T800 Series II - T800V102 Firmware Information
Current Version is T800V102b

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General

Tait Australia have added a few extra features to the standard T800 firmware (T800V101). These changes were done mainly to improve the RX/TX CTCSS reverse burst performance (RTB) when being used in system with mixed fleets of equipment from different manufacturers. The function of BCD external channel inputs has also been added.

Background

One problem that can occur in a radio systems with mixed fleets is mute crash. This can happen for several reasons, and from several different sources. The first source for a mute crash is from a base stations receiver. A T800's receiver normally shuts down quite quickly and does not produce much of a mute crash. Some mobiles/portables that use RTB (Reverse Tone Burst) keep transmitting for a little bit too long after the burst (e.g. some Motorola ™ mobiles/portables keep transmitting for ~170mS). The T800 receiver will normally correctly decode the RTB, but because the transmission continues for too long, the receivers gate opens up again. This then results in an exacerbated mute crash. The other source for mute crashes comes from the receiving mobile/portable itself. Some mobiles/portables (i.e. some Motorola ™ mobiles/portables) close their receiver gates very slowly at the end of receiving a carrier. Such units require the use of a system such as RTB to force their receive gates to close before a mute crash occurs. These same radios do not reliably decode the default 180 degree RTB phase shift that T800 transmitter produces. There are several ways to overcome this problem, as you will see below.

Parts

The parts required are as follows:

Part Number	Description	Supplier	Qty.
002-08951-20	IC AT90C51 (or equiv) PLCC44 MIC 12MHZ	Tait	1 or 2

Procedure

To use any of T800V102's new features detailed in this application note you will need to fit a new version of firmware to the T800 series II module. The microcontroller part listed above can be ordered from Tait Australia. Please specify that you would like the microcontroller programmed with version T800V102, otherwise you will get either a blank micro or one programmed with the standard T800V101. If you wish to only use the new features that apply to the transmitter, then you will only need to update the firmare in the transmitter and not the receiver (i.e. you'll only need one new micro). Otherwise, you'll need two new micros. Also, be really nice chaps and send your old micros that you remove back to Tait Australia product support (in an anti-static bag of course).

Programming Details

The T800V102 firmware still uses the standard T800 programming software, e.g. PGM800Win Version 4.00 (ref. Figure 1.). No special T800 programming software should be required now or in the future.

Figure 1.

Enabling and Disabling of the T800V102 special features is done by adding special characters into the "Remark" field on the System Information page of the PGM800 software. As you can see in Figure 2. the "Remark" field has some extra characters added to it. The first strange character is a '|'. This character is called a "Pipe". This pipe character delimits our special commands from the regular text

that we enter into the "Remark" field (e.g. the bases site name or similar). On a standard PC keyboard, the pipe character is normally somewhere near the main <ENTER> key. It normally shows up as a two short vertical lines on top of one another.

If your keyboard doesn't have the required key on it, don't despair, there's another simple way to get it. One way would be to just copy and paste the character (|) into the remark field. Another way is as follows. Place the screen cursor inside the "Remark" field so its ready to enter characters into that field. Hold down the keyboards "ALT" key. Now, while still holding down the "ALT" key, type in the numbers "1" then "2" and finally "4" (i.e. 124). Just the numbers, not the quotes. Then let go

Figure 2.

of the "ALT" key. POW! The pipe character magically appears. Wow, bet you didn't know that was hiding in there!

Make sure you test this out before driving 500KLm with your new micros and laptop under arm. If you find that it does not work, try another computer.

Now we can enter in our commands. So what are the commands and what do they do? Well, read on.
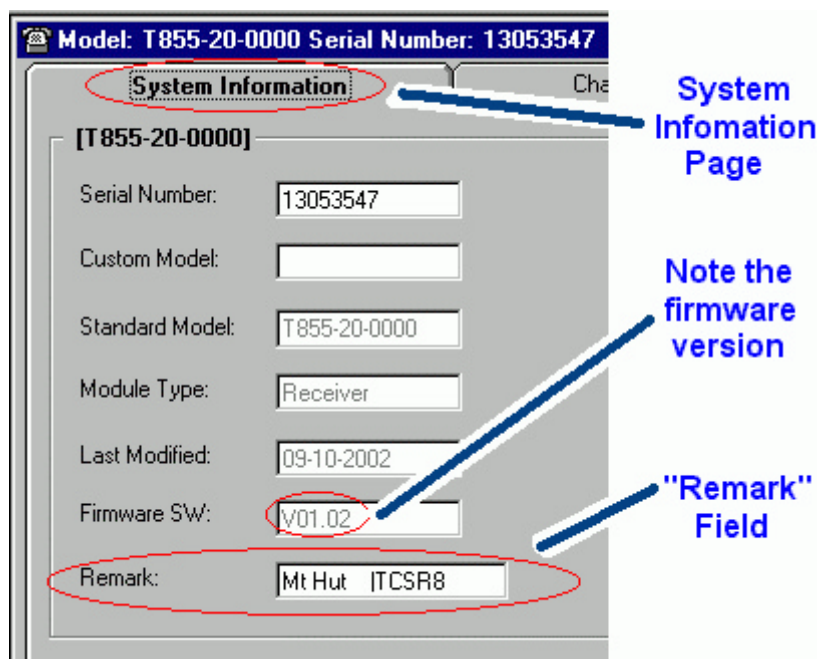
Commands

