

TB9100 base station

DTMF Remote Control Installation and Configuration Manual

MAI-03203-00-01 · Issue 1 · October 2013

Contact Information

Tait Communications Corporate Head Office

Tait Limited
P.O. Box 1645
Christchurch
New Zealand

For the address and telephone number of regional offices, refer to our website: www.taitradio.com

Copyright and Trademarks

All information contained in this document is the property of Tait Limited. All rights reserved. This document may not, in whole or in part, be copied, photocopied, reproduced, translated, stored, or reduced to any electronic medium or machine-readable form, without prior written permission from Tait Limited.

The word TAIT and the TAIT logo are trademarks of Tait Limited.

All trade names referenced are the service mark, trademark or registered trademark of the respective manufacturers.

Disclaimer

There are no warranties extended or granted by this document. Tait Limited accepts no responsibility for damage arising from use of the information contained in the document 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.

Enquiries and Comments

If you have any enquiries regarding this document, or any comments, suggestions and notifications of errors, please contact your regional Tait office.

Updates of Manual and Equipment

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

Intellectual Property Rights

This product may also be made under license under one or more of the following U.S. Patents: 5,146,497, 5,148,482, 5,164,986, 5,185,795, 5,185,796, 5,271,017, 5,377,229 and 5,502,767.

The AMBE+2™ voice coding Technology embodied in this product is protected by intellectual property rights including patent rights, copyrights and trade secrets of Digital Voice Systems, Inc. This voice coding Technology is licensed solely for use within this Communications Equipment. The user of this Technology is explicitly prohibited from attempting to decompile, reverse engineer, or disassemble the Object Code, or in any other way convert the Object Code into a human-readable form. Protected by U.S. Patents 5,870,405, 5,826,222, 5,754,974, 5,701,390, 5,715,365, 5,649,050, 5,630,011, 5,581,656, 5,517,511, 5,491,772, 5,247,579, 5,226,084 and 5,195,166.

Environmental Responsibilities



Tait Limited is an environmentally responsible company which supports waste minimization, material recovery and restrictions in the use of hazardous materials.

The European Union's Waste Electrical and Electronic Equipment (WEEE) Directive requires that this product be disposed of separately from the general waste stream when its service life is over. For more information about how to dispose of your unwanted Tait product, visit the Tait WEEE website at www.taitradio.com/weee. Please be environmentally responsible and dispose through the original supplier, or contact Tait Limited.

Tait Limited also complies with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive in the European Union.

In China, we comply with the Measures for Administration of the Pollution Control of Electronic Information Products. We will comply with environmental requirements in other markets as they are introduced.

Contents

1	Introduction	7
2	Configuration and Installation	9
	Files provided	9
	Edit the configuration file	10
	Software installation	13
	TB9100 CSS configuration	15
3	Troubleshooting	17
	Run the binary file	17
	Check the syslog	18
4	Sample Configuration	19
	MA3 8-site system	19

Preface

Scope of Manual

This manual describes how to install and configure the DTMF remote control software.

Document Conventions

“File > Open” means “click File on the menu bar, then click Open on the list of commands that pops up”. “Monitor > Module Details > Reciter” means “click the Monitor icon on the toolbar, then in the navigation pane find the Module Details group, and select Reciter from it”.

Within this manual, four types of alerts are given to the reader. The following paragraphs illustrate each type of alert and its associated symbol.



Warning This alert is used when there is a hazardous situation which, if not avoided, could result in death or serious injury.



Caution This alert is used when there is a hazardous situation which, if not avoided, could result in minor or moderate injury.

Notice This alert is used to highlight information that is required to ensure procedures are performed correctly. Incorrectly performed procedures could result in equipment damage or malfunction.



This icon is used to draw your attention to information that may improve your understanding of the equipment or procedure.

Associated Documentation

TB9100 Base Station Customer Service Software User's Manual (MBA-00003-xx).

Publication Record

Issue	Publication Date	Description
01	October 2013	First release.

1 Introduction

The DTMF remote control software runs on the TB9100 reciter and allows remote control of TB9100 base stations using DTMF tones. The software maps DTMF tone sequences to function codes in the TB9100 Customer Service Software (CSS) Task Manager. The mapping is defined in an .ini configuration file.

DTMF digits can be sent from a radio or dispatcher console. Matched sequences are acted on by any and all TB9100 base stations they are received by.

DTMF sequences of arbitrary length can be mapped to any of the 256 function codes. These are configured in Task Manger to control functions such as channel change, repeater operation, RF frequency and tone transmission.

The DTMF audio is sourced from the TB9100 receiver. The DTMF remote control only works for analog networks.

2 Configuration and Installation

Configuration and installation of the TB9100 DTMF remote control software is carried out by a PC connected to the same IP network as the TB9100 reciter. The TB9100 reciter must be configured using the TB9100 Customer Service Software (CSS) Task Manager.

Prior to installation, a configuration file is created for all DTMF-controlled base stations in a given system. The configuration file contains general DTMF decoder settings, a list of DTMF-controlled base stations, and the DTMF tone sequences to control functions for each base station. The same configuration file is used for all DTMF-controlled base stations in a system, simplifying the installation and support processes.

During installation, the network-connected PC will:

- download the DTMF remote control software to the TB9100 reciter,
- download the configuration file to the TB9100 reciter,
- update the TB9100 reciter to run the DTMF remote control software automatically.

When the installation is complete, the DTMF remote control software automatically starts. At startup, the DTMF remote control software loads the configuration file which contains general configuration items that applies to all DTMF-controlled base stations, and the specific configuration items that applies to each reciter.

The TB9100 reciter must be configured to be controlled by the TB9100 DTMF remote control software. The standard TB9100 CSS Task Manager is used. During configuration, Task Manager items are added to provide DTMF remote control of the required base station functions. This may include channel change, repeater and monitor functions as appropriate.

2.1 Files provided

The deployment zip file contains:

- DTMF remote control binary executable (3203Ax)
- an example configuration file (3203Ax.ini)
- a batch script (deploy.bat)
- a program for executing commands on a remote machine (plink.exe)
- a tool for transferring files securely between computers (pscp.exe).

Both plink.exe and pscp.exe are components of PuTTY; a free and open-source terminal emulator, serial console and network file transfer application.

PuTTY, including licensing information is available via <http://www.putty.org/>. PuTTY, PSCP and Plink use cryptography for secure communications and there may be restrictions in some countries.

2.2 Edit the configuration file

The configuration file is an .ini file stored in the directory `/etc/tait/3203Ax.ini` on the reciter. You can edit it there or edit the example file `3203Ax.ini` before deploying.

The configuration file is in the standard ini file format.

- The `[config]` section holds general items to change the behaviour of the software.
- The `[site map]` section maps IP addresses to sequence maps.
- sequence map sections, which set the DTMF to function code mapping for each individual DTMF-controlled base station in the system.

