TAIT COMMUNICATIONS

Lexington-Fayette Urban County Government

Invitation to Bid

RFP #207-2014

Public Safety Radio System Subscriber Units

TAIT COMMUNICATIONS FOR LEXINGTON DIVISION OF POLICE: Public Safety Radio System Subscriber Units

tait communications

"With the talent we have in the department and the supportive community in Lexington, my vision is to make Lexington the safest city of its size in the nation."

Ronnie J. Bastin,
Chief of Police,
Lexington-Fayette Urban County Government Division of Police

"Putting more police on the streets is essential to provide the highest level of safety to the public and to the officers. We will vigorously review manpower levels on the street to make sure police have what they need to do the job."

Lexington Mayor Jim Gray

"Public safety continues to be a top priority for our city during very difficult financial times."
Lexington-Fayette Urban County Government Council member Kevin Stinnett

Tait Communications offers mobile and portable radios well aligned with the Lexington Division of Fire and Emergency Services intent to purchasing radio user equipment that will interface seamlessly with the system provided by Airbus Defense & Space Communications (formerly Cassidian Communications). Tait Communications has engineered mission critical radios that will meet or exceed your requirements.

Our key deliverables in this proposal are based on:

- Public service grade radios that are tough and reliable
- Full featured public safety grade radios that offer custom software options
- Radios with advanced functionality to meet the needs of high end user radios, for Commander/Management level

Tait is pleased to submit our response to Lexington-Fayette Urban County Government. Tait understands that the primary goal of the project is to replace the Lexington Division of Fire and Emergency Services current Public Safety Radio Subscriber Units.

TAIT MANUFACTURES TOUGH, RELIABLE, AND EASY TO USE RADIOS

Tait has a philosophy to pour profits back into research and development. We test and improve different aspects of everything we do with a focus on audio quality and reliability. Our P25 radios will deliver excellent audio quality utilizing your Airbus Defense & Space Communications (formerly Cassidian Communications) Network. In fact, key components of the Airbus DS Communications solution for Fayette County designed and manufactured in the same centralized facility as our portable and mobile subscriber equipment.

COMMITMENT TO OPEN STANDARDS

Tait closely monitors developments in the public safety sector, staying abreast with trends as members of industry bodies around the world and holding memberships of communications standards committees. All P25 products tested in P25 compliance assessment program (CAP) labs, including Tait's own Department of Homeland Security-approved CAP lab in Houston. The Tait mobile and portable are manufactured to be 100% compliant to "APCO Project 25" (P25).

CUSTOMIZE AND CONFIGURE WITH SOFTWARE

As needs change, software licenses allow a custom radio modification without the risk of removing hardware for upgrades. Our reliable software will help LFUCG's Division of Fire and Emergency Services keep radios in the hands of users if a software upgrade is required. Trunking, MDC1200 encode/decode, two-tone decode, P25 CAI, encryption, APIs and conventional OTAR are just some of the software license options available. On mobile radios, optional dual head, remote head, and hand-held control head configuration offer space-saving communications and mean the Tait P25 mobile radios can dynamically respond to your needs.

TAIT ENSURES THAT MILESTONES ARE ALIGNED AND THAT RETURN ON INVESTMENT IS MAXIMIZED

Our goal is to ensure the P25 radios operate at its highest potential. Our confidence in delivering that value comes from our experience meeting the needs of the Lexington Police, and the knowledge that while you might be able to purchase a lower price radio, you will not get something equal to the feature-rich functionality of Tait radios.

Every Tait offering must meet stringent criteria, including affordability, cost-effectiveness, and ease of implementation and use, to ensure maximum value. Our goal is the same as expressed to your own Lexington Police Department: to deliver P25 mobile and portable radios that meet your affordability, cost-effectiveness, and usability requirements while maximizing the radios useful lifetime.

In conclusion

We are committed to provide mobile and portable radios exceeding the RFP specifications with:

- Multiple experienced Tait dealers with over five years of experience installing and programming our mobile and portable radios will manage and lead an experienced mobile installation staff in the Lexington area to support the project. This staff includes experienced mobile installers who completed P25 mobile installation in a community adjacent to Fayette County, as well as other counties within the Commonwealth of Kentucky.
- The highest quality, toughest radios in the industry designed and tested to work seamlessly with your existing P25 Airbus DS Communications system.
- Zero percent financing

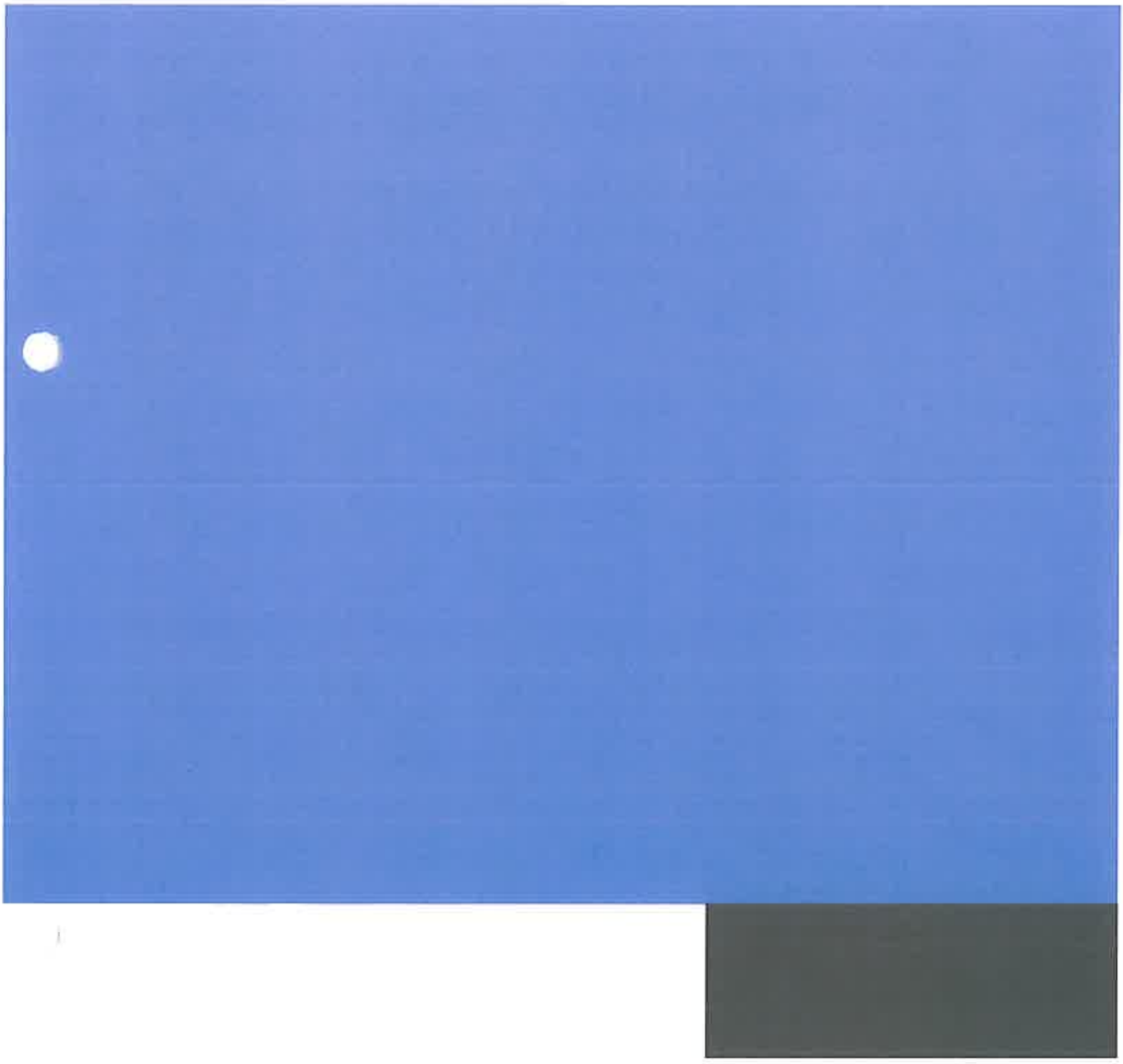
We thank you for the opportunity to present this response offered by Tait Communications. We're proud to have served the Lexington Police Department for the past 2 years. We look forward to expanding that relationship with Fayette County and the LFUCG's Division of Fire and Emergency Services radio user community.

;ou have any questions, your point of contact is:

Walt Bolil
Sales Director
Tait Communications

walter.bolil@taitradio.com

281-600-5908 (office)
281-703-0480 (mobile)



December 29, 2014

Division of Central Purchasing
Lexington-Fayette Urban County Government
Room 338, Government Center
200 East Main Street
Lexington, KY 40507

RE: Invitation To Bid #207-2014
Public Safety Radio System Subscriber Units

Thank you for the opportunity to respond to Lexington-Fayette Urban County Government (LFUCG) Invitation for Bid for the provision of Public Safety radio system subscriber units. Tait has prepared its response based on the requirements of the Invitation for Bid #207-2014 and our response accompanies this letter.

Our offering is uniquely focused on the needs of Public Safety state and local agencies who demand dependable and cost effective products and services. We understand that procuring P25 radios that are tough and reliable and will easily integrate with your new Airbus Defense & Space Communications (formerly Cassidian) network is important for LFUCG. Please note that the radios offered have been designed and manufactured by the same Tait engineering teams as your base system components ensuring out of the box smooth operation and life-long compatibility.

Tait is committed to work in good faith with LFUCG to negotiate mutually agreeable Terms and Conditions to be applied to the enclosed bid. In our 40 year history in all cases where Tait has been selected as the preferred supplier, Tait has been able to reach mutually acceptable Terms and Conditions with its clients and we can do the same with LFUCG.

We look forward to participating in the electronic bidding event for Lexington-Fayette Urban County Government for your radio project. We are committed to delivering radios that will meet your needs today and for many years to come.

Sincerely,

Walter Bolil

Walter Bolil
Sales Director - Americas
Office: 281-600-5908
Email: walter.bolil@taitradio.com

Tait Communications
15342 Park Row Blvd
Houston, Texas 77084

Phone: (281) 829-3300
Fax: (281) 829-3320
www.taitradio.com

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- 5.6.6 Portable Radios for Public Services
- 5.6.7 Control Station Radios
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Section 6: 6. Product Catalog

- 6. 0 Product Catalog

Section 7: 7. Pricing (submitted electronically on January 14th, 2015)

- 7.1 Pricing for items in Product Information Sheets Section 5.6
- 7.2 Pricing for Portable Radio Chargers
- 7.3 Pricing for Mobile Installation and Programming Services
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- 7.5 Standard Price List

Addendums

- Addendum #1

Section 1

Invitation to Bid

RFP# 207-2014

The Lexington-Fayette Urban County Government assumes no responsibility for Sealed Specification Responses that are not addressed and delivered as indicated above. Sealed Specification Responses that are not delivered to the Division of Central Purchasing by the stated time and date will be rejected.
All bids must have the company name and address, bid invitation number, and the commodity/service on the outside of the envelope.

Bids are to include all shipping costs to the point of delivery located at: See Specifications.

Bid Security Required: __Yes _X_No Performance Bond Required: __Yes _X_No
Cashier Check, Certified Check, Bid Bond (Personal checks and company checks will not be acceptable).

Quantity	Commodity/Service
PCT	**Public Safety Radio System Subscriber Units**
	See specifications.

Check One:	**Proposed Delivery:**
_____Bid Specifications Met __X__Exceptions to Bid Specifications. *Exceptions shall be itemized and attached to bid proposal submitted.*	__30__ days after acceptance of bid.

Procurement Card Usage

__X__Yes The Lexington-Fayette Urban County Government will be using Procurement Cards to
_____No purchase goods and services and also to make payments. Will you accept Procurement Cards?

Submitted by:

Tait North America
Firm
15342 Park Row Blvd.
Address
Houston, TX 77084
City, State & Zip

Bid must be signed: (original signature)

Signature of Authorized Company Representative – Title
Kris Klug, Vice President of Finance and Administration
Representative's Name (Typed or printed)
(281) 600-6280
Area Code - Phone – Extension *Fax #*
kris.klug@taitradio.com
E-Mail Address

The Affidavit in this bid must be completed before your firm can be considered for award of this contract.

Section 2

Required Documents

AFFIDAVIT

Comes the Affiant, Tait North America, and after being first duly sworn under penalty of perjury as follows:

1. His/her name is Kris Klug and he/she is the individual submitting the bid or is the authorized representative of Tait North America,

the entity submitting the bid (hereinafter referred to as "Bidder").

2. Bidder will pay all taxes and fees, which are owed to the Lexington-Fayette Urban County Government at the time the bid is submitted, prior to award of the contract and will maintain a "current" status in regard to those taxes and fees during the life of the contract.

3. Bidder will obtain a Lexington-Fayette Urban County Government business license, if applicable, prior to award of the contract.

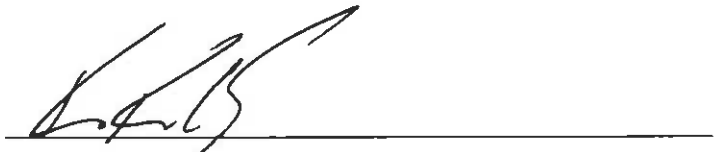
4. Bidder has authorized the Division of Central Purchasing to verify the above-mentioned information with the Division of Revenue and to disclose to the Urban County Council that taxes and/or fees are delinquent or that a business license has not been obtained.

5. Bidder has not knowingly violated any provision of the campaign finance laws of the Commonwealth of Kentucky within the past five (5) years and the award of a contract to the Bidder will not violate any provision of the campaign finance laws of the Commonwealth.

6. Bidder has not knowingly violated any provision of Chapter 25 of the Lexington-Fayette Urban County Government Code of Ordinances, known as "Ethics Act."

7. Bidder acknowledges that "knowingly" for purposes of this Affidavit means, with respect to conduct or to circumstances described by a statute or ordinance defining an offense, that a person is aware or should have been aware that his conduct is of that nature or that the circumstance exists.

Further, Affiant sayeth naught.

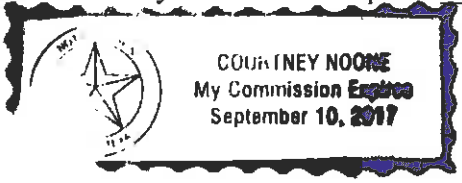


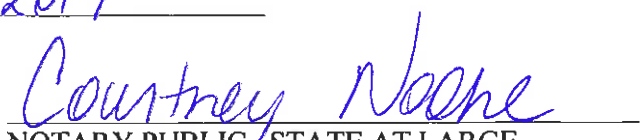
STATE OF Texas

COUNTY OF Harris

The foregoing instrument was subscribed, sworn to and acknowledged before me by Kris Klug on this the 18th day of December, 2015.

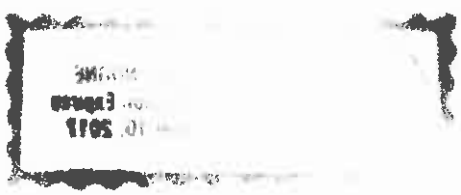
My Commission expires: 9/10/2017





NOTARY PUBLIC, STATE AT LARGE

Please refer to Section II. Bid Conditions, Item "U" prior to completing this form.



EQUAL OPPORTUNITY AGREEMENT

The Law

- Title VII of the Civil Rights Act of 1964 (amended 1972) states that it is unlawful for an employer to discriminate in employment because of race, color, religion, sex, age (40-70 years) or national origin.

