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**TB9100** base station  
and analog gateway

## Release Notes



Base station version 2.04  
TN-1109-SR  
19 December 2005

This technical note contains information to accompany the version 2.04 release of the TB9100 base station and analog gateway.

# 1 What's New in This Release

The TB9100 Base Station version 2.04 and its equivalent analog gateway incorporates the following improvements:

## **Analog gateway option with encryption support**

An analog gateway is now available for connecting analog dispatcher equipment to a network of Tait TB9100 base stations. With a Base Encryption feature license (TBAS057), it can function as an encryption/decryption point, enabling a dispatcher to participate in encrypted calls.

Analog gateways interconnect analog dispatch console equipment and a TaitNet P25 network. They have a digital line (IP over Ethernet to connect to the network) and a 4-wire E & M analog line to connect to the console equipment. Their encryption capabilities are similar to Tait P25 mobiles and portables. They can store up to 16 encryption keys. The DES algorithm is currently supported, AES support is in development.

The analog gateway has a standard P25 key-fill interface for loading encryption keys. This can be done using the Motorola KVL3000+ key fill device (see the Encryption Key Loading Guide on the product CD and on the Tait support web site). Analog gateway operation can be monitored and configured using the same CSS as is used for the TB9100 base station.

Currently, the analog gateway consists of a TB9100 reciter with the receive and transmit functions disabled. It can be supplied in the following hardware configurations:

- Single reciter in a subrack with PMU. The state of the power supply can be remotely monitored by the CSS or syslog collector.
- Single reciter in a subrack without PMU (subrack: TBA232K-A000, control panel: TBA2020). A well-conditioned external power supply is required.

Analog gateway functions (including encryption) can also be carried out by a TB9100 base station, for example when it is connected locally to analog console equipment. Additional feature licenses are required (see the CSS Help or manual for details).

## Channel group performance improvements

TB9100 base stations that are combined as a channel group within a TaitNet P25 network now operate in an improved way. Distributed voting by member base stations seamlessly selects the best uplink signal for repeating. Appropriately configured subscriber units automatically choose the best repeated signal from among the base stations in the channel group.

Configurable parameters enable the fine-tuning of base station operation for optimal voting performance. QoS monitoring by the CSS displays the signal quality measure used for voting and indicates which base station is winning the vote.

## Receive-only reciters

A TB9100 reciter can now be supplied in a subrack without a PA or PMU. It can be used as a receiver at receive-only sites. A well-conditioned external DC supply is required. (Subrack: TBA232K-A000, control panel: TBA2020.)

## 2 Compatibility

The following table specifies all compatible configurations of the TB9100 base station and the related software. A configuration is compatible if a base station, the CSS, and the calibration software have compatible versions. If changes are made to the hardware or firmware of a base station, you need to check whether the hardware and firmware versions of the individual modules are compatible.

- Each row in the table identifies a compatible base station configuration.
- Each cell within a row contains the hardware, firmware, or software version number that is compatible with the other versions in the row. If a cell contains more than one version number, more than one version is compatible.
- Table footnotes indicate any restrictions imposed on a particular combination by the hardware, firmware, or CSS version.
- Any other combination is **not** compatible and not supported.

Base Stn	Calib s/w	CSS	Data-base	Module Hardware					Module Firmware			
				Digital Board	Network Board	PMU	PA	Control Panel	Digital Board	N/W board	PMU	PA
2.04	2.09	2.04	2.18	00.04 00.03	00.01 <sup>a</sup> 00.00	00.01	00.01	TBA2020	2.03	2.04	2.08	2.09
1.23	2.07	1.23	2.11	00.04 00.03	00.01 <sup>a</sup> 00.00	00.01	00.01	TBA2020	1.23	1.23	2.08	2.07
1.16	2.05	1.16	2.10	00.03	00.00	00.01	00.01	TBA2020	1.09	1.07	2.07	2.07
1.15	2.05	1.15	2.10	00.03	00.00	00.01	00.01	TBA2020	1.09	1.07	2.06	2.05
1.14	2.05	1.12	2.10	00.03	00.00	00.01	00.01	TBA2020	1.07	1.06	2.06	2.05
01.02	2.03	01.01	02.08	00.03	00.00	00.01	00.01	TBA2020	01.02 <sup>b</sup>	01.02 <sup>b</sup>	02.03	02.03

a. This network board version has a larger (8 MB) flash memory. Future versions may require 8 MB flash.

b. Downgrading firmware to this version should not be done using the CSS. Contact Tait for more information.

