Other Channels

Once you have adjusted the EPOT values for a middle channel according to the procedures in the service manual, you can copy those values to other channels. Tait only recommends doing this to the Reference Modulation EPOT if the channels are not used for data applications and to the Deviation EPOT for channels that are within a 0.5 MHz switching range of the original channel.

1. Multi-select the channels.
2. Press the Edit button. The Edit Channel form appears.
3. Enter the EPOT values obtained by the adjustment procedures into the Deviation and Reference boxes.
4. If you do not want to overwrite other settings, ensure that all checkboxes other than Deviation and Reference are cleared.
5. Press OK, then save your changes and write them to the module.

Part 3: Programming the T803 Tone Remote Module

This part describes how to configure the T803 for operation with a despatch console.

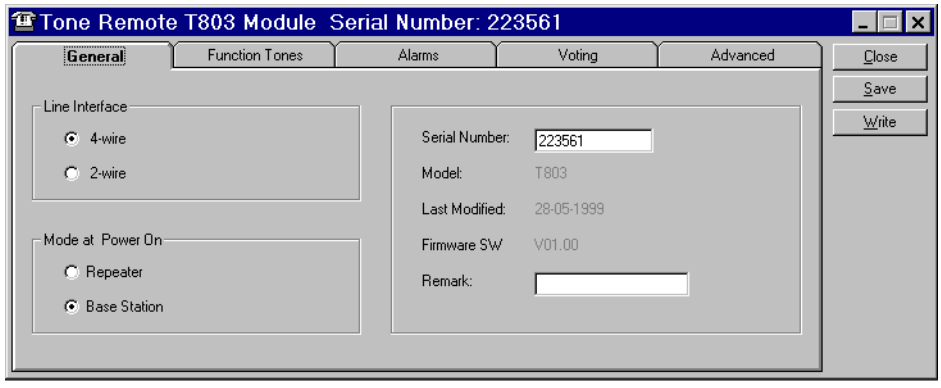
Topics

- Introduction
- General
- Function Tones
- Alarms
- Voting
- Advanced

Introduction

The T803 allows a despatcher to control and monitor T800 channel equipment over a two-wire or four-wire voice-grade line. It provides channel control, alarm monitoring and voting functions. It must be programmed using PGM800Win so that it communicates correctly with the despatcher console.

Read the rack and select the T803-00-0000, or use another method to access the information. The following form appears inside the main programme window.



The different tabs in this form let you configure the various aspects of the T803's operation.

General

The General tab lets you configure general aspects of the T803. Follow these steps.

1. Select 4-wire or 2-wire, depending on the type of link used to connect the T803 to the despatcher console.
2. Select the mode that the channel will operate in when it is powered on. If it is to be a base station, select Base Station. If it is to operate as a repeater, select Repeater. The channel will continue in that mode until the Mode Toggle button on the T803 front panel is pressed or the T803 receives a function tone that changes mode. If the T803 is in base station mode and the line fails, it can be configured to automatically switch to repeater mode, so that the radios can communicate directly with each other. For more information, see "Line Failure" on page 33.
3. If you want to ensure that the channel equipment stays in the mode you selected, click on the Advanced tab and select Disable Front Panel Mode Switch.
4. Optionally enter up to 16 characters in the Remark box. This could be information about the module, for example, or a customer name. Whenever you read the rack, what you enter appears in the Read Rack form.
5. Click the Save button to update the configuration, then click the Write button to transfer the configuration to the T803 module in the rack.

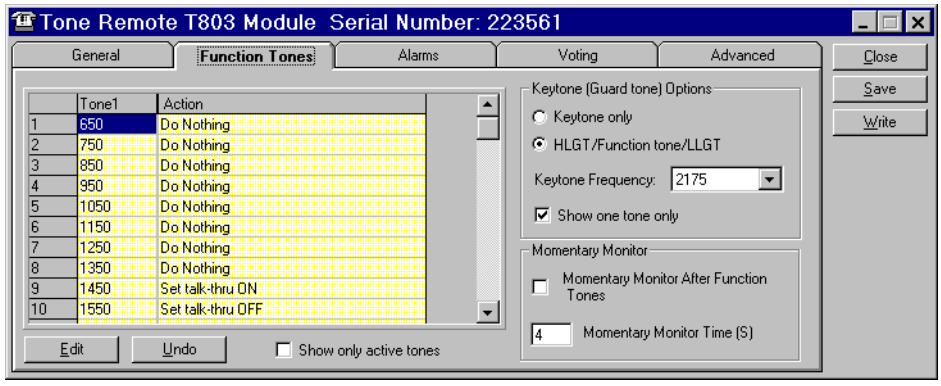
Channel Mode

Generally, the T803 is used to remotely control base stations. However, it can be used with repeaters as an alarm interface. You need to configure the T803 for its normal mode of operation. In some applications, the console operator may want to be able to change from Base Station to Repeater mode, for example to enable radio users to talk directly to each other. To do this, you set up a function tone to change the channel operating mode, see Table 1, "Function Tone Actions," on page 29.

In addition, you can stop anyone changing the mode at the site by disabling the Mode Toggle button on the front of the T803, see "Disable Front Panel Mode Switch" on page 37.

Function Tones

The Function Tones tab lets you configure the T803 to recognise the control signalling from the console and to take the correct action. The T803 supports keytone only, single-tone and dual-tone methods.



Configuring for Keytones Only

If the console only needs to key the base station transmitter and uses no other command tones, configure the T803 for keytone only.

1. Select the Keytone Only check box. Any Function tone settings in the table to the left will have no effect.
2. Check that the console uses a keytone frequency of 2175 Hz. If not, select the correct frequency from the Keytone Frequency drop-down list.
3. Save your changes and write them to the module.

Configuring for Single-Tone Function Tones

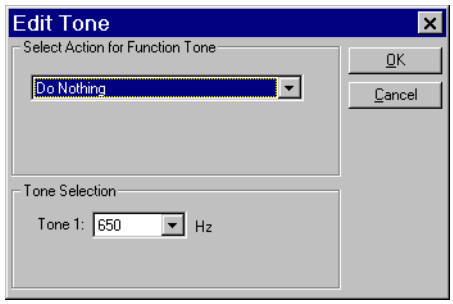
If the console uses the standard Motorola Guard-Tone™ or GE Secur-It™ formats, follow these steps.

1. Select the HLGT/Function tone/LLGT option.
2. Select the Show One Tone Only check box and ensure that the Show Only Active Tones box is cleared. The table now displays only one column of tones. There is one row for each available tone frequency (650 to 2050 Hz in 100 Hz steps).