2.2.1 Syntax Rules

Comments start with `;`. Comments can be on the same line as valid content but the `;` must have a space before it.

Sections are specified like `[Section Name]` on a line of their own. All spaces with the brackets are included in the name.

Keys and values are separated with `=` or `!`. Neither of those characters are valid with a key name. The separators may have spaces around them.

2.2.2 `[config]` section - user configurable

Inter digit timeout This defines the maximum gap between two consecutive DTMF tones, in 100s of milliseconds. If no tone occurs in this period then any currently stored sequence is checked against the mapping and then cleared. Default setting is:

```
inter digit timeout = 20
```

Allow prefix Allow input of eg “123456” to match a sequence of “1234” if it is non-ambiguous (ie if there are no mappings for the sequences “12345” and “123456” defined). Only has an effect if “wait on match” is set. Default setting is:

```
allow prefix = true;
```

Here	<p>This defines the site name and overrides the 'site map' list for this basestation. The site name must correspond to one of the sequence maps defined in this configuration file. There is no default setting. Example of usage is:</p> <p>here = San Miguel Mtn</p>
Wait on match	<p>This determines whether DTMF sequences that match a defined sequence are acted on immediately, or wait until a sequence timeout occurs.</p> <p>If false, a received sequence that exactly matches a defined sequence, and it is not a substring of a longer sequence, will be acted on immediately.</p> <p>If true, then a matched sequence is acted on when the sequence timeout expires. This setting may reduce false positives due to long invalid sequences that have a valid prefix. Default setting is:</p> <p>wait on match = false</p>
Sequence timeout	<p>This timer starts when the first digit is recognized. The currently stored sequence is acted on and cleared when it expires. Default setting is disabled:</p> <p>sequence timeout = 0</p>

2.2.3 [config] section - advanced

Notice We recommend that you do not change these configuration items.

Stream source	<p>This defines where the DTMF decoder audio is sourced from.</p> <p>0=audio is sourced from the analog line,</p> <p>1=audio is sourced from the RF receiver. Audio sourced from the RF receiver contains more noise, uses more resources and is more susceptible to false positives. Default setting is:</p> <p>stream source = 0</p>
Nice_inc	<p>This defines the priority of DTMF decoder process within the TB9100 reciter. A higher value corresponds to a lower schedule priority. Default setting is:</p> <p>nice_inc = 10</p>

Samples_per_block	Audio samples per block. A block is the minimum window that the DTMF decoder looks for tones in. Increasing the samples per block will improve noise performance but will increase processor usage. Defaults to 102 (the sample rate is 8000Hz). If you are experiencing incorrectly repeated digits on a channel with a low SNR, this may be changed to 204. Default setting is: samples_per_block = 102
Filter_dialtone	Filter dialtones from the input before checking for DTMF digits. Default setting is: filter_dialtone = false
Twist / Reverse Twist	Change the acceptable twist in the received tones pairs. Default settings are: twist = 8 reverse_twist = 4
Threshold	The minimum acceptable tone level for detection, in dBm0. Default setting is: threshold = -42

2.2.4 [site map] section

The [site map] section contain a list of the TB9100 DTMF remote control base stations in the system. Each list entry contains the name of the TB9100 DTMF remote controlled base station and its IP address. The entries in the [site map] reference the individually defined sequence map for each TB9100 DTMF remote controlled base station.

Example [site map]

10.0.0.10 = San Miguel Mtn

10.0.0.11 = Lake San Marcos

192.168.6.3 = Test

2.2.5 Sequence map sections

These sections are used to define the DTMF to function code mapping for each individual TB9100 DTMF remote controlled base station in the system. They detail which received DTMF sequences generate which TB9100 function codes.

Each Sequence Map Section starts with the name of the TB9100 DTMF remote controlled base station, or base stations IP address. The base station name should correspond to the entries listed in the [site map] section.

Each entry in the sequence map contains DTMF sequences on the left and function codes which are sent to the Task Manager on the right.

Valid DTMF digits are 123456789ABCD*#.

Example

The following defines which DTMF sequences generate which TB9100 function codes for the “San Miguel Mtn” TB9100 reciter. It maps a DTMF sequence of “1051” to the function code “1” and so on:

```
[San Minguel Mtn]
1051=1 ;F1
1052=2 ;F2
1053=3 ;F3
1054=4 ;F4
1055=5 ;F5
1056=6 ;F6
1057=7 ;Repeat Enable
1058=8 ;Repeat Disable
TBC=9 ;Toggle Monitor
```

When the TB9100 DTMF remote control software is running on a reciter, only one such section is active at any one time. At startup the TB9100 DTMF control software reads the complete configuration file and determines which Sequence Map section applies to that reciter. There are three ways to tell the software which section to use, in order of precedence:

- “Set “here = San Miguel Mtn” in the [config] section to tell the software explicitly which section to use.
- “Set “10.0.0.10 = San Miguel Mtn” in the [site map] section to tell the software that it should use the section “San Miguel Mtn” if its IP address is “10.0.0.10”.
- “If neither of the previous two rules are matched then the software will look for a section with a name which matches its IP address (eg “10.0.0.10”).

See 'Sample Configuration' at the end of this document for a complete example.

2.3 Software installation

The batch file copies and installs the binary and configuration files to the base station. It also adds the binary to the startup routine and restarts the 3203Ax binary, if running.

1. Run the deploy.bat batch script by double-clicking or run from a command prompt. You must run from the existing directory.

When running from a command prompt, enter “deploy.bat /?” to see the list of arguments. The following optional arguments are available:

deploy.bat [--uninstall] [--fetch] [remote_host] [ssh_password]
where:

Batch file arguments

Argument	
--uninstall	Remove binary, config and startup directive.
--fetch	Fetch binary and configuration files to current directory, same names as on device so we don't overwrite example.ini.
remote_host	The IP or hostname of the target reciter. Will be prompted for name if not supplied.
ssh_password	For SSH access to the reciter. Will be prompted for if not supplied.

