TP9100 - Key Features

Ruggedness*

- Drop Protection
- MIL810 Specifications
- IP54
- Magnesium Chassis
- Strong Belt Clip
- Stable Frequency Performance

Audio Quality*

- Superb Audio Quality

Battery Technology*

- Intelligent Batteries
- High Quality Cells
- Patented Securing Mechanism
- Charging Options

Usability*

- Designed For Ease of Use
- Menu Structure Shared With Mobile
- Suitable for Gloved Hands

Interoperability**

- Analog Operation
- P25 Digital Operation
- Dual Mode Operation

Product Functionality**

- Keypad locking of radios
- Intelligent Scanning
- Repeater Talk-Around
- Comprehensive Range of P25 Digital Services
- Comprehensive Analog Functionality
- Emergency Modes
- Economy Modes
- Connectivity to Otto Accessories

*** These are areas that the TP9100 products are outstanding in when compared to other P25 radios**

**** While the TP9100 is also outstanding in these areas, they are not necessarily distinguishing areas because other manufacturers' P25 radios can be expected to have comparable functionality -as mandated.**

Ruggedness

Shock Absorbing Corners

The corners of the TP9100 portables have built-in shock absorbing protection. This is located on the radio chassis itself and also on the battery and is a tough rubberised form of plastic which will not separate from the radio case.
The standard Tait drop test now consists of 26 drops from 1.8m onto concrete, after which the TP9100 portables will only have minor abrasions and yet still possess full functionality.

Benefits: The drop protection significantly improves the radio's ability to withstand a drop onto a hard surface. There is a tremendous ability throughout the radio's life to withstand repeated drops and still perform to full specification.

Example: A Policeman drops a radio onto the pavement. Instead of the radio falling apart and becoming useless, the TP9100 will bounce, remain intact and be fully usable once picked up.

MIL 810 Specification

These are a set of standards produced by the US Military, against which products can be tested for ruggedness. The TP9100 meets temperature, shock and vibration specifications which are part of MIL-STD 810E.

Benefits: Meeting this stringent military specification means the product is able to operate in extremely rugged environments – for example, jarring effects and constant vibration.

Example: The radio would be suitable for applications that demand performance and reliability in harsh conditions. Portables are particularly susceptible to shock from being dropped or tossed.

IP54

This is a European Standard that products can be tested against to meet certain standards of water and dust ingress. The TM9100 meets IP54 for sealing against rain and humidity.

Benefits: The product can be operated in applications where there can be persistent driving rain and /or high humidity.

Example: The TP9100 radios would be ideal for use in marine applications where water and saltfog are present constantly, or in mining and agricultural applications where dust is always a factor.

Advanced Thermal-Aging Testing

During the desing phase, the TP9100 has been subjected to numerous heating and cooling cycles in order to simulate the effects of aging. This was done to ensure that the design of the seals maintain their integrity and do not deteriorate. If the seals were to deteriorate, dust and moisture would get into the radio which would reduce it's reliability and compromise the IP54 rating.

Benefits: The TP9100 will maintain an IP 54 rating throughout its life.

Example: Demanding temperature changes are experienced when a radio is left in a car. This could range from extreme heat to extreme cold. Despite constant exposure to these situations, the TP9100 radios will continue to operate correctly and maintain their reliability - as customers would expect.

Magnesium Chassis

The chassis inside the TP9100 portable radio is constructed from Magnesium.This is a leap forward in mechanical technology for the Tait portable products.

Benefit: The portable radios obtain maximum internal strength with minimal weight.

Belt Clip

The belt clip on the TP9100 radios is rugged and very difficult to break. It is designed for use by gloved hands with a large area to push on to spring the clip open. Once the belt clip is in use, a secure edge on the clip prevents it from slipping off of a belt.

Frequency Stability

The TCXO within the TM9100 mobile radios features a specified frequency stability of 1.5ppm (parts per million), and below 100MHz of 2.5ppm. This stability is achieved across the temperature range of –30 to +60C(-22 to +140F). The TCXO provides the reference frequency from which all other RF frequencies are derived.