### 3 Upgrading to Version 2.04

Upgrading base station firmware to version 2.04 cannot be done by the CSS alone. You will need to download firmware files using the TFTP protocol. If your analog gateway will use encryption, its bootloader must first be given a password. After downloading firmware using TFTP, the network board command line can no longer be accessed using telnet; SSH is required. It is essential to give new configuration items suitable values if your system uses networking or encryption.

Follow these steps:

1. Install the version 2.04 CSS software from the product CD. You can install it alongside any existing versions of the CSS.

**Important** Make sure that you have saved a copy of the current base station configuration before upgrading the firmware. If the firmware download doesn't complete successfully and must be repeated, you will need to restore the configuration from the backup copy.

2. Follow the instructions in TN-977a. See also [“Safe practices for firmware download from the CSS”](#) below.
3. Update the settings of new configuration parameters as described in [“New Configuration Items”](#) below.
4. When step 3 is completed, save the new configuration data to a file, so that you have a backup.

## Safe practices for firmware download from the CSS

The process of loading firmware from the CSS to the base station is very reliable. The base station and CSS perform many checks during the process, and the likelihood of corrupt firmware on the base station is very low. Still, remote communications can occasionally go wrong, and checks sometimes fail. Here are some practical steps to take to ensure the best likelihood of success.

- Always make sure that you have saved a copy of the base station configuration data before beginning a firmware download.
- Until you gain confidence in the overall process, upgrade firmware locally at the base station, rather than remotely via a communications link.
- All communication links have occasional transmission errors. If a download fails before the activation process begins, then resetting the base station will clear all loaded files, and allow you to try again. The activation process does not begin until the files have been successfully transferred to the base station.
- Even if the CSS reports that something failed, do not panic. Restart the base station (if necessary) and use the download screen to see what is on the base station. You can try the download again, and if necessary use the 'Force download' option to force the files to be transferred again.

## 5 New Configuration Items

Version 2 has additional configuration items to support network operation and encryption. The following introduces you to them. The online Help and User's Manual have detailed information.

### Configuring network operation

To ensure smooth voting operation, you need to configure each base station with a suitable preamble duration (for example, 150 ms) and a local repeat hold-off (set to the average network delay). These parameters are set in the Network form (Configure > Digital Line > Network). The default settings are suitable for a standalone repeater, but need to be adjusted for successful network operation. The online Help and User's Manual give assistance for different system designs.

### Configuring encryption operation

Once you have loaded encryption keys, you need to go to the Encryption form (Configure > Analog Line > Encryption) and define names for each of the keys. In the calling profile, select a key name. This enables encryption and specifies which key is used to encrypt. Then go to the General form (Configure > Analog Line > General) and specify whether you want a warning tone when the analog line provides clear speech or when a key other than the one specified in the calling profile used for decryption.

## Adjusting the number of microslots

The new default number of microslots per slot is 1. Those upgrading to version 2.04 should change their setting to 1. This ensures that Tait subscriber units have the best performance possible.

## 6 Issues Fixed

The following known issues and limitations, listed in the release notes for version 1.23, have been fixed in this release.

Headline	Tait Reference
Analog line: Dispatcher must re-start call after losing vote	TIMS00050462
Analog line: Transient signals	TIMS00050156
Base Station: Blank IP Address and hostname	TIMS00050617
Base Station: External frequency reference problems	TIMS00044470
Firmware Upgrade: Spurious errors	TIMS00050581
Network: QoS alarms don't trigger actions	TIMS00044142
Network: VoIP availability	TIMS00043594
PMU: Fan is not checked at start-up	TIMS00044738

## 7 Known Issues and Limitations

### Alarms: Some reciter alarms do nothing

The CSS displays a number of reciter and system alarms. Some of these do not operate when they might be expected to. The alarms are:

- BER high
- Network board configuration invalid
- Network user traffic
- Network board comms failure (this alarm is not displayed, but is an input into Task Manager)

These faults are either meaningless, or occur seldom in practice.