Motorola Guard-Tone™ and GE Secur-It™ formats

Consoles using the Motorola Guard-Tone or GE Secur-It command formats send a high level guard tone (HLGT) before the function tone. The function tone is followed by a low level guard tone (LLGT) if the command was initiated by pressing PTT. The LLGT continues as long as PTT is pressed.

3. Configure each function tone that the despatcher console and the base station support. Follow these steps.
   a. Select the tone and press the Edit button. The Edit Tone form appears.



   b. Select an action (see Table 1 on page 29 for descriptions of the available actions).
   c. If you selected Set Channel, specify which channel. If you selected an action involving an auxiliary output, specify the number of that output.
   d. Press OK. The Edit Tone form closes and the action you chose appears in the Action column.
5. Save your changes and write them to the module.

Note

All available tones already exist in the table in the Function Tones tab. Selecting a different tone and assigning it an action leaves the row that you initially selected unchanged, but changes the row for the tone you select.

Tip

Once you have defined the actions for the supported function tones, select the Show Only Active Tones check box. This makes it easier to view the function tones and their actions so that you can check that they are correct and all present.

Configuring for 2-Tone Function Tones.

If the console uses the expanded Motorola Guard-Tone™ or GE Secur-It™ formats, which use a sequence of two tones to define each function, follow these steps.

1. Select the HLGT/Function tone/LLGT check box.
2. Clear the Show one tone only check box and ensure that the Show only active tones is cleared. The table now displays two columns of tones. There is a large number of rows, one for each possible permutation of tones.
3. Configure each tone permutation that the despatcher console and the base station support. Follow these steps.

2-Tone Function Tones

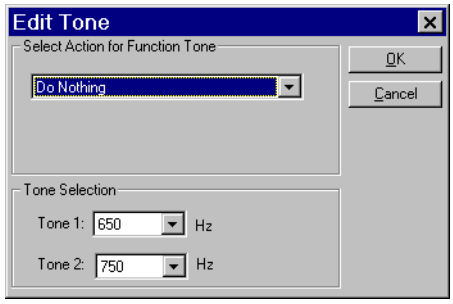
Consoles using 2-tone function tones send a high level guard tone (HLGT), a first function tone, then a second function tone. The sequence of two tones is necessary to specify any function. This expanded format greatly increases the number of possible functions that the console can request.

Table 1: Function Tone Actions

Select This Action...	And the T803 does the following on receiving the Function Tone...
Set Channel [a]	Instructs the receiver and transmitter or exciter to select the channel number specified in the Channel Number box. (This instruction is overridden if SW1 on the backplane specifies a channel number between 0 and 127), that is, if switch CH7 is ON.)
Turn ON Auxiliary Output[b]	Turns on the auxiliary output with the number specified in the Output Number box. For example, if the Output Number is 0, turns on Aux0. You can connect to these outputs via the 25-way D-range SK8 on the bin backplane. For more information see the Appendix.
Turn OFF Auxiliary Output[b]	Turns off the auxiliary output with the number specified in the Output Number box.
Toggle Auxiliary Output[b]	Changes the status of the auxiliary output with the number specified in the Output Number box. For example, if the auxiliary output is on, it turns it off.
Enable Talk-Thru	Switches the channel to repeater mode so that any audio from the receiver is passed on to the exciter or transmitter and broadcast.
Disable Talk-Thru	Switches the channel to base station mode. Only audio from the line is broadcast.
Toggle Talk-Thru	Changes the channel mode.
Toggle Loopback	Turns loopback on or off. When loopback is on, the T803 loops line audio back, that is, audio received on the line is sent back down the line. This function is only available for 4-wire connections and enables the despatcher to check the line.
Defeat CTCSS until keyed	Sends all received audio down the line until the exciter/transmitter is keyed. This enables the despatcher to hear anything that is happening on the channel's receive frequency before initiating a conversation. Consoles are often designed to initiate this action when the despatcher lifts the handset.
Defeat CTCSS for momentary time or until keyed	Sends all received audio down the line for the duration of the Momentary Monitor Time (default 4 s) or until the despatcher keys the exciter/transmitter, whichever happens first.
Toggle CTCSS Defeat (keying resets)	Changes the status of CTCSS Defeat until the despatcher keys the exciter/ transmitter.
Cancel Alarm Pip-Tones	Clears the beep (a 200 ms burst of 600 Hz tone) that you hear at the end of each conversation. Does not clear the Alarm LEDs on the T803 or reset the alarm.
Cancel Alarms	Clears any alarms. Clears pip-tones and the LEDs on the T803. Resets the alarms so that they can register any future alarm condition.
Do Nothing	Nothing.

a. When you select the Set Channel option, the Channel Number box appears so that you can enter the number of the channel that the T800 equipment will transmit and receive on.
b. When you select an Auxiliary Output option, the Output Number box appears so that you can enter the number of the auxiliary output you want to configure.

a. Select a row and press the Edit button. The Edit Tone form appears.



b. Select an action (see Table 1 on page 29 for descriptions of the available actions).

c. If you selected Set Channel, specify which channel. If you selected an action involving an auxiliary output, specify the number of that output.

d. Press OK. The Edit Tone form closes and the action you chose appears in the Action column.

5. Save your changes and write them to the module.

Note

All available tone permutations already exist in the table in the Function Tones tab. Selecting a different permutation of tones and assigning them an action leaves the row that you initially selected unchanged. It changes the row for the tone permutation you select.

Tip

Once you have defined the actions for the supported function tones, select the Show Only Active Tones check box. This makes it easier to view the function tones and their actions so that you can check that they are correct and all present.

Configuring the Monitoring of the Channel

The T803 has various options for enabling the despatcher to monitor activity on the channel. If the console has a Monitor Channel button, its function tone can be given one of the Defeat CTCSS actions (see Table 1 on page 29). Alternatively, the T803 can be configured to automatically provide the despatcher with received audio after every function tone. Follow these steps.

1. In the Function Tones tab, select the Momentary Monitor After Function Tones check box.
2. In the Momentary Monitor Time check box, enter the duration in seconds that you want the despatcher to hear the received audio for.

Configuring Other Console Functions

Tone on Idle Detect

If the despatcher console has a detector that mutes audio, you can configure the T803 to work with it. The T803 can provide a tone on idle at a suitable frequency. This tone mutes audio, but as soon as the T803 receives audio from the rack, it ceases the tone.

See “Configuring for Tone on Idle” on page 34.