The value 1.5ppm specifies the tolerance of the frequency reference. (eg. a radio operating on 400MHz has a frequency drift of 400 x 1.5 = +/-600Hz).

This figure is the maximum drift of frequency allowed within the specified temperature limits (-30 to +60°C). The current T2000 range offers 2.5ppm at best – equating to a frequency drift @ 400MHz, of +/- 1kHz.

Benefits: The TCXO is the reference at the heart of the frequency generation process, the better the stability, the more reliable the communications – particularly data.

The high frequency stability also allows maximum use of the available channel spacing and provides some enhancement to the quality of voice communications.

Audio Quality

Audio Quality

The audio quality of the TP9100 radios is superb. The portables have extremely low distortion of under 1%, with 0.6% being typical.

Digital audio quality is also governed by the vocoder (see P25- A Survival Guide) which acts to reduce background acoustic noise around the microphone. Vocoders reduce sounds such as music, wind-noise and sirens, discriminating in favour of the human voice. This filtering action, combined with very low distortion, results in extremely clear overall voice reproduction. Vocoder functionality is not used in the TP9100 when the radio is used in the analog mode.

Tests on theTP9100 have shown that even when users scream as loud as they can into it, the resulting transmission from them is absolutely clear and undistorted.

Delay

All P25 radios have an unavoidable delay between someone speaking and their voice being heard at a receiving speaker. The overall delay is the sum of the time taken to convert the voice to digital (when transmitting) and plus the time to convert the digital signal into audio (when receiving).

The delay within the TP9100 is extremely low and the total end-to-end delay between two TP9100s over a direct (simplex) radio path is approximately 100mS (2 x 50mS).

Benefit: Customer transmissions will be clear in most situations, regardless of background noise.

Example: A policeman using a TP9100 outdoors during a loud rock concert or amongst much road traffic will be clearly audible to the dispatcher above the background noise.

Battery Technology

Intelligent Batteries

The TP9100 batteries have components installed inside them which provide them with some intelligence.

This intelligence provides:

- An electronic serial number (ESN) for the battery
- The age of the battery
- Identification of a “first ever” charge
- Information on what type of battery is presently connected to the radio – ie a Nickel Metal Hydride or a Nickel Cadmium, counterfeit(non-Tait, dry cell.
- For a battery to be left on a charger and for it not to become overcharged
- The ability to “tell” the radio when the battery is connected to a charger.

Battery intelligence has led to an innovation on the TP9100 for the “battery charge” indicator. Traditionally the LED indicator is just a battery voltage meter, but not so on the TP9100 where it is indicating the Coulombs of energy available to run the radio. This is a more meaningful indicator of how long the radio will actually run for, because the radio draws a constant amount of power irrespective of the available battery voltage.

Benefits: Customers can be confident that their portable radio battery radio will always receive the optimum charge for either type of battery and whatever it’s existing charge.

Customers can also be confident that irrespective of what type of intelligent battery is fitted to the radio, the gauge will always indicate meaningfully to them.

Example: 1 A customer may place a brand new Nickel Cadmium battery on to be charged. It will automatically receive the correct charge that a new battery needs.

Example: 2 A customer then puts a Nickel Metal Hydride battery on the charger to be charged. This battery has been in service for a year, has had a lot of use and is presently half-charged. The customer can be confident that the charger will correctly charge that type of battery and in the correct manner.

Hi Quality Cells

The cells used in the TP9100 battery packs are from a reputable cell manufacturer- Sanyo.

Tait has selected the latest battery technology , of the highest available quality, for use in the TP9100 batteries. As a result customers can be confident that the TP9100 batteries are the best available and provide the best possible performance. A genuine Tait battery provides essential functionality and performance not duplicated in a counterfeit battery.

Benefit: The customer will get top performance from their Tait batteries on the TP9100.

Example: A policemen just starting a 12 hour shift can be confident that the Nickel Metal Hydride battery will not go flat during that shift –based on a typical 5-5-90 duty cycle test. This duration is extended when the economy mode is used.

