Technical Support

TECHNICAL NOTE

Technical Note TN-887-AN

TM8100 Cross-Band Operation

28th June 2004

Applicability

This technical note explains how to configure two TM8100 radios for Audio Linking operation either as Back-to-Back or Cross-Band Repeater.

1. Introduction

What is Cross-Band repeating

Back to Back or Cross-band repeating provides a relatively inexpensive means for extending the range of a system and to the terminals used.

A repeater allows stations to communicate that ordinarily would not be able to do so because of the frequencies used and the distance or terrain between them. This is also the case with back-to-back or cross-band repeating.

A cross-band repeater is similar in function to a standard repeater, but for the different frequencies used. Voice signals that one TM8100 receives on its input frequency are automatically retransmitted on the other TM8100's output frequency.

This can provide simplex to simplex linking or repeater to simplex. It can not easily provide repeater to repeater linking as it does not have the repeater tail lockout feature.

What is Back-to-Back?

Back-to-back literally means having two radio units audio lines connected together. Radio A's receiver keys radio B's transmitter and vice versa. A normal back-to back repeater usually uses frequencies within the same band. A Cross-Band back to back repeater uses frequencies in different bands (eg. UHF to VHF)

Things to consider

If you are unfamiliar with how repeater setups are installed and how they operate, the points below will help guide you in the right direction.

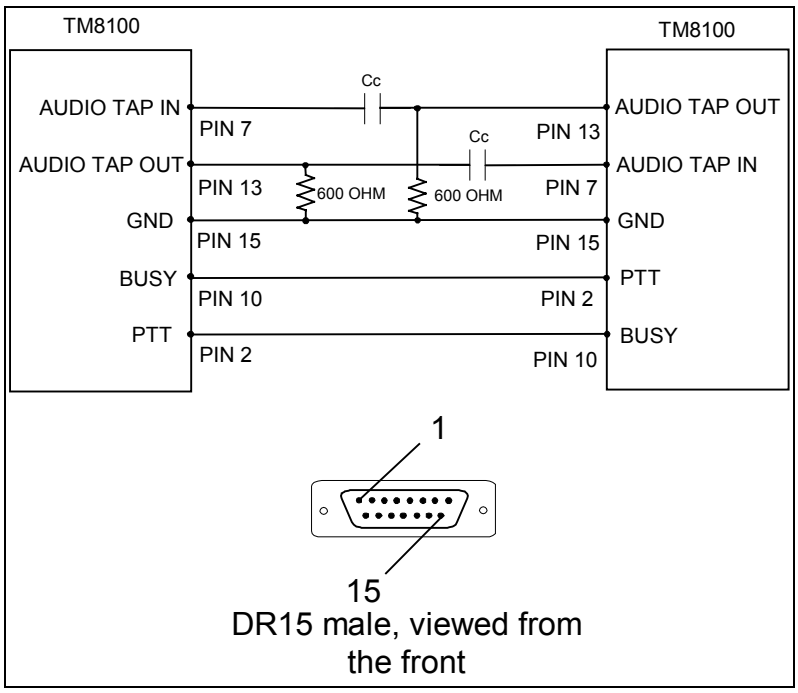
- Antenna separation: How far to separate the antennas
- Notch Filtering: Is it required?
- Tail Time / Delay: Critical for repeater linking

Tait Electronics Limited
PO Box 1645, Christchurch, New Zealand
Telephone: +64–3–358–3399
Facsimile: +64–3–358–3903
support.taitworld.com

2. Instructions

Configuring the Cross-Band Interconnect Cable

Configure the Cross-Band interconnect cable as indicated in the diagram below.



For voice applications the value of Cc should be at least 100ηF.
For high-speed (base band) data applications then the recommended value for Cc is 4.7μF. The capacitor needs to be non-polarised.

The simplest way to create a 600-Ohm resister is by using two 1k2Ω resistors in parallel.

The resistor and capacitor can be mounted inside each DB-15 plug.

