TB9100 base station/repeater &
TaitNet P25 systems

Features
and benefits

Features and Benefits

Contents

Basic Features

State-of-the-Art Design

The TB9100 is a digital base station design that builds upon the state-of-the art software-based platform of Tait's TB8100 analog range.

Software Radio

A digital board in the reciter has a microcontroller that monitors all aspects of the TB9100 and controls its operation. A DSP defines the bandwidth and does the data and speech processing. Items such as channel configurations and tuning settings are stored in non-volatile memory.

Benefits: The use of DSP technology allows Tait to upgrade or improve the operation of the TB9100 Reciter without he requirement to develop new circuit boards. It may also allow for the adoption of new signalling standards.

Example: This has allowed the reuse of the TB8100 Digital board in the TB9100.

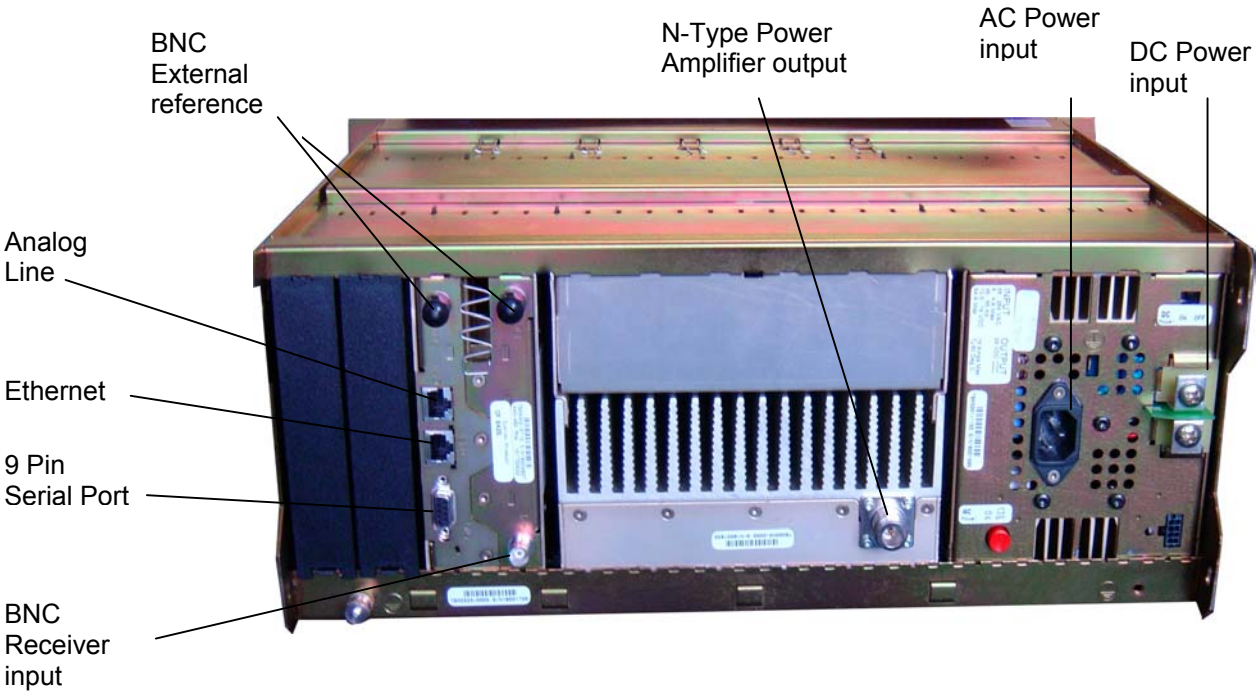
28 V Power Amplifier Technology

28 V transistors are used in the PA. They are more efficient than the 12 V equivalent and have a much greater frequency range. As a result, a single PA covers the entire UHF range (400-520 MHz). 28 V transistors are common for cell phone transmitters, but until now have only been available in very high-priced PMR base station equipment.

Benefits: Because the 28V technology is used by a number of manufacturers the commonality of components mean that parts availability is guaranteed for a longer period.

Uncluttered External Interfaces

The TB9100 uses no backplane PCB or rear unit wiring. This allows you to fit modules in any configuration according to your requirements. At the rear of the TB9100, you only have the connections that are required to connect to a radio system:



All the internal wiring of the modules is behind the front panel in a tidy cable tray. The internal links between modules are:

- Control Bus
- Power Supply Cables (28V DC and 12V DC)
- Exciter to PA RF Link using SMC connectors

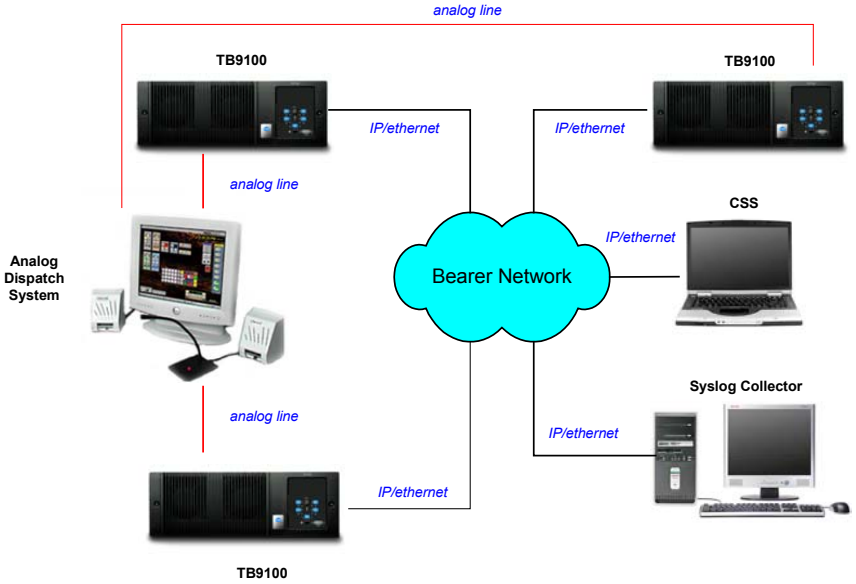
Benefits: Allows for clean and tidy installation and reduces the possibility of rodent damage.