Private Lines

Some despatcher consoles have private line buttons (PL1, PL2, and so on). The intention is that these change the CTCSS frequency of the channel, so that the despatcher can speak to a different radio user, without other channel users being able to hear the conversation. However, a channel in a Tait T800 module can only be programmed with one CTCSS frequency. This means that you cannot set up a system in which a private line button defines the CTCSS frequency but not the channel number.

Intercom Mode

Many despatcher consoles have a button for Intercom mode. The intention is that the button makes communication possible with a technician at the site. This requires no function tone. The console sends audio without keytone down the line. The technician does the following:

1. Ensures that the T803 is in base station mode. (If it is in repeater mode, the test microphone will key up the transmitter and broadcast to air.)
2. Plugs the T800-80-0001 test microphone into the RJ11 connector on the front of the T803 labelled Programming Port.
3. Presses PTT to talk.

Wildcards

Some despatcher consoles have Wildcard buttons. These have configurable functions and they can be used to initiate actions at the site such as turning equipment on or off. Ascertain the function tone frequency that the button is programmed for, then select the appropriate function tone action for it, using one of the auxiliary output options (see Table 1, "Function Tone Actions," on page 29).

Alarms

The T803 can monitor internal and external alarms. When an alarm occurs, the T803 can generate pip tones and/or a Selcall sequence and send these down the line to the console, and/or instruct the channel to transmit them. The Alarms tab lets you configure the way the T803 responds to signals from its alarm sources.

Alarm Sources

The T803 can monitor up to eight alarm sources. The first four are built into the T803 or the T800 channel equipment. The others can be provided as external alarms and connected to the T803 via the 25-way D-range SK8.

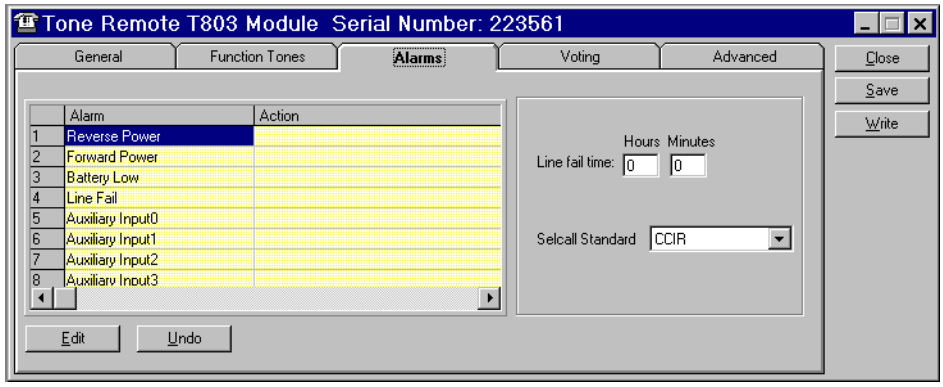
No.	Alarm	Description
1	Reverse Power[a]	The power amplifier or transmitter is not properly connected to the antenna so that the power it generates is being reflected back into the power amplifier or transmitter.
2	Forward Power[a]	The power amplifier or transmitter is not producing sufficient output.
3	Battery Low	The T803 has measured a supply line voltage that is below 10.7 V.
4	Line Fail	The T803 has not received a keying signal for a period longer than the line fail time
5	Auxiliary Input 0	If an external closure alarm is connected to the T803 and the alarm closes the circuit, the T803 does what you configure it to do for that alarm.
6	Auxiliary Input 1	
7	Auxiliary Input 2	
8	Auxiliary Input 3	

a. T800 Transmitters need to be fitted with an alarm board to provide these alarms

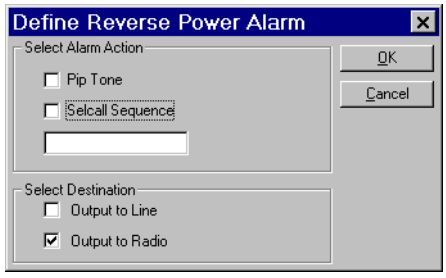
Configuring the Alarm Response

To configure the way the T803 responds to one or more alarms, follow these steps.

1. Select the Alarms tab.



2. Select one or more rows in the table
3. Press the Edit button. The Define Alarm form appears.



4. Check the Pip Tone box and the T803 will append a pip tone (a 200 ms burst of 600 Hz tone) at the end of every transmit sequence, if the corresponding alarm is latched.
5. If you want to use a Selcall sequence, check the Selcall Sequence box, and enter the sequence into the box below.
6. Check the Output to Line box if you want the Despatcher to hear the Selcall sequence.
7. Check the Output to Radio box if you want the channel to transmit the Selcall sequence.
8. Press OK to confirm your changes and return to the main window.
9. Enter a length of time in hours and minutes into the Line Fail Time boxes. Alternatively, leave the default setting of 0 to disable the line fail timer.
10. In the Selcall Standard box, select the Selcall tone standard that the console and the receiving radio(s) use.
11. Save your changes and write them to the module.

Selcall Sequences

Selcall sequences are a powerful and highly flexible way of configuring the alarm response of your remotely controlled base station. The Selcall sequence can specify the identity of a particular radio (for example the maintenance technician's handportable) and trigger an alarm or display an alarm message. The Selcall sequence can also trigger an alarm on the despatcher console if it is fitted with a Selcall board. See the documentation for the console and for terminal equipment (for example the Tait Orca Conventional Programming Manual) for more information.

Line Failure

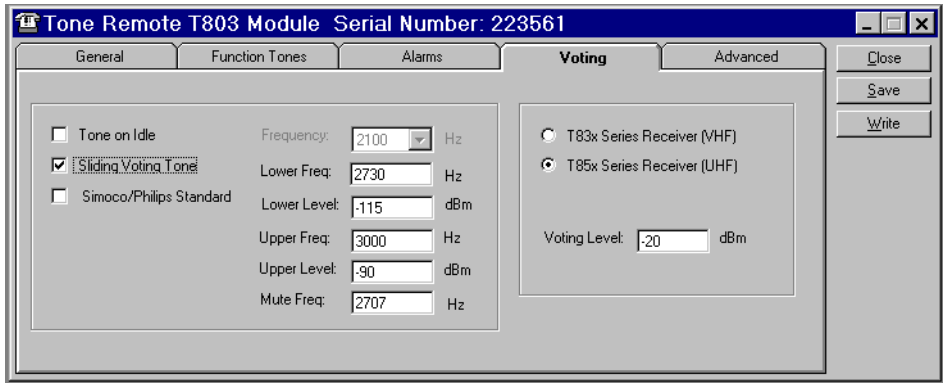
The T803 cannot directly detect a failure in the line connecting it with the despatcher console. However, you can set a line fail time. If the T803 waits for the line fail time without receiving any keying signal from the despatcher console, it concludes that the line has failed. It takes the action that you configure for the Line Fail alarm and automatically switches to repeater mode.