## **Analog line: MDC 1200 signaling increases end-to-end delay**

Tait reference:  
TIMS00052545

If the dispatch console uses MDC 1200 signaling, the information must be sent to the analog gateway/base station before digital P25 voice transmission can begin. This is an inherent characteristic of the MDC 1200 and digital P25 standards and increases the end-to-end delay. Alternatively, depending on the dispatch equipment, the start of the call can be lost or can interfere with the MDC 1200 signaling. Sending guard tone, a single function tone, and the PTT ID takes at least 280 ms.

*Work-around:* Include the MDC 1200 signaling time when calculating the end-to-end delay of the system. You may be able to configure your dispatch equipment to achieve a balance of initial voice loss and end-to-end delay.

## **Analog line: MDC 1200 product-specific variations**

Tait reference:  
TIMS00043248

Contact Tait Electronics Ltd. for details of compatibility information with your MDC 1200 console.

## **Base station: CSS cannot connect (rare)**

Tait reference:  
TIMS00050412

On very rare occasions, the base station does not allow the CSS to connect to it. If you ping the base station IP address, the base station responds - it just does not accept a connection request from the CSS. The problem is that the CSS communication process on the base station gets into a state that will not accept CSS requests.

*Work-around:* It is possible to use telnet to remotely reset the state of the base station's CSS communication process. Contact your Tait technical support representative for details.

## **Base station: CWID transmissions override calls**

Tait reference:  
TIMS00045562

If the base station is configured for automatic CWID and a call is in progress when a CWID is due for transmission, the call will be interrupted.

*Work-around:* A future release will allow automatic CWID transmissions to be held off until the Tx tail.

## **Base station: Speaker silent during encrypted calls**

Tait reference:  
TIMS00052142

To maintain security, the speaker must not decrypt calls. Normally, it plays encrypted speech audibly, as squawks and squeaks. However, if the base station has the required encryption feature license(s), it remains silent. This is necessary, because the voter cannot make encrypted speech available alongside decrypted speech.

## **Calibration: Re-calibrate RSSI after front end tuning**

Tait reference:  
TIMS00050820

After tuning the reciter front end, you must re-calibrate the RSSI (Note that you will require a signal generator to generate a -80 dBm reference input.) Otherwise the value reported by the CSS will be in error, RSSI gating levels will be incorrect in analog mode, and voting will be inaccurate in both modes.

## **Calibration Software: Receive-only reciter appears as standard**

Tait reference:  
TIMS00050365

The calibration software can display details about the currently selected module. It always reports the reciter type as standard, even when it is receive only.

The calibration functionality is shared with the TB8100—but the TB8100 and TB9100 implement the receive-only function differently. The TB8100 receive-only reciter is a hardware variant, with no transmit capability. It does not make sense to calibrate the transmitter. The TB9100 receive-only functionality is determined by a SFE license (Transmit Enable). The transmitter circuitry is fully capable, and can be calibrated.

*Work-around:* Ignore the reciter module type setting. You may calibrate the transmitter of a receive-only reciter if you wish.

## **Configuration: Setting up line-controlled base stations is counter-intuitive**

Tait reference:  
TIMS00052337

Setting up a line-controlled base station requires that you disable RF repeat in the calling profile. For a channel group, you would expect only to have to configure the calling profile in the one base station or analog gateway whose analog line is used. In fact, for correct line-controlled behavior you must disable RF repeat in the calling profiles of all base stations in the channel group, even if they are not using their analog line.

## **CSS: Incorrect tone remote mapping display**

Tait reference:  
TIMS00052604

The Tone Remote Mapping form display can become incorrect if you clear the Hide Task Manager actions check box, sort one or more columns in the table, and select the Hide Task Manager actions check box.

*Work-around:* Leave the form and then return to it. The display is now correct.

## **CSS: Limited operating system support**

Tait reference:  
TIMS00051024

The current CSS will work correctly with the English version of the Windows XP Professional or Windows 2000 (SP4 or later) operating systems. However, there is a known problem with the German Windows XP. Problems could also be encountered if the CSS is installed on Windows versions for other languages.

*Work-around:* Install the CSS on PCs with the English version of Windows XP Professional or Windows 2000.

## **CSS: Data logging may cause voice drop-outs**

Tait reference:  
TIMS00052621

When you use the CSS to view the Call Record log, the System log or the Trace log, the base station sends all the entries in its log to the CSS. This may flood switched networks, which cannot prioritize voice packets. The result is that voice traffic does not arrive in time.