Simplified Site Design

A number of TB9100s can be connected at the site. As the TB9100 is designed to be an IP connected platform the issues affecting the number of TB9100 Base stations is controlled by the bandwidth available.

If required the dispatcher equipment can be connected to the site either with leased lines or using 4 wire audio interface equipment. The CSS and Syslog collector can be remotely positioned using standard Wide Area Networking (WAN) router equipment.

The inbuilt analog interface allows the use of existing analog dispatch equipment. The TB9100 has in inbuilt tone panel to enable interfacing with a number of different manufacturer dispatchers and provides support for the advanced features specified in the P25 documents.



Benefits: As the TB9100 has built in TCP/IP connection; we are able to use standard Cisco equipment to connect a number of repeaters together.

The ability to have the dispatcher equipment remotely positioned.

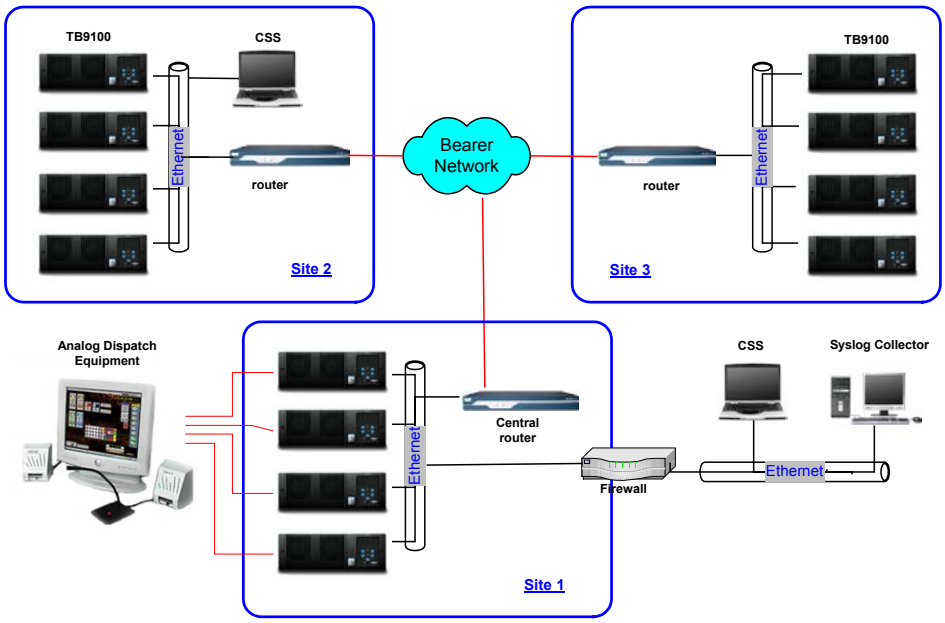
Example: The diagram above shows a 3 channel site connected to dispatch console, with IP connections to the Customer Support Software (CSS) for monitoring and configuration control. The Syslog Controller is used for the logging of everything form alarm messages to calls made.

Note: The Syslog collector is not a Tait Product.

Multi Site Networks

To provide a wider area of coverage it is very easy to connect a number of sites together using the Tait implementation of Voice over IP solution.

To connect a number of sites together we use the same equipment that we have for a single site system, with the addition of high-speed data links. The number of channels that are connected to other sites determines the speed of the link.



Benefits: The ability to use standard high speed linking technology allows the use of E1 and T1 links, as well as link speeds down to speeds 64K.

Example: The diagram above shows a 4 channel, 3 site connected to dispatch console, with IP connections to the Customer Support Software (CSS) for monitoring and configuration control. The Syslog Controller is used for the logging of everything form alarm messages to calls made.

Note: The Syslog collector is not a Tait Product.

Operation Modes

The TB9100 has two primary different operation modes.

“Run” mode is used for normal operation.

“Standby” mode takes the TB9100 out of service and lets you update the configuration or carry out diagnostic tests. There is a front panel indicator that indicates that the TB9100 is in standby mode.

From the “Standby” mode you can access the “Download” Utility that is used if you want to upgrade the firmware.

While in the “Standby” mode you are able to use the “Calibration” software/Hardware package to calibrate the Reciter.

The TB9100 changes mode only when a Customer Service Software (CSS) user requests it. This protects you from inadvertently taking a TB9100 out of service. When you close down a CSS session, you are warned if this will leave the TB9100 out of service.

On power-up, the TB9100 automatically goes into Run mode.

Benefits:

The front panel LED indicator reminds the user that the unit is in standby. A quick check of the front panel indicators will confirm the correct operation of the TB9100 before the technician leaves the site.

Allows for a simple and safe operation of the TB9100 that ensures consistent and stable operation.

Customer Service Software

The Customer Service Software (CSS) is your window into the TB9100. It is PC-based and comes on a CD. You can install it on as many PCs as you want. It lets you:

- monitor the TB9100
- display, modify, and update the TB9100's configuration settings
- carry out diagnostic tests.

(Calibration is carried out using the Calibration Kit, which is an additional utility provided on the CD.)

The CSS can connect to the TB9100 directly using TCP/IP connection at the rear of TB9100 Reciter, or remotely via Wide Area Network (WAN) or radio modem connected to a router. It runs under Microsoft Windows 2000, or XP

There are three levels of CSS access to a base station: Read-only, User, and Administrator. Each base station has three passwords, one for each level. Offline use of the CSS is not password-protected. Multiple levels of access make it possible to assign capabilities according to people's responsibilities. For example, several people may be permitted to view the configuration, but only one person to change it. The administrator sets the password for each level and configures an access profile that defines what those with a user access level can see and do. ****(Not Yet Implemented).****