- Executive Order No. 11246 on Nondiscrimination under Federal contract prohibits employment discrimination by contractor and sub-contractor doing business with the Federal Government or recipients of Federal funds. This order was later amended by Executive Order No. 11375 to prohibit discrimination on the basis of sex.

- Section 503 of the Rehabilitation Act of 1973 states:

  The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap.

- Section 2012 of the Vietnam Era Veterans Readjustment Act of 1973 requires Affirmative Action on behalf of disabled veterans and veterans of the Vietnam Era by contractors having Federal contracts.

- Section 206(A) of Executive Order 12086, Consolidation of Contract Compliance Functions for Equal Employment Opportunity, states:

  The Secretary of Labor may investigate the employment practices of any Government contractor or sub-contractor to determine whether or not the contractual provisions specified in Section 202 of this order have been violated.

****

The Lexington-Fayette Urban County Government practices Equal Opportunity in recruiting, hiring and promoting. It is the Government's intent to affirmatively provide employment opportunities for those individuals who have previously not been allowed to enter into the mainstream of society. Because of its importance to the local Government, this policy carries the full endorsement of the Mayor, Commissioners, Directors and all supervisory personnel. In following this commitment to Equal Employment Opportunity and because the Government is the benefactor of the Federal funds, it is both against the Urban County Government policy and illegal for the Government to let contracts to companies which knowingly or unknowingly practice discrimination in their employment practices. Violation of the above mentioned ordinances may cause a contract to be canceled and the contractors may be declared ineligible for future consideration.

Please sign this statement in the appropriate space acknowledging that you have read and understand the provisions contained herein. Return this document as part of your application packet.

Bidders

I/We agree to comply with the Civil Rights Laws listed above that govern employment rights of minorities, women, Vietnam veterans, handicapped and aged persons.

Signature

TaiH North America

Name of Business

December 18, 2014

This letter certifies that pursuant to Tait Communication's Equal Employment Opportunity policy, Tait does not discriminate against any person because of race, color, creed, religion, sex, national origin, handicap, disability, age, genetic information or any other characteristic protected by law.

Tait Communications complies with all Equal Employment Opportunity regulations and does not engage in discriminatory hiring practices either through disparate treatment or disparate impact. Tait's EEO policy and practices are effective at ensuring that unlawful discrimination does not take place. As such, Tait has not established or implemented an Affirmative Action Program ("AAP"). Further, Tait has not been court ordered to develop an AAP, nor does Tait meet the criteria that mandates an AAP.

Dawn Craig
HR Business Partner

Tait Communications
15342 Park Row Blvd.
Houston, Texas 77084

Phone: (281) 829-3300
Fax: (281) 829-3320
www.taitradio.com

WORKFORCE ANALYSIS FORM

Name of Organization: Tait North America, Inc **Date:** 12/29/14

Categories	Total	White		Latino		Black		Other		Total	
		M	F	M	F	M	F	M	F	M	F
Administrators	1			1						1	
Professionals	42	26	5	4	2		1	3	1	33	9
Superintendents											
Supervisors	9	5	2		1			1		6	3
Foremen											
Technicians	14	10	1		1	2				12	2
Protective Service											
Para-Professionals											
Office/Clerical	11				3	3	3	1	1	4	7
Skilled Craft	1	1								1	
Service/Maintenance											
Total:	78	42	8	5	7	5	4	5	2	57	21

Prepared by: Dawn Craig - HR Business Partner
Name & Title

Dawn Craig

LFUCG MBE/WBE PARTICIPATION FORM
Bid/RFP/Quote Reference #__207-2014_____

The MBE/WBE subcontractors listed have agreed to participate on this Bid/RFP/Quote. If any substitution is made or the total value of the work is changed prior to or after the job is in progress, it is understood that those substitutions must be submitted to Central Purchasing for approval immediately.

MBE/WBE Company, Name, Address, Phone, Email	**Work to be Performed**	**Total Dollar Value of the Work**	**% Value of Total Contract**
1. TEM Elect 3560 Bashford Ave Louisville, KY 40218 502-454-0101	Radio installation	<$50,000	~10%
2.Futurcom 1023 W. Lexington Ave Winchester, KY 40391 859-744-0000	Radio installation	<$50,000	~10%
3.Harlan Two-Way 2415 West Hwy 72 Harlan, KY 40831 606-573-3826	Radio installation	<$50,000	~10%

The undersigned company representative submits the above list of MBE/WBE firms to be used in accomplishing the work contained in this Bid/RFP/Quote. Any misrepresentation may result in the termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and false claims.

Tait Communications
Company

Walt Bold
Company Representative

Dec 29, 2014
Date

Sales Director
Title

December 29, 2014

Marilyn Clark, Division of Central Purchasing
Lexington-Fayette Urban County Government
Room 338, Government Center
200 East Main Street
Lexington, KY 40507

Dear Ms. Clark,

Subject: MBE/WBE Subcontractors

Tait Communications recognizes your goal of awarding at least 10% of contracts to qualified MBE/WBE subcontractors. The installation and support of Tait radios requires specialized knowledge and training to ensure proper functionality and a satisfactory user experience.

After searching the KY M/WBE subcontractor website, I had discussions with Pat Abrams of TEM Electric. Although TEM is not experienced in radio installation, they have enough technical experience that they could be trained and likely meet the needs of the City of Lexington.

In addition, we have two WBE qualified dealers in place today: Harlan Two-Way out of Harlan, KY, and Futurcom out of Winchester, KY.

Please call me if you have questions, but I believe with these companies we can meet the city's requirements for qualified MBE/WBE subcontractors.

Sincerely,

Walter Bolil

Walter Bolil
Sales Director - Americas
Office: 281-600-5908
Email: walter.bolil@taitradio.com

LFUCG STATEMENT OF GOOD FAITH EFFORTS
Bid/RFP/Quote #__207-2014_____

By the signature below of an authorized company representative, we certify that we have utilized the following methods to obtain the maximum practicable participation by minority and women owned business enterprises on the project. Please indicate which methods you used by placing an X in the appropriate place.

____ Attended LFUCG Central Purchasing Economic Inclusion Outreach Event

____ Sponsored Economic Inclusion event to provide networking opportunities

__X_ Requested a list of MBE/WBE subcontractors or suppliers from LFUCG Economic Engine

____ Advertised for MBE/WBE subcontractors or suppliers in local or regional newspapers

___ Showed evidence of written notice of contracting and/or supplier opportunities to MBE/WBE firms at least seven days prior to the bid opening date

____ Provided copies of quotations submitted by MBE/WBE firms which were not used and/or responses from firms indicating they would not be submitting a quote

____ Provided plans, specifications, and requirements to interested MBE/WBE subcontractors

__X_ Other
Please list any other methods utilized that aren't covered above.
connected with previously approved Tait resellers to ascertain which were approved MBW/WBE businesses._____
_____
_____

The undersigned acknowledges that all information is accurate. Any misrepresentations may result termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and claims.

Tait Communications
Company

Walt Bolef
Company Representative

Dec 29, 2014
Date

Sales Director
Title

Section 3

Tait Commercial Review

Tait Commercial Review of Request for Quote and RFP Terms and Conditions

Tait is committed to agreeing mutually acceptable terms with its customers and is excited for the opportunity to work with Lexington Fayette Urban County Government. Any questions or comments may be addressed directly to Tait's Legal and Commercial Manager at Darrin.Ramsey@taitradio.com.

<table>
<tr><th colspan="2">Invitation to Bid #207-2014 – Public Safety Radio System Subscriber Units – December 2014</th></tr>
<tr><td>Insurance Requirements</td><td><u>Coverage</u> <u>Limits</u>
General Liability $3 million per occurrence, $~~5~~<u>4</u> million aggregate
(Insurance Services Office Form CG 00 01) or $2 million combined single limit

Response: Considering the limited size of the proposed contract, Tait requests that the insurance requirement for the General Liability be lowered to $4 million aggregate.</td></tr>
<tr><td></td><td><u>INDEMNIFICATION AND HOLD HARMLESS PROVISION</u>

(1) <u>To the extent the Vendor is determined to be responsible,</u> It is understood and agreed by the parties that Vendor hereby assumes the entire responsibility and liability ~~for any and all~~ damages to persons or property caused by or resulting from or arising out of any <u>negligent</u> act or omission on the part of Vendor or its employees, agents, servants, owners, principals, licensees, assigns or subcontractors of any tier (hereinafter "Vendor") under or in connection with this agreement and/or the provision of goods or services and the performance or failure to perform any work required thereby.

(2) <u>To the extent the Vendor is determined to be responsible,</u> Vendor shall indemnify, save, hold harmless and defend the Lexington-Fayette Urban County Government and its elected and appointed officials, employees, agents, volunteers, and successors in interest (hereinafter "LFUCG") from and against ~~all~~ liability, damages, and losses, including but not limited to, demands, claims, obligations, causes of action, judgments, penalties, fines, liens, costs, expenses, interest, defense costs and reasonable attorney's fees that are in any way incidental to or connected with, or that arise or are alleged to have arisen, directly or indirectly, from or by Vendor's performance or breach of the agreement and/or the provision of goods or services provided that: (a) it is attributable to personal injury, bodily injury, sickness, or death, or to injury to or destruction of property ~~(including the loss of use resulting therefrom),~~ or to or from the negligent acts, errors or omissions or willful misconduct of the Vendor; and (b) not caused ~~solely~~ by the active negligence or willful misconduct of LFUCG.</td></tr>
</table>

	~~(3) In the event LFUCG is alleged to be liable based upon the above, Vendor shall defend such allegations and shall bear all costs, fees and expenses of such defense, including but not limited to, all reasonable attorneys' fees and expenses, court costs, and expert witness fees and expenses, using attorneys approved in writing by LFUCG, which approval shall not be unreasonably withheld.~~ (4) Except for the Limitation of Liability, These provisions shall in no way be limited by any financial responsibility or insurance requirements, and shall survive the termination of this agreement. Response: Tait requests the indemnity to be drafted to make it party responsible for its negligence with a reasonable damages for both parties.
Add the following Term & Definition:	"Beneficial Use" means when Customer first uses the System or a Subsystem for operational purposes (excluding training or testing or by written permission from System Integrator). Response: Tait requests the term Beneficial Use be added to the Agreement.
Add the following:	**Limitation of Liability.** Notwithstanding any other provision to this Agreement, the parties total liability, whether for breach of contract, warranty, negligence, strict liability in tort, indemnification, or otherwise, will be limited to the total contracted value. In no event will special, incidental, indirect or consequential damages in any way related to or arising from this entire agreement. This Limitation of Liability will survive the expiration or termination of this Agreement. Response: Tait requests a reasonable mutual limitation of liability be added as is standard within the communication industry.
Add the following:	1. CU-L1B Communication System Agreement 2. Tait's Limited Warranty; and 3. Tait's General Software License Agreement Response: Tait has attached to its response the above documents: 1. Tait's preferred terms and conditions wording for negotiation; 2. Tait's standard warranty; and 3. the license agreement that governs Tait's intellectual property.

Tait is committed to work in good faith with Lexington Fayette Urban County Government to determine Terms and Conditions that are suitable to the type of scope that Tait is offering.

3.2 Reference Documents to Commercial Section

- Standard Equipment Terms and Conditions of Sale
- EXHIBIT A – Limited and Extended Warranty
- EXHIBIT B - Tait General Software License Agreement

Tait North America Inc.
STANDARD EQUIPMENT TERMS AND CONDITIONS OF SALE

These terms apply between Tait North America Inc. ("Tait") and _____. ("Customer") and are made this _____ day of _____, 20___.

1. **DEFINITIONS**
"Equipment" means all goods and services sold by Tait to the Customer

2. **WRITTEN ASSENT TO ADDITIONAL TERMS REQUIRED**
TAIT OBJECTS TO ANY TERMS OR CONDITIONS CONTAINED IN CUSTOMER'S PURCHASE ORDERS OR OTHER COMMUNICATIONS FROM CUSTOMER, WHICH ARE DIFFERENT FROM OR IN ADDITION TO THE TERMS AND CONDITIONS HEREIN ABSENT TAIT S EXPRESS WRITTEN ASSENT. NO DIFFERENT OR ADDITIONAL TERMS OR CONDITIONS SHALL BE OF ANY FORCE OR EFFECT WHATSOEVER UNDER ANY CIRCUMSTANCES WITH RESPECT TO TRANSACTIONS BETWEEN TAIT AND CUSTOMER. NOTWITHSTANDING ANY FAILURE BY TAIT TO COMMUNICATE FURTHER OBJECTIONS THERETO No contract shall be formed except upon the terms and conditions contained herein or assented to in writing by the Parties

3. **ORDERS**

No contract for sale of equipment shall result except by Tait's written acceptance of each order submitted by Customer.

4. **PRICES**

4 1 The prices to be paid by Customers to Tait for each order of Equipment shall be Tait s prices in effect on the date said order for Equipment is accepted by Tait Tait may change its prices for Equipment from time to time, however, no price change shall affect the prices of Equipment sold to Customer pursuant to orders placed by Customer and accepted by Tait prior to the effective date of such price change

4 2 Prices for Equipment are exclusive of any taxes, if any The Customer agrees to reimburse Tait where Tait pays the same or is responsible for payment of all such taxes including penalties where Customer actions resulted in incurring such penalties

4 3 Prices are inclusive of packing to full normal shipping standards Prices are not inclusive of freight charges which shall be billed to Customer

4 4 If the Customer requires Tait to vary quantities, delivery dates or Equipment specifications from those against which prices were quoted, Tait shall have the right to adjust the quoted price.

5. **PAYMENT**

5 1 Unless other payment terms have been agreed, full payment of the Contract Price shall be paid within 30 days of shipping date Tait will invoice the Customer as of the shipping date.
A payment will be considered late, if paid later than 30 days from invoice date

5 2 A late payment charge of 1 25% may be added to all past due accounts This late payment charge is due net 30 days after it is added to the trade account This charge is, in part, to cover the cost of recordkeeping requirements arising from failure to make timely payments

5 3 Separate invoice(s) may be submitted in respect of any installation or labor charges These invoices are to be paid no later than 30 days from the date of invoice

5 4 No payment may be withheld by the Customer by way of set-off (legal equitable or otherwise) against any sums owed to Tait

5.5 Any charge by Tait determined to be a charge to compensate Tait for the time value of money shall not exceed the maximum amount of nonusurious charges that may be contracted for, taken reserved, charged, or received under law, any charge in excess of the maximum amount shall be credited to the account of Customer or, if Customer has a credit balance, refunded This provision overrides other provisions in this and all other instruments concerning a Customer's account debt.