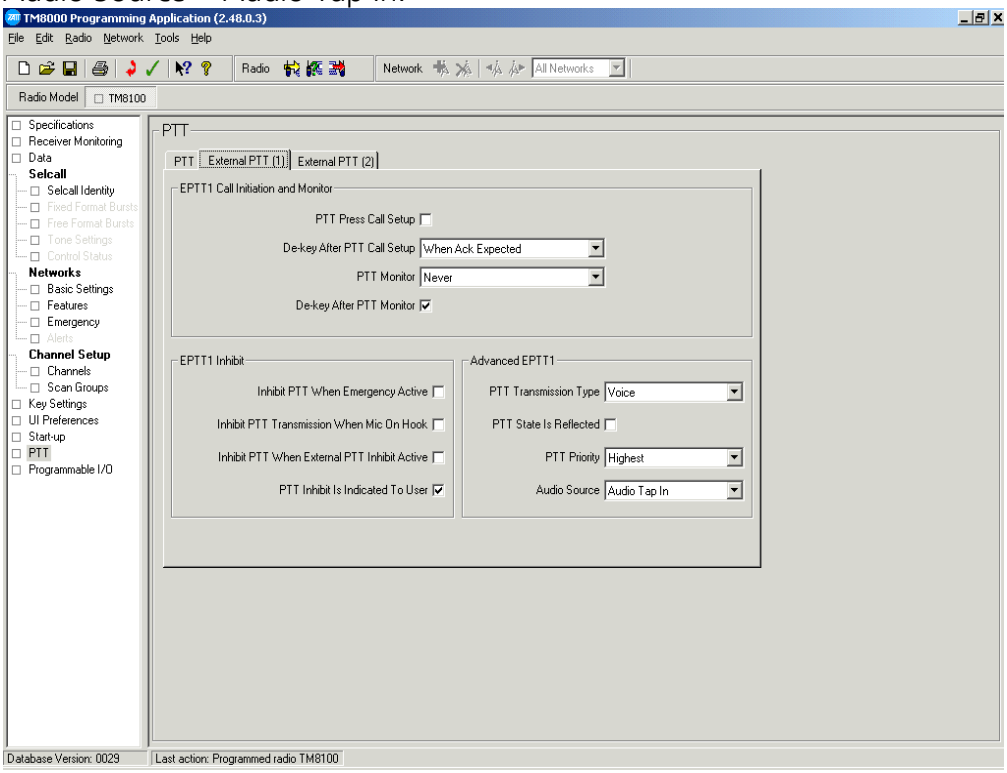
Tait Electronics Limited Telephone: +64–3–358–3399
PO Box 1645, Christchurch, New Zealand Facsimile: +64–3–358–3903
support.taitworld.com

3. Radio Programming Requirements

Instructions After defining the Tx / Rx parameters, the settings below need to be programmed into both radios to enable cross-band operation.

PTT: External PTT 1

PTT Transmission Type = Voice.
PTT Priority = Highest *(PTT or EPTT(2) priority may need changing)*
Audio Source = Audio Tap In.

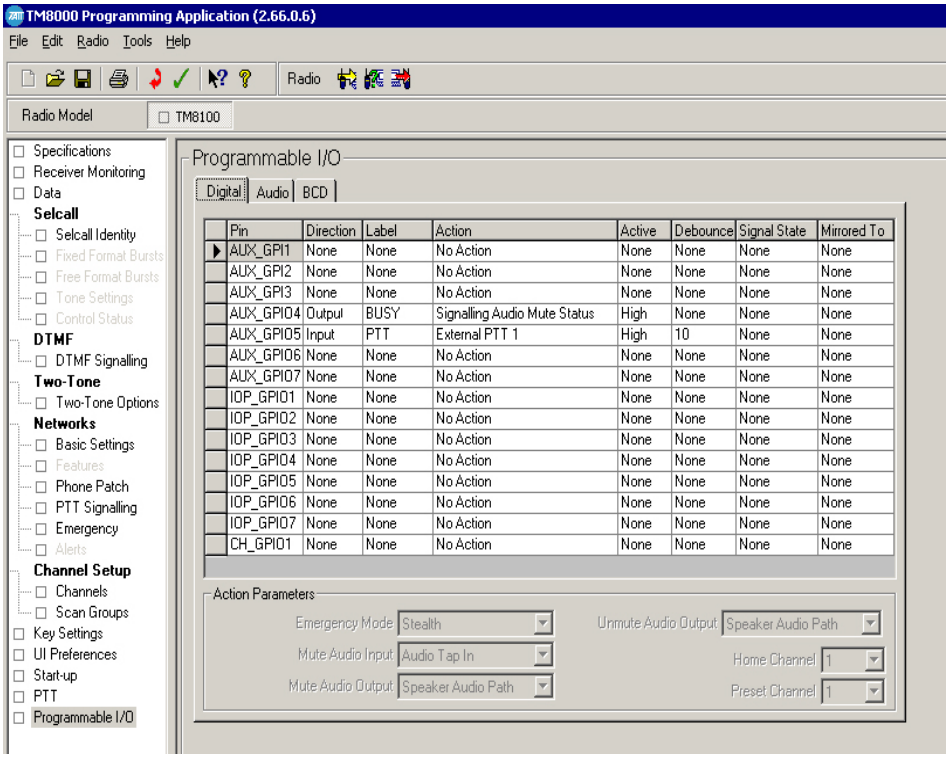


Tait Electronics Limited Telephone: +64–3–358–3399
PO Box 1645, Christchurch, New Zealand Facsimile: +64–3–358–3903
support.taitworld.com