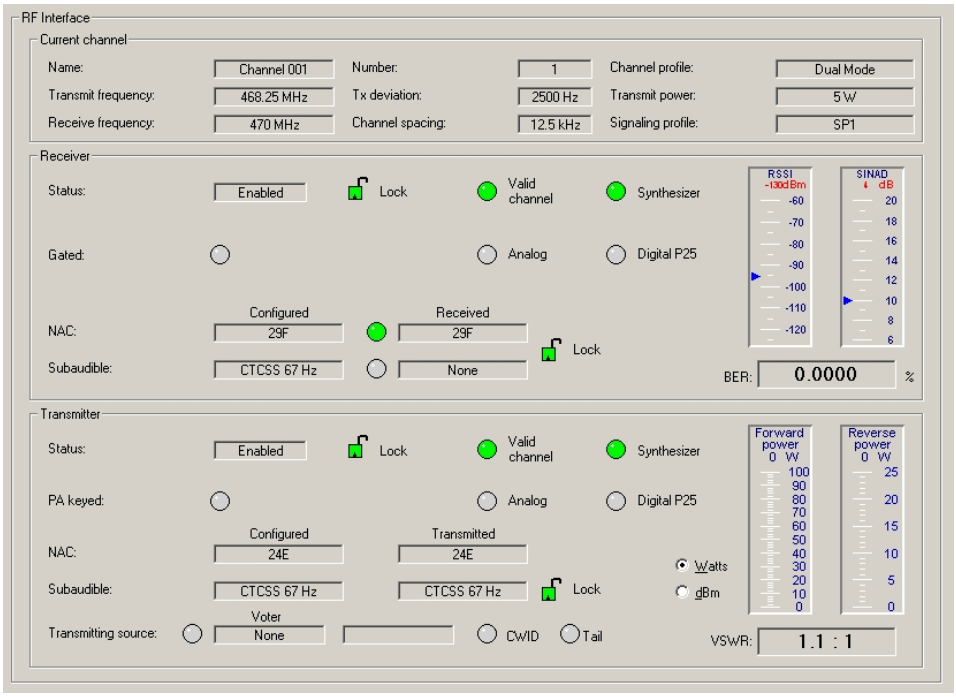
Benefits: The major benefit of the Customer Service Software (CSS) is that it allows the remote management of a number of Repeaters / Base Stations.

Note: Only one person is able to access the TB9100 Reciter at a time.

Monitoring

A whole suite of measurements that can be made to an in-service base station to check on system conditions and current behaviour.

You can check a number of different system parameters while the base station is running. This has no effect on the real-time operation of the base station—which means that regular statistics can be gathered from the system without any downtime.



This monitoring can be done both locally and remotely using WAN or dial-up access.

Benefits: There are a number of screens that allow management and engineering staff to determine the state of operation of the TB9100 hardware (Reciter, Power Amplifier and Power Management Unit).

Example: The screen above (RF Interface) is one of many; this is a summary screen that gives the user a clear indication of what is happening in the TB9100

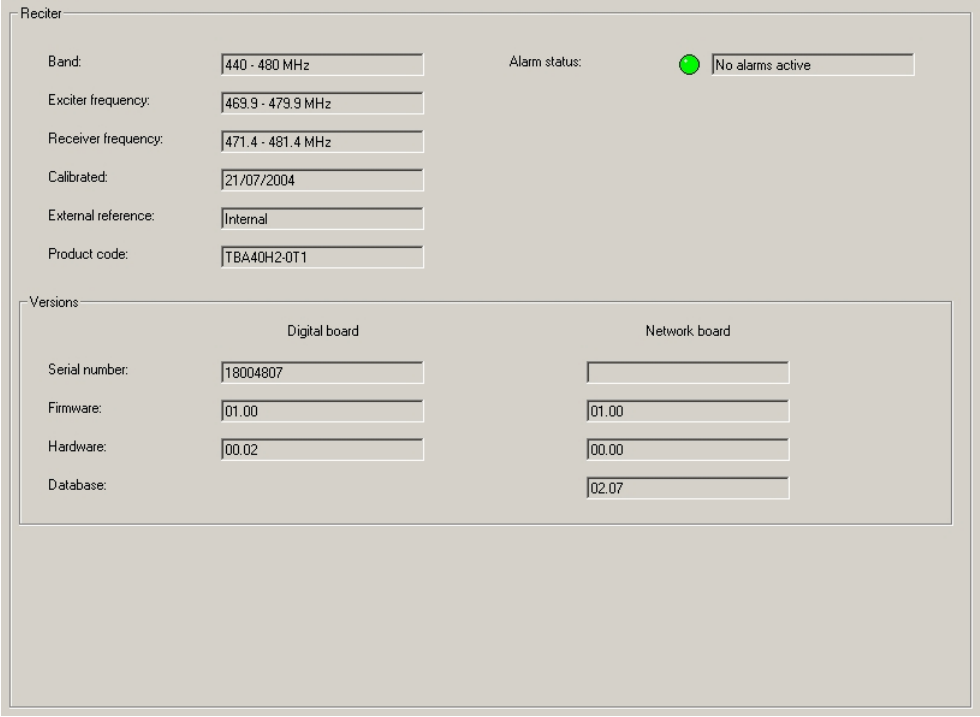
Equipment Parameters

The CSS can display the following information about the base station's equipment.

Reciter: Model and band, serial number, receiver sub band calibrated setting, exciter sub band calibrated setting, interface module type and version, hardware version, firmware version, date, last calibration date.

PA: Model and band, serial number, power rating. Hardware version, firmware version and update date, last calibration date.

PMU: Model and serial number. AC or AC/DC or DC, input voltage, auxiliary output voltage, hardware version, firmware version and update date.



Benefits: Provides the ability to quickly check the current software and firmware status of the equipment at the site.

The ability to check current operating frequency can also be used as a diagnostic tool.

Example: The screen above (Reciter) is one of three screens that details key information of the reciter.

Operation Parameters

The CSS monitor option can display the following information about the current operation of the base station.

Alarms; Displays the current state of the TB9100 Equipment.

Interface: The "RF Interface" screen displays the Current channel number, frequency, deviation, power and signalling function. Receiver status, gating, NAC, CTCSS (PL) /DCS (DPL) signalling condition, BER and received signal strength (RSSI/SINAD). Transmitter status, forward / reverse power, VSWR, NAC, CTCSS (PL) /DCS (DPL) signalling condition, CWID.

The "Digital Line" screen indicates Worst delay, maximum round trip time, worst jitter, maximum jitter and average lost packets.