*Work-around:* The base station can send the same data to a syslog collector (see the Network Installation Guide for the bandwidth effect of this). Use the syslog collector to view the data.

## **Diagnostics: Auxiliary supply test always 'good'**

Tait reference:  
TIMS00050649

The auxiliary supply diagnostics test is always reported as good. The Toggle Output button has no effect on the actual auxiliary supply output or on the display of its state in the PMU Control Tests form.

## **Diagnostics: Caution needed with transmission test**

Tait reference:  
TIMS00038765

The transmission test does not default to the currently configured frequency and power. If you start a transmission test without setting these parameters, you might transmit at full power on someone else's frequency.

*Work-around:* Always check the transmitted frequency and power before running the test.

## **Diagnostics: Problems with Log C4FM test**

Tait reference:  
TIMS00046453  
TIMS00049209

The Log C4FM test allows you to record raw C4FM data from the RF. You can compare it with the original data that was sent and verify the performance of the RF channel and base station receiver. This facility is currently not reliable. The base station may lock up, or may produce garbled output.

*Work-around:* You may still use the diagnostic. It is usually obvious whether it is working properly. Only run the test when you are local to the base station, so that you can reset it if needed.

## **Logging: Call attempts are logged as calls when in Standby mode**

Tait reference:  
TIMS00045125

If the base station is in Standby mode, any calls arriving at the RF or line interfaces are recorded as actual calls, even though the calls are not actually transmitted.

*Work-around:* Minimize the time that the base station is in Standby mode.

## **Logging: Trace log display hard to understand**

Tait reference:  
TIMS00044108

The Trace log contains Tait-internal messages that are intended for use by designers. Maintainers may find that reading the log is slow, and the results hard to interpret.

*Work-around:* View the System log instead of the Trace log. If a problem is particularly difficult to diagnose, Tait staff may ask you to look at the Trace log or save it to file and send it to Tait.

## **Monitoring: Display misleading when transmitter not enabled**

Tait reference:  
TIMS00050151

A receive-only base station PA may falsely display indications that the base station is transmitting, even though it cannot transmit. The CSS does not disable the transmitter monitoring display.

## **Monitoring: Rx and Tx status display ignores configuration**

Tait reference:  
TIMS 000051854

The RF Interface form displays the receiver status and the transmitter status. This status is normally 'Enabled,' but if the synthesizer is out of lock, the channel configuration is invalid, or Task Manager has locked the receiver or transmitter, the status is 'Disabled.'

It is possible in the configuration to disable the receiver (in the channel profile, clear both the analog and the digital receiver modes) or transmitter (clear the RF transmit check box). This is not reflected in the status display, which still shows 'Enabled.'

## **Network: Gateway address may need configuring**

Tait reference:  
TIMS00044306

At present, the base station uses Proxy ARP (RFC 1027) to find out which host on the LAN will forward packets destined for the network. The routers recommended by Tait support this protocol. Some networks may use different routers, or not use a local router at all. In these circumstances, it is necessary to set a gateway address in the base station. Tait's intention is to make the gateway address configurable in the CSS in a future release.

*Work-around:* If the network does not support the use of the Proxy ARP protocol, contact Tait for advice or assistance in setting up the gateway address.

### **Network: Syslog can cause voice drop-outs**

Tait reference:  
TIMS00051921

A switched network does not have QoS and so cannot give voice packets priority. If the base station's logging level is low (Notice or Trace), syslog messages may combine with voice to exceed the available bandwidth, causing voice drop-outs. See the Network Installation Guide for guidance on bandwidth allocation and syslog bandwidth requirements.

### **Receiver: DPL decoder delay can lose speech**

Tait reference:  
TIMS00045587

In analog mode, Digital Private Line signaling (also known as DCS) allows the base station to reject channel noise—and to only repeat signals with the correct embedded code. In combination with a slow subscriber unit decoder, the delay can cause the first half-second of speech in a transmission to be lost.

*Work-around:* Use Private Line/CTCSS instead. This currently has a faster decode time.

### **Receiver: Problems with DPL**

Tait reference:  
TIMS00045587  
TIMS00050668  
TIMS00050769  
TIMS00050708  
TIMS00050816

DPL (also known as DCS) is currently not properly supported. Tait plans to address this in a future release.

### **Task Manager: No response to digital input 4**

Tait reference:  
TIMS00050273

Task Manager does not respond to changes in the status of digital input 4.