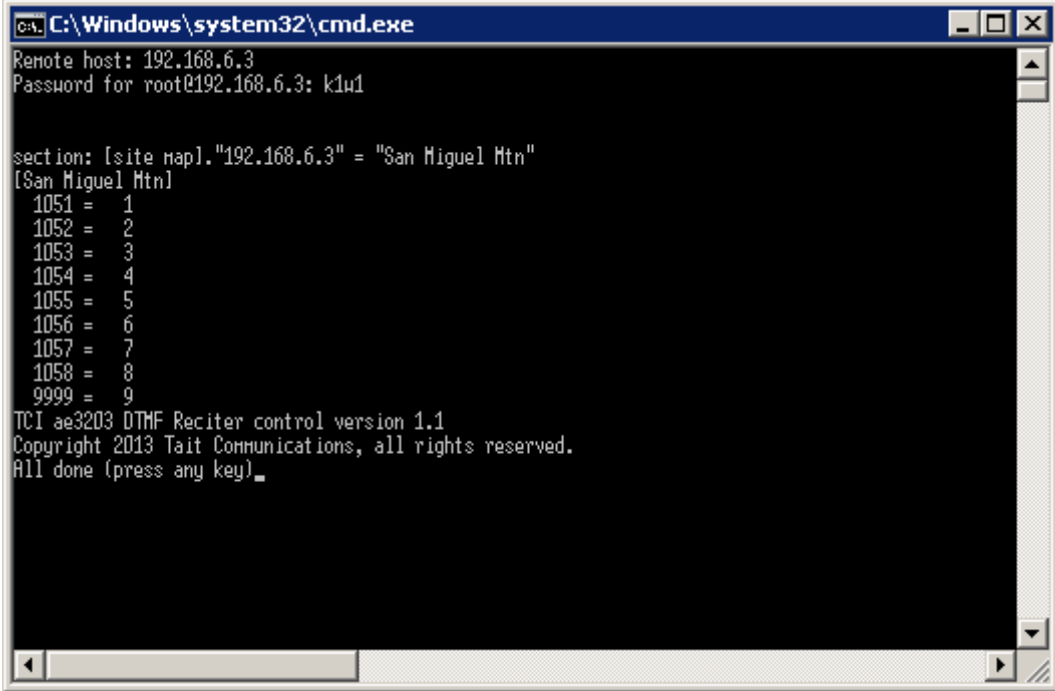
2. After the batch script is run, a command prompt window appears and asks you for the target reciter's IP address and password. The hostname can be used as an alternative to the IP address.
3. Enter the IP address or hostname, then password into the command line, in that order.
4. The batch script uses pscp to transfer the binary file and configuration file to the reciter. Then the binary file restarts.

5. If an error occurs, such as a fault in the configuration file prevents installation, a message is printed to the command prompt and to the system log. Refer to [Section 3 Troubleshooting](#).

If everything was installed without error, it prints out:

TCI ae3203 DTMF Reciter control version 1.1

Copyright 2013 Tait Communications, all rights reserved.



```
C:\Windows\system32\cmd.exe
Remote host: 192.168.6.3
Password for root@192.168.6.3: k1u1

section: [site map]. "192.168.6.3" = "San Miguel Mtn"
[San Miguel Mtn]
 1051 = 1
 1052 = 2
 1053 = 3
 1054 = 4
 1055 = 5
 1056 = 6
 1057 = 7
 1058 = 8
 9999 = 9
TCI ae3203 DTMF Reciter control version 1.1
Copyright 2013 Tait Communications, all rights reserved.
All done (press any key)_
```

2.4 TB9100 CSS configuration

The TB9100 requires configuration to operate with the TB9100 DTMF remote control software.

The TB9100 DTMF remote control software communicates with the T9100 reciter using network function codes. The TB9100 CSS Task Manager is used to configure what each function code does.

The TB9100 CSS warning of the use of network function codes for changing channel, enabling/disabling RF repeat, and monitor mode, do not apply to the DTMF remote control software. For DTMF remote control the UDP messages are sent from the DTMF remote control process to the reciter process, where both processes are run on the same processor. The UDP message are not sent across the IP network.

Task Manager configuration is outside the scope of this manual, however a sample Task Manager script is provided in the [Sample Configuration](#) section of this document. For Task Manager details, refer to the TB9100 Base Station Customer Service Software User's Manual (MBA-00003-xx).

3 Troubleshooting

This section describes what to do if operation is not proceeding as expected. An error in the configuration file should prevent deployment, otherwise you need to connect to the TB9100 reciter using SSH to debug the software in place.

3.1 Run the binary file

The binary is located in `/usr/bin/tait/3203Ax`. The binary can be run with command line options which may be useful for testing a configuration.

To run the 3203A8 software from command line, the 3203A8 process that was automatically started by the 3203A8 software was installed, may be stopped using the following steps:

1. Connect to the TB9100 reciter using an ssh client.
2. edit `/etc/inittab` and comment out the line `'null::respawn:/usr/bin/tait/3203A8'`.
3. restart the initialization process using `'init -q'` so that the previous `/etc/inittab` changes take effect.
4. Enter `'ps'` to list the running processes and find the PID (process identifier) for the 3203A8 software.
5. Use `kill <pid>`, where `<pid>` is the PID (process identifier) obtained in the previous step, to stop the 3203A8 process.
6. Once the 3203A8 process is stopped, the 3203A8 software can be run from command line using `./3203A8`.
7. Run the binary file with the `--help` argument to get an informative listing of accepted command line arguments. The most useful one is `-v` to increase the verbosity of debug message. You can use that argument a second time to increase the verbosity even more.

Command line arguments

Argument	
<code>-V</code>	version; print identifying information and exit
<code>-c file</code>	get configuration from <code>`file`</code> instead of <code>`/etc/tait/\$0.ini`</code>
<code>-v</code>	verbose; print active site mapping and sequence map at startup, print function tones as they are sent.

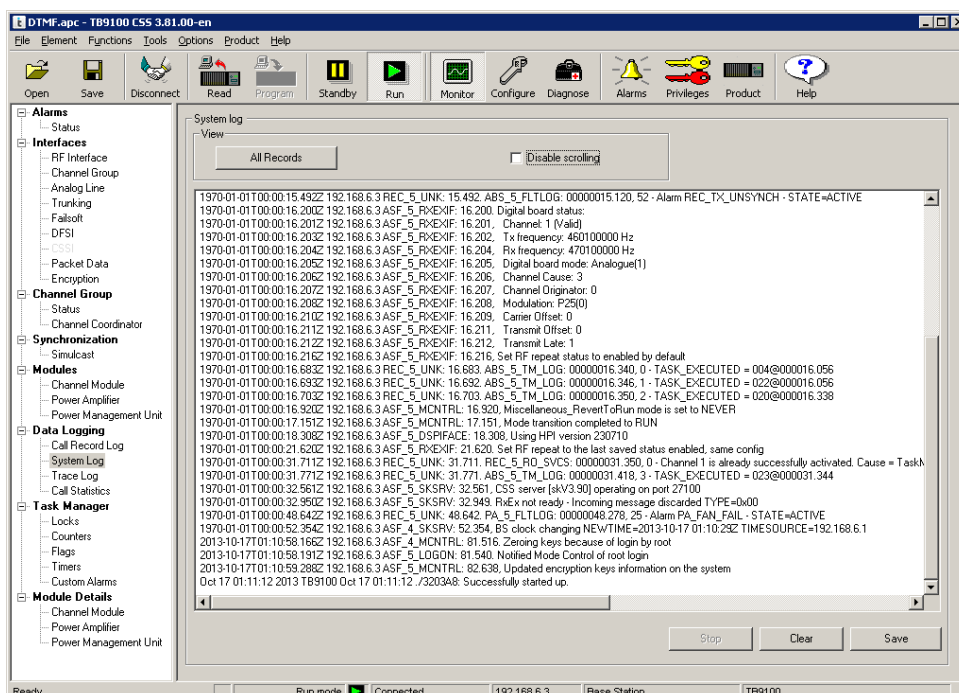
Argument	
-vv	very verbose; also print all DTMF tones as they are recognised, print config file entries as they are parsed
--dry-run	do <code>`-v`</code> but exit after parsing the config file
--dtmf ["sequence[...]"]	act on these (space separated) dtmf sequences, reads from stdin if no argument provided
--code ["num[...]"]	just forward these (space separated) function codes to the reciter task manager, doesn't do any config file parsing, reads from stdin if no argument
--stdout	print tones to stdout instead of sending the to the task manager
--stderr	as with <code>`--stdout`</code> but print to stderr

Debug messages are printed to the standard output. Errors are printed to the standard error and to the system log.