The "Analog Line" screen displays the status, calling profile information for the analog interface, signalling E&M / tone remote, MDC 1200 and function tones.

Modules: The "Reciter" screen displays the received RF level (SINAD/RSSI), analog line (received / transmitted) line level and fan operation.

The "Power Amplifier" displays the status, forward / reverse power, temperature, current draw, duty cycle and fan operation.

The "Power Management Module" displays the status, source power supply information, output voltage and current details.

Data Logging: The "Call Record Log" provides a record of calls made.

The "Systems log" provides information on the current TB9100 status.

The "Trace Log" gives a detailed log on all operations in the TB9100, a combination of "Call Records" and "System Log".

Task Manager: These screens provide the ability to view "Overrides" (Which functions are enabled), Counters (Name and current count), Flags (Current status of flags), Timers (Name and current status).

Module Details: The "Reciter" screen provides information on the Band and the current tuned frequency range for the Receiver and Transmitter, Hardware serial numbers, software / firmware versions and dates.

The "Power Amplifier" screen details on module serial number, power, frequency band, hardware and firmware versions.

The "Power Management Unit" provides PMU status, serial number, input and output options fitted and firmware / hardware version details.

Benefits: These screens allow for the remote collection of data for systems auditing.

Alarms

The TB9100 continuously checks 47 different alarm parameters. These cover all aspects of the TB9100: the reciter, the PMU and its power sources, the PA, as well as external inputs such as the line input levels and the received signal strength. (In addition, the TB9100 can receive external alarms via its digital inputs and Task Manager tasks can get the base station to respond appropriately).

If an alarm is triggered, the Alarm LED on the front of the TB9100 flashes. If a CSS is logged on, it displays a flashing alarm icon. An alarm condition can also lead to other action.

Each of these alarms can also be an input that causes Task Manager to modify the system.

The TB9100 can be configured forwards any alarms to an assigned IP address of a computer running a systems logging application.

You can configure the base station to disable any alarm that is inappropriate for your system. For example, the External reference alarm is only suitable if the TB9100 expects a to have an External frequency reference. Disabled alarms appear gray on the Current Status form, do not activate the control panel alarm LED, and are not listed in the alarm log.

Benefits: The TB9100 alarms centre provides the adjustment of the alarm threshold point, which allows the correct setup to prevent false alarms being raised.

There is also the ability to disable the detection of alarms for bench testing.

Example: In the above example the “Fan Failed” alarm has been disabled as the fan assembly has been removed for bench testing.

Configuration Management

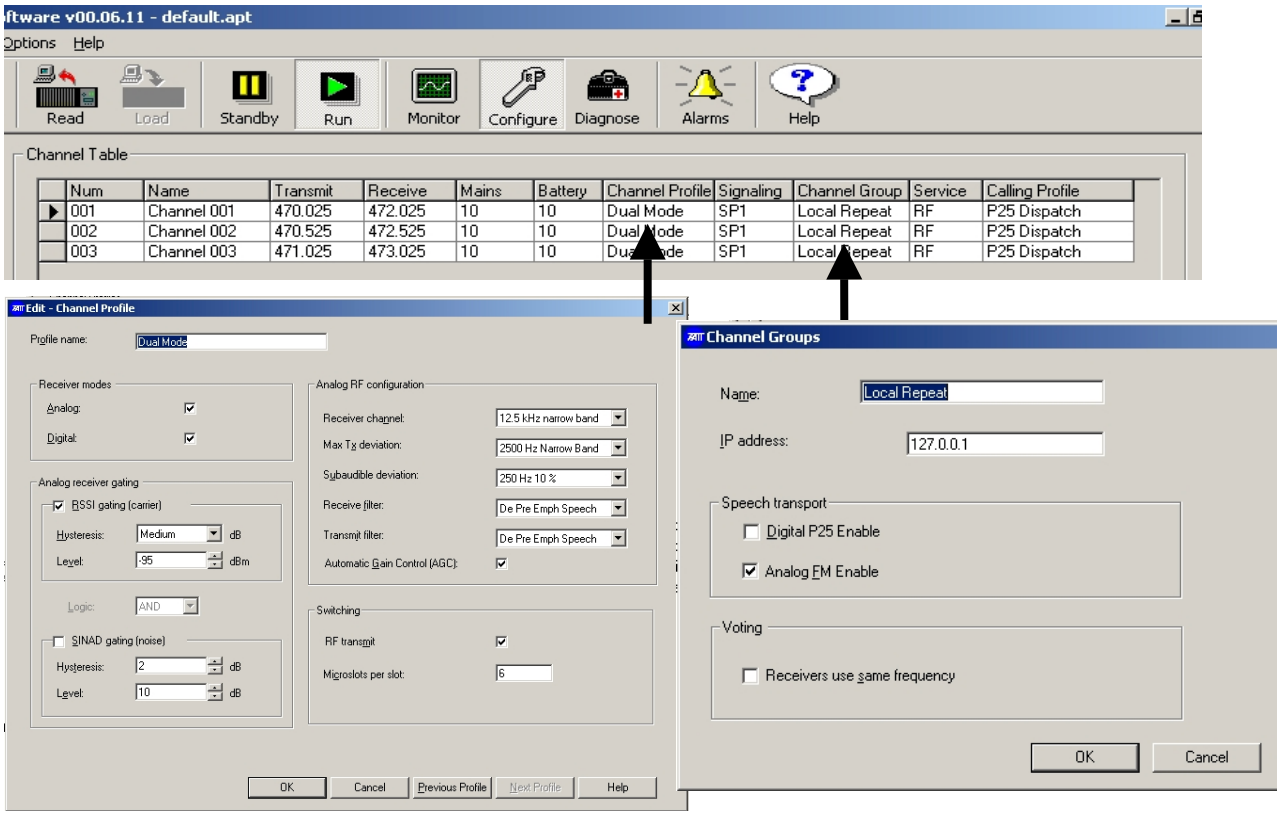
A large number of settings and other configuration items are stored in the TB9100's non-volatile memory. The CSS lets you read these items in, view them, change them, and program them into the TB9100.