6. **DELIVERY & RETURN OF INVENTORY**

6 1 Delivery

6 1 1 Unless otherwise agreed by the parties, in writing, all sales of Equipment shall be:
- Canadian customers and shipments EXW Markham, Ontario
- United States customers and shipments EXW Houston, Texas

6 1 2 No claim for shortage, out of box failures or damage in respect of Equipment delivered will be considered unless notice is received in writing by Tait within 7 days from the earlier of the date of receipt of the Equipment by the Customer or by a third party on the Customer's behalf

6 2 Return of Inventory

6 1 1 Products or equipment purchased under condition of Sale or Return, if not sold or purchased by the Customer within the first 30 days, may be returned without penalty Freight for products returned under this condition will be paid by Tait

6 1 2 If under any other circumstances, Tait, at its sole discretion, agrees to accept the return of products for credit, a restocking fee of 20% of the invoiced value may apply

6 1 3 No products or equipment will be accepted for credit after 30 days from the time of delivery of goods under any circumstances

6.3 Quoted delivery periods are calculated from the last to occur of
a) Tait's acceptance of the Customer's order, or
b) provision by the Customer to Tait of all engineering and configuration details and Customer supplied parts and materials necessary to enable Tait to manufacture and supply the Equipment, or
c) receipt of any necessary letter of credit, in the agreed form or a form acceptable to Tait, and other required documentation (including any confirmation or guarantee); or

6 4 In the event where Tait drop ships equipment at the customers request, the Customer shall indemnify Tait for all losses and costs incurred by Tait if United States Customs Service refuses or fails to accept delivery of the Equipment including storage charges

incurred by Tait with any third party warehouse In those circumstances, delivery to a warehouse shall be deemed to be a completed delivery by Tait

6 5 Shipments for accounts which exceed the credit limit as determined by Tait or for accounts with outstanding balances more than 30 days old are subject to credit hold at the discretion of Tait

7. DELAYS

In the event Tait's performance of work is delayed by acts of the Customer, Tait shall be entitled to an adjustment for time and expenses resulting therefrom in addition to extension of the time and of performance Under no circumstances will either party be responsible for delays or lack of performance resulting from events beyond the reasonable control of that party ("See Article 17 Force Majeure")

8. CANCELLATION

Customer cancellation of any order without liability will be by written mutual agreement of the parties only. If Customer unilaterally cancels all or part of any purchase order, work on such orders shall be stopped as quickly as is practical upon receipt of written notification of cancellation Customer will make payment to Tait in an amount equal to

a) For work in process, a percentage of the sales price based on work completed up to the time of cancellation and work is stopped

b) For custom work and/or work that includes unique materials that cannot be reasonably be used in normal production or sold to other Tait customers in a reasonable period of time, then the cancellation fee may be up to 100% of the order value of the custom work and or materials

c) For work completed at the time of cancellation and the equipment is standard Tait product and can be sold to other Tait customers in a reasonable period of time, the Tait restocking policy shall apply

d) For custom work completed and/or work that includes unique materials that cannot be sold to other Tait customers in a reasonable period of time than the cancellation fee may be 100%

Tait will use commercially reasonable efforts to minimize cancellation charges by canceling orders and by using common industry components in its products when possible

9. TITLE

Title of Equipment shall pass once Tait has received payment in full, however, title to software and the media on which it is embodied, together with copyright and other intellectual and industrial property rights in the software and in all data and information embodied in the hardware, shall at all times remain with Tait or its licensors The rights of the Customer in software not produced by Tait but included in the Equipment may be subject to the Customer accepting conditions as a sub-licensee imposed by the owner of the software

10. EQUIPMENT SPECIFICATION AND QUALITY

10 1 Tait reserves the right to amend details of the technical specification of the Equipment in the Contract to improve the facilities or performance of the Equipment or to substitute items of equivalent performance where items referred to in the quotation are no longer available

10.2 All specifications, particulars and descriptions set out in catalogs, brochures and similar documents, shipping specifications and particulars of weight and dimension are approximate and being intended for general guidance and shall not be binding

10 3 Tait reserves the right to discontinue the sale of Equipment and to change the formula, contents or packaging thereof. Tait shall not incur any liability thereby or any obligation to change or repurchase Equipment previously sold by Tait to Customer.

11. INSPECTION AND TESTING

11 1 The Equipment will be submitted to Tait's standard tests before shipment

11 2 Any additional tests of the Equipment, which may be required by Customer, must be agreed to separately in writing and may be subject to additional charges

12. WARRANTY

The Tait Limited Warranty is attached hereto as Exhibit A. Warranty repairs shall only be undertaken by an Authorized Tait Service Center unless specifically authorized in writing by Tait In cases where Tait authorizes the customer to undertake warranty repairs, Tait will replace faulty components free of charge No reimbursement will be made with respect to labor

13. LIMITATION OF LIABILITY

NEITHER PARTY SHALL BE LIABLE FOR ANY INDIRECT, PUNITIVE, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THIS CONTRACT (INCLUDING LOSS OF BUSINESS, REVENUE, PROFITS, USE, DATA OR OTHER ECONOMIC ADVANTAGE), HOWEVER IT ARISES, WHETHER FOR BREACH OF CONTRACT OR IN TORT, EQUITY OR OTHERWISE.

UNLESS OTHERWISE PROVIDED BY APPLICABLE LAW, TAIT'S LIABILITY, IF ANY, FOR ANY ALLEGEDLY DEFECTIVE PRODUCT, PART OR SOFTWARE SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, PART OR SOFTWARE, AT TAIT'S OPTION, AND THE LIABILITY OF TAIT, IF ANY, FOR DAMAGES RELATING TO DEFECTIVE PRODUCT, PART OR SOFTWARE SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE ITEM IN QUESTION

14. INTELLECTUAL PROPERTY WARRANTY

14 1 Because of the complexity of manufacturing techniques for electronic components and of the intellectual property rights pertaining thereto including software, Tait is unable to declare that the Equipment does not infringe the intellectual property rights of third parties In the event that a third party makes a claim alleging that the Equipment infringes such a third party's intellectual property rights, Tait undertakes at its option and expense to defend the claim or seek a compromise. If unfavorable judgment is rendered against Tait, Tait shall at its option take out a license from the said third party or shall modify the Equipment in such way as to avoid infringement or replace the components or software with components or software of equivalent quality, functionality and performance If such solution shall be impractical for economic and/or technical reasons Tait shall accept the return of the Equipment and refund the Customer the Customer's net book value for the Equipment deemed to infringe

14 2 Tait's obligations under clause 14 1 shall only apply if the Customer promptly notifies Tait, permits Tait through its counsel to defend and if appropriate settle the claim at Tait's expense, gives Tait all available information, assistance and authority to enable Tait to defend or settle the claim at Tait's expense and has not settled or compromised such claim

14 3 Tait's obligations under clause 14 1 shall not apply if Tait has followed a design or instruction furnished or given by the Customer or the Equipment has been modified without Tait's approval or used in a manner or for a purpose or in a country not specified by or disclosed to Tait prior to the Contract Date or the Equipment has been used in association with software or equipment not supplied by Tait

14 4 Clause 14 states the entire liability of Tait and the exclusive remedies for the Customer for claims of infringement of third party intellectual property rights

15 CONFIDENTIAL INFORMATION

Customer will safeguard and treat as confidential all price lists and quotations, technical information and particulars and other information supplied by Tait.

16 SURVIVAL

Those provisions that by their nature survive the expiration or termination of this agreement shall survive expiration or termination of this Contract and extend to all media in which data and Information may be stored or displayed.

17. FORCE MAJEURE

Tait shall not be liable for any delay, failure or non-performance of any of its obligations under this contract resulting from war, armed conflict, civil disturbance, Act of God, fire, explosion, accident, industrial dispute or any regulation, rule or act of any Government or Governmental agency, failure of third party suppliers to deliver parts and components, or any other cause beyond Tait's reasonable control.

18 MISCELLANEOUS PROVISIONS

18.1 The Laws of the State of Texas, excluding its conflicts-of- law rules which might apply the laws or refer the matter to a different jurisdiction, shall govern the validity, construction, and enforcement of this Contract and the rights and obligations of the parties hereunder. The parties designate the state and federal courts of Texas as having exclusive jurisdiction over any dispute arising under or in connection with this Contract. The exclusive venue of any litigation between the parties shall be in Harris County, Texas.

18.2 This Contract shall inure to the benefit of and be binding upon Tait and its successors and assigns and upon Customer and its legal representatives.

18.3 In the event any provision of this Contract is found to be unenforceable or invalid, such provision shall be severable from this Contract and shall not affect the enforceability or validity of any other provision contained in this Contract.

18.4 The relationship between Customer and Tait is that of buyer and seller only. Nothing stated in this Contract shall be construed as creating the relationship of employer and employee, franchisor and franchisee, master and servant, principal and agent, partnership or joint venture between the parties. CUSTOMER SHALL BE DEEMED AN INDEPENDENT PARTY AT ALL TIMES, AND SHALL HAVE NO EXPRESS OR IMPLIED RIGHT OR AUTHORITY TO ASSUME OR CREATE ANY OBLIGATION ON BEHALF OF TAIT. Customer shall be solely responsible for its acts, conduct and expenses and for the acts, conduct and expenses of its employees and agents.

18.5 This Contract supersedes and cancels all prior discussions, Contracts and understandings with respect to the subject matter hereof between the parties, written, oral or implied.

18.6 Exhibit A Limited Warranty and Exhibit B Tait General Software License Agreement are attached to this contract and the terms of said attached documents are incorporated into this contract. This contract and the aforementioned attached and incorporated documents shall evidence the entire agreement of the parties.

18.7 Customer may not assign, transfer or sell all or any of its rights under this Contract without the advance written consent of Talt, which may be granted or withheld at Tait's sole discretion, except as provided for in this Clause 18.

18.8 Failure by either party to enforce or take advantage of any provision hereof shall not constitute a waiver of the right subsequently to enforce or take advantage of such provision. This Contract or any of the terms or provisions thereof may not be changed or amended or waived, in any way whatsoever, except by written agreement executed by the parties.

18.9 The paragraph headings are for reference only and shall not be considered substantive provisions of this Contract. The use of of a singular or plural form shall include the other form and the use of the masculine, feminine or neuter gender shall include the other genders.

IN WITNESS WHEREOF, this Contract is effective as of the day and year first above written.

Tait North America, Inc. _____

By: _____	**By:** _____
Name: _____	**Name:** _____
Title: _____	**Title:** _____
Date: _____	**Date:** _____

EXHIBIT A

LIMITED WARRANTY

Tait North America Inc., (Warrantor) 15342 Park Row, Houston, Texas, 77084 USA, warrants to the original owner thereof all parts of every new Tait brand equipment products or Tait brand software purchased in the Continental United States or Canada to be free from defects in materials or workmanship, as hereinafter provided, for two years from the date of purchase excluding all accessories and batteries which are covered for one year. If the purchase is for a system installation, the warranty shall start from final acceptance or Beneficial Use, whichever occurs first. "Beneficial Use" means when Customer first uses the System or a Subsystem for operational purposes (excluding training or testing or by written permission from System Integrator).

Warrantor will, at its option, repair or replace any equipment or software covered by this warranty, which becomes defective, malfunctions or otherwise fails to conform to this warranty under normal use and services during the term of this warranty, at no charge for parts or labor.

In order to obtain warranty service, the equipment, together with the original or a machine reproduction of the bill of sale or other dated, proof-of-purchase document describing the equipment, must be delivered, to Warrantor in the Continental United States or Canada at the owner's expense. Any evidence of alteration, erasing or forgery of proof-of purchase documents will be cause to void the warranty.

This warranty does not cover defects, malfunctions or failures resulting from shipping or transit accidents, abuse, misuse, operation contrary to furnished instructions, operation to incorrect power supplies, operation with faulty associated equipment, modification, alteration, improper servicing, tampering and normal wear and tear. Equipment on which the serial number has been defaced or removed shall not be eligible for warranty service. Should any equipment or software submitted for warranty service be found ineligible therefore, an estimate of repair cost will be furnished and the repair will be accomplished if requested by the owner upon receipt of payment or acceptable arrangements for payment. Software operation is warranted only with the operating system for which it was designed and only on Tait brand software. At customer's cost, Warrantor will use its best efforts to enforce any software warranty provided by any third party software copyright owner. Warrantor does not warrant that the functions contained in the software will meet customer's requirements or that the operation of the software will be uninterrupted or error free.

This is the only warranty applicable to Tait brand equipment products or software; Warrantor neither assumes nor authorizes anyone to assume for it any other warranty. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OF NON-INFRINGEMENT AND OF ANY OTHER OBLIGATIONS OR LIABILITY ON THE PART OF WARRANTOR. WARRANTOR'S LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM ANY CAUSE WHATSOEVER, INCLUDING WARRANTOR'S NEGLIGENCE, ALLEGED DAMAGED OR DEFECTIVE GOODS, WHETHER SUCH DEFECTS ARE DISCOVERABLE OR LATENT, SHALL IN NO EVENT EXCEED THE PURCHASE PRICE OF THE EQUIPMENT. IN NO EVENT SHALL WARRANTOR BE LIABLE FOR LOSS OF USE, COMMERCIAL LOSS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER.

EXTENDED WARRANTY PROGRAM

The extended warranty extends the standard limited warranty terms beyond two years from the date of purchase as specified in EXIBIT A.

Batteries and accessories have a one year Standard Warranty and are excluded from the Extended Warranty Program

The annual price of the extended warranty will be offered during the Electronic Bidding Event

TM9400 Series

Year	Price (USD)
3	

TP9400 Series

Year	Price (USD)
3	

Exhibit B

TAIT GENERAL SOFTWARE LICENSE AGREEMENT

Purpose

This is the Tait General Software Licensing Agreement for inclusion with all media containing or relating to Tait product software and firmware.

Disclaimer for Translations

The following disclaimer will precede any translated versions of the Tait General Software License Agreement:

The following is a translation of the terms and conditions of the Tait General Software License Agreement. The Tait General Software License Agreement is in English and in the case of any inconsistency between the <Language> translation and the English version, the English version shall prevail.

Tait General 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) authorised 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.

END OF DOCUMENT

Section 4

Financing Options

December 31, 2014

Division of Central Purchasing
200 East Main Street, Room 338
Lexington, KY 40507

Thank you for the opportunity to present the following proposal for financing:

Lessor: Tait Communications
Lessee: Lexington-Fayette urban County Government
Purchase Option: $1.00 upon contract completion
Equipment/Project: Public Safety Radio System Subscriber Units
Financing Structure: Lease Purchase
Payment Terms: Quarterly Payments
Minimum Down Payment: 15%

36 Month Financing Option
Effective Annual Interest Rate: 4.75%

60 Month Financing Option
Effective Annual Interest Rate: 5.50%

84 Month Financing Option
Effective Annual Interest Rate: 6.50%

The above proposal is an expression of interest, subject to audit analysis and mutually acceptable documentation and is not a binding commitment. The terms outlined herein are subject to change and rates are valid for fourteen (14) days from the date of this proposal. If funding does not occur within this time period, rates will be indexed to markets at that time. Proposed funding considers the total cost of borrowing and may include rate adjust and call features along with effects of interest from escrow and/or issuance costs. I look forward to proceeding with this project and should you have any questions or wish to consider other terms, please feel free to give me a call.