Multiple instances of the binary may run at once without issue, although you will get duplicate function codes sent to the Task Manager.

3.2 Check the syslog

After installation, check the syslog. The software prints to syslog on both fatal and non-fatal errors. You can view this in the “System Log” and “Trace Log” tabs of the monitor mode of the CSS. It has the name it was run with as a prefix in the log message, which in most cases will be `/usr/bin/taic/3203Ax`.



4 Sample Configuration

This section describes the TB9100 DTMF remote control configuration and TB9100 CSS configuration for an 8-site system.

4.1 MA3 8-site system

The Mutual Aid radio system 3 (MA3) operates across eight sites. The base stations at each site are individually controlled using unique 4-digit DTMF sequences.

The 4-digit DTMF sequence is used to:

- select the transmit and receive frequency,
- enable and disable repeater operation,
- toggle monitor on and off at each site.

4.1.1 MA3 DTMF sequences

	San Miguel Mtn	Lake San Marcos	Red Mtn	Monument Peak	Los Pinos Mtn	White Star	North Peak	Palomar Mtn
Repeat Enable	1057	2027	2047	3107	3127	3157	3217	3207
Repeat Disable	1058	2028	2048	3108	3128	3158	3218	3208
Select F1	1051	2021	2041	3101	3121	3151	3211	3201
Select F2	1052	2022	2042	3102	3122	3152	3212	3202
Select F3	1053	2023	2043	3103	3123	3153	3213	3203
Select F4	1054	2024	2044	3104	3124	3154	3214	3204
Select F5	1055	2025	2045	3105	3125	3155	3215	3205
Select F6	1056	2026	2046	3106	3126	3156	3216	3206
Toggle Monitor	9091	9092	9093	9094	9095	9096	9097	9098

All DTMF transmissions are 4-digits in length, with no additional digits at the start or end of the sequence. The dispatcher does not send DTMF tones. The dispatcher selects the channel by an EIA tone sequence.

A MA3 user can not control the MA3 base-stations that are out of range. The audio received at one MA3 site is not repeated at the other sites.

4.1.2 Sample 3208A8.ini configuration for the MA3 system

The following is a sample 3208A.ini configuration for the MA3 system. Most of the comments have been removed from the 3208A.ini to help readability. It is expected that the standard comments in the 3203A8.ini file will be retained to assist support staff that do not have ready access to this manual.

[config] ;default settings are used throughout. These have been included here for reference
;inter digit timeout = 20
;allow prefix = true;
;here = San Miguel Mtn
;wait on match = false
;sequence timeout = 0
;stream source = 0
;nice_inc = 10
;samples_per_block = 102
;filter_dialtone = false
;twist = 8
;reverse_twist = 4
;threshold = -42

[site map] 10.0.0.10 = San Miguel Mtn
10.0.0.11 = Lake San Marcos
10.0.0.12 = Red Mtn
10.0.0.13 = Monument Peak
10.0.0.14 = Los Pinos Mtn
10.0.0.15 = White Star
10.0.0.16 = North Peak
10.0.0.17 = Palomar Mtn

[San Miguel Mtn] 1051=1 ;F1
1052=2 ;F2
1053=3 ;F3
1054=4 ;F4
1055=5 ;F5
1056=6 ;F6
1057=7 ;Repeat Enable
1058=8 ;Repeat Disable
9091=9 ;Toggle Monitor

[Lake San Marcos] 2021=1 ;F1
2022=2 ;F2
2023=3 ;F3
2024=4 ;F4
2025=5 ;F5
2026=6 ;F6
2027=7 ;Repeat Enable

2028=8 ;Repeat Disable
9092=9 ;Toggle Monitor

[Red Mtn] 2041=1 ;F1
2042=2 ;F2
2043=3 ;F3
2044=4 ;F4
2045=5 ;F5
2046=6 ;F6
2047=7 ;Repeat Enable
2048=8 ;Repeat Disable
9093=9 ;Toggle Monitor

[Monument Peak] 3101=1 ;F1
3102=2 ;F2
3103=3 ;F3
3104=4 ;F4
3105=5 ;F5
3106=6 ;F6
3107=7 ;Repeat Enable
3108=8 ;Repeat Disable
9094=9 ;Toggle Monitor

[Los Pinos Mtn] 3121=1 ;F1
3122=2 ;F2
3123=3 ;F3
3124=4 ;F4
3125=5 ;F5
3126=6 ;F6
3127=7 ;Repeat Enable
3128=8 ;Repeat Disable
9095=9 ;Toggle Monitor

[White Star] 3151=1 ;F1
3152=2 ;F2
3153=3 ;F3
3154=4 ;F4
3155=5 ;F5
3156=6 ;F6
3157=7 ;Repeat Enable
3158=8 ;Repeat Disable
9096=9 ;Toggle Monitor