This system will fit in with the way you want to work. You can:

- Work offline. Even before a base station arrives, you can create a configuration file for it, with all the settings that you want.
- Work remotely. Even the basic TB9100 lets you read and program it from your office PC (if there is a TCP/IP connection or modem link).
- Use a template. Define a standard configuration for your base stations and save it as a template. For each new base station, create a configuration based on the template.
- Maintain a single configuration for a whole network. All the channels for your network could be stored in one configuration file. To configure a replacement TB9100, all you need to do is specify the default channel.
- Copy a set of profiles, channels, or Task Manager tasks from one base station to many others. Develop and test new capabilities on one base station, and then export them to the others.
- Back up the configuration with one click. Whenever you program a base station, simply click the Save icon and a copy of the configuration items is stored in a file on the CSS PC.

Channel Configuration

The TB9100 optimizes the configuration of channels. Some channel-related parameters need to be set just once for the base station. These are grouped into default profiles. Other parameters may need to be set differently for different channels. These are set either in the channel table or in different custom profiles.

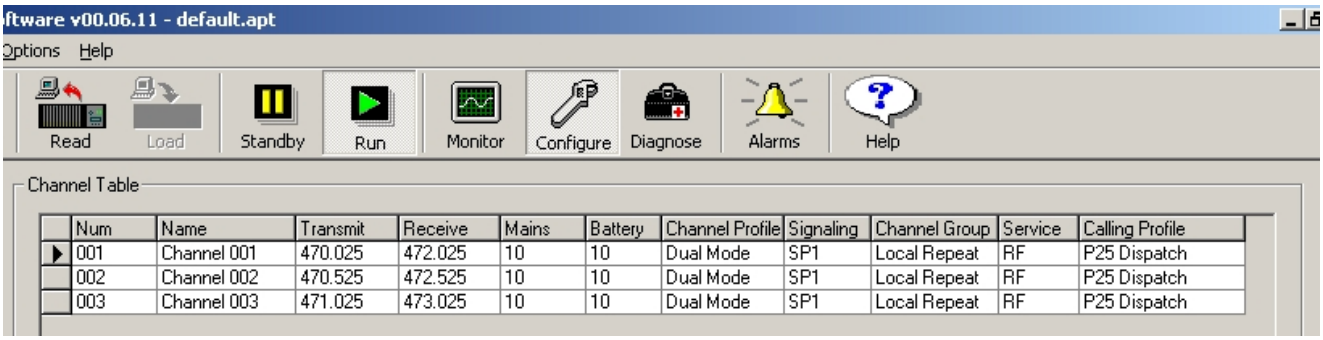


Custom profiles make it possible to maintain sets of completely different configurations and to switch between them. For example, one channel could be set up as a repeater and another as a line-connected base station. All that is needed to convert the TB9100 from a repeater to a line-connected base station (or vice-versa) is to change the operating channel. You can define up to 16 channel profiles and 16 signalling profiles.

Transmitter Power

A standard TB9100 lets you configure the power setting on a per-channel basis. Only a single power can be entered. This is done in the channel table.

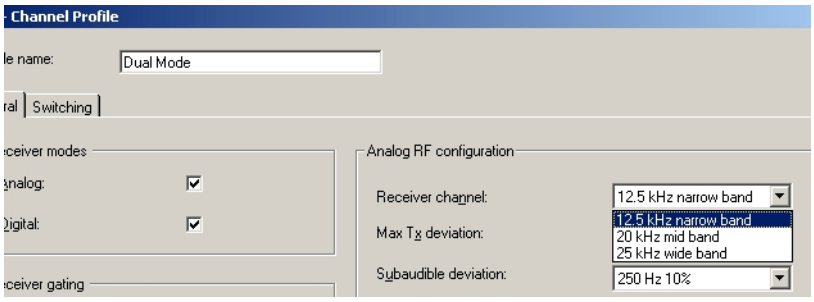
A TB9100 with an Advanced Profiles and Task Manager licence lets you define two settings, based on the power source. This makes power control far easier for AC/DC systems where batteries can only supply power for a limited time.



In all cases, the base station will attempt to deliver the power requested but of course this is limited by the hardware installed. For example, if a setting of 50 W is programmed into a 50 or 100 system, it will operate at 50 W as requested. However, if a 5 W PA is installed, the base station will simply transmit at 5 W. The minimum power that a PA can be set to is 10% of nominal full power (for 100W and 50W units) and 20% of nominal full power (for the 5 W PA). In the case of extreme over-temperature, extreme VSWR, or other failures, the PA will fold back to its minimum configurable power setting.

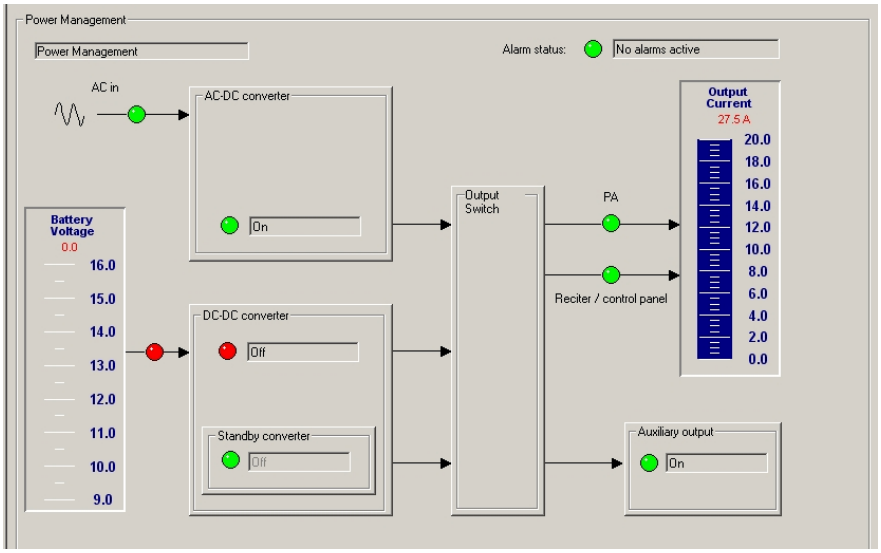
Channel Spacing

The standard TB9100 base station allows 25 kHz, 20 kHz, or 12.5 kHz channel spacing. Each channel in the channel table has its own channel spacing. This sets the receiver bandwidth and the transmitter full system deviation (5000 Hz, 4000 Hz or 2500 Hz) at the same time.