Sincerely,

Kristopher Klug
Vice President of Finance

Tait Communications
15342 Park Row Blvd
Houston, Texas 77084

Phone: (281) 829-3300
Fax: (281) 829-3320
www.taitradio.com

Section 5

Technical Specifications

5.1 Compliance Statements

Bid Overview	
LFUCG has implemented an 800 MHz P25 Phase 1 multicast/simulcast system provided by Cassidian Communications (COR P25). The Lexington Division of Fire and Emergency Services is seeking bids for the purchase of the subscriber units that will be used on this system. The total purchase for the Division of Fire will be approximately 350 portable hand-held radios, 160 mobile radios, and 50 control station radios.	Noted
The LFUCG also seeks to establish a price contract that can be used by other Divisions of the LFUCG as they migrate to the system in the near future. This migration would require approximately 100 portable hand-held radios, 250 mobile radios and 25 control station radios.	Noted
1. It is envisioned that the purchased subscriber units for the Division of Fire will be shipped to Lexington by the end of February 2015. Obtaining a certificate of interoperability from Cassidian Communications will be a pre-requisite for the shipment.	Noted
2. Long term the LFUCG system is expect to serve about 3500 radios.	Noted
3. The vendors will provide their complete standard price lists for subscriber equipment and all related accessories, options, licenses, etc. LFUCG's final price will be determined via the electronic bidding event process on January 14th.	Noted - Standard Price List for subscriber equipment including accessories and options is enclosed in Section 7
4. The vendors will provide good faith estimates (during the electronic bidding event on January 14th) of per-unit installation and programming charges and will identify the resources and their handling capacity to be used for such services.	Noted
5. Vendors will describe their warranty programs in detail.	Noted - see Tait Limited and Extended Warranty Program in Section 3.2 Exibit A
6. Vendors will provide information about available financing options for all submitted equipment.	Noted - see section 4
7. For each proposed radio the vendors will provide the year when the radio was first offered on the market and expected lifetime for the model (how long it will be in production). The vendors will provide certificates of CAP compliance for the proposed units or provide binding timeline for when such certificates are expected to be available. The vendors will provide names and contact info for public safety agencies with >500 users using the proposed radios.	Noted -see section 5.3
8. For each radio offered, vendor will detail what testing has been done to ensure the unit's interoperability and functionality with a Cassidian Communication COR P25 Trunked Radio System.	Noted - see section 5.2

Subscriber Radio Specifications	
1.1 Technical Specifications	
1.1.1 Overview	
LFUCG's Division of Fire and Emergency Services will be purchasing radio user equipment that will require different features depending on the user departments and their operational needs. By "radio user equipment", the solicitation refers to mobile radios, portable radios, and control station radios. These radios will fall into several classes, from those with the most advanced features to basic models. This equipment will be used on a Cassidian COR P25 system operated by the LFUCG.	Noted
Vendors will propose suitable user equipment for 4 different groups of users:	Noted
a. Full featured public safety grade radios as described below; these radios will be the model used by firefighters with primary emergency response duties. These radios will operate on the new LFUCG system and must meet all Phase I P25 mandatory requirements. Usefulness of the radios in harsh environments with and without firefighting gloves will be considered.	Noted
b. Full featured public safety grade radios as described below; these radios will be the model used by firefighters that provide support functions. These radios will operate on the new LFUCG system and must meet all Phase I P25 mandatory requirements. Usefulness of the radios in harsh environments with and without firefighting gloves may be considered.	Noted
c. Full featured high end public safety grade radios as described below; these radios will be the model used Commander/Management level personnel. These radios will operate on the new LFUCG system and must meet all Phase I P25 mandatory requirements. These radios may have additional features available including multi-band operation. Usefulness of the radios in harsh environments with and without firefighting gloves may be considered.	Noted
d. Public service grade radios; these mobiles, portables and control stations will be economy units, meeting all Phase I P25 mandatory requirements.	Noted
Public Safety grade radio features:	
a. APCO P25 Phase I trunked radio	Comply
b. Software Upgradeable to APCO P25 Phase II	Comply
c. Minimum 32 conventional channels	Comply
d. Minimum 256 system/talkgroups	Comply
e. Programmable time–out-timer	Comply
f. Digital and analog talk-around	Comply
g. Individual call	Comply
h. Emergency operation	Comply
i. Group scan	Comply
j. PC programmable	Comply
k. Alphanumeric display	Comply
l. Back lighting of display with dimmer control	Comply
m. Encryption capable, AES, minimum 15 keys	Comply
n. On/off volume knob	Comply
o. 16 position rotary knob with stops	Comply
p. Advanced System Key	Comply

q. Dynamic regrouping capable	Comply
r. Mil Specs 810C, D, E , F, and G	Comply
s. Accessories	
i. Rapid rate desk charger (1 hour full recharge)	Typical time to achieve a full charge of the offered batteries is between 1 to 2 hours
ii. Choice of antenna types	(1) 1/2 Wave whip and (2) Helical (Stubby)
iii. Spring-loaded belt clip	Comply
iv. Choice of battery types	Tait only **offers** Li-ion Batteries. Choice of battery capacity available
v. Multi unit charger (standard charge)	Single, 6-way multiple and vehicular charges available
vi. Public Safety remote speaker-mic with emergency activation button (no antenna)	Comply
vii. Covert surveillance earpiece to work with lapel mic	Comply
viii. Noise cancelling mic with emergency activation button (no antenna)	Comply
ix. Complete programming set – software, licenses, cables and connectors	Comply
x. Complete encryption management kit – software, licenses, cables and connectors	Comply
t. Options:	
xi. GPS	Noted
xii. Bluetooth	Noted
xiii. UL intrinsically safe portable model	Noted
xiv. 3-year factory warranty	Noted
xv. Detailed service manual	Noted
Submitters shall provide a detailed explanation of the testing that has been done to ensure the submitted radio's functionality on Cassidian COR P25 infrastructure. A detailed description of the expected performance when operating on Cassidian COR P25 Infrastructure including expectations during failsoft operation shall be submitted.	Noted - see section 5.1 Interoperability Compliance
Submitters shall provide a detailed explanation of the offering including the impact of potential P25 Phase II system upgrade on all user radio equipment, specifically whether or not the radios proposed are currently P25 Phase II capable, or are upgradeable from Phase I to Phase II. If they are upgradeable to Phase II, describe the process required to upgrade them to Phase II operation, whether it is a simple software update, requires modification to the radios or required replacement of the radios. If the radios require modification, describe the process. List price of any costs associated with the upgrade shall be provided.	Comply - The proposed TP/TM9400 are software upgradable to Phase II and no modification to the radio's hardware is required
LFUCG has procured a complex system infrastructure throughout which the radio units will operate. Superior performance of the system will depend on the radio units' abilities to properly and predictably roam throughout the system. The Submitters shall provide a detailed discussion of the methodology with which the radio units roam, including:	Noted - **See** Product Description in section 5.5
♦ Methodology by which the radio units choose on which site/subsystem to register	Noted - See Product Description in section 5.5

♦ How the radio units avoid remaining on a low signal site when in range of a higher-signal site.	Noted - See Product Description in section 5.5
♦ The radio units' algorithm for accessing a site upon power-up and upon requiring a site change.	Noted - See Product Description in section 5.5
♦ Any features in the radio units' roaming algorithm, which might provide for more efficient system operation (automatically favoring a higher-capacity site, etc.). Please provide details on how these features operate.	Noted - See Product Description in section 5.5
♦ Describe how the radios' operating algorithm protects from conditions that might entail numerous radios registering simultaneously, thus potentially overloading the system.	Noted - See Product Description in section 5.5
♦ Please describe the radio units' flexibility for operating in preferred conditions upon infrastructure failures. Such as, changing to an available wide-area subsystem when a "site trunking" condition occurs, or conversely, remaining in the "site trunking" condition. Also, describe the radios' ability to switch to and handle conventional failsoft operation.	Noted - See Product Description in section 5.5
♦ Please describe any added value features of the proposed units.	Noted - See Product Description in section 5.5
Submitters shall provide a detailed explanation of the testing that has been done to ensure the submitted radio's interoperability with Cassidian COR P25 infrastructure. A detailed description of the expected performance when operating on Cassidian COR P25 Infrastructure including expectations during failsoft operation shall be submitted.	Noted - See Product Description in section 5.5
The Submitter shall describe the process by which system frequencies are programmed into the radio units. Specifically, if sites and/or channels are added to the system at a later date, what must be performed to the radio units to accommodate these additional sites/channels.	Noted - See Product Description in section 5.5
Submitters that participated in LFUCG RFI #6-2014 and are providing pricing for radios that were submitted for testing during this process may reference the documentation pertaining to the communications equipment that was previously submitted. Only major changes to the documentation already on file need be submitted.	Noted
If any of the requested features are not available at the time of submission, a time line indicating when the features will be available must be submitted for review.	Noted
The LFUCG reserves the right to withhold 10% of the unit purchase price as retainage. This 10% retainage will be paid in full when the selected vendors proposed features (features not yet available on current models) are obtainable via a software update.	Noted
1.1.2 Mobile Radio, 700/800 MHz	
Mobile radios shall be frequency synthesized and furnished to operate on all channels in the 700/800 MHz land mobile bands. Specific channel assignment will be made by the trunking control system. In the event the mobile radio unit begins operating on a site or subsystem which is in a failed mode, a unique tone will be heard on the unit's speaker and indicated on the display if applicable. Submitters shall describe the capabilities of the proposed mobile radios to provide an indication to the user that the trunked system is operating in a mode that is not normal. It is preferred that users have the ability to silence the failure indication tone.	Comply

Detailed operational and technical instructions on programming shall be supplied. The RF output power into 50 Ohms shall be 15 Watts minimum.	Noted - see section 5.9
Mobile stations shall have an engraved or stamped multi-digit unique serial number applied to each unit. These shall be of such type, and located in such a position that their removal or alteration is as difficult to do and as obvious to spot as economically feasible. It is not the intent of LFUCG in requiring this identification to raise the cost of the units by any significant percentage. Submitters must be aware of this intent when proposing a suitable method of identification.	Comply with stamped multi-digit unique serial number to each unit.
The mobile station exterior housing shall be made of plated or painted steel or aluminum of sufficient gauge to provide for adequate protection and theft deterrence. Plastic, nylon or other suitable synthetic material may be used for the radio enclosure/housing if its usage is adequately justified and it can meet the required performance specifications.	Comply
The interconnecting cable, including + and - DC power, shall be of such construction that frequent exposure to hydraulic fluids and petroleum based oils will cause minimal damage such as cracking or softening of the cable jacket.	Comply
All mobile units and operation radios shall be supplied with control unit, speaker, microphone and all accessories required for installation.	Noted
The successful vendors shall be required to demonstrate that the microprocessor-based equipment is totally functional in the vehicular environment in which LFUCG intends it to be used. This test shall include, but not be limited to, RF immunity, DC input voltage fluctuations, noise introduced in the DC line and typical usage impact. Any degradation of functional parameters of the equipment supplied due to normal or emergency operation of the vehicle in which it is installed shall be corrected by the Contractor.	Noted
Open air mobile units and all external headsets, microphones and speakers must be weatherproofed and suitable for outdoor mounting. All installation and operating cabling, brackets, etc. must be part of this procurement.	Comply
The housing shall be devoid of any louvers or other openings thereby protecting the radio set from dirt, dust, and moisture and splashing water.	Comply
The mobile radio shall be capable of operation from a nominal 12-volt dc primary power source, with positive action reverse polarity protection to avoid damage if the radio were to be incorrectly installed. In that event, the only damage allowed shall be blown fuses if the radio were turned "ON". The radio set shall operate from a negative ground primary source.	Comply
All power should be derived directly from the vehicle battery, without using active components such as transistors in an oscillator circuit, step-up transformers, or rectifiers. Primary power input shall be adequately fused to assure fast and positive action.	Comply
Some mobile radios will require priority-scanning capability. These units shall be capable of scanning a minimum of ten (10) fleets/sub fleets. The operator shall be readily able to select the fleets/sub fleets to be scanned, to designate and change the priority channel, and to enable or disable the scanning mode.	Comply
Additional equipment specifications are listed below.	

System Compatibility - Mobile radios shall be equipped and compatible with software related features of the trunking system:	Noted
♦ Dynamic talkgroup reconfiguration	Comply
♦ System access priority	Comply
♦ Trunking controller failure operating mode	Comply
♦ Signaling error correction (To correct erroneous talkgroup assignments, software shall provide for the mobile to revert to the signaling channel in the event that a unit is assigned to an incorrect talkgroup)	Comply - The system will have to signal the radios to revert to the correct traffic channel and/or talkgroup
♦ Wide area operation capability	Comply
♦ Selective inhibit and uninhibit	Comply
♦ Multi-key Encryption (256 bit AES Encryption)	Comply
♦ Software driven tuning and alignment capabilities	Comply
♦ Batch cloning capability	Note that each radio has a unique ID information (SUID, RSI, OTAP ID) AND each SUID that is added also needs adding to the RFSS fleet manager to be allowed onto the trunked system
♦ Over-The-Air-Rekeying (OTAR) (Selected Public Safety radios) (optional)	Comply
♦ Over-The-Air-Programming (OTAP) (optional)	Comply
Emergency Alarm Switch - Mobile radio control heads shall be equipped with an emergency switch which will encode a unit identification and emergency status message when depressed. The emergency signaling shall be placed onto the system immediately to be decoded and displayed at the user's dispatch center. Submitter shall describe programmable options associated with emergency signaling that are available with their submission.	Comply
Status Tones - Audible programmable indication shall be provided for the following operational conditions:	
♦ System busy	Comply
♦ Callback when channel is available	Comply
♦ Trunking controller failure	Comply
♦ Time out timer operation	Comply
♦ Access to system denied	Comply
♦ Out of range of trunked system	Comply
Control Head	
♦ Mounting - Shall provide for mounting on vertical or horizontal plane mounting surface	Comply
♦ Displays - Shall be clearly labeled and shall be backlit for nighttime visibility	Comply
♦ Microphone - Palm type, with push to talk switch	Comply
♦ Selector Switches - Rotary selectors and volume controls are preferred on Public Safety radios;	Comply with the volume control but selector is operated from the keypad
♦ Multiple control heads - Some vehicles require a front and rear control heads	Comply
♦ An "on-off" switch shall control primary power to the radio set.	Comply
♦ A volume control shall regulate the audio level of the speaker. Minimum volume shall be software programmable.	Comply
♦ Indicator lamps (either LED or LCD devices) shall be provided which indicate "radio set on" and "transmitter carrier on" functions.	Comply

♦ A talkgroup selector switch or switches, if applicable.	Talgroup selector is operated from the keypad
Service Facilities - A central metering jack shall be provided for connecting test apparatus to the radio for measuring transmitter and receiver circuitry alignment.	Comply
Selective Signaling and Alert Decoder – Unit shall allow for selective signaling of mobile units and shall provide a visual or audible indication on the control head of a call waiting.	Comply
Talk-around and Conventional Operation - Shall provide for direct, simplex, mobile-to-mobile communication in analog or digital mode. Programming should allow user selection of a trunked talk group, a conventional channel or a talk-around channel from the same bank utilizing the talk group/channel selector control. This operational method shall not result in loss of radio features or the functional system/group (channel) capacity.	Comply
Radio Models - Bidders should focus on models that were submitted under LFUCG RFI 6-2014.	Noted
1.1.3 Portable Radio, 700/800 MHz	
The portable radio will be used by the firefighters in harsh environments. The portable radio shall meet MIL 810 C, D, E, F and G standards for shock, vibration, salt, fog, dust and rain, and shall consist of weather resistant, FM transmitter, receiver battery power supply and operating controls, all housed in a durable, attractive, weather resistant enclosure. The case of the unit shall fit comfortably in, and permit, one hand operation. Power output of the transmitter shall be a minimum of 3 Watts.	Comply
Portable radios supplied under this procurement shall be frequency synthesized and furnished to operate on all channels in the 700/800 MHz land mobile bands. Specific channel assignment will be made by the trunking control system. In the event the portable radio unit begins operating on a site or subsystem which is in a failed mode, a unique tone will be heard on the unit's speaker and indicated on the display if applicable. Submitters shall describe the capabilities of the proposed portable radios to provide an indication to the user that the trunked system is operating in a mode that is not normal. It is preferred that users have the ability to silence the failure indication tone.	Noted - See section 5.5 Product Description page 12
Radios shall be delivered with all necessary channels already programmed. Detailed operational and technical instructions on programming shall also be supplied.	Noted
The radio set shall be small, lightweight and rugged. The radio set shall be capable of withstanding severe operating conditions. The portable housing shall be constructed of high impact resistant material. It shall be sealed and gasketed to protect internally mounted circuitry against dust, foreign particles, moisture and splashing water. Opening the battery compartment shall not break the seal to the radio circuitry. "Ruggedized" portable radios are preferred. If available, ruggedized portable radios shall be offered and thoroughly described.	Comply - See Data Sheet in Section 5.7 and Product Description in Section 5.6