[North Peak] 3211=1 ;F1
3212=2 ;F2
3213=3 ;F3
3214=4 ;F4
3215=5 ;F5
3216=6 ;F6

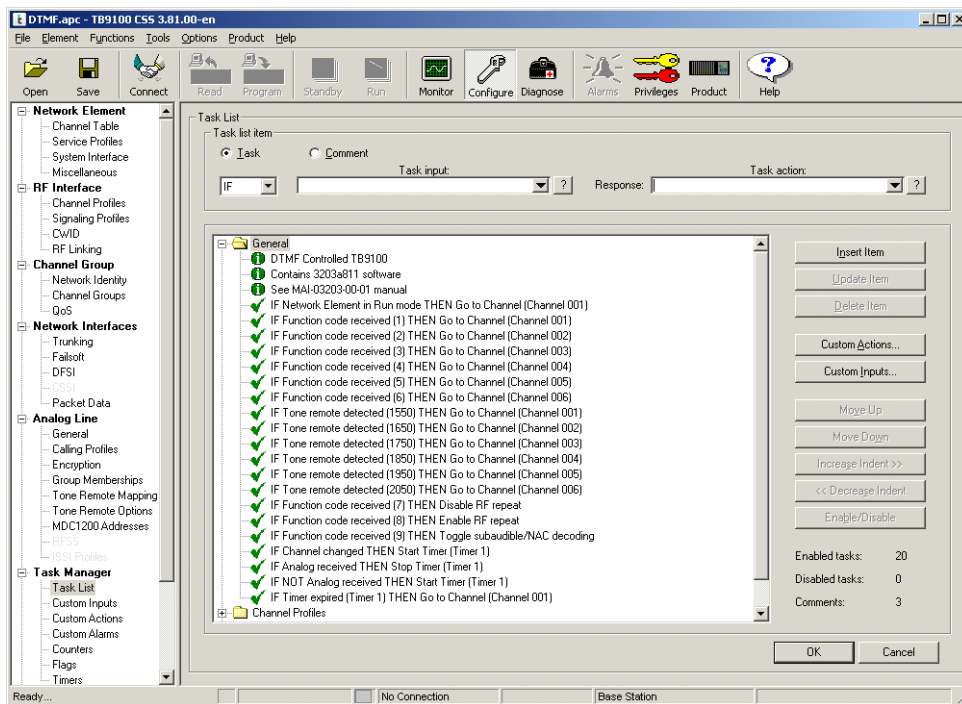
3217=7 ;Repeat Enable
 3218=8 ;Repeat Disable
 9097=9 ;Toggle Monitor

[Palomar Mtn]

3201=1 ;F1
 3202=2 ;F2
 3203=3 ;F3
 3204=4 ;F4
 3205=5 ;F5
 3206=6 ;F6
 3207=7 ;Repeat Enable
 3208=8 ;Repeat Disable
 9098=9 ;Toggle Monitor

4.1.3 Sample TB9100 Task Manager Script for the MA3 system

The following shows a sample Task Manager script to support the DTMF remote control.



This script contains the following sections:

- Comments
- Initialise TB9100
- Function code control of TB9100 channel
- Tone Remote control of TB9100 channel
- Function code control of TB9100 RF repeat
- Function code control of TB9100 monitor

■ Home channel reversion

This is explained below:

Comments

```
Comment: DTMF Controlled TB9100
Comment: Contains 3208a811 software
Comment See MAI-03203-00-01 manual
```

Comments are recommended for annotating the Task Manager Script. These comments will ensure that Support Staff are aware the base station supports DTMF decoding, and will aid system recovery.

Initialise TB9100

```
IF Network Element in Run mode THEN Go to Channel (Channel 001)
```

This is a default Task Manager item that ensures that the TB9100 goes to channel 1 when it starts up.

Function code control of TB9100 channel

```
IF Function code received (1) THEN Go to Channel (Channel 001)
IF Function code received (2) THEN Go to Channel (Channel 002)
IF Function code received (3) THEN Go to Channel (Channel 003)
IF Function code received (4) THEN Go to Channel (Channel 004)
IF Function code received (5) THEN Go to Channel (Channel 005)
IF Function code received (6) THEN Go to Channel (Channel 006)
```

These Task Manager lines cause the TB9100 to change to the appropriate channel when a function code is sent from the DTMF control software. The function code values correspond to received DTMF sequences as defined in the 3208A8.ini configuration file.

Tone Remote control of TB9100 channel

```
IF Tone remote detected (1550) THEN Go to Channel (Channel 001)
IF Tone remote detected (1650) THEN Go to Channel (Channel 002)
IF Tone remote detected (1750) THEN Go to Channel (Channel 003)
IF Tone remote detected (1850) THEN Go to Channel (Channel 004)
IF Tone remote detected (1950) THEN Go to Channel (Channel 005)
IF Tone remote detected (2050) THEN Go to Channel (Channel 006)
```

A requirement of the MA3 system is that the TB9100 channel selection is controlled by DTMF sequence, or from EIA tones from the dispatcher console. These Task Manager lines cause the TB9100 to change to the appropriate channel when EIA tone remote is sent from the line connected dispatcher console

Function code control of TB9100 RF repeat

```
IF Function code received (7) THEN Disable RF repeat
IF Function code received (8) THEN Disable RF repeat
```

A requirement of the MA3 system is that the TB9100 RF repeat is controlled by DTMF sequence.

In the CSS > Channel Table, the RF Repeat column should be set to 'DispatchControlled'

Function code control of TB9100 monitor

```
IF Function code received (9) THEN Toggle subaudible/NAC decoding
```

A requirement of the MA3 system is that the TB9100 monitor is controlled by DTMF sequence.

In the TB9100 the monitor mode disables the analog lines selective squelch and NAC, CTCSS and DCS filters. Monitor mode has no impact of the reciters RF repeat function.

For this application the TB9100 Subaudible/NAC decode lock is used instead of the TB9100 monitor mode, as this can be used to toggle whether or not signals are repeated based on selective squelch, NAC, CTCSS and DCS signals.

Home channel reversion

```
IF Channel changed THEN Start Timer (Timer 1)
IF Analog received THEN Stop Timer (Timer 1)
IF NOT Analog received THEN Start Timer (Timer 1)
IF Timer expired (Timer 1) THEN Go to Channel (Channel 001)
```