As soon as the T803 receives a valid keytone signal, it returns the channel to the channel mode that existed before the alarm condition.

Voting

If the T803 is part of a despatch system with voting capability, you need to configure its voting behaviour. If it is not, leave the Voting tab with its default settings.

Select the Voting tab and the following appears:



The three checkboxes enable different voting options. If all boxes are disabled, the 2-wire check box in the General tab is selected; voting is only possible with a 4-wire line interface.

Configuring for Tone on Idle

1. Select the Tone On Idle check box.
2. Using the Frequency drop-down list, select the frequency of the tone that the voting equipment expects from the T803. This is usually the same frequency as the LLGT or keytone.
3. In the Voting Level box, specify a nominal output level for the voting signal. The T803 will output the signal at this level.
4. Save your changes and write them to the module.

Tone on Idle

When the T803 is configured for Tone on Idle, it sends a tone to line as long as the receiver is muted. When the tone disappears, voting equipment measures the signal-to-noise ratio of the audio on the line and compares it with audio from other receivers. The equipment then selects the audio with the best result and feeds it to the control room user. It can also be used to mute a console if it is fitted with appropriate equipment. See "Tone on Idle Detect" on page 30, for more information.

Configuring for a Sliding Voting Tone

1. Select the Sliding Voting Tone check box.
2. Enter into the Lower Freq box the frequency that the voting equipment will interpret as indicating a muted receiver.
3. Enter into the Lower Level box the lowest level that the T800 receiver's RSSI can detect.

Sliding Voting Tone

When the T803 is configured for a sliding voting tone, it sends to line a tone that is proportional to the strength of the signal that the receiver is receiving. The voting equipment compares the frequency of the incoming tones, selects the incoming audio with the best result, and feeds it to the control room user.

4. Enter into the Upper Freq box a frequency that corresponds to a strong signal.
5. Enter into the Upper Level box the level in dBm of a strong received signal.
6. Specify whether the receiver works in VHF (for example T83x) or UHF (for example T85x). This is necessary because these different receiver models have different RSSI circuits.
7. In the Voting Level box, specify a nominal output level for the voting signal. The T803 will output the signal at this level.
8. Save your changes and write them to the module.

Configuring for Simoco/Philips Equipment

1. Select the Simoco/Philips Standard check box.
2. Specify whether the receiver works in VHF (for example T83x) or UHF (for example T85x). This is necessary because these different receiver models have different RSSI circuits.
3. Save your changes and write them to the module.

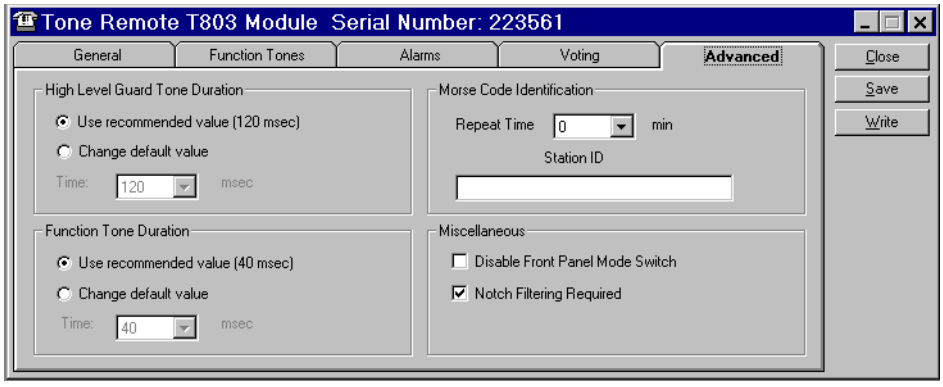
Simoco/Philips Standard

When the T803 is configured for the Simoco/Philips standard, it generates a stepped voting tone that is compatible with voting equipment from Simoco/Philips.

Advanced

The Advanced tab lets you:

- alter the default durations of High Level Guard Tones (HGLT) and function tones if the sending console deviates from the industry standard values
- define a Morse Code ID that the channel will include in its transmissions (required in some countries)
- disable the Mode Toggle button on the T803 front panel, so that unauthorised persons cannot change the channel's function
- turn off notch filtering, so that the T803 passes on all the signalling from the console to the transmitter/exciter or from the receiver to the console.



High Level Guard Tone Duration

To configure the T803 for a non-standard high level guard tone duration, select Change Default Value and select a time from the drop-down list.

Function Tone Duration

To configure the T803 for a non-standard function tone duration, select Change Default Value and select a time from the drop-down list.

Morse Code ID and Repeat Time

Morse Timer

Defines the interval in minutes between morse code ID transmissions. When the channel is transmitting audio, it repeats the morse code ID at this interval. Leave Morse Timer set to 0 to disable the sending of a morse code ID.

Enter Station ID Number

Defines the ID of the base station. The following characters are available; letters A-Z, numbers 0-9, and the following - /. You will receive a warning if you enter too many characters.

Miscellaneous

Disable Front Panel Mode Switch

Disabling the front panel mode switch prevents any unauthorised person at the remote site changing the T803 mode.

Notch Filtering Required

Normally, remotely controlled base stations have notch filtering, which removes the keytone or LLGT from the audio so that it is not transmitted.

If the T803 belongs to the channel providing the link in a linking system (see TN-621, Remotely Controlling and Monitoring Base Stations), clear the Notch Filtering Required check box. This tells the linking channel to propagate command signals to the end channel.

The Notch Filtering Required check box is only available when the 4-wire button in the General tab is selected.

Appendix

The Appendix contains TN-621, Remotely Controlling and Monitoring Base Stations. It is included to give background information for programming T803 tone remote modules.

Remotely Controlling and Monitoring Base Stations

3 August 2000

This technical application note explains how the remote control of base stations works, describes a number of system configurations, and provides some information about using the Tait T803 Tone Remote module together with a third party despatcher console to enable the remote control of base stations using Tait T800 equipment.

Note: Although Tait currently don't manufacture console equipment, Tait system integrators can provide complete turnkey despatcher systems using other manufacturers' equipment.

Overview

Base stations are often the core of a two-way communications system. They are located somewhere with good RF propagation, such as the top of a tall building or a mountain peak. However, the despatcher is usually in an office which is remote from the base station, maybe even kilometres away. A system such as that shown in Figure 1 is needed to bring voice to and from the base station and to enable the despatcher to control and monitor the base station.