Power Management

The TB9100 has its own Power Management Unit (PMU), designed specifically for a subrack with one 100 W or two 50 W base stations and fully integrated into it. It is far more than just a power supply:



- Continual monitoring of 11 PMU alarm parameters.
- On mains failure, automatic and seamless switchover to DC supply and back using an award-winning method.
- Hysteresis mode for high efficiency at low load. PMU turns off, and then back on as needed to maintain voltage levels.
- Battery Protect mode means that no third party equipment is needed to manage battery backup.
- Modular design means that you only pay for the functions you need.
- Optional DC power output for third party equipment or for trickle-charging the battery.

Software Licensing of Additional Features

The TB9100 has a range of powerful capabilities, but some of them are only available with a license. The Tait's software licensing scheme means that you are able to select and pay for those features that the network will use. You can either order a base station with the features you need already licensed or obtain license keys later on.

Code	Feature Name Description
Analog FM	Support analog voice operation (1)
P25 common air interface	Support P25 digital voice (1)
Analog line	Allow an analog dispatcher connection (3)
Digital line	Allow digital line connection (only affects voice)
Networked user data	Network support for user data comms (2)
MDC1200 Signaling Support	MDC1200 signalling on the analog interface

A license key is an encrypted code that only works for a single reciter. (Different features require different keys.) You can receive via email a key as a small file with a .key extension. You can then save this file in the CSS license folder and use it to enable the particular feature you want.

Line-Connected Base Station Operation

The TB9100's many software-based features can simplify the installation and enhance the operation of a line-connected base station.

- A diagnostic test can produce a defined line level for testing the line
- The Network Board has built-in isolated E & M connections.
- Intercom mode makes it possible for a technician on site to talk over the line to the console operator using the TB9100 speaker and front panel microphone socket.

System Designer Features

A network may cover many thousands of square miles and have sites on the top of mountains or in the middle of the desert. The cost of ownership for such systems increases every year. When Tait began designing a completely new base station, their aim was to produce the ideal radio for systems. The result is the TB9100, which can dramatically reduce the costs involved in monitoring sites, diagnosing conditions, and re-configuring systems.

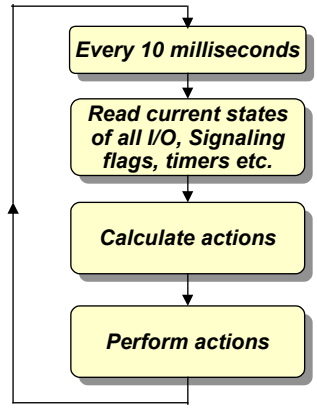
Here are some of the cost-saving features that a system designer can build into a network:

- Remote access lets you connect to a base station via WAN or a dial-up modem and monitor, diagnose, or configure it.
- A PC running Syslog software can be set up to receive and display messages from all the TB9100s in the system.
- Mini-applications to fulfill special requirements of your system (created using Task Manager, which is a menu-driven logic engine built into the TB9100).

Task Manager

A menu-driven logic engine built into the base station to vastly increase the power, flexibility and versatility of the system

Task Manager is a type of 'programmable logic controller' that controls the behavior of the TB9100. It executes once every 10 milliseconds. On each execution it checks the state of the system: all alarms, inputs, outputs, and internal flags, counters and timers. Based on this it triggers a number of user-programmed actions.



A graphical screen with drop-down menus makes adding new actions easy; there is no syntax to learn.

Task Manager can be used to:

- Control the notifying of base station alarms
- Handle the TB9100's response to digital inputs
- Control external equipment
- Execute front-line diagnostics and service recovery operations within seconds of a fault occurring
- Re-configure the base station in run-time
- Replace intelligent backplanes and external switching / changeover systems.
- Create mini-applications to enhance the TB9100 for your system requirements

The full power of Task Manager is limited only by your imagination.

How is it Done?

Task Manager uses a very simple language of IF- THEN statements:

IF ***input*** THEN ***action***

It looks for the *input* to become true and then it executes the *action*.

Alternatively it could look for the *input* becoming false:

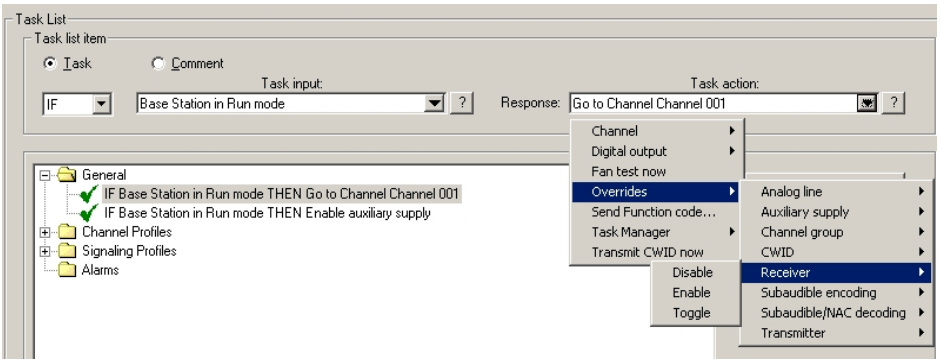
IF NOT ***input*** THEN ***action***

Here is a simple example, which lets you use a digital input line to disable the receiver:
IF Digital Input 1 THEN Disable Receiver
IF NOT **Digital Input 1** THEN **Enable Receiver**

And another example, which starts alarm pips if the air intake temperature gets too hot:
IF **PA air intake temperature high** THEN **Start over the air alarm**
IF NOT **PA air intake temperature high** THEN **Stop over the air alarm**

Timers

You can improve Task Manager tasks by using its configurable timers. For example, in the first example above, we can use a timer to delay the re-enabling of the receiver. Here is part of the CSS screen showing this.



The first two lines are executed as soon as you activate the input. The receiver is disabled and the timer (used to re-enable the receiver) is stopped. If you deactivate the input, this starts the timer (third line). When the timer times out (after 150 ms as long as you don't activate the digital input), Task Manager enables the receiver (fourth line).