Battery Securing Mechanism

Yet another innovation on the TP9100 radios is the patented battery securing mechanism. This is certain to keep the battery attached in the event of a drop. The battery clips directly onto the radio chassis. The clips are also designed to produce an audible “click” when they attach, so that the user is confident that the battery is securely fastened.

Benefit: The battery will not separate from the radio if it is dropped.

Example: A fireman with wet hands drops the radio onto a concrete floor. Instead of the battery breaking away from the radio and becoming damaged, it stays attached. The user picks up the radio and continues to speak on it. The last thing the user needs at an urgent moment is the frustration and delay of the radio and battery package letting them down.

Usability

Ease of Use

The TP9100 is designed to be very easy to use in all situations, such as in the dark or when wearing gloves. When used in the dark, the major controls, namely the uniquely angled (and patented) volume knob, the channel knob, and the emergency button, are all very easy to locate.

There are also small identifying spots on the PTT and on the function key above the PTT. These function keys if required, are conveniently located just above the main PTT switch.

Wearing thick gloves is often a necessity for a fireman and for these users the radio buttons are large and accessible. To help these users even more, the radio has raised grips on the sides to provide a secure grip.

Should a user be uncertain about which channel or group of channels to use, a Function button can be set up as a “Homegroup/channel” button – so if in doubt, push this button to go to your channel.

The LCD provides a large 4 line display and is easy to see. It features adjustable brightness and contrast settings. A tough lens cover protects against damage. The LCD can show 10 icons to indicate battery/on charger, silent operation, scanning, repeater talkaround, monitor/squelch, call queue, encryption enabled, transmit power(low/hi), zone, and RSSI.

In covert situations, the radio can be put into a silent mode when there will be no “beeps” or audio indications. Another option is “quiet” when the radio will only ‘beep” for significant radio events not for minor keypad activations.

Feature: The TP9100 radios are easy to use in a variety of situations.

Benefit: Users will be able to focus upon their work and not become stressed over their radio.

Shared Menu Structure

The user menu structure on the TP9100 portable and the TM9100 mobile is almost identical. A user familiar with only one of these products will be able to intuitively and easily be able to use the other.

Benefit: It is easy to use both products as a result of knowledge of just one of them.

Example: In a large organization this effectively cuts the training time in half as it does not take twice as long to train on both products having trained on just one.

Channel Number

It is possible on the TM9100 mobile radios to configure a function button to recall and display a familiar channel number irrespective of the zone setting on the radio. Potentially the same number could be used across all zones.

Benefit: This allows the radio to readily integrate into an existing system and display a well known channel ID.

Interoperability

Analog Operation

An analog mode is available on the TP9100 portable radios that provides interoperation with existing analog radios.

Benefit: An easy migration path exists for a customer to change from analog to P25, with the customer not having to change all fleet radios at once. Radios may be upgraded as budgets permit, perhaps over a number of financial years. A TP9100 radio also has the enduring ability to communicate with analog radios belonging to other organizations.

Example: A customer may purchase some of their overall P25 radio requirement in the present financial year, with a plan to expand these numbers in the next financial year. During the transition time, the P25 radios can be operated in an analog mode.

P25 Digital Operation

The TP9100 portable radios are fully P25 compliant and will communicate with P25 compliant radio products from other manufacturers. The TP9155 range conforms to the P25 requirements as outlined by the TIA, in relation to Mandated Features, Standard Options, and Manufacturers Options.

Benefit: Customers purchasing the TP9100 portables can be very confident that the radios will provide excellent digital performance, as well as having the full range of P25 radio mandated services available.

Example: A customer may have some existing P25 radios. They can be confident that any newer TP9100 radios they purchase will operate with these radios – given that there is no proprietary content in the existing radios.

Dual Mode Operation

The TP9100 portables can be operated in a “dual-mode”. This is when the radio has the ability to automatically receive analog or P25 digital.

Benefit: The radio user does not have to do anything special to their radio, make any decisions, nor have technical understanding in order to successfully operate in this mode. They just pick up the radio and talk.