This system consists of three parts.

- **Despatch Console**. A simple despatch console (also known as a desktop controller) often looks like a telephone. Each button is allocated a function and there is a handpiece that allows the despatcher to key the base station transmitter or to listen to what the base station is receiving.
- **Remote Controller**. The remote controller (also known as a tone panel) is located at the base station. It receives commands from the despatch console and carries them out.
- **Link**. A link (for example a telephone line or a microwave link) that connects the despatch console to the remote controller.

Control Signals

The signalling that the system uses works in the following way:

1. The despatcher does something, for example presses PTT.

2. The despatch console encodes the action into one of the available standard signalling tones and sends it over the link to the remote controller.

558 Wairakei Rd, P.O. Box 1645, Christchurch, New Zealand
Phone: (64) (3) 358 3399 Fax: (64) (3) 358 3903

3. The remote controller receives the signal, decodes it and activates the correct function, for example keying the transmitter.

Control signals are of two basic types: DC line signals or tones. DC line signals must have a dedicated wire line from end to end. Tone signals are tones in the same range as voice so that they can be carried by any links (for example microwave or optical fibre) that will carry conversation.

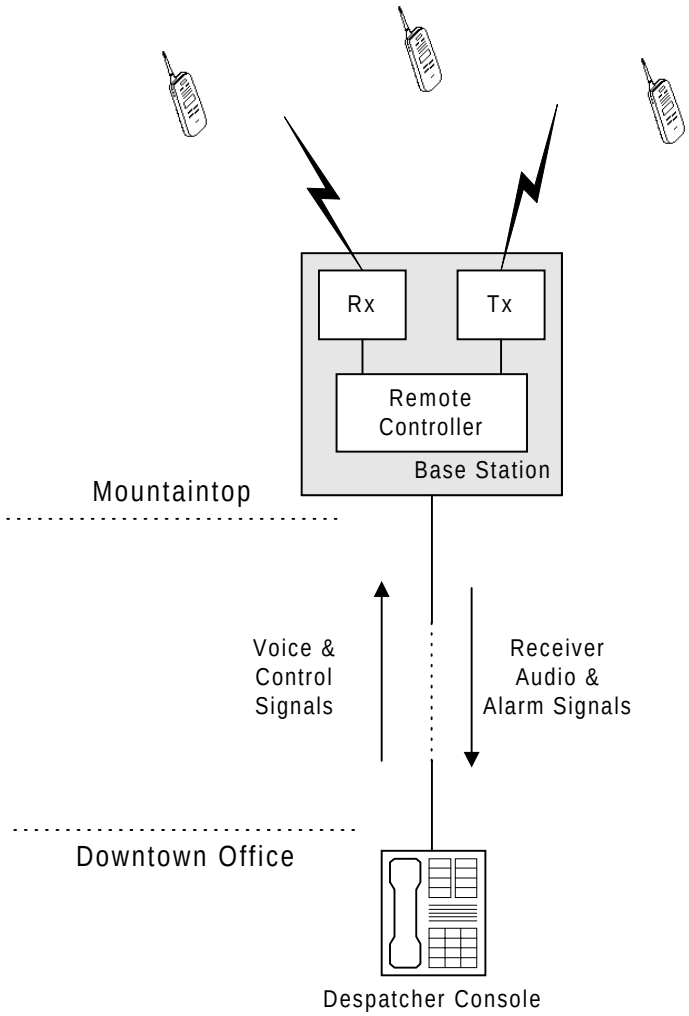


Figure 1 A Remotely Controlled Base Station

System Configurations

The T803 is suitable for use together with a third party despatcher console and other optional equipment in the following remotely controlled base station systems.

Basic Despatch System

In a basic despatch system, the despatcher console remotely keys the base station. Typically, there is no DC path so that DC signalling cannot be used. There may also be a requirement for the despatcher to change channels, monitor radio traffic, and change the channel mode from base station to despatcher. The T803 may also need to be configured with tone on idle, so that the despatcher console is unmuted when audio is on the line.

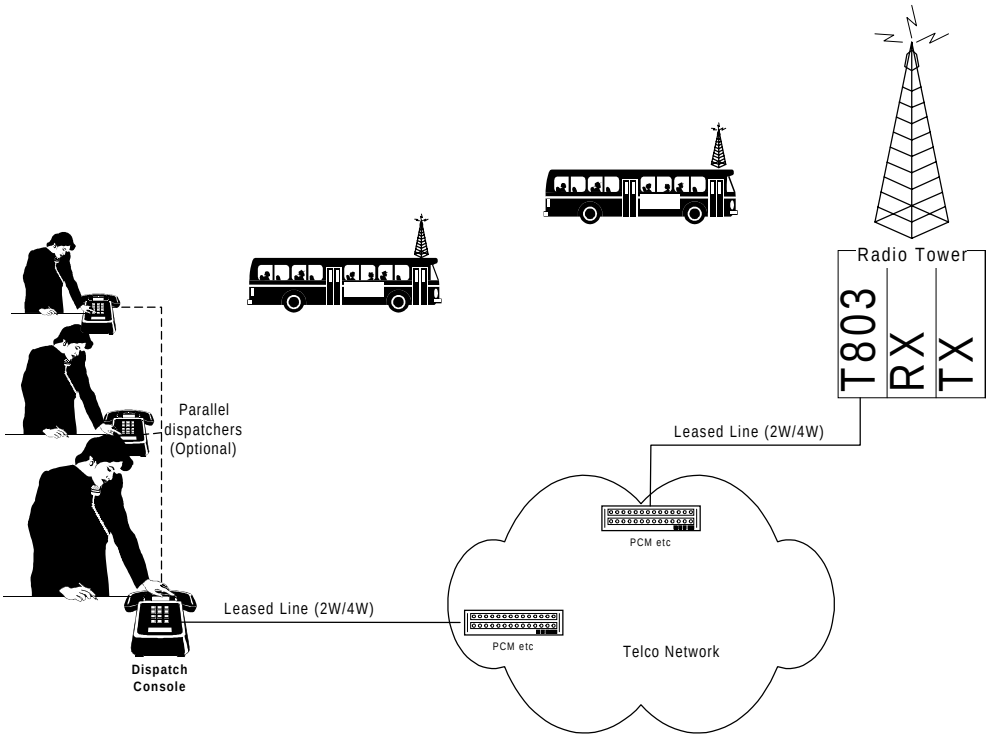


Figure 2 Basic Despatch System

Despatch with High Site Control

A despatch system can be set up so that the despatcher can remotely control equipment at the site, for example to turn tower lighting on or off, to turn on stand-by power systems, provide door entry security, and so on. The T803 has four auxiliary outputs that can be used to open or close relays. Function tones can turn these outputs on or off.