There are 16 timers available. Task Manager also supports 16 counters and 16 internal flags, 20 custom inputs and 20 custom actions. Counters are preset to any length required. Task Manager actions can increment, decrement, or reset a counter.

Custom Inputs

Task Manager allows you to define your own custom inputs. They can combine up to eight inputs using Boolean operators. This allows more complicated logic to be performed, as shown in the following examples.

Look for any fault in the PA except for the temperature fault:

IF **PA Summary Fault** AND NOT **PA Over temperature** THEN **. .**

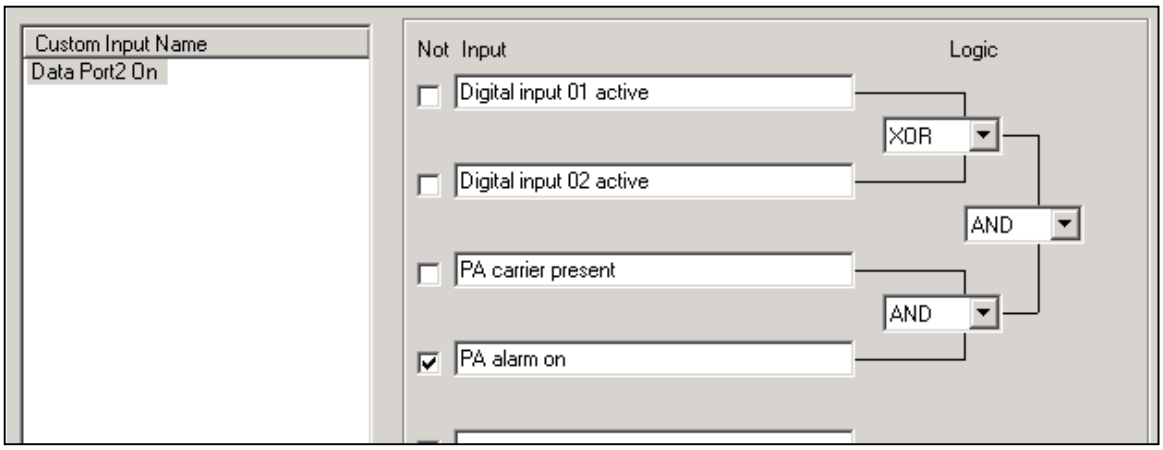
Look for one of the more critical faults:

IF **external reference absent** OR **VSWR fault** OR **Line Input level low** THEN **. .**

Look for either input 1 or 2 (but not both), but only when the PA is transmitting:

IF **(Digital input #1** XOR **Digital input #2)** AND **PA Carrier Present** THEN **. . .**

Custom inputs are all defined using a simple drop-down menu system.



Custom actions allow a number of commonly used actions to be grouped together so that it is easy to reuse them often without re-entering them.

Mini-Applications

By combining Task Manager's different capabilities into an integrated set of tasks, powerful functions can be programmed into the TB9100. Here are a few examples:

Antenna Switching

In sites with multiple antenna systems, the base station itself could switch across to the secondary antenna automatically. Alternatively, the operator could just transmit a code to the base station to initiate this behaviour.

Remote Access

You can connect to the base station from anywhere—this makes remote monitoring and diagnostics possible

The TB9100 base station has been designed to have a TCP/IP connection via the RJ45 connector on the rear of the reciter. This connection allows a reciter to be connected together via a hub to form a Local Area Network (LAN). With the addition of a router we use Wide Area Networking (WAN) techniques to allow remote support, if required a modem can be connected to the router to allow dialup support.

Direct access (LAN)

- Can be achieved with a LAN connection from a computer running the CSS software.

Remote access (WAN)

- Where the site is remote from the CSS standard computer based WAN allows for the ability to access any repeater on the network for monitoring or diagnostic purposes.

Note; With the us of LAN or WAN access the TB9100 can be configured to use a syslog program to record any faults or abnormalities at a central point. (Remote diagnostics of error conditions).

- Dial-in access

By connecting a modem to a router on the site (or network), dial in access can be provided (the with this connection should be configured as a firewall).

Benefits of Dial-Up Access

Dial-up access means that other assistance can be called in if your local technical help cannot diagnose a problem. No matter where the base station has been installed, Tait system engineers can directly dial in to help with problems, if you give them access. You can have the very best assistance in a very short time, minimizing downtime.

Diagnostics

A test and control system designed to make fully remote diagnostic analysis a reality

The TB9100 diagnostics system maximizes your ability to check system behavior and performance before having to go on-site. Sites can be very difficult to access; they may be a long way away, have high security, or be on mountaintops in bad weather. As long as there is a communications link to the site, you can do almost as much as if the Base Station was sitting on your desk.

The TB9100 diagnostics are deliberately designed to reduce the need for external test instruments. You can key the transmitter, generate line output test signals, do a frequency sweep of the whole receive band and kill the mains supply to check the DC backup supply. All this can be done remotely.

Many diagnostic tests are invasive. You must take the base station off-line before you can carry them out.

Using Diagnostic Tests at Installation

The TB9100's diagnostic tests and control options are very useful when installing a new base station. Consider this scenario:

Output Line Level I want to set up the external line interface equipment with a standard audio signal (60% full system deviation). I use the TB9100 line output diagnostics to select the output frequency and start the test. Now it is easy to adjust the external equipment.

Input Line Level The same diagnostics screen displays the incoming line signal level. I can see that the incoming level is about one dB too low. I adjust the TB9100's nominal line input level to suit.

Digital Inputs and Output Digital output #1 is to trigger an external alarm. To confirm that it has been correctly terminated, I use the diagnostics controls to activate this output. The alarm operates. I have also programmed one of the digital inputs to switch the base station between being a line-controlled base and a talk through repeater. I use a diagnostics screen to confirm that this input signal is being read correctly.

Radio Check A quick transmission test confirms that the antenna impedance matches.

Signalling Check In initial testing, the portable radios in one talk group did not trigger the repeater. I use the subaudible diagnostic to see what DCS code they are transmitting. I find that they are transmitting DCS code 134, whereas I have set the channel to 143. A simple typing mistake.