The radio shall be single battery operated to insure uniform battery depletion. Submitters shall propose a rechargeable battery, which shall be quickly and easily removed. Battery life, based on a 10% transmit, 10% receive, 80% stand-by duty cycle, measured in accordance with EIA RS-316 at 250 milliwatts of audio output, shall be at least twelve (12) hours. Batteries must be capable of full recharge in one (1) hour or less. Batteries provided must be capable of withstanding a 3' drop test to concrete without damaging battery performance or visibly cracking the battery housing. Submitters shall provide a listing of the batteries available and a comparison detailing the advantages and disadvantages of each type of battery. The comparison shall include the maximum and minimum operating temperatures of each battery offered.	Note that Tait only manufactures Li-Ion batteries for the TP9400. Choice of battery capacity options are available - See User Guide in Section 5.9 Also, the typical time to achieve a full charge of the offered batteries is between 1.5 to 2 hours
LFUCG is interested in considering different types of batteries. The Submitter shall include in their bid a section describing the pros and cons of their available battery types, including their operational parameters. LFUCG intends on making final decisions on battery types after evaluating this response. LFUCG is also interested in compatible battery cases that would allow the use of standard commercially available AA Alkaline batteries with your portable radio equipment.	Note that Tait only manufactures Li-Ion batteries for the TP9400. Tait could however consider exploring possible clamshell battery arrangments to take AA cells.
The volume and mode selection controls on the portable radios shall be mounted on the top of the unit for easy access. Minimum volume shall be software programmable. A rotary control knob shall be provided to select talkgroups as desired, simultaneously selecting the correct transmitter and receiver digital code. The switch shall not rotate through more than 355 degrees. Other controls shall include a volume control/on-off switch. A sealed transmitter "push-to-talk" (PTT) switch shall be provided on the side of the unit, and an emergency switch shall be provided for user defined quantities of radios.	Comply
The audio output levels of indication tones shall be capable of being independent of the volume control.	Comply
All portables shall be available with a variety of devices such as belt clips, leather cases, etc. Public safety speaker/microphone assemblies shall be available and thoroughly described in the bid. Further, it must be possible for an operator to remove the public safety speak-er/microphone assembly from a portable radio without the use of tools, and then operate the radio in normal fashion. Speaker/microphones shall not have antennas on the microphone. All speaker/microphones shall use coiled cords to connect the speaker microphone to the radio, and shall have an emergency alarm switch that will activate the emergency alarm in the portable radio. Speaker microphones shall be noise canceling. Submitters shall provide a description of how noise cancelation is achieved.	Comply
Additional equipment specifications are listed below.	
Unit Identification - Shall transmit a digital unit identification when the PTT switch is depressed	Comply
System Compatibility - Radios shall be equipped and compatible with the following trunked system software or firmware related functions:	Comply
♦ Dynamic talkgroup reconfiguration	Comply
♦ System access priority	Comply
♦ Trunking controller failure operating mode	Comply

♦ Signaling error correction (To correct erroneous talkgroup assign-ments, software shall provide for the mobile to revert to the signaling channel in the event that a unit is assigned to an incorrect talkgroup)	Comply - The system will have to signal the radios to revert to the correct traffic channel and/or talkgroup
♦ Wide area operation capability	Comply
♦ Selective inhibit and uninhibit	Comply
♦ Multi-key Encryption (256 bit AES Encryption)	Comply
♦ Software driven tuning and alignment capabilities	Comply
♦ Batch cloning capability	Note that each radio has a unique ID information (SUID, RSI, OTAP ID) AND each SUID that is added also needs adding to the RFSS fleet manager to be allowed onto the trunked system
♦ Over-The-Air-Rekeying (OTAR)(optional)	Comply
♦ Over-The-Air-Programming (OTAP) (optional)	Comply
Emergency Alarm Switch - An emergency button/switch shall be provided, which, when activated, permits immediate access to a control channel and alerts the dispatcher of an emergency transmission. When the emergency button is activated, the transmitter operates in its highest priority mode, and the PTT switch can be used to key the transmitter in that mode. No receive audio shall be present unless the PTT switch is first activated. Submitter shall describe programmable options associated with emergency signaling that are available with their submission.	Comply
Status Tones - Shall provide audible programmable indication of the following conditions:	Comply
♦ System busy	Comply
♦ Call back when channel available	Comply
♦ Trunking controller failure	Comply
♦ Time out timer activation	Comply
♦ Access to system denied	Comply
♦ Out of trunked radio system range	Comply
♦ Master Network Controller failure	Comply
♦ Other reduced capability indicator	Comply
Selector Switches - Rotary selectors are required on Public Safety models. Ease of use while wearing firefighting gloves will be considered.	Comply
Talk-around and Conventional Operation – Proposed radio shall provide for direct, simplex, and radio-to-radio communication in analog or digital mode. Programming should allow user selection of a trunked talk group, a conventional channel or a talk-around channel from the same bank utilizing the top selector control. This operational method shall not result in loss of radio features or the functional system/group (channel) capacity.	Comply
Accountability Tone Operation – Radio shall be capable generating the Lexington Fire Department Accountability Tone as demonstrated during RFI 6-2014. If selected as finalist, the vendor shall be required to demonstrate this capability prior to the final awarding of any purchase contract.	Comply

Batteries - Proposed portable handheld radio batteries shall use nickel metal hydride, lithium-ion or lithium polymer chemistry. The following table shall be completed for each battery submitted in this RFB. Battery options for each radio should be outlined using the format listed below:	Comply with lithium-ion

Battery Model #	Capacity (maH)	Chemistry (NiH, LiON, LiPoly)	Avg radio run time 5/5/90	Is there a limited number of Charging Cycles?	Typical Number of Charging Cycles	Recommended Single Unit Charger	Recommended Multi Unit Charger
T03-00011-AAAA	1860mAh	Li-Ion	FDMA=9h, TDMA=11.5h	See note below	See note below	T03-00012-AEAA	T03-00013-AEAA
T03-00011-CAAA	2400mAh	Li-ion	FDMA=12h, TDMA=16h	See note below	See note below	T03-00012-AEAA	T03-00013-AEAA

The minimum number of cycles to reach a residual capacity of 80% will be 300 cycles. Based on a single 12 hour shift 5 days a week, one battery should not reach the 80% capacity level for at least 60 weeks (just over one year). Maximum capacity will further reduce after the 300 cycle mark

Battery Chargers - Battery charging units operating from 110V AC, 60 Hz primary power shall be provided. Multi-unit chargers shall be capable of fully charging batteries in one (1) hour or less. All chargers shall automatically switch to trickle charge when the battery is 70% (or more) charged. Miniature meters (scaleless) or lighted indicators shall be provided which will indicate when a battery is charging and also when it is fully charged.	Comply with exceptions to charging time. Typical time to achieve a full charge of the offered batteries is between 1 to 2 hours
Three types of battery chargers shall be provided:	
♦ Desktop charger capable of holding a single radio unit or battery.	Comply
♦ Multi-unit charger suitable for wall mounting or desktop placement.	Comply
♦ Rapid rate vehicle mountable radio charger.	Comply
Each charger provided shall be capable of recharging batteries with the nickel-cadmium, nickel metal hydride, lithium-ion or lithium polymer battery either connected to, or removed from, the radio set. The charger shall be equipped with automatic full discharge option to first fully discharge the battery to a minimum of 1 volt per cell and then recharge the battery, or else the bidder shall certify that this feature is not needed, because the batteries being supplied are not susceptible to developing "battery memories".	Note that the offered chargers are for Li-Ion battery only. Li-Ion does not suffer from memory effect thus the charger is not equipped with a discharge function
In addition LFUCG is interested in the following list of accessories/items for potential future purchases of fire service grade radio equipment:	
• Ruggedized lapel microphone with emergency activation button and earpiece connection (no antenna provision)	Comply
• Standard lapel microphone with emergency activation button and earpiece connection (no antenna provision)	Comply
• Belt clips and carrying accessories	Comply
• Earpiece accessories	Comply
• Skull/bone microphone options (for Fire Hazmat units)	Comply
• Antenna options (length, gain)	(1) ½ Wave Whip - [184mm, 2.15dbi], (2) Helical -Stubby [48mm]

Radio Models - Bidders should focus on the following models that were submitted under LFUCG RFI 6-2014:

HARRIS	XG-75	Noted
	UNITY XG100P	
RELM	KNG P800T2	
	KNG P800	
MOTOROLA	APX6000XE	
	APX7000XE	
	XTS1500	
	APX7000	
KENWOOD	TK5410D-K2	
	TK5410-K2	
TAIT	TP9160 TP9455	

1.1.4 Control Stations

Radio operation in the trunked radio system from various fixed locations within the system is required. Control stations must include antennas and transmission lines if applicable. Control Stations shall have the capability to be mounted in a 19" rack. Proposer shall describe available methods with which Control Stations can be interfaced with common console systems.	Comply
All radio equipment shall be FCC type accepted under Part 90 of the FCC Rules and Regulations. Control stations shall be available with an optional auxiliary power system capable of sustaining operation for a period of four hours. Additional equipment specifications are listed below.	Comply
Automatic Unit Identification - Shall transmit digital unit identification on push to talk.	Comply
System Compatibility - Control Stations shall be equipped and compatible with software related features of the trunking system:	Comply
♦ Dynamic talkgroup reconfiguration	Comply
♦ System access priority	Comply
♦ Trunking controller failure operating mode	Comply
♦ Signaling error correction (To correct erroneous talkgroup assignments, software shall provide for the mobile to revert to the signaling channel in the event that a unit is assigned to an incorrect talkgroup)	Comply - The system will have to signal the radios to revert to the correct traffic channel and/or talkgroup
♦ Wide area operation capability	Comply
♦ Selective inhibit and uninhibit	Comply
♦ Multi-key Encryption (256 bit AES Encryption)	Comply
♦ Software driven tuning and alignment capabilities	Comply
♦ Batch cloning capability	Note that each radio has a unique ID information (SUID, RSI, OTAP ID) AND each SUID that is added also needs adding to the RFSS fleet manager to be allowed onto the trunked system
♦ Over-The-Air-Rekeying (OTAR) (selected Public Safety radios) (optional)	Comply
♦ Over-The-Air-Programming (OTAP) (optional)	Comply

Emergency Alarm Switch - As outlined in the pricing section, control stations shall be equipped with an emergency switch which will encode a unit identification and emergency status message when depressed. This indication shall be placed onto the system immediately, and shall be decoded and displayed at the user's dispatch center. Submitter shall describe programmable options associated with emergency signaling that are available with their submission.	Comply
Status Tones - Audible indication shall be provided for the following operational conditions:	
♦ System busy	Comply
♦ Callback when channel is available	Comply
♦ Trunking controller failure	Comply
♦ Time out timer operation	Comply
♦ Access to system denied	Comply
♦ Out of range of trunked system	Comply
Radio Controls	
♦ Displays - Shall be clearly labeled and shall be backlit for nighttime visibility	Comply
♦ Microphone – Desk or palm type, with push to talk switch	Comply
♦ Selector Switches - Rotary selectors and volume controls are required on Public Safety radios, instead of rocker buttons	Comply
♦ An "on-off" switch shall control primary power to the radio set.	Comply
♦ A volume control shall regulate the audio level of the speaker. Minimum volume shall be software programmable.	Comply
♦ Indicator lamps (either LED or LCD devices) shall be provided which indicate "radio set on" and "transmitter carrier on" functions.	Comply
♦ A talkgroup selector switch or switches, if applicable.	Comply
Service Facilities - A central metering jack shall be provided for connecting test apparatus to the radio for measuring transmitter and receiver circuitry alignment.	Comply
Selective Signaling and Alert Decoder	
♦ Shall allow for selective signaling of radio units	Comply
♦ Shall provide a visual or audible indication on the control head of a call waiting	Comply
Talk-around and Conventional Operation - Shall provide for direct, simplex, radio-to-radio communication on the base station transmit frequency or other frequency, and conventional mobile relay operation	Comply
Radio Models - Proposals should focus on models that were submitted under LFUCG RFI 6-2014.	Noted
1.1.5 Vehicular Mounted Repeaters	
Vehicular Repeaters shall be frequency synthesized and furnished to operate on all channels in the 700/800 MHz land mobile bands. The RF output power into 50 Ohms should be 15 Watts minimum. Lower power vehicular repeaters will be considered.	Our offering includes the SVR P250 with RF Power output = 1W. See Data Sheet in Section 5.7
Vehicular repeaters shall have an engraved or stamped multi-digit unique serial number applied to each unit. These shall be of such type, and located in such a position that their removal or alteration is as difficult to do and as obvious to spot as economically feasible. It is not the intent of LFUCG in requiring this identification to raise the cost of the units by any significant percentage. Submitters must be aware of this intent when proposing a suitable method of identification.	Comply with stamped multi-digit unique serial number to each unit.