Programmable I/O = Digital I/O Settings

	AUX_GPI04	AUX_GPI05
Direction	Output	Input
Label	Busy / Rx Gate	PTT
Action	Signalling Audio Mute Status	External PTT 1
Active	Active High	Active High
Debounce	NONE	10
Signal State	Momentary	None
Mirrored To	None	None

Programming instructions (cont)

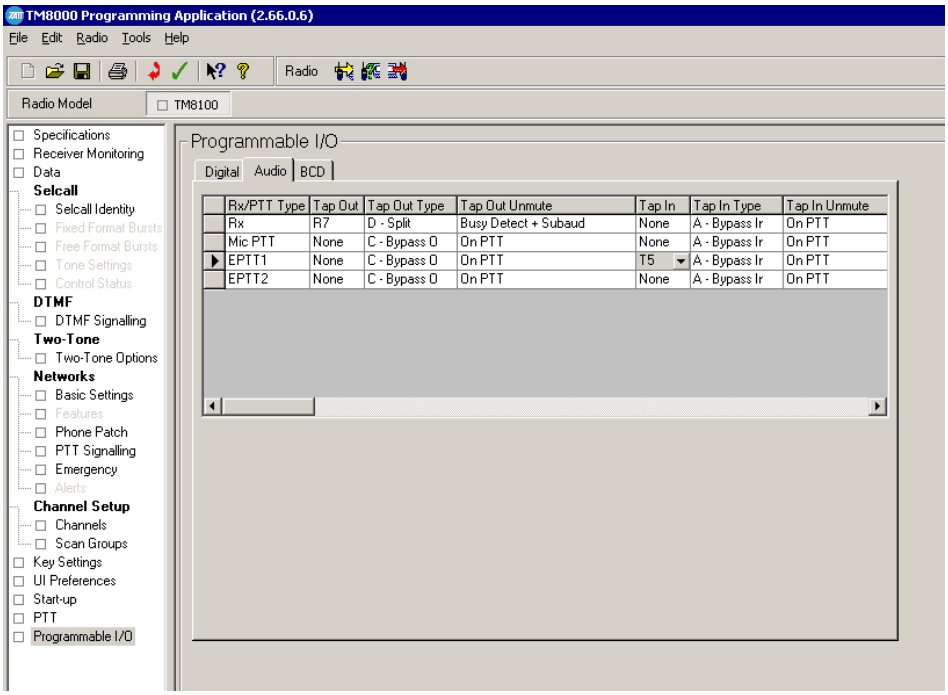


Tait Electronics Limited
PO Box 1645, Christchurch, New Zealand
Telephone: +64–3–358–3399
Facsimile: +64–3–358–3903
support.taitworld.com

Audio I/O Settings

Rx/PTT Type	RX	EPTT1
Tap in	None	T5
Tap in Type	A - Bypass In	A - Bypass In
Tap in Unmute	On PTT	On PTT
Tap Out	R7	None
Tap Out Type	D – Split	C - Bypass Out
Tap Out Unmute	Busy Detect + Subaudible	On PTT

Programming Instructions (cont)



Cross-Band Operation Testing

1. Inject into the receiving radio an on-channel RF signal of –70dBm with a 1 kHz tone and the deviation set to either 3 kHz Wide Band or 1.5 kHz Narrow Band.

2. The transmit deviation on the other radio should be 3 kHz (+/- 200Hz) Wide Band or 1.5 kHz (+/- 200 Hz) Narrow Band.

Tait Electronics Limited
PO Box 1645, Christchurch, New Zealand
Telephone: +64–3–358–3399
Facsimile: +64–3–358–3903
support.taitworld.com

Compliance Issues	If the link is a fixed site, RF compliance may need to be obtained and / or monies to be paid to regulatory bodies.
CSO Instruction	Please pass this information onto the field support technicians, technical support engineers and appropriate dealers.

3. Issuing Authority

Name and Position of Issuing Officer	Barry Crates Technical Support Team Leader - Terminals
Confidentiality	Confidential – This message or document contains proprietary information intended only for the person(s) or organisation(s) to whom it is addressed. All Recipients are legally obliged to not disclose Tait technological or business information to any persons or organisations without the written permission of Tait.
Distribution Level	Tait Only, Accredited Service Centre System Integrator, Accredited Service Centre and System Integrator
Document History	Original Release - **TN-NSC078** January 2004 BP Modified to TEL TN format for publishing to global audience. 28 June 2004 BLC

Tait Electronics Limited Telephone: +64–3–358–3399
PO Box 1645, Christchurch, New Zealand Facsimile: +64–3–358–3903
support.taitworld.com