Power Check I use the power tests to ensure that both mains and DC supplies can operate to full load.

Using Diagnostic Tests in Support

The TB9100's diagnostic tests and control options can be used in many situations by support technicians who maintain a system of base stations. They really prove their value when they save a trip to the site.

Consider this scenario:

A TB9100 has generated an alarm, which sent an email to my PC, notifying me via my pager. I read the full contents of the email and learn that the PA Duty has dropped off and that the PA is not transmitting at the moment. (The channel is supposed to be transmitting continuously.)

I can see that the air intake temperature is OK, as are the PA & Power Management Unit (PMU) temperatures.

However, the audio input has been lost. (In this installation, the auxiliary supply in the TB9100 has been used to supply power to the 3rd party line multiplexer.)

I switch on the TB9100 Service Kit, and connect to the faulty base station, using a dial-up modem. In the diagnostics menus I look at the incoming line level. Dead. I go to PMU diagnostics. It says that the auxiliary output voltage is OK. Something must be wrong in the line multiplexer that the auxiliary power output connects to. So I decide to reset the line multiplexer.

I switch the TB9100 into Standby mode, and then toggle the auxiliary power output off then on again.

I now read the input line level. -5dBm. Perfect. I switch the TB9100 back to Run mode and then look at the Transmitter diagnostics. Transmitting again.

I note down what happened and go back to bed. The customers on that trunking system haven't yet realized that their system went down even though it was mid-morning in their time zone.

Miscellaneous

External Frequency Reference

Quasi-synchronous simulcast networks require a high level of frequency accuracy. The TB9100 can be connected to an external frequency reference to provide that accuracy. Reference frequencies of 10.0 and 12.8 MHz are supported.

The TB9100 automatically detects the presence of an external reference. If this fails, the TB9100 switches to its internal source and generates an alarm.

Applications Engineer Features

Application engineers love the TB9100. Many installations are full of custom-wired backplanes, third party modules to 'help' the system operate, and one-off circuit boards to route the alarms and control base station inputs and outputs. The TB9100 reduces or eliminates the need for these extras, reducing cost and speeding up installation and commissioning.

Here are some areas that benefit the application engineer:

- The TB9100 has inbuilt audio switching to ensure that only the best or highest priority audio source is selected.
- Subaudible signalling features can give you a built-in tone panel and additional ways of remotely controlling the base station.
- Task Manager, Tait's powerful and easy-to-use scripting language, vastly increases the base station's power, flexibility, and versatility.

Signal Path

The most advanced RF and line audio configuration system ever devised for a base station. Flexible and powerful, yet simple to understand and simple to program

The TB9100 has been developed with a number of powerful features to improve its flexibility.

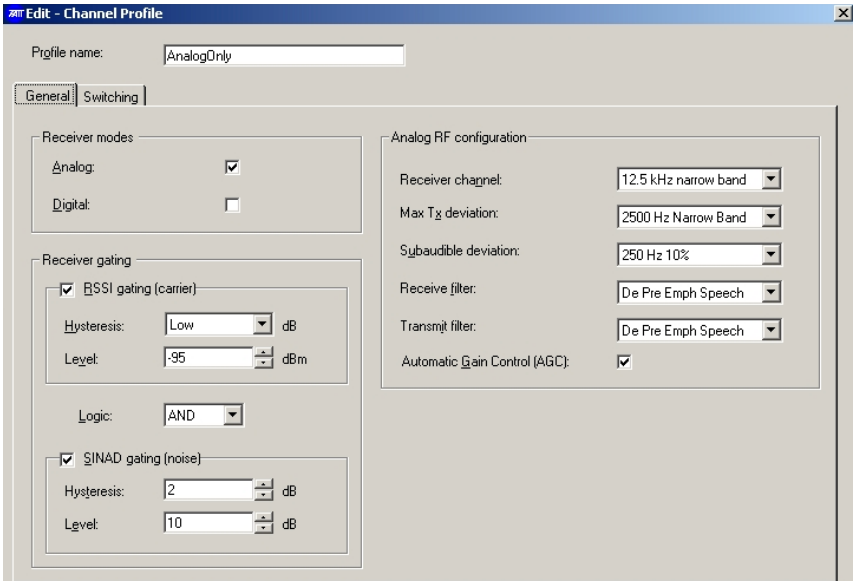
These include:

- Audio from the receiver to Digital and / or Analog ports
- Audio from the Digital or Analog line to the transmitter
- Internal voting to ensure the best audio source is selected

These items are independently configurable; together they form the backbone of what Tait calls the signal path.

Simple to Program

Configuring the signal path is fast and easy using the graphical interface, and you can see at a glance what has been set up. Configuration as a repeater, a line-controlled base station, or as a linking system is only a few clicks away.



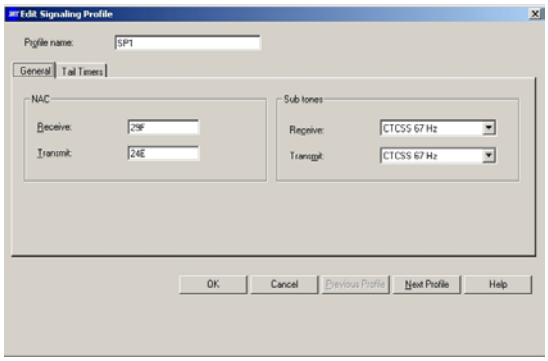
Audio Filters

For each “Channel Profile”, you can select from a range of audio filters. Your choice determines the filtering that will be applied to all receive and transmit audio paths. A pre-emphasised transmit path automatically corresponds to a de-emphasised receive path.

Subaudible Signalling

Each channel in the TB9100 base station’s channel table can be assigned a pair of subaudible CTCSS tones and/or DCS code (normal or inverted).

The receiver will only respond to transmissions with its tone or code, and the transmitter will always encode its transmissions with its tone or code.



Transmit Timers

Conventional radio systems rely on the clever use of tail timers for the ‘conversation management’ of talk groups. Correct combinations of these timers means:

- talkgroups don’t get interrupted by other groups
- there is no *‘Chshch’* sound at the end of every over