The exterior housing shall be made of plated or painted steel or aluminum of sufficient gauge to provide for adequate protection and theft deterrence. Plastic, nylon or other suitable synthetic material may be used for the radio enclosure/housing if its usage is adequately justified and it can meet the required performance specifications.	Comply
The interconnecting cable, including + and - DC power, shall be of such construction that frequent exposure to hydraulic fluids and petroleum based oils will cause minimal damage such as cracking or softening of the cable jacket.	Comply
The successful vendors shall be required to demonstrate that the microprocessor-based equipment is totally functional in the vehicular environment in which LFUCG intends it to be used. This test shall include, but not be limited to, RF immunity, DC input voltage fluctuations, noise introduced in the DC line and typical usage impact. Any degradation of functional parameters of the equipment supplied due to normal or emergency operation of the vehicle in which it is installed shall be corrected by the Contractor.	Noted
The housing shall be devoid of any louvers or other openings thereby protecting the radio set from dirt, dust, and moisture and splashing water.	Comply
The vehicular repeater shall be capable of operation from a nominal 12-volt dc primary power source, with positive action reverse polarity protection to avoid damage if the radio were to be incorrectly installed. In that event, the only damage allowed shall be blown fuses if the radio were turned "ON". The radio set shall operate from a negative ground primary source.	Comply
All power should be derived directly from the vehicle battery, without using active components such as transistors in an oscillator circuit, step-up transformers, or rectifiers. Primary power input shall be adequately fused to assure fast and positive action.	Comply

1.1.6 Minimum Mobile, Portable, Control Station Radio Specifications

(Public Safety Tiers)

SPECIFICATIONS	MOBILE	PORTABLE	CONTROL	
Power Requirements	11-16 Vdc, negative ground	Min choice of Ni-MH or Nickel-Cadmium, (re-chargeable)	120 Vac, 60 Hz & 12 or 24 VDC	Comply with requirements for MOBILE and CONTROL radios. The only battery option offered for PORTABLE is Li-Ion
Temperature	-30° to +60° C (Full Performance)	-30° to +60° C (Full Performance)	-30° to +60° C (Full Performance)	Comply
Humidity	95% @ 50° C	95% @ 50° C	95% to 50° C	Comply
Duty Cycle	20% Tx 100% Rx	10% Tx 10% Rx 80% Stby (12 hours minimum battery life)	20% Tx 100% Rx	Comply
Shock & Vibration	MIL 810 C/D/E/F/G	MIL 810 C/D/E/F/G	MIL 810 C/D/E/F/G	Comply
Tx RF Output Power	15-30 watts	3 watts	10-30watts	Comply
Tx RF Output Impedance	50 Ω	–	50 Ω	Comply
Tx Frequency Stability	±0.00015% -30°/+60° C	±0.00015% -30°/+60° C	±0.00015% -30°/+60° C	
Tx Local Audio Sensitivity			-15 dBm @ 3.3 kHz deviation	Comply

FCC Emission Designator	11K0F3E 20K0F3D	11K0F3E 20K0F3D	11K0F3E 20K0F3D	20K0F3D is a W/B designator. Tait radios conform to 16K0F3E for W/B analog voice
Tx Audio Response	+1, -3 dB, 6 dB pre-emphasis	+1, -3 dB, 6 dB pre-emphasis	+1, -3 dB, 6 dB pre-emphasis	Comply
Tx Audio Distortion	≤3% @ 1 kHz	<5% @ 1 kHz	≤3% @ 1kHz	Comply
Tx Spurious & Harmonic	≥-75 dB	≥-75 dB	≥-75 dB	Comply
Tx FM Noise	≥-40 dB @ 3 3 kHz deviation & 1 0 kHz modulation	≥-40 dB @ 3.3 kHz deviation & 1 0 kHz modulation	≥-40 dB @ 3.3 kHz deviation &1 0 kHz modulation	Comply
Rx Frequency Stability	±0.00015% -30°/+60° C	±0.00015% -30°/+60° C	±0.00015% -30°/+60° C	Comply
Rx Sensitivity (EIA SINAD)	0 35µV/12dB SINAD	0 35µV/12dB SINAD	0 35µV/12dB SINAD	Comply
Rx Selectivity (12 5kHz Channel)	≥-63 dB	≥-63 dB	≥-63 dB	Comply
Rx Intermod Rejection	≥-70 dB	≥-70 dB	≥-70 dB	Comply
Rx Spurious & Image Rejection	≥-75 dB	≥-75 dB	≥-75 dB	Comply
Rx Audio Response	+1, -3 dB, 6dB/octave de-emph	Describe	+1, -3 dB, 6dB/octave de-emph	Comply
Rx Audio Output	5 or 10 watts, ≤3% distortion @ max rated output	0 5 watts, ≤5% distortion @ max rated output	1 5 watts, min ≤3% distortion @ max rated output	Comply

1.1.7 Offering

Submitters shall complete an information sheet for each of the radio models offered in each category. Submitters shall indicate whether the listed features are included in the price that they will be submitting during the electronic bidding event (auction). Each offering shall have a picture depicting the model of radio being supplied.	Noted - See Section 5.6 Product Information Sheets
Submitters shall supply a catalog of additional accessories that are available for the radios offered which shows the list price of these accessories. During the electronic bidding event on January 14th, submitters will provide discounts that apply to the additional accessories.	Noted - See Section 7.0 Price List
During the electronic bidding event on January 14th, submitters shall also provide discounts that will apply to purchases made within three (3) years of the initial radio purchase.	Noted
Pricing and discount information should **NOT** be submitted with your sealed specification package.	Noted

5.3 Product Lifecycle Certificate

The proposed TP9400 and TM9400 series were first offered on the market in December 2012 and the minimum expected life cycle for each radio model offered in this bid response is about 8 years

Product Lifecycle and Obsolescence Management
Tait's product and solution development and design philosophy has delivered a track record of technology platforms with long manufacturing lifecycles and even longer for support.

Tait uses a gate process in product lifecycle management from concept through to end of life, and plan roadmaps throughout. When Obsolescence is planned, Tait"s process is to supply an "End of Life" or "Last Time Buy" notice to customers with as much warning to customers as possible, allowing for additional forecasting and production planning. There are examples of customers making significant "Last Time Buy" orders, which Tait will store for the customer to draw down on over several years beyond the manufacturing End of Life, and invoiced as it is drawn down.

Further there are examples of Tait"s lifecycle planning being focused on the customer's needs and typically the End of Life is not applied across the complete platform in a single movement. End of life for different product variants are handled separately and according to the customer's requirements.

Other exemptions include contractual obligations that allow forecasting of customer requirements and production components to continue availability of a product beyond the official End of Life.

5.4 References

Public Safety agencies using the proposed radios.

STATE OF MISSISSIPPI
Address: 412 East Woodrow Wilson Ave, Mail Stop 6601, Jackson, Mississippi 39216
Telephone: (601) 359-5363
Contact: Dent Guynes, System Technician
Email: DGuynes@wcc.ms.gov
1,400 law enforcement and emergency responders using Tait 9400 mobiles and portables across the State of Mississippi.

CITY OF PHOENIX, AZ
Address: 2441 So. 22Nd Ave, Phoenix, Arizona 85009
Telephone: (602) 262-6743
Contact Person: Tom Grebner, City of Phoenix Communications Supervisor
Email: thomas.grebner@phoenix.gov
1,004 Tait 9400 radios: 973 mobiles and 36 portables

PANOLA COUNTY, MS
Address: Court House, 151 Public Square, Batesville, Mississippi 38606-2220
Telephone: (662)-563-6245
Contact Person: Daniel Cole, Director of Emergency Operations
Email: dcole@panolacoms.com
450 law enforcement and emergency responders using Tait 9400 mobiles and portables. Approximately 350 radios operate in P25 Phase 2 mode.

CITY OF BILLINGS, MT
Address: 210 North 27th Street, Billings, Montana 59101
Telephone: (406)-237-6153
Contact Person: Mark Balter, Quartermaster – City of Billings
Email: balterm@ci.billings.mt.us
425 Tait 9400 radios: Fire Department 112 TP9455 mobiles and 40 TM9455 portable radios, Police Department 175 TP9455 portables and 98 TM9455 mobiles.

EL PASO COUNTY, CO
Address: Colorado Springs, CO
Telephone: (719) 520-7253
Contact Person: Bob Ricketts, Radio Systems Manager
Email: bobricketts@elpasoco.com
397 Tait 9400 mobiles and portables including 233 TP9455 portables and 164 TM9455 mobiles

5.5 Product Description

SECTION CONTENT

Portable Radio, 700/800 MHz

More efficient networks. More possibilities.

The Tait TP9400 may be the smallest P25 Phase 2-capable portable but it is uncompromising in meeting the demands of those serving our communities. With analog, 12.5kHz P25 Phase 1 FDMA conventional/trunked and 6.25kHz equivalent P25 Phase 2 TDMA trunked and LSM (CQPSK) decode capability in a single device, you can transition to a more spectrally efficient solution in a time frame that suits you.

The TP9400 portable enables first responder effectiveness and safety with internal GPS*, *Bluetooth*® wireless technology*, IP67 protection and AES encryption.

The Tait TP9400 is feature-packed and ready to work in demanding environments with the quality and reliability which those serving our communities depend on.

With multiple operating modes including analog, 12.5kHz P25 Phase 1 FDMA conventional/trunked, upgradable to 6.25kHz (equivalent) P25 Phase 2 TDMA trunked, and LSM (CQPSK) decode capability in a single device, you can transition to a more spectrally efficient solution in a time frame that suits you.

Key Features

- Manage migration risk with a multi-mode portable – analog, P25 Phase 1 conventional/trunked and upgradable to P25 Phase 2 for enhanced interoperability
- P25 Phase 2 TDMA for increased capacity
- P25 standards compliance for greater choice and interoperability
- Smaller and lighter, Li-Ion premium battery gives 12hr shift life
- AES encryption, voice and data, pre-set status messages and internal GPS for safe and efficient operations
- Engineered for demanding environments with IP67 rating and new water-shedding grille

Ensure the safety of your first responders and increase operational effectiveness with TP9400 capabilities such as internal GPS* for location services (over a conventional network) and *Bluetooth*®wireless technology* for accessory connectivity. With additional Man Down and Lone Worker functionality, and AES encryption capability, your first responders can work confidently, knowing their communications are secure.


FEATURES AND BENEFITS

Delivers on the P25 standards

Benefit from the spectral efficiency, multi-vendor interoperability, security, migration and data capability demanded by the P25 standards.

- TIA-102 P25 CAP tested and certified, providing multi-vendor interoperability
- 12.5kHz P25 Phase 1 FDMA and 6.25kHz equivalent P25 Phase 2 TDMA capable
- Product compliances satisfy FCC 2015 and 2017 ultra narrowbanding mandates
- FCC and IC compliances include P25 Phase 2 emission designator (8K10F1W)

Designed for demanding environments

- Designed with users to ensure effective every-day operation
- Exceeds relevant MIL-STD-810G
- IP67 sealing protects to one meter of water for 30 minutes
- Water shedding grille assists voice clarity and volume in wet environments
- Shock absorbing
- impact-protected corners
- Large four-line LCD with icons to display key parameters
- 4 and 16 keypad options
- Four programmable function keys and three-way selector

High-performing voice communications

Robust design delivers clear, mission-critical voice communications.

- Analog, P25 Phase 1 conventional/ trunked and P25 Phase 2 trunked
- Automatic dual mode between analog and P25 Phase 1 conventional
- Unique microphone design coupled with AMBE+2 enhanced vocoder reduces background noise in demanding environments
- Voting ensures priority selection of the channel with optimum receive quality
- Dynamic regrouping and supergroup operation for mission critical workforce management
- Increased channel capacity with up to 2,000 channels
- Scanning modes include: priority, dual priority, editable, zone, and background scan
- Range of analog signalling functionality, i.e. MDC1200 encode and decode, Two Tone decode, PL (CTCSS), DPL (DCS)

Improve workforce safety

- Programmable emergency key is easily accessible and highly visible on the radio
- Man Down and Lone Worker as standard
- Inbuilt GPS transmits location over your conventional voice network
- Radio inhibit and uninhibit to allow management of misplaced or stolen radios
- Supports end-to-end encryption, including AES encryption
- Trunked failsoft reverts to conventional operation during trunked network failure

Effective operations with voice and data

- Support for a variety of simulcast modes such as LSM and C4FM
- Pre-set status messages
- P25 data such as emergency GPS location
- Conventional and trunked IP data
- Location services over a conventional network

Efficient, security-focused management

The TP9400 management facilities and applications allow you to efficiently manage your radio fleet.

- Over-the-air Rekeying (OTAR)
- EnableProtect Key Fill Device (KFD) for quick, reliable encryption key programming
- Programming application for efficient fleet operation
- EnableProtect Advanced System Key allows administrators to authorize and restrict subscriber units on their network

TP9400 Accessories

- Audio: speaker-microphones, earpieces and surveillance kits
- Chargers: in-vehicle, single fast and 6-way multi-chargers
- Range of Li-ion battery capacities to match your operational needs

Tait products are known for their rugged build, and the TP9400 is no exception. The robust design has IP67 sealing and shock absorbing impact-protected corners, exceeds relevant MIL-STD-810G standards, and features a water-shedding grille which aids voice clarity in wet environments.

The TP9400 provides:

- Operation in VHF and 700/800MHz frequency bands
- Minimized risk with multi-mode operation for staged migration
- Greater vendor choice, increased competition and interoperability with adherence to the P25 standards and software-upgradability to P25 Phase 2
- Efficient operations with encryption, voice and data, simulcast support and pre-set status messages
- Security-focused fleet management with Over-the-air Rekeying (OTAR) and Tait Key Fill Device (KFD) support

Battery Chargers

Tait Communications offers three types of charger available for the TP89400 portable radio.

These chargers are:

- **Single Radio Desktop Charger** - *Small enough to fit on a desk, it charges one battery at a time*
- **6 Bay Multi-unit Charger** – *Suitable for Wall or Desktop mounting*
- **Single Radio vehicle charger** - *Charges one battery at a time while installed in a vehicle*

All of the batteries offered by Tait for the TP9400 are intelligent batteries and are not susceptible to developing battery memories. The Batteries offered for the TP9400 are:

- TP9400 Li-Ion 1880 mAh
- TP9400 Li-Ion 2400 mAh

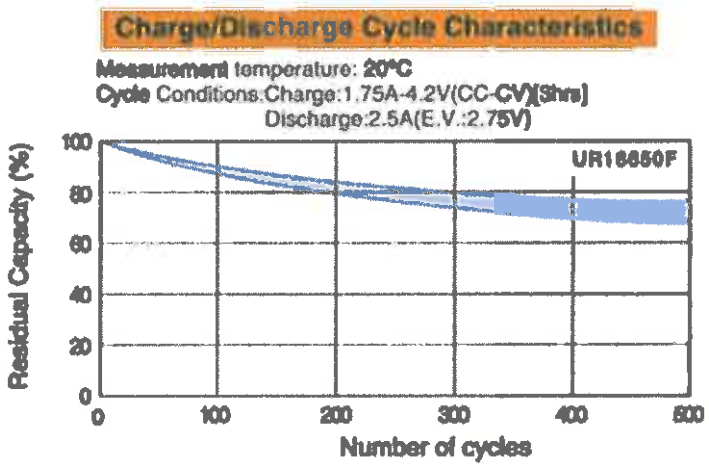
Audio Accessories

Tait Communications offers a complete range of Audio accessories. See section product catalog in **section 6** for more details.

Portable Radio Battery life

Battery life is highly influenced by how the battery is cared for over its life. See the battery care and battery charging guide in Section 5.9 Portable User Guides.

If we assume the use of a TP9400 Premium Li-Ion battery, the minimum number of cycles to reach a residual capacity of 80% will be 300 cycles. Based on a single 12 hour shift 5 days a week, one battery should not reach the 80% capacity level for at least 60 weeks (just over one year). Maximum capacity will further reduce after the 300 cycle mark as shown by the graph below.



It is highly recommended that two batteries are provided per portable. This allows one battery to be ready and charged available for use when required.

Storage – Remove the battery from the radio before storage. If the battery is to be stored for longer than a month, charge the battery to about 30% of total capacity. If the battery is to be stored for less than a month, fully charge the battery prior to storage. In either case, the battery should be stored in a cool (20°C) dry place.

Charging – Batteries should be charged in an environment that does not exceed 10-25°C to achieve optimal charge. If the charger detects that the batteries temperature is outside of the desired temperature range, it will not initiate a charge cycle until the battery temperature reaches the desired level.

Use Temperature – Exposing the battery to temperatures above 60°C and below -30°C for long periods of time will potentially reduce the service life of the battery.

More efficient networks. More possibilities.

The Tait TM9400 has the means and flexibility to meet the operational needs of your organization today and tomorrow. The TM9400 provides analog, 12.5kHz P25 Phase 1 FDMA conventional/trunked, 6.25kHz equivalent P25 Phase 2 TDMA trunked and LSM (CQPSK) decode capability in a single device.