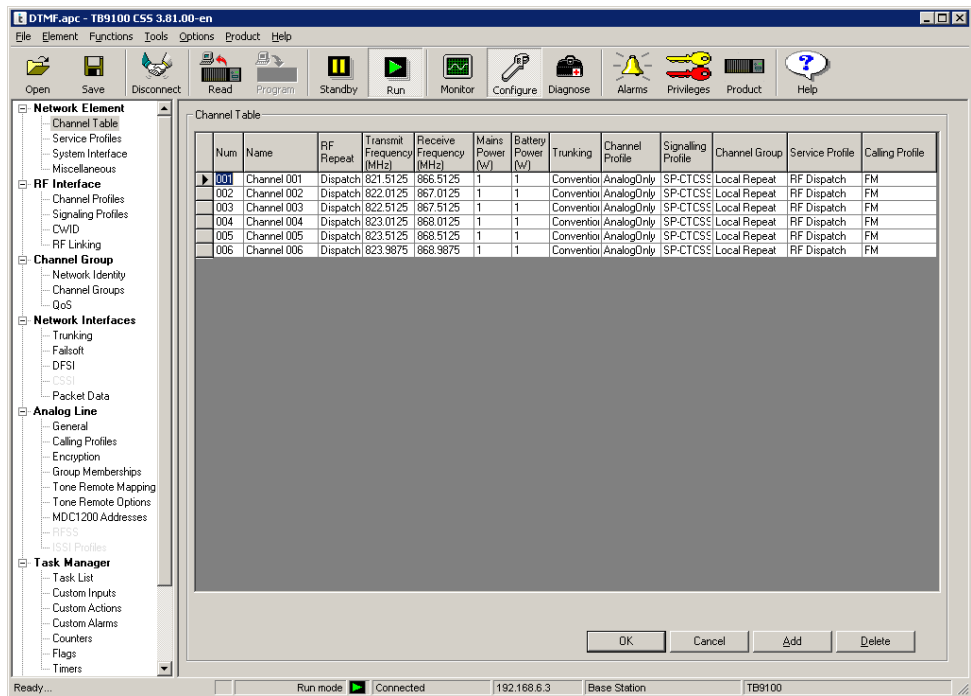
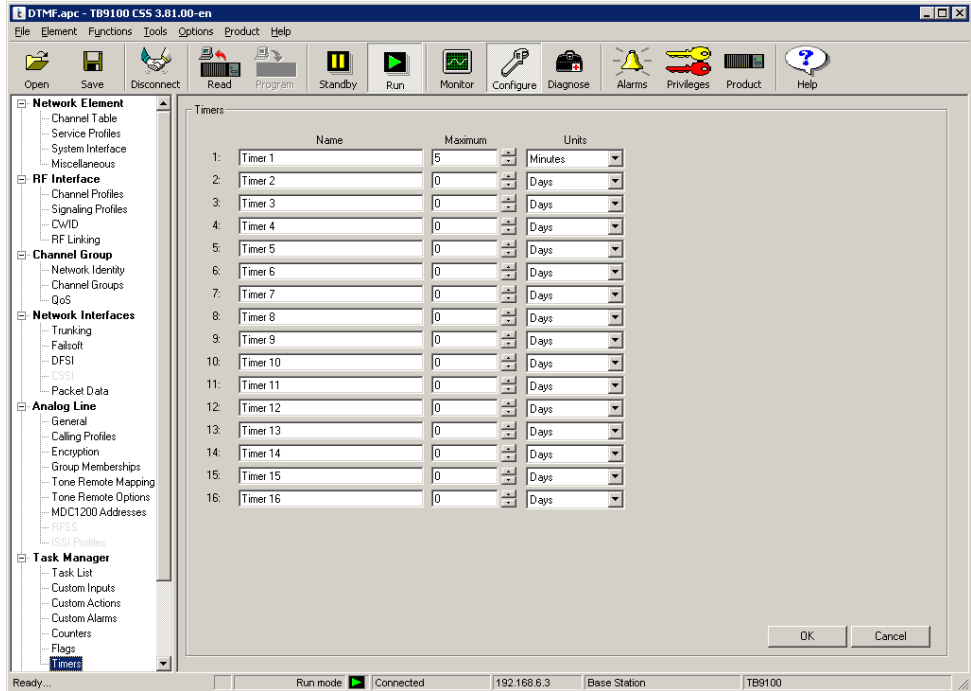
A requirement of the MA3 system is that the DTMF-controlled channel change reverts to a 'Home Channel' after a period of inactivity. These Task Manager entries use a programmable timer to provide the required behavior. The programmable timer is configured on the CSS > Configure > Task Manager > Timers page.

4.1.4 MA3 transmit and receive frequency pairs

Six frequency pairs can be selected using the DTMF sequences:

MA3 Frequencies	Transmit (MHz)	Receive (MHz)
F1 - ITAC1	821.5125	866.5125
F2 - ITAC2	822.0125	867.0125
F3 - ITAC3	822.5125	867.5125
F4 - ITAC4	823.0125	868.0125
F5 - CLEMARS	823.5125	868.5125
F6 - FIREMARS	823.9875	868.9875

These are defined in the CSS Channel Table.



Tait Software License Agreement

This Software License Agreement ("Agreement") is between you ("Licensee") and Tait Limited ("Tait").

By using any of the Software items embedded and pre-loaded in the related Tait Designated Product, included on CD, downloaded from the Tait website, or provided in any other form, you agree to be bound by the terms of this Agreement. If you do not agree to the terms of this Agreement, do not install or use any of the Software. If you install or use any of the Software, that will be deemed to be acceptance of the terms of this Agreement.

For good and valuable consideration, the parties agree as follows:

Section 1 DEFINITIONS

"Confidential Information" means all or any information supplied to or received by Licensee from Tait, whether before or after installation or use and whether directly or indirectly pertaining to the Software and Documentation supplied by Tait, including without limitation all information relating to the Designated Products, hardware, software; copyright, design registrations, trademarks; operations, processes, and related business affairs of Tait; and including any other goods or property supplied by Tait to Licensee pursuant to the terms of this Agreement.

"Designated Products" means products provided by Tait to Licensee with which or for which the Software and Documentation is licensed for use.

"Documentation" means product and software documentation that specifies technical and performance features and capabilities; user, operation, and training manuals for the Software; and all physical or electronic media upon which such information is provided.

"Executable Code" means Software in a form that can be run in a computer and typically refers to machine language, which is comprised of native instructions the computer carries out in hardware. Executable code may also refer to programs written in interpreted languages that require additional software to actually execute.

"Intellectual Property Rights" and **"Intellectual Property"** mean the following or their substantial equivalents or counterparts, recognized by or through action before any governmental authority in any jurisdiction throughout the world and including, but not limited to all rights in patents, patent applications, inventions, copyrights, trademarks, trade secrets, trade names, and other proprietary rights in or relating to the Software and Documentation; including any adaptations, corrections, de-compilations, disassemblies, emulations, enhancements fixes, modifications, translations and updates to or derivative works from, the Software or Documentation, whether made by Tait or another party, or any

improvements that result from Tait processes or provision of information services.

"Licensee" means any individual or entity that has accepted the terms of this License.

"Open Source Software" means software with freely obtainable source code and license for modification, or permission for free distribution.

"Open Source Software License" means the terms or conditions under which the Open Source Software is licensed.

"Person" means any individual, partnership, corporation, association, joint stock company, trust, joint venture, limited liability company, governmental authority, sole proprietorship, or other form of legal entity recognized by a governmental authority.

"Security Vulnerability" means any flaw or weakness in system security procedures, design, implementation, or internal controls that if exercised (accidentally triggered or intentionally exploited) could result in a security breach such that data is compromised, manipulated, or stolen, or a system is damaged.

"Software" (i) means proprietary software in executable code format, and adaptations, translations, de-compilations, disassemblies, emulations, or derivative works of such software; (ii) means any modifications, enhancements, new versions and new releases of the software provided by Tait; and (iii) may contain one or more items of software owned by a third-party supplier. The term "Software" does not include any third-party software provided under separate license or not licensable under the terms of this Agreement.

"Source Code" means software expressed in human readable language necessary for understanding, maintaining, modifying, correcting, and enhancing any software referred to in this Agreement and includes all states of that software prior to its compilation into an executable programme.

"Tait" means Tait Limited and includes its Affiliates.