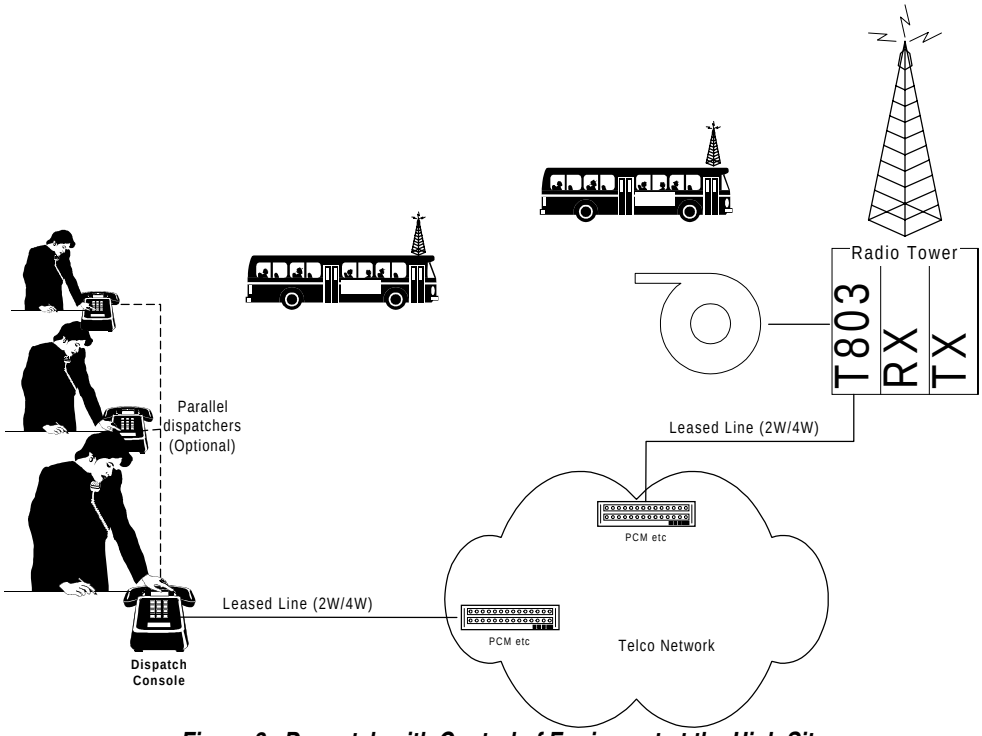


Figure 3 Despatch with Control of Equipment at the High Site

Despatch with Alarm Monitoring

A despatch system can be equipped with alarm monitoring. The T803 can provide alarm signals to the despatcher and/or to the maintenance technician's radio. The T803 can be programmed to provide a Selcall sequence for transmission or sending down the line, to target one or more radios or despatcher consoles. The T803 has four built-in alarm sources for monitoring the status of the channel. In addition, up to four auxiliary inputs can be connected to equipment such as intruder sensors. A function tone is available so that the despatcher can remotely reset the alarms. High site control can be used to turn the sensors on.

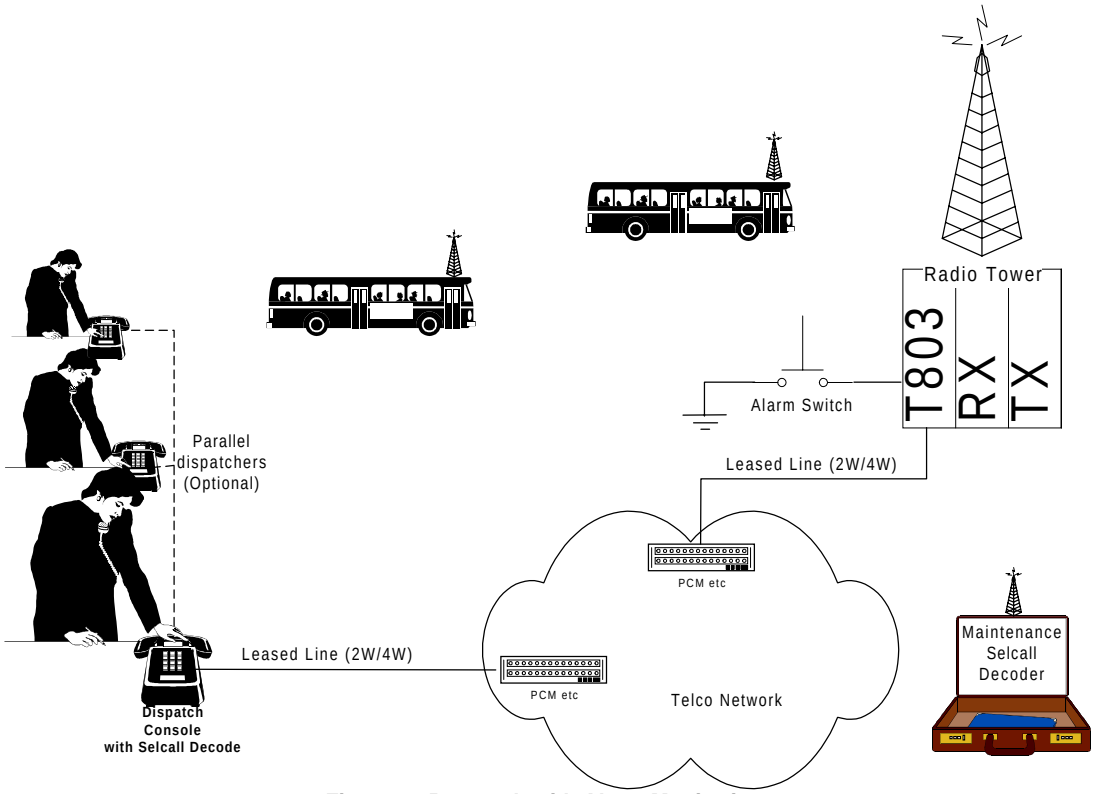


Figure 4 Despatch with Alarm Monitoring

Despatch with Linking

A despatcher console can be linked to the base station using a pair of T800 Series II transmitters/receivers. This is referred to as a relay or linked despatch system. Two T803s are needed: one for the linking repeater and another for the base station itself. The first T803 must be programmed for keytone only operation with notch fltering disabled. This means that it passes all control signalling on unchanged to the base station T803. Note that both T803s can be programmed with other capabilities such as alarm monitoring.