The TM9400 is capable of AES encryption, Over-the-air Rekeying (OTAR), various emergency modes and is IP54 rated to keep those relying on the mobiles safe and efficient. The TM9400 also has an options slot allowing extension of capabilities and a range of remote mounting and control head options.

The Tait TM9400 is a high-performing, flexible and robust mobile, designed for use in challenging environments while delivering high quality audio and intuitive operation to first responders around the world.

Each TM9400 features multiple modes of operation, including analog, 12.5kHz P25 Phase 1 FDMA conventional/trunked, upgradable to 6.25kHz (equivalent) P25 Phase 2 TDMA trunked and LSM (CQPSK) decode capability, for ease of migration to a more spectrally efficient solution when required.

Key Features

- Manage migration risk with a multi-mode mobile – analog, P25 Phase 1 conventional/trunked and upgradable to P25 Phase 2 for enhanced interoperability
- Future proofed with software-upgradability to P25 Phase 2 TDMA for increased capacity
- Variety of options to suit your application – remote mount and control head
- Flexibility with an options slot for expansion and addition of future capabilities
- P25 standards compliance for greater choice and interoperability
- Engineered for demanding environments with IP54 rating and water-resistant control head
- AES encryption, voice and data, simulcast support and pre-set status messages for effective operations

For safe, secure and effective communications on the move, the TM9400 features Lone Worker, a covert microphone and stealth emergency modes as standard. For additional operational security, the TM9400 supports end-to-end encryption (including AES), the Tait Key Fill Device (KFD) and Over-the-air Rekeying (OTAR).

The TM9400 allows you to work the way that suits you best. With multiple configuration options, software licenses for additional features, and programmable function keys, the TM9400 is an efficient addition to any organization.

FEATURES AND BENEFITS

Delivers on the P25 standards

Benefit from the spectral efficiency, multi-vendor interoperability, security, migration and data capability demanded by the P25 standards.

- TIA-102 P25 CAP tested and certified, providing multi-vendor interoperability
- 12.5kHz P25 Phase 1 FDMA and 6.25kHz equivalent P25 Phase 2 TDMA capable
- Product compliances satisfy FCC 2015 and 2017 ultra-narrowbanding mandates
- FCC and IC compliances include P25 Phase 2 emission designator (8K10F1W)

Designed for demanding environments

Designed with users to ensure effective every-day operation

- IP54 rated: protected against dust and splashing water
- Exceeds MIL-STD-810G
- Large four-line LCD with icons to display key parameters
- Configurable to suit your needs: dual head and remote mount (6m and 12m options)
- Four programmable function keys on the standard mobile head
- Programmable orange emergency key

High-performing, voice communications

Robust design delivers clear, mission-critical voice communications.

- Analog, P25 Phase 1 conventional/ trunked and P25 Phase 2 trunked
- Automatic dual mode between analog and P25 Phase 1 conventional
- Programmable power level options
- Option to operate with dual band functionality
- AMBE+2 enhanced vocoder reduces background noise in demanding environments
- Voting ensures priority selection of the channel with optimum receive quality
- Dynamic regrouping and super-group operation for mission-critical workforce management
- Increased channel capacity with up to 2,000 channels
- Scanning modes include: priority, dual priority, editable, zone, background scan

Keeping your people safe

- Supports end-to end encryption, including AES encryption
- Lone Worker, covert microphone and stealth emergency mode as standard
- Radio inhibit and uninhibit to allow management of radios during vehicle servicing
- Trunked failsoft reverts to conventional operation during trunked network failure

Effective operations with voice and data

- Support for a variety of simulcast modes such as LSM and C4FM
- Pre-set status messages
- P25 data such as emergency GPS location
- Conventional and trunked IP data
- Location services over a conventional network
- Software configurable, including feature upgrades through software licenses

Efficient, security-focused management

The TM9400 management facilities and applications allow you to efficiently manage your radio fleet.

- OTAR (Over-the-air Rekeying)
- EnableProtect Key Fill Device (KFD) for quick, reliable encryption key programming
- Programming application for efficient fleet programming
- EnableProtect Advanced System Key allows administrators to authorize and restrict subscriber units on their network

TM9400 Accessories

Digital and analog interfaces allow a range of accessory options for the TM9400.

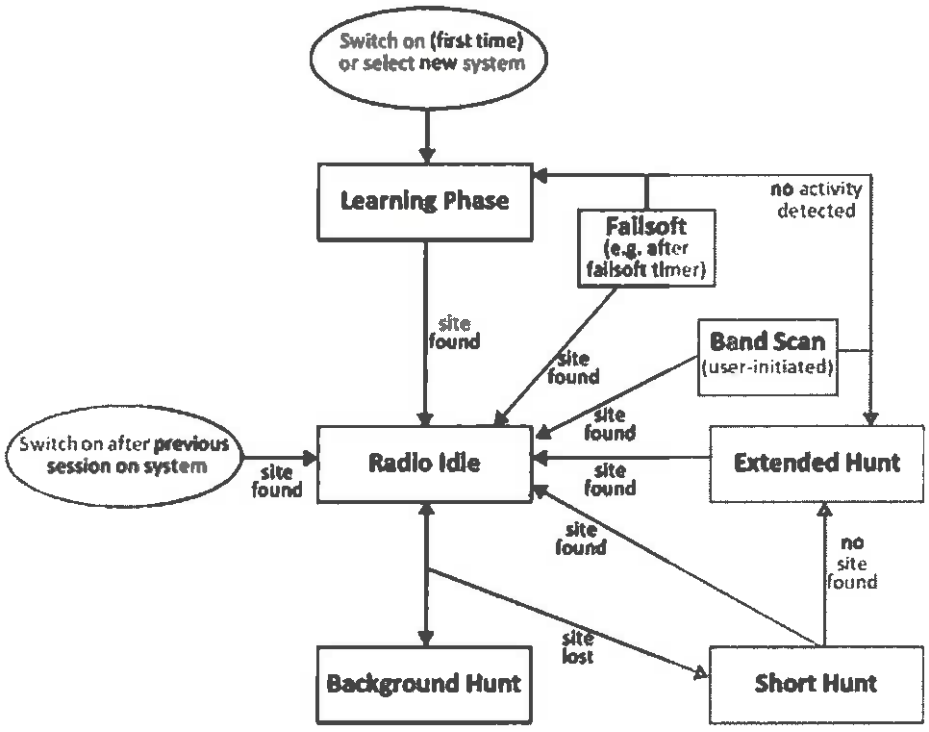
The TM9400 provides:

- Operation in VHF and 700/800MHz frequency bands
- Reduced migration risk with the multiple modes of operation
- Greater vendor choice, increased competition and interoperability with adherence to the P25 standards and software-upgradability to P25 Phase 2
- Efficient operations with encryption, voice and data, simulcast support and pre-set status messages
- Flexible expansion via an options slot for additional capabilities

Rugged build with an IP54 rating, water-resistant control head, and exceeding relevant MIL-STD-810G

Roaming Methodology and Failsoft

When the user first turns the SU on after programming, or first selects a trunking channel profile, the radio begins a **Learning Phase**. The learning phase converts the list of pre-programmed control channel frequencies into sites. As soon as at least one (or more) valid sites have been found, the radio picks the most appropriate site and control channel based on the received RSSI level and the weighting of the site preference.



Once a valid site has been selected, the radio will periodically check for any better control channels (with a higher preference and stronger signal). This is known as a **background hunt**, and will only occur if the current site contains adjacent site information. Background hunting allows the radio to roam across sites within an RF subsystem, and ensures the best possible site is always used.

If the radio loses a control channel and must hunt immediately (for example an average of received signal strength falls below the RSSI Threshold), then a **Short Hunt** is performed. The short hunt consists of the same sites used in the background hunt. If the short hunt does not find any sites, then an **Extended Hunt** is performed. The extended hunt searches all valid sites that the radio has previously used or has been informed about.

If the extended hunt does not find any valid sites, then the radio returns to the **Learning Phase** and searches all pre-programmed control channel frequencies. If a valid site still cannot be found the radio alternates between the learning and extended hunt phases. At any stage during this time the radio may enter **Failsoft**, or the radio user may initiate a Band scan.

In autonomous failsoft, when radios lose contact with their control channel, they start the "Go into Failsoft" timer. While this timer is counting down, they hunt for another control channel. If they find one, the timer is canceled.

If they do not find one, the 'Go to Failsoft' timer expires and the radio switches to the failsoft channel. The failsoft channel is a preconfigured conventional channel (analog or P25 digital) for the radios to operate on. The user can now make and receive group calls on this channel. Operation is conventional, with a minor difference. This means that different talk-groups may "failsoft" to different conventional channels.

The above-mentioned roaming and failsoft operation are therefore expected when the proposed radios operate on a Cassidian COR P25 Infrastructure.

Example display after switching to failsoft channel

Site Selection

The Tait 9400 SU will select which site to be on based upon a number of different factors and will rank all of the sites that it can see in order.

The Radio will perform a quick scan of the sites to get an RSSI reading, and will then rank all of the visible sites, based on the Signal Strength it receives. Every time the radio scans those sites it will record the signal strength and then average the RSSI readings for each site.

If all the sites have the same preference then the averaged RSSI reading will be used either remain on the current site or select a new site.

If Site Preferencing is used, the radio will select a new site if it has a significantly higher preference, or an equal or near preference (such as default or preferred) and a stronger signal. The following table details the rules that govern when the radio will select a new site over the current site.

		To Site Preference			
		Always	Preferred	Default	Least
From Site preference	Always	If RSSI >=10dB	Never	Never	Never
	Preferred	Always	If RSSI >=10dB	If RSSI >=10dB	Never

	Default	Always	If RSSI >=5dB	If RSSI >=10dB	Never
	Least	Always	Always	Always	If RSSI >=10dB

Note: the 10dB is the default value, and can be changed via the programming application

This field and the information in the table above only apply if both the current site and potential new site are above the programmable RSSI Threshold. If the current site falls below the threshold then site selection is based on RSSI only. If a potential new site is below the threshold, then it will not be hunted even if set to Always.

Trunked System Failure modes

The 9400 Series of Subscriber unit fully supports both the **Site Trunking** and **Failsoft** modes of operation.

Site Trunking is a condition where the current site is isolated from the rest of the Wide Area network, resulting in the Radios, and therefore, the users been isolated from the dispatchers.

When the site is isolated, the network connectivity flag is set on the control channel signaling and this indicated to the SU that it is not on an isolated site.

The 9400 Series of subscriber has a programmable option that allows the Site Trunking state to be indicated to the user.

In the Failsoft scenario, where the site has lost its site controller, the individual repeaters at the site go into Failsoft mode. This Failsoft mode is indicated to the SU via a specific Failsoft Message, and the Tait 9400 Series contains full support for the Cassidian Failsoft message and feature.

When in Failsoft the Tait 9400 radio can be programmed to go do a designated frequency for a particular Talkgroup, or to us the best failsoft channel that the SU can see.

While the SU is on a site that is in Failsoft or in Site Trunking it will periodically perform an extended hunt in an attempt to move to a site with a better level of Service.

Programming System Frequencies into the Radio Units

The Tait 9400 Series of radios have the ability to be pre-programmed with the control channel frequencies that are used within the system, if it possible to pro-program up to 1820 unique frequencies, which will be used during the Learning phase to find valid Trunked Sites that the radio can work on.

As the radio roams around the network it learns about new sites, by way of the Adjacent Status Broadcast messages, and adds these new sites to its internal site database. Any site that the radios uses or is informed of is stored persistently in its internal site database.

If new sites are added to the Trunked network after the radios have been deployed the radio will learn about these new sites from the broadcast messages sent by the network and will add the information about the new site to into internal Site Database.

It a radio cannot find a site, either by looking in its internal database or by using the pre-programmed frequencies a **Band Scan** can be initiated.

A Band Scan scans the entire frequency band that the radio is capable of looking for a valid trunked site, as soon as a valid site is found the Band Scan will stop and the radio will register on the site.

Control Station

Tait Communications provides a number of solutions for interfacing a console station to the P25 Trunked Network.

The first solution would be to use a Mobile radio configured as a console station by using a TMAA01-01 4 wire Line interface card and a power supply.

The TMAA01-01 line-interface board provides both audio and digital interfaces for a variety of systems. The interfaces available are:

- an isolated 600Ωaudio interface that is capable of both simplex operation on a two-wire system, or duplex operation on a four-wire system
- a keying interface which allows for two-wire keying or single line bi-directional keying
- a variable delay timer
- a logic sense control

The line-interface board fits inside the radio in the options cavity and is connected to the main board by the internal options loom. The high-density 15-way D-range connector mounted on the line-interface board fits through the external options connector hole provided in the radio chassis.

The Control station is powered by its own 12v power supply (TMAA13-22) and can fitted in a 2U 19" rack Tray.

Another solution for interfacing the Cassidian Trunked P25 Network to a standard console interface would be to utilize the Trunked Analog Gateway (TAG) from Tait Communications.

Trunked Analog Gateway

The Tait P25 TAG trunked analog gateway is used to interface a third party analog dispatch console to a TaitNet P25 trunked network. Each trunked analog gateway makes a 'channel' available to the dispatcher by providing a connection into the trunked network.

It is connected to the dispatch console by a 4-wire E & M link and to the trunking controllers via IP/ Ethernet. A gateway can handle one conversation at a time between a dispatcher and a group or individual. The trunked analog gateway is essentially a protocol converter, converting between digital P25 voice (IMBE) and analog voice and between P25 digital signaling and legacy analog signaling of various sorts (E&M, tone remote, and MDC1200). The gateway connects to the trunked network using the P25 CSSI protocol and two legacy EADS protocols, the Group Control Tree (GCT) and the RFSS Voice Protocol (RVP).

The trunked analog gateway also serves as an encryption/decryption point for encrypted calls and therefore supports key management activities such as loading and updating key material.

You can think of the dispatch console as a virtual radio and the trunked analog gateway as providing the dispatcher with a radio identity on the trunked network. This radio identity and other call configuration details are defined by the trunked analog gateway's calling profile. The trunked analog gateway also acts like an RFSS when it connects to the trunked network.

On connecting to the RFSS controller over its CSSI interface, the trunked analog gateway registers the dispatcher's SUID with the RFSS controller and affiliates to the group specified by its current calling profile, using the CSSI protocol. Like any SU on a P25 trunked network, it can only belong to one group at a time.

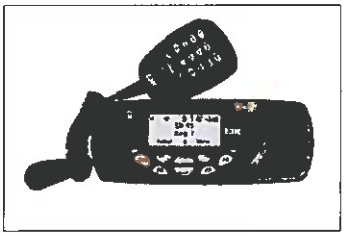
The trunked analog gateway vocodes and encrypts speech (in the same way as the P25 Console Gateway). Calls that the dispatcher initiates are configured according to the current calling profile.