Listed below, in Table 1. are the commands that are available for entering in via the "Remark" field. The listed functions can be used in any combination by entering the "Keys" in any order after the "pipe" symbol. The default values shown are the settings if no characters are entered into the "Remark" field.

Table 1. Commands

Applys To	Function	Key	Description	Default
TX	Reverse Place	P	As standard, a T800 transmitter with firmware version T800V101 or earlier will do a TX RTB phase change at the point in time when the external TXKEY signal is removed. With T800V102, the RTB is at the end of a TX Tail. So if the TX tail is 5 seconds, the RTB will happen just before the TX Tail drops out. Defining the Reverse Place with the "P" key forces the TX to revert to putting the RTB at the start of the TX Tail. Tait Australia recommends leaving the RBT at the end of the TX Tail, i.e. don't use the "P" command. This command is provided just for backward compatibility.	Enabled (i.e. RBT at end of TX Tail with NO "P" defined)
TX	Soft Off	S	Enabling Soft Off with the "S" key makes the transmitter do a "Soft Off" during a TX Tail. A soft off is where the transmitter ceases to generate subaudible tone for a short period of time, normally at the end of a TX Tail. The absence of subaudible tone enables mobiles & portables to shut down quietly at the end of the TX Tail. This is an alternative to using RTB, and should work with all models and brands of radios. This works great. Tait Australia recommends using this function.	Disabled
TX & RX	Reverse Type	T	**TX:** As standard, a T800 transmitter with firmware version T800V101 or earlier will do a TX RTB that is a 180 degrees phase change. This works with most models and brands of radios, but there are some radios that will not decode this, such as some Motorola ™ mobiles/portables. Some or all Motorola ™ mobiles/portables use a 240 degree RTB system. Enabling the Reverse Type using the "T" key will make the T800 transmitter generate a 225 degree RTB phase shift instead of the normal 180 degrees. Although 225 degree is a little way off the desired 240 degrees, it does still work. Note that some models and brands of radio may not decode the 225/240 degree RTB burst. Although this function does work, there can be other unexpected side effects, like those mentioned above. Tait Australia recommends using the Soft Off function instead, as it is a more universally functional way of achieving a quiet TX Tail. **RX:** In a receiver, this enables software RTB detection. A standard T800 receiver does not do any of its actual CTCSS decoding in its microcontroller software. It's all done in hardware. As such, its performance in detecting RTB is just a characteristic of the hardware circuitry. In T800V102, enabling this function turns on new code in the microcontroller that tracks the received CTCSS tone and decodes RTB phase shifts.	Disabled

Applys To	Function	Key	Description	Default
TX & RX	Reverse Tone Time	Rx	**Where "x" is time in hex (*20mS).** **TX:** By default this parameter would normally not require adjusting. This parameter does default to values that will work in most systems. In a transmitter, this parameter adjusts the point in time that a RTB will happen before the end of a TX Tail. If Soft Off is defined, this parameter will adjust time length of the Soft Off. **RX:** In a receiver, this parameter adjusts the length of time that the receivers RX Gate will be forced shut after the software detection of a RTB. For this parameter to have any effect, the receiver has to have the Reverse Type parameter (i.e. "T") enabled (see above). To use this parameter, enter a "R" character followed by a single hexadecimal character (i.e. 0 to F). The time is the hexadecimal number time multiplied by 20mS. So a value of 1 equals 20 mS, a value of 9 equals 180mS, and a value of F equals 300mS. Nice and cryptic.	TX: 8h = ~160mS RX: Dh = ~260mS
TX & RX	BCD Channel Input	B	Enabling BCD Channel Input using the "B" key changes the standard T800 external channel lines to accept BCD (Binary Coded Decimal) instead of the standard binary. This is good for some remote channel control systems, or maybe even for just hooking up an external BCD channel switch!	Disabled
TX & RX	Chan Save	C	As standard on a T800 module with firmware version T800V101 or earlier, when its channel is changed via its external channel lines the modules will save the new channel into its non-volatile memory (E2Prom), overwriting the modules PGM800 programmed "Default" channel. If this is not desirable (e.g. a base with an external BCD channel switch), then enable this function. After the function is enabled, the modules PGM800 programmed "Default" channel will always remain the same, regardless of the state of the external channel lines.	Disabled