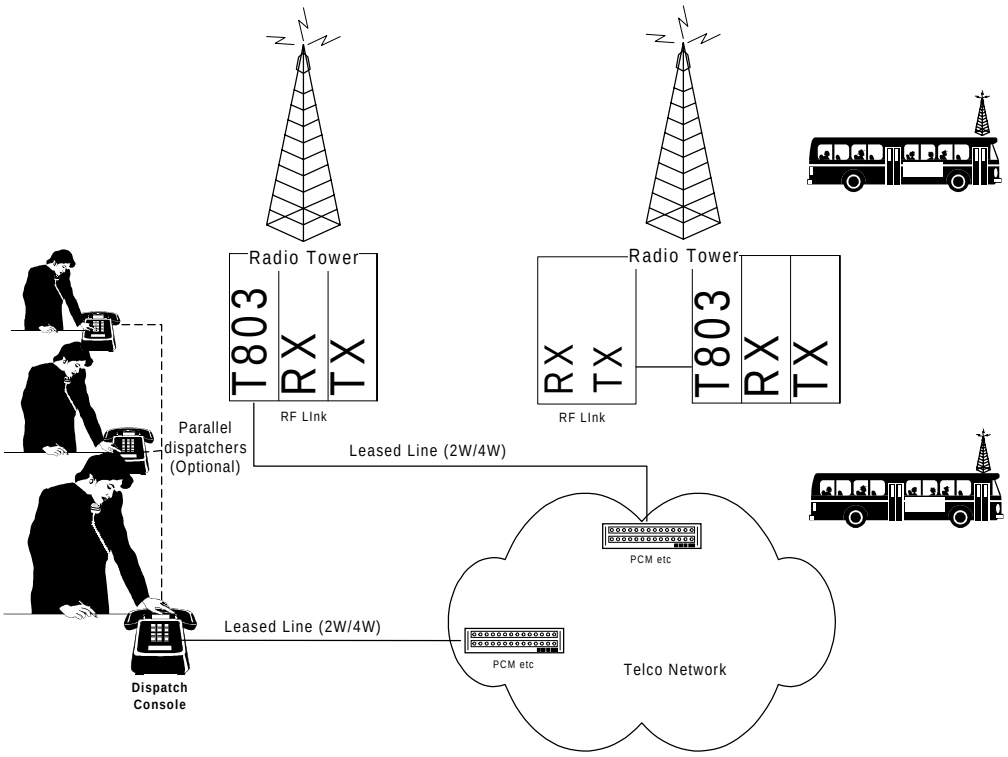


Figure 5 Relay (or Linked) Despatch System

Despatch with Multiple Receivers

A despatch system can have several receivers to cover a geographical area. For each call, the receiver with the best reception must be selected so that it provides audio to the despatcher. Selection works like this. The T803s at each site send a voting tone to the despatch room equipment, which selects the receiver producing the best quality audio.

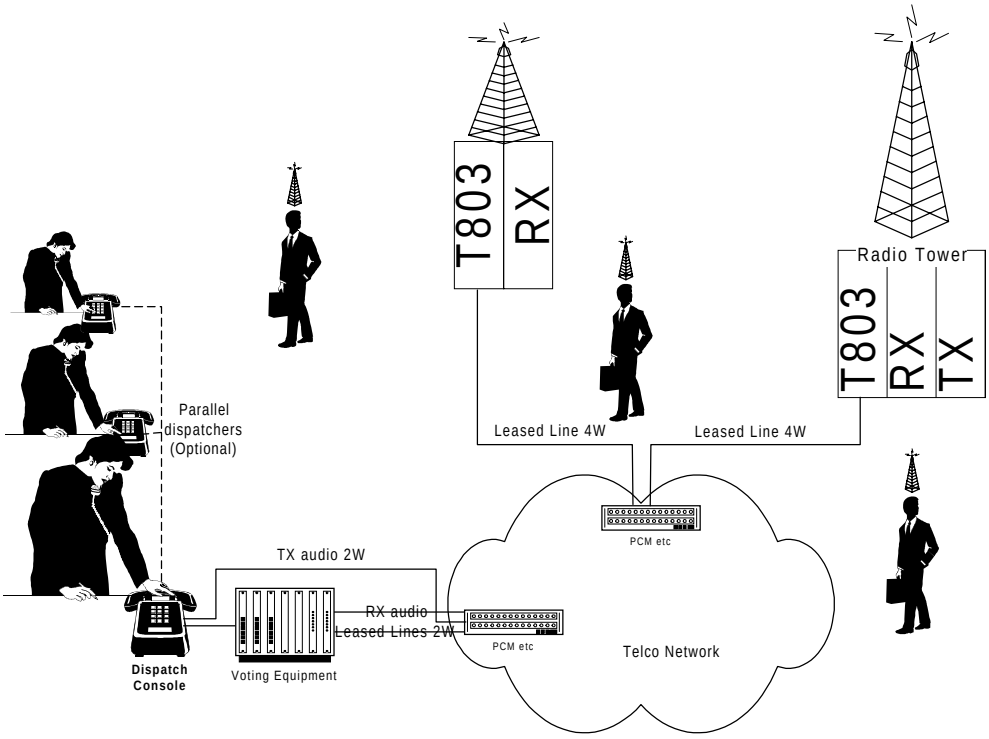


Figure 6 Despatch System with Receiver Voting

Tait T803 Tone Remote Module

Until recently, operators with Tait T800 base stations needed to add equipment from third party vendors to create a remotely controlled base station. Now, with the release of the Tait T803 Tone Remote module, a fully featured and configurable remote controller is available. The T803 is designed to fit into a channel rack frame; because it incorporates a monitoring speaker and a programming port, it can replace the usual speaker panel without requiring any additional space. The T800-27-0x01 single-channel rack frame is available for exciter/power amplifier output up to 100 W and the T800-27-0x00 dual-channel rack frame for transmitter output up to 25 W.

This section explains the different tone control signalling formats that the T803 supports, describes the T803 front panel display, and provides pinout information for the T803's auxiliary control outputs and auxiliary alarm inputs. For more details on the T803's features, technical specifications, and accessories, and for instructions on how to install, set up and test it, see the T803 Service Manual. For information on how to use PGM800Win to programme the T803, see the T800 Programming Application User's Manual or the online Help.