Example: A dual mode channel can be established for interoperability with an adjacent public safety agency, perhaps in the next region. It does not matter if the adjacent agency has P25 radios or analog radios because either will operate successfully on the dual mode channel.

Product Functionality

Keypad Lock

The front panel keypad of the radio can be locked or unlocked by a long press of the menu key. This stops accidental activation of the keys.

Intelligent Scanning

The TM9100 offers a range of scanning features and up to 300 scan groups, each with up to 80 members is offered.

Priority and Dual Priority scan are offered, which allows 1 or 2 channels to be sampled more regularly for activity, even when the radio is currently receiving on another channel.

Editable Scan Groups

These are editable (userprogrammable) and allow a user to add or delete channels to a scan group using a long press of the scan button..

Nuisance Delete

A user can temporarily remove busy channels from a scan group. This is beneficial when the channels are perhaps being affected by interference or traffic that is of no interest to the user.

Benefits:. These abilities allow monitoring of a group of channels for activity. The user programming allows for flexibility in terms of the group's members. Nuisance Delete allows for temporary deletion of interfering channels

Example: A customer can monitor the activity of several different working channels. The user-programmable scan function allows for creation of temporary workgroups (dynamic).

Repeater Talkaround

This feature can be used when the radio has left repeater coverage. When it is activated by the user, the radio will receive and transmit upon the output frequency(downlink) of the repeater.

Benefit: This will allow repeater users, within direct radio range of other repeater users to communicate together in the event that they have left repeater coverage or when perhaps the repeater has failed.

Example: A rural fire crew only has one repeater channel available to them, and sometimes they can be called to fires beyond it's coverage. The message for the crew is simple- when outside coverage just activate repeater talkaround. Crews operating beyond the repeater will then be able to talk together and potentially still retain communication with other crews still be operating though the repeater.

P25 Digital Services

There is a comprehensive range of P25 digital radio services available on the TP9100 portables. These include, preset status messages, broadcast calls, individual calls, radio inhibit/uninhibit, encryption*, talking party ID, call alerting, radio check, group calls.

Individual Calls, Group Calls, Broadcast Calls

The TP9100 radios can be configured so that the users can quickly call preset groups of other radio users. These groups can range in size from an individual radio right through to including all radio channel users.

Benefit: Radio users can communicate with the other radio users conveniently.

Example: A fleet of Police radios can be divided into private operational groups who of people who would routinely expect to be in contact with each other. Some group examples could be homicide, dogs, drug squad, traffic.

This P25 calling functionality may surprise some customers who may have previously only associated such functionality with trunked radio systems.

Radio Inhibit/Uninhibit

The TP9100 portables have the ability to be remotely inhibited or disabled when necessary. This could perhaps be done by a dispatcher or a technician The radios can also be remotely restored to normal operation once the dispatcher wishes this to happen.

Benefit: This ability ensures that uncontrolled radios do not jeopardize the customer's operations.

Example: If a P25 portable radio is stolen or lost, it can be remotely inhibited so that the thief is not able to listen to confidential radio traffic. It becomes useless to anyone until it is "uninhibited".

Talking Party ID

The identity of the calling party may be displayed on a TP9100 . This can either be in the form of a person's name or their radio's a numeric identity

Benefit: Radio users can identify who is speaking on the channel.

Example: At a large incident with many radio users, it will be possible for dispatchers and incident controllers to identify just who,or which radio is actually transmitting at present.

* Later release.

Preset Status Messages

The TP9100 portables provide users with the ability to send status messages to other users. A preset list of statuses is stored in all radios and these are sent as as required.

Benefit: Radio users can rapidly and privately send a preset status

Example: A user can quickly recall a status from a preset list and then send that to the dispatcher where it will be logged. This is quick to do and uses a minimum of channeltime.

Encryption*

The TP9100 portables may have their transmissions encrypted. This is done by altering the CAI transmission (Common Air Interface format), according to a mathematical formula or “key”.The encrypted transmissions can then only be received on radios which have the correct “key” installed.