*Work-around:* If possible, use one of the other four digital inputs to trigger Task Manager actions.

### **Task Manager: Problem with the input 'NAC received'**

Tait reference:  
TIMS00043683,  
TIMS00043680

There is a problem with the Task Manager processing of detected NACs. Following a transition to Run mode (e.g. on restart), Task Manager may not respond when the base station receives the NAC code.

*Work-around:* After going to Run mode, use a subscriber unit to transmit a NAC code other than the one which Task Manager is expecting. Task Manager will then recognize the expected NAC code.

## Transmitter—Analog FM: Over-deviation limiter may constrain deviation

Tait reference:  
TIMS00031363

An overload test input will cause a transmitter deviation of only 80 percent of full system deviation.

*Work-around:* Contact Tait.

## Transmitter—Analog FM: Subaudible signaling reduces speech deviation

Tait reference:  
TIMS00051735

The channel profile allows installers to set the deviation of subaudible tone as a percentage of the speech deviation. In order to prevent over-deviation, the speech level is reduced accordingly. In the TB8100, you can choose not to reduce the speech deviation, but this option is not currently available in TB9100.

## Transmitter—Digital P25: Optimizing modulation fidelity

Tait reference:  
TIMS00051882

The transmitter frequency should be an exact multiple of the synthesizer's frequency step, otherwise there may be a slight degradation of the modulated waveform in digital P25 mode.

The frequency step is determined as a by-product of the configuration for analog FM operation (the Max Tx deviation setting in the Edit Channel Profile dialog box). If this setting is 'narrow band' or 'wide band,' the step is 3.125 kHz for VHF and 6.25 kHz for UHF. If the setting is 'mid band,' the step is 2.5 kHz for VHF and 5 kHz for UHF.

In a future release, the correct frequency step will be automatically selected, based on the transmit frequency.

*Work-around:* If the transmitter is only handling digital P25 signals, determine whether the transmit frequency is divisible by the frequency step. Set the Max Tx deviation accordingly, so that the transmit frequency is an exact multiple of the synthesizer's frequency step. For example:

Tx Frequency	Max Tx Deviation	Channel Step	Exact Multiple?
138.0325	Narrow or wide band	3.125	No
	Mid band	2.5	Yes
140.015625	Narrow or wide band	3.125	Yes
	Mid band	2.5	No
400.035	Narrow or wide band	6.25	No
	Mid band	5	Yes
438.13125	Narrow or wide band	6.25	Yes
	Mid band	5	No

## Transmitter—Digital P25: New preamble not used

Tait reference:  
TIMS00053119

The TB9100 generates a preamble before transmitting speech and signaling messages. Under some circumstances, if the preamble is changed, the change will be applied to the speech signal, but not signaling messages. The base station continues to generate the previous preamble for signaling messages.

*Work-around.* For signaling messages (such as status messages), the preamble is always at least 100 ms, regardless what length has been set. This should be long enough in most cases. However, to be confident that the base station is using the changed value, you can reset the base station (from the CSS, select Element > Reset Base Station).

## Voting: Synchronization issues on monitoring screen

Tait reference  
TIMS00052161

The Digital Line monitoring screen shows the status of all of the base stations in the channel group, as reported to the base station being monitored. Because of delays around the network and the slow update rate of the CSS monitoring screen, it is not unusual for the monitoring screen to briefly show two vote winners, or no vote winners, when the base stations are actually voting correctly (there is exactly one vote winner at any time, and all base stations agree which one).

*Work-around:* These are transient artefacts of the monitoring process. Do not rely on the monitoring screen to give an accurate picture of the network operation for timescales of less than a second or so.

## Voting: Monitoring does not show vote winner for control panel or analog line

Tait reference  
TIMS00052136

The Digital Line monitoring screen has a table showing QoS and speech quality information for the other base stations in the channel group, and shows which base station has the current vote winner.

The vote winner is only shown for radio terminals. If the vote winner is from a base station control panel or dispatch position, this information is not shown.

*Work-around:* View the RF Interface monitoring screen for each base station to determine the vote winner. This screen shows the source of the transmitted signal, whether it is from a radio terminal, local control panel microphone, local analog line, or some other base station in the network via the IP interface.

## 8 Issuing Authority

This TN was issued by: Kurt Ebrecht  
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