Tone Control Signalling

The T803 supports the following methods of tone control signalling:

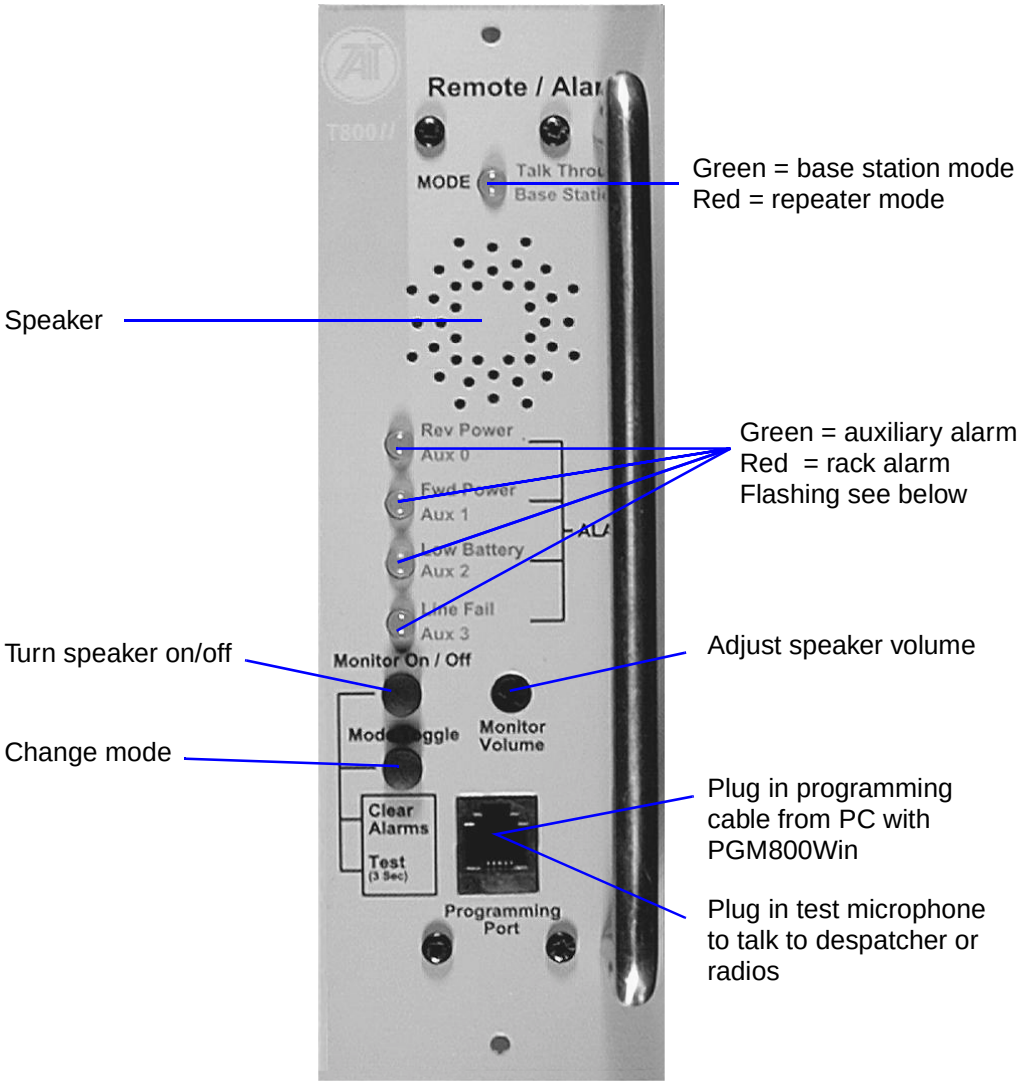
Keytone only
A keytone is a signal to the remote controller to key the transmitter on. Generally, the keytone is 2175 Hz, though for example Simoco M81 signalling uses 2970 Hz. When the T803 receives the keytone from the despatcher console, it keys the transmitter on and leaves it on as long as it continues to receive the keytone. The T803 can be programmed to use any one of a number of pre-defined frequencies as the keytone. If required, Tait can add other frequencies.

High Level Guard Tone / Function Tone / Low Level Guard Tone
The Motorola Guard-Tone™ and GE Secure-IT™ formats use more complex signalling in order to support a range of commands. When the despatcher presses the PTT, the console sends a high level guard tone (HLGT) followed by one or two function tones, then by a low level guard tone (LLGT). The LLGT acts as a keytone and continues as long as the console PTT is pressed. When the T803 detects the function tone(s), it carries out the function (for example setting the channel), and when it detects the LLGT, it keys the transmitter on and leaves it on until the LLGT signal ceases.

When the despatcher wants to make a change to the base station but does not activate the PTT, the HLGT and the function tone are sent, but the LLGT is omitted.

The frequency used by HLGT and LLGT is the same, usually 2175 Hz. HLGT has a nominal level of +10 dBm and LLGT -20 dBm. The T803 can be programmed for a variety of other frequencies and its automatic level control means that it can accept a wide variety of line levels and attenuation. It sends received audio to the console in accordance with TBR15 and TBR 17.

Front Panel Display



Front Panel Mode LED

The Mode LED on the front panel flashes in different ways, depending on the condition.

Flash Rate		Condition
— — — —	equal 0.3s on/ 0.3s off	Module is linked with PGM800Win
——— ———	long flash 1 s on/0.3 s off	Microcontroller has detected an internal communications error
— — — — — —	short off 0.3 s on/0.08 s off	Speaker is ON.

Where two or more conditions occur at the same time, the precedence is in the order shown above (i.e. module linked has the highest priority, followed by microcontroller error, then speaker ON).

Resetting Alarms

Press the Monitor and Mode buttons together to reset any alarms.

Auxiliary Alarm Inputs

The T803 can be provided with up to four auxiliary alarm inputs. You connect them to the T803 using SK8 on the rack frame backplane. They use contact closure to 0 V.
The following are the pinouts.

	Input	Adjacent Earth
Alarm0	14	1
Alarm1	15	2
Alarm2	16	3
Alarm3	17	4

Auxiliary Control Outputs

The T803 can provide up to four open collector control outputs. They are connected to SK8 on the rack frame backplane and are rated at a maximum of 50 V and 250 mA.
The following are the pinouts.

	Output	Adjacent 13.8 V
Aux 0	25	13
Aux 1	24	12
Aux 2	23	11
Aux 3	22	10

Issuing Authority

This TN was issued by: John Crossland
Documentation Manager

Publication History

Publication Date	Author
1 July 2000	L Chisholm
3 August 2000	L Chisholm

Amendment Record

Publication Date	Page	Amendment
1 July 2000	10	Initial release
3 August		3rd party equipment references

Index

G

H

I

K

L

M

N

O

P

06/01 IPN: 439-80100-03

R

S

T

U

V

W