Depending on the customer’s needs for security, different levels of encryption are available.

Benefit: The customer can be assured that their conversations are only being heard by authorized people.

Example: It may be essential for very critical users to have encypted transmissions. Examples could be in drug surveillance or armed offenders policing.

Even though a P25 transmission is not able to be received upon an analog radio it may be received by a suitable scanner receiver. Encryption ensures that users communicate completely in private.

Comprehensive Analog Functionality

In addition to digital functionality, the TP9100 radios have comprehensive analog functionality. This functionality includes 12.5 or 25 KHz operation, and a variety of signaling formats - CTCSS(PL), DCS(DPL), MDC1200 and DTMF encode. There is even a built in frequency inversion scrambler with a selectable “mirror” frequency.

Benefit: The analog capability gives the P25 digital radios the ability to communicate with existing analog radios.

Example: When a fleet is being upgraded to P25, the new P25 radios can be used in the analog mode until all of the fleet has been upgraded with new radios. Once all radios are upgraded they can then be switched to digital operation simultaneously. The customer benefit is that there are no difficulties in communicating with the older radios during the upgrade transition.

* Later release.

Emergency Modes

The TP9100 portables cater for a variety of user emergency needs. The exact behaviour of the radio in emergency mode depends upon how it has been programmed to behave.

Emergency Mode can be initiated in 3 ways - via the large easily identified orange button on top of the radio, via the Man-Down* or Lone Worker* intelligence within the radio. The user is prompted to cancel the Emergency Mode, and provided with a time period to do this in case the activation has happened by mistake.

Once Emergency Mode has been activated, the radio can exhibit two forms of behaviour – stealth or non-stealth. In the stealth mode the radio gives no indication – no sounds or visual indications that there is any problem at all. In the non-stealth mode audio sounds alert to a problem.

In Emergency Mode the radio will cycle between receive and transmit for a predetermined number of cycles to alert the dispatcher or other radio users to the emergency.

Benefit: The user can alert other people to an emergency. This can be done a number of ways whichever is the most appropriate for the organization.

Example: A policeman working alone at night is injured. He is able to reach for the radio in the dark, run his fingers down the aerial to locate the emergency button and push it. Immediately the dispatcher is alerted to the problem, without a word being said, and can mobilize assistance.

Economy Modes

Economy modes provide the ability for the TP9100 products to reduce the current drain from the battery during the receive periods. The receive current is a major determinant in how long a battery will last, because the radio generally is receiving for most of the time. By activating the economy mode within the radio programming software, the radio can be made to be turned off for some fractions of a second every second. Effectively the radio is “going to sleep” and then “waking up” to listen for calls.

Depending upon the ratio of “off time” to “on time” the economy mode is usually invisible to the users, with no noticeable operational affects at all other than the battery lasting longer.

Benefit: The user can optimize their battery life if this is critical to them.

Example: The radio is programmed to operate in this mode at set up, and it is not a user selected feature. The user is unlikely to even be aware that the radio is operating in “economy mode”. The user receives the benefit of the enhanced battery life without having to do anything technical at all.

* Later release.

Otto Accessories

The TP9100 portables operate with Otto Accessories. The Otto range of accessories is diverse and includes light and heavy duty headsets, as well as specialist microphones and covert earpieces.

These accessories are designed to cater for a variety of demanding environments, with some being rated for complete water submersion.

Benefit: Otto is an accessory manufacturer whose entire focus is on accessories. They produce accessories which are tailored for demanding markets. Customers can obtain some selected key accessories from Tait and source any secondary ones from Otto directly.

Example: The Genesis is a rugged MIL810 rated speaker microphone, which has been designed for use by Fire Departments. It features a removable front grille for easy cleaning, and is able to withstand high pressure water such as a hose squirt, or even complete immersion.

The PTT button has a “snap action” which gives the user confidence that it has been pushed. This is important to customers who wear fire gloves. The spring clip that attaches to clothing rotates 360 degrees in order to give the user freedom when wearing it.