Section 2 SCOPE

This Agreement contains the terms and conditions of the license Tait is providing to Licensee, and of Licensee's use of the Software and Documentation. Tait and Licensee enter into this Agreement in connection with Tait delivery of certain proprietary Software and/or products containing embedded or pre-loaded proprietary Software.

Section 3 GRANT OF LICENSE

3.1. Subject to the provisions of this Agreement and the payment of applicable license fees, Tait grants to Licensee a personal, limited, non-transferable (except as permitted in Section 7), and non-exclusive license to use the Software in executable code form, and the Documentation,

solely in connection with Licensee's use of the Designated Products for the useful life of the Designated Products. This Agreement does not grant any rights to source code.

3.2. If the Software licensed under this Agreement contains or is derived from Open Source Software, the terms and conditions governing the use of such Open Source Software are in the Open Source Software Licenses of the copyright owner and not in this Agreement. If there is a conflict between the terms and conditions of this Agreement and the terms and conditions of the any applicable Open Source Software Licenses, the terms and conditions of the Open Source Software Licenses will take precedence. For information about Open Source Components contained in Tait products and the related Open Source licenses, see:

<http://support.taitradio.com/go/opensource>

Section 4 LIMITATIONS ON USE

4.1. Licensee may use the Software only for Licensee's internal business purposes and only in accordance with the Documentation. Any other use of the Software is strictly prohibited. Without limiting the general nature of these restrictions, Licensee will not make the Software available for use by third parties on a "time sharing," "application service provider," "service bureau" basis, or for any other similar commercial rental or sharing arrangement.

4.2. Licensee will not, and will not directly or indirectly allow or enable any third party to: (i) reverse engineer, disassemble, extract components, decompile, reprogram, or otherwise reduce the Software or any portion thereof to a human perceptible form or otherwise attempt to recreate the source code; (ii) modify, adapt, create derivative works of, or merge the Software; (iii) copy, reproduce, distribute, lend, or lease the Software or Documentation to any third party; (iv) grant any sublicense or other rights in the Software or Documentation to any third party; (v) take any action that would cause the Software or Documentation to be placed in the public domain; (vi) remove, or in any way alter or obscure any copyright notice or other notice of Tait or third-party licensor's proprietary rights; (vii) provide, copy, transmit, disclose, divulge or make the Software or Documentation available to, or permit the use of the Software by, any third party or on any machine except as expressly authorized by this Agreement; or (viii) use, or permit the use of, the Software in a manner that would result in the production of a copy of the Software by any means whatsoever other than what is permitted in this Agreement. Licensee may make one copy of the Software to be used solely for archival, back-up, or disaster recovery purposes; provided that Licensee may not operate that copy of the Software at the same time as the original Software is being operated. Licensee may make as many copies of the Documentation as it may reasonably require for the internal use of the Software.

4.3. Unless otherwise authorized by Tait in writing, Licensee will not, and will not enable or allow any third party to: (i) install a copy of the

Software on more than one unit of a Designated Product; or (ii) copy or transfer Software installed on one unit of a Designated Product to any other device. Licensee may temporarily transfer Software installed on a Designated Product to another device if the Designated Product is inoperable or malfunctioning. Temporary transfer of the Software to another device must be discontinued when the original Designated Product is returned to operation and the Software must be removed from the other device.

4.4. Licensee will maintain, during the term of this Agreement and for a period of two years thereafter, accurate records relating to this license grant to verify compliance with this Agreement. Tait, or a third party nominated by Tait, may inspect Licensee's premises, books and records, upon reasonable prior notice to Licensee, during Licensee's normal business hours and subject to Licensee's facility and security regulations. Tait is responsible for the payment of all expenses and costs of the inspection, provided that Licensee shall indemnify Tait for all costs (including audit costs and legal costs on a solicitor client basis) if Licensee has breached the terms of this Agreement. Any information obtained by Tait during the course of the inspection will be kept in strict confidence by Tait and used solely for the purpose of verifying Licensee's compliance with the terms of this Agreement.

Section 5 OWNERSHIP AND TITLE

Tait, its licensors, and its suppliers retain all of their Intellectual Property Rights in and to the Software and Documentation, in any form. No rights are granted to Licensee under this Agreement by implication, estoppel or otherwise, except for those rights which are expressly granted to Licensee in this Agreement. All Intellectual Property developed, originated, or prepared by Tait in connection with providing the Software, Designated Products, Documentation, or related services, remains vested exclusively in Tait, and Licensee will not have any shared development or other Intellectual Property Rights.

Section 6 LIMITED WARRANTY; DISCLAIMER OF WARRANTY

6.1. The commencement date and the term of the Software warranty will be a period of one (1) year from Tait shipment of the Software. If Licensee is not in breach of any obligations under this Agreement, Tait warrants that the unmodified Software, when used properly and in accordance with the Documentation and this Agreement, will be free from a reproducible defect that eliminates the functionality or successful operation of a feature critical to the primary functionality or successful operation of the Software. Whether a defect has occurred will be determined solely by Tait. Tait does not warrant that Licensee's use of the Software or the Designated Products will be uninterrupted, error-free, completely free of Security Vulnerabilities, or that the Software or the Designated Products will meet Licensee's particular requirements. Tait

makes no representations or warranties with respect to any third-party software included in the Software.

6.2 Tait sole obligation to Licensee, and Licensee's exclusive remedy under this warranty, is to use reasonable efforts to remedy any material Software defect covered by this warranty. These efforts will involve either replacing the media or attempting to correct significant, demonstrable program or documentation errors or Security Vulnerabilities. If Tait cannot correct the defect within a reasonable time, then at Tait option, Tait will replace the defective Software with functionally equivalent Software, license to Licensee substitute Software which will accomplish the same objective, or terminate the license and refund Licensee's paid license fee. If Tait investigation of the perceived defect reveals that no such defect in fact exists, Tait may recover its costs in respect of such investigation from Licensee.

6.3. Tait disclaims any and all other warranties relating to the Software or Documentation other than the express warranties set forth in this Section 6. Warranties in Section 6 are in lieu of all other warranties whether express or implied, oral or written, and including without limitation any and all implied warranties of condition, title, non-infringement, merchantability, or fitness for a particular purpose or use by Licensee (whether Tait knows, has reason to know, has been advised of, or is otherwise aware of any such purpose or use), whether arising by law, by reason of custom or usage of trade, or by course of dealing. In addition, Tait disclaims any warranty to any person other than Licensee with respect to the Software or Documentation.

Section 7 TRANSFERS

7.1. Licensee will not transfer the Software or Documentation to any third party without specific prior written consent from Tait. Tait may withhold such consent or at its own discretion make the consent conditional upon the transferee paying applicable license fees and agreeing to be bound by this Agreement.

7.2. In the case of a value-added reseller or distributor of Tait Designated Products, the consent referred to in Section 7.1 may be contained in a Tait Reseller or Tait Distributor Agreement.

7.3. If the Designated Products are Tait vehicle-mounted mobile products or hand-carried portable radio products and Licensee transfers ownership of the Tait mobile or portable radio products to a third party, Licensee may assign its right to use the Software which is embedded in or furnished for use with the radio products and the related Documentation; provided that Licensee transfers all copies of the Software and Documentation to the transferee.

7.4. For the avoidance of any doubt, Section 7.3 excludes TaitNet Infrastructure, or the products listed at any time under network products at: <http://www.taitradio.com>.

7.5. If Licensee, as a contractor or subcontractor (integrator), is purchasing Tait Designated Products and licensing Software not for its own internal use but for end use only by a Customer, the

Licensee may transfer such Software, but only if a) Licensee transfers all copies of such Software and the related Documentation to the transferee and b) Licensee has first obtained from its Customer (and, if Licensee is acting as a subcontractor, from the interim transferee(s) and from the ultimate end user sub license) an enforceable sublicense agreement that prohibits any other transfer and that contains restrictions substantially identical to the terms set forth in this Software License Agreement. Except as stated in the foregoing, Licensee and any transferee(s) authorized by this Section may not otherwise transfer or make available any Tait Software to any third party nor permit any party to do so. Licensee will, on request, make available evidence reasonably satisfactory to Tait demonstrating compliance with all the foregoing.

Section 8 TERM AND TERMINATION

8.1. Licensee's right to use the Software and Documentation will commence when the Designated Products are supplied by Tait to Licensee and will continue for the life of the Designated Products with which or for which the Software and Documentation are supplied, unless Licensee breaches this Agreement, in which case this Agreement and Licensee's right to use the Software and Documentation may be terminated immediately upon notice by Tait.

8.2. Within thirty (30) days after termination of this Agreement, Licensee must certify in writing to Tait that all copies of the Software have been removed or deleted from the Designated Products and that all copies of the Software and Documentation have been returned to Tait or destroyed by Licensee and are no longer in use by Licensee.

8.3. Licensee acknowledges that Tait made a considerable investment of resources in the development, marketing, and distribution of the Software and Documentation and that Licensee's breach of this Agreement will result in irreparable harm to Tait for which monetary damages would be inadequate. If Licensee breaches this Agreement, Tait may terminate this Agreement and be entitled to all available remedies at law or in equity including immediate injunctive relief and repossession of all non-embedded Software and associated Documentation. Licensee shall pay all Tait costs (on an indemnity basis) for the enforcement of the terms of this Agreement.

Section 9 CONFIDENTIALITY

Licensee acknowledges that the Software and Documentation contain proprietary and Confidential Information valuable to Tait and are Tait trade secrets, and Licensee agrees to respect the confidentiality of the information contained in the Software and Documentation.

Section 10 LIMITATION OF LIABILITY

10.1. In no circumstances shall Tait be under any liability to Licensee, or any other person whatsoever, whether in Tort (including negligence), Contract (except as expressly provided in this Agreement), Equity, under any Statute, or otherwise at law for any losses or damages whether general, special, exemplary, punitive, direct,

indirect, or consequential arising out of or in connection with any use or inability of using the Software.

10.2. Licensee's sole remedy against Tait will be limited to breach of contract and Tait sole and total liability for any such claim shall be limited at the option of Tait to the repair or replacement of the Software or the refund of the purchase price of the Software.

Section 11 GENERAL

11.1. **COPYRIGHT NOTICES.** The existence of a copyright notice on the Software will not be construed as an admission or presumption of publication of the Software or public disclosure of any trade secrets associated with the Software.

11.2. **COMPLIANCE WITH LAWS.** Licensee acknowledges that the Software may be subject to the laws and regulations of the jurisdiction covering the supply of the Designated Products and will comply with all applicable laws and regulations, including export laws and regulations, of that country.

11.3. **ASSIGNMENTS AND SUBCONTRACTING.** Tait may assign its rights or subcontract its obligations under this Agreement, or encumber or sell its rights in any Software, without prior notice to, or consent of, Licensee.

11.4. **GOVERNING LAW.** This Agreement shall be subject to and construed in accordance with New Zealand law and disputes between the parties concerning the provisions hereof shall be determined by the New Zealand Courts of Law. Provided however Tait may at its election bring proceedings for breach of the terms hereof or for the enforcement of any judgment in relation to a breach of the terms hereof in any jurisdiction Tait considers fit for the purpose of ensuring compliance with the terms hereof or obtaining relief for breach of the terms hereof.

11.5. **THIRD-PARTY BENEFICIARIES.** This Agreement is entered into solely for the benefit of Tait and Licensee. No third party has the right to make any claim or assert any right under this Agreement, and no third party is deemed a beneficiary of this Agreement. Notwithstanding the foregoing, any licensor or supplier of third-party software included in the Software will be a direct and intended third-party beneficiary of this Agreement.

11.6. **SURVIVAL.** Sections 4, 5, 6.3, 7, 8, 9, 10, and 11 survive the termination of this Agreement.

11.7. **ORDER OF PRECEDENCE.** In the event of inconsistencies between this Agreement and any other Agreement between the parties, the parties agree that, with respect to the specific subject matter of this Agreement, this Agreement prevails.

11.8. **SECURITY.** Tait uses reasonable means in the design and writing of its own Software and the acquisition of third-party Software in order to limit Security Vulnerabilities. While no software can be guaranteed to be free from Security Vulnerabilities, if a Security Vulnerability is discovered, Tait will take the steps specified in Section 6 of this Agreement.

11.9. **EXPORT.** Licensee will not transfer,

directly or indirectly, any Designated Product, Documentation or Software furnished hereunder or the direct product of such Documentation or Software to any country for which New Zealand or any other applicable country requires an export license or other governmental approval without first obtaining such license or approval.

11.10. **SEVERABILITY.** In the event that any part or parts of this Agreement shall be held illegal or null and void by any court or administrative body of competent jurisdiction, such determination shall not affect the remaining terms which shall remain in full force and effect as if such part or parts held to be illegal or void had not been included in this Agreement. Tait may replace the invalid or unenforceable provision with a valid and enforceable provision that achieves the original intent and economic effect of this Agreement.

11.11. **CONSUMER GUARANTEES.** Licensee acknowledges that the licenses supplied in terms of this agreement are supplied to Licensee in business, and that the guarantees and other provisions of prevailing consumer protection legislation shall not apply.

11.12. **WHOLE AGREEMENT.** Licensee acknowledges that it has read this Agreement, understands it and agrees to be bound by its terms and conditions. Licensee also agrees that, subject only to the express terms of any other agreement between Tait and Licensee to the contrary, this is the complete and exclusive statement of the Agreement between it and Tait in relation to the Software. This Agreement supersedes any proposal or prior agreement, oral or written, and any other communications between Licensee and Tait relating to the Software and the Designated Products.