5.6 Product Information Sheets

LFUCG Radio Purchase Information Sheet

5.6.1 Front Mount Mobile Radio

Radio Model: TM9455



	Included?: Y/N
Vehicle mounted mobile radio operating in the 700/800MHz frequency band.	Y
Control head	Y
Convention Analog Operation	Y
P25 Conventional Operation	Y
APCO P25 Phase I trunked radio	Y
Software Upgradeable to APCO P25 Phase II	Y
Minimum 32 conventional channels	Y
Minimum 256 system/talkgroups	Y
Programmable time–out-timer	Y
Digital and analog talk-around	Y
Individual call	Y
Emergency operation	Y
Group scan	Y
PC programmable	Y
Alphanumeric display	Y
Back lighting of display with dimmer control	Y
Encryption, AES multi-key (min. 15 key capacity)	Y
On/off volume knob	Y
16 position rotary knob with stops	N
Advanced System Key	Y
Dynamic regrouping capable	Y
Mil Specs 810C, D, E , F, and G	Y
Microphone	Y
External Speaker	Y
Power cables and mounting hardware	Y
Mixed Mode Operation (Trunked talk groups and Conventional Channels in the same bank of frequencies)	Y

		One Time Discounts
Cost per Radio		
Cost for 50 radios		
Cost for 100 radios	**All** pricing and discount information to be provided **at auction event on** January 14th!	
Cost for 150 radios		
Cost for 200 radios		

5.6.2 Remote Mount Mobile Radio

Radio Model: TM9455

	Included?: Y/N
Vehicle mounted mobile radio operating in the 700/800MHz frequency band.	Y
Control head	Y
Convention Analog Operation	Y
P25 Conventional Operation	Y
APCO P25 Phase I trunked radio	Y
Software Upgradeable to APCO P25 Phase II	Y
Minimum 32 conventional channels	Y
Minimum 256 system/talkgroups	Y
Programmable time–out-timer	Y
Digital and analog talk-around	Y
Individual call	Y
Emergency operation	Y
Group scan	Y
PC programmable	Y
Alphanumeric display	Y
Back lighting of display with dimmer control	Y
Encryption, AES multi-key (min. 15 key capacity)	Y
On/off volume knob	Y
16 position rotary knob with stops	N - Keypad
Advanced System Key	Y
Dynamic regrouping capable	Y
Mil Specs 810C, D, E , F, and G	Y
Microphone	Y
External Speaker	Y
Cable for connection between the transceiver and the control head (30' min.)	Y
Power cables and mounting hardware	Y
Mixed Mode Operation (Trunked talk groups and Conventional Channels in the same bank of frequencies)	Y

		One Time Discounts
Cost per Radio	All pricing and discount information to be provided at auction event on January 14th!	
Cost for 50 radios		
Cost for 100 radios		
Cost for 150 radios		
Cost for 200 radios		

5.6.3 Public Safety Grade Portable Radio for Field Operations

Radio Model: TP9455

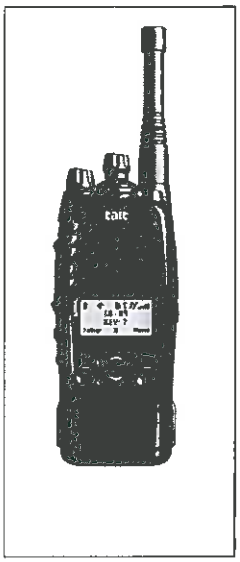
	Included?: Y/N
Hand-held radio operating in the 700/800MHz frequency band.	Y
Battery - 2400maH Li-Ion minimum (List battery supplied in the 'Included' column to the right)	2400maH Li-ion
Antenna (Indicate which antenna is being offered in the 'Included" column to the right)	762-870MHz ½ Wave Whip
Convention Analog Operation	Y
P25 Conventional Operation	Y
APCO P25 Phase I trunked radio	Y
Software Upgradeable to APCO P25 Phase II	Y
Minimum 32 conventional channels	Y
Minimum 256 system/talkgroups	Y
Programmable time–out-timer	Y
Digital and analog talk-around	Y
Individual call	Y
Emergency operation	Y
Group scan	Y
PC programmable	Y
Alphanumeric display on the face of the radio	Y
Alphanumeric display on the top of the radio	N
Back lighting of display with dimmer control	Y
Encryption, AES multi-key (min. 15 key capacity)	Y
On/off volume knob	Y
16 position rotary knob with stops	Y
Advanced System Key	Y
Dynamic regrouping capable	Y
Mil Specs 810C, D, E , F, and G	Y
Public Safety Grade Ruggedized Speaker/Microphone with Emergency Button	Y
Mixed Mode Operation (Trunked talk groups and Conventional Channels in the same bank of frequencies)	Y
Spring-loaded Belt Clip	Y

		One Time Discounts
Cost per Radio		All pricing and discount information to be provided at auction event on January 14th!
Cost for 50 radios		
Cost for 100 radios		
Cost for 150 radios		
Cost for 200 radios		
Cost for 250 radios		
Cost for 300 radios		

5.6.4 Public Safety Grade Portable Radio for Support Operations

Radio Model: TP9455

	Included?: Y/N
Hand-held radio operating in the 700/800MHz frequency band.	Y
Battery - 2400maH Li-Ion minimum (List battery supplied in the 'Included' column to the right)	2400maH Li-ion
Antenna (Indicate which antenna is being offered in the 'Included" column to the right)	762-870MHz ½ Wave Whip
Convention Analog Operation	Y
P25 Conventional Operation	Y
APCO P25 Phase I trunked radio	Y
Software Upgradeable to APCO P25 Phase II	Y
Minimum 32 conventional channels	Y
Minimum 256 system/talkgroups	Y
Programmable time–out-timer	Y
Digital and analog talk-around	Y
Individual call	Y
Emergency operation	Y
Group scan	Y
PC programmable	Y
Alphanumeric display on the face of the radio	Y
Back lighting of display with dimmer control	Y
Encryption, AES multi-key (min. 15 key capacity)	Y
On/off volume knob	Y
16 position rotary knob with stops	Y
Advanced System Key	Y
Dynamic regrouping capable	Y
Mil Specs 810C, D, E , F, and G	Y
Public Safety Grade Speaker/Microphone with Emergency Button	Y
Mixed Mode Operation (Trunked talk groups and Conventional Channels in the same bank of frequencies)	Y
Spring-loaded Belt Clip	Y



		One Time Discounts
Cost per Radio	All pricing and discount information to be provided at auction event on January 14th!	
Cost for 50 radios		
Cost for 100 radios		
Cost for 150 radios		
Cost for 200 radios		

5.6.5 Public Safety Grade Portable Radio for Command Level

Radio Model: NOT OFFERED

	Included?: Y/N
Hand-held radio operating in the VHF frequency band.	N/A
Hand-held radio operating in the UHF frequency band.	N/A
Hand-held radio operating in the 700/800MHz frequency band.	N/A
Battery - 2400maH Li-Ion minimum (List battery supplied in the 'Included' column to the right)	N/A
Antenna (Indicate which antenna is being offered in the 'Included" column to the right)	N/A
Convention Analog Operation	N/A
P25 Conventional Operation	N/A
APCO P25 Phase I trunked radio	N/A
Software Upgradeable to APCO P25 Phase II	N/A
Minimum 32 conventional channels	N/A
Minimum 256 system/talkgroups	N/A
Programmable time–out-timer	N/A
Digital and analog talk-around	N/A
Individual call	N/A
Emergency operation	N/A
Group scan	N/A
PC programmable	N/A
Alphanumeric display on the face of the radio	N/A
Back lighting of display with dimmer control	N/A
Encryption, AES multi-key (min. 15 key capacity)	N/A
On/off volume knob	N/A
16 position rotary knob with stops	N/A
Advanced System Key	N/A
Dynamic regrouping capable	N/A
Mil Specs 810C, D, E , F, and G	N/A
Public Safety Grade Speaker/Microphone with Emergency Button	N/A
Mixed Mode Operation (Trunked talk groups and Conventional Channels in the same bank of frequencies)	N/A
Spring-loaded Belt Clip	N/A

		One Time Discounts
Cost per Radio	N/A	
Cost for 50 radios	NOT OFFERED	

5.6.6 Public Service Grade Portable Radio

Radio Model: TP9455

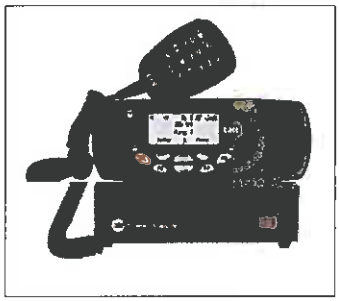
	Included?: Y/N
Hand-held radio operating in the 700/800MHz frequency band.	Y
Battery (List battery supplied in the 'Included' column to the right)	2400maH Li-ion
Antenna (Indicate which antenna is being offered in the 'Included" column to the right)	762-870MHz ½ Wave Whip
Convention Analog Operation	Y
P25 Conventional Operation	Y
APCO P25 Phase I trunked radio	Y
Software Upgradeable to APCO P25 Phase II	Y
Minimum 32 conventional channels	Y
Minimum 256 system/talkgroups	Y
Programmable time–out-timer	Y
Digital and analog talk-around	Y
Individual call	Y
Emergency operation	Y
Group scan	Y
PC programmable	Y
Back lighting of display with dimmer control	Y
Encryption, AES multi-key (min. 15 key capacity)	Y
On/off volume knob	Y
16 position rotary knob with stops	Y
Advanced System Key	Y
Dynamic regrouping capable	Y
Mil Specs 810C, D, E , F, and G	Y
Mixed Mode Operation (Trunked talk groups and Conventional Channels in the same bank of frequencies)	Y
Spring-loaded Belt Clip	Y

		One Time Discounts
Cost per Radio	All pricing and discount information to be provided at auction event on January 14th!	
Cost for 50 radios		
Cost for 100 radios		
Cost for 150 radios		

5.6.7 Control Station Radio

Radio Model: TM9455

	Included?: Y/N
Control Station radio operating in the 700/800MHz frequency band.	Y
Convention Analog Operation	Y
P25 Conventional Operation	Y
APCO P25 Phase I trunked radio	Y
Software Upgradeable to APCO P25 Phase II	Y
Minimum 32 conventional channels	Y
Minimum 256 system/talkgroups	Y
Programmable time–out-timer	Y
Digital and analog talk-around	Y
Individual call	Y
Emergency operation	Y
Group scan	Y
PC programmable	Y
Alphanumeric display on the face of the radio	Y
Back lighting of display with dimmer control	Y
Encryption, AES multi-key (min. 15 key capacity)	Y
On/off volume knob	Y
16 position rotary knob with stops	N
Advanced System Key	Y
Dynamic regrouping capable	Y
Mil Specs 810C, D, E , F, and G	Y
Mixed Mode Operation (Trunked talk groups and Conventional Channels in the same bank of frequencies)	Y



		One Time Discounts
Cost per Radio	All pricing and discount information to be provided at auction event on January 14th!	
Cost for 50 radios		
Cost for 100 radios		
Cost for 160 radios		

5.6.8 Vehicular Mounted Repeater

Model: **SVR P250**

	Included?: Y/N	
Vehicular Repeater System operating in the 700/800MHz frequency band.	Y	
		One Time Discounts
Cost for 1 Vehicular Repeater Systems	All pricing and discount information to be provided at auction event on January 14th!	
Cost for 6 Vehicular Repeater Systems		

SVR P250 – Pyramid Vehicular Repeater

TP9455

TM9455 – Front Panel Mobile Radio

TM9455 – Front Panel Mobile Radio

5.7 Data Sheets

TP9400
SPECIFICATIONS

tait communications

More efficient networks. More possibilities.

The Tait TP9400 may be the smallest P25 Phase 2-capable portable but it is uncompromising in meeting the demands of those serving our communities. With analog, 12.5kHz P25 Phase 1 FDMA conventional/trunked and 6.25kHz equivalent P25 Phase 2 TDMA trunked and LSM (CQPSK) decode capability in a single device, you can transition to a more spectrally efficient solution in a time frame that suits you.

The TP9400 portable enables first responder effectiveness and safety with internal GPS*, *Bluetooth*® wireless technology*, IP67 protection and AES encryption.

KEY FEATURES

- Manage migration risk with a multi-mode portable – analog, P25 Phase 1 conventional/trunked and upgradable to P25 Phase 2 for enhanced interoperability
- P25 Phase 2 TDMA for increased capacity
- P25 standards compliance for greater choice and interoperability
- Smaller and lighter, Li-Ion premium battery gives 12hr shift life
- AES encryption, voice and data, pre-set status messages and internal GPS for safe and efficient operations
- Engineered for demanding environments with IP67 rating and new water-shedding grille

P25

TP9400
SPECIFICATIONS


FEATURES AND BENEFITS

Delivers on the P25 standards

Benefit from the spectral efficiency, multi-vendor interoperability, security, migration and data capability demanded by the P25 standards.

- TIA-102 P25 CAP tested and certified, providing multi-vendor interoperability
- 12.5kHz P25 Phase 1 FDMA and 6.25kHz equivalent P25 Phase 2 TDMA capable
- Product compliances satisfy FCC 2015 and 2017 ultra narrowbanding mandates
- FCC and IC compliances include P25 Phase 2 emission designator (8K10F1W)

Designed for demanding environments

- Designed with users to ensure effective every-day operation
- Exceeds relevant MIL-STD-810G
- IP67 sealing protects to one meter of water for 30 minutes
- Water shedding grille assists voice clarity and volume in wet environments
- Shock absorbing
- impact-protected corners
- Large four-line LCD with icons to display key parameters
- 4 and 16 keypad options
- Four programmable function keys and three-way selector

High-performing voice communications

Robust design delivers clear, mission-critical voice communications.

- Analog, P25 Phase 1 conventional/ trunked and P25 Phase 2 trunked
- Automatic dual mode between analog and P25 Phase 1 conventional
- Unique microphone design coupled with AMBE+2 enhanced vocoder reduces background noise in demanding environments
- Voting ensures priority selection of the channel with optimum receive quality
- Dynamic regrouping and supergroup operation for mission critical workforce management
- Increased channel capacity with up to 2,000 channels
- Scanning modes include: priority, dual priority, editable, zone, and background scan
- Range of analog signalling functionality, i.e. MDC1200 encode and decode, Two Tone decode, PL (CTCSS), DPL (DCS)

Improve workforce safety

- Programmable emergency key is easily accessible and highly visible on the radio
- Man Down and Lone Worker as standard
- Inbuilt GPS transmits location over your conventional voice network
- Radio inhibit and uninhibit to allow management of misplaced or stolen radios
- Supports end-to-end encryption, including AES encryption
- Trunked failsoft reverts to conventional operation during trunked network failure

Effective operations with voice and data

- Support for a variety of simulcast modes such as LSM and C4FM
- Pre-set status messages
- P25 data such as emergency GPS location
- Conventional and trunked IP data
- Location services over a conventional network

Efficient, security-focused management

The TP9400 management facilities and applications allow you to efficiently manage your radio fleet.

- Over-the-air Rekeying (OTAR)
- EnableProtect Key Fill Device (KFD) for quick, reliable encryption key programming
- Programming application for efficient fleet operation
- EnableProtect Advanced System Key allows administrators to authorize and restrict subscriber units on their network

TP9400 Accessories

- Audio: speaker-microphones, earpieces and surveillance kits
- Chargers: in-vehicle, single fast and 6-way multi-chargers
- Range of Li-ion battery capacities to match your operational needs

TP9400
SPECIFICATIONS

tait communications

GENERAL[1]

Frequency stability	±0.5ppm (-22°F to +140°F/-30°C to +60°C)
Channels/zones	1,000 channels/50 zones (2,000 channels/100 zones optional enhancement with software license)
Talk groups	50 talk groups, up to 1,000 members total (2,000 members optional enhancement with software license)
Scan groups	300 with up to 50 members each, maximum of 2,000 members total
Dimensions (DxWxH)	
with Li-Ion standard battery	1.61 x 2.56 x 5.35in (41 x 65 x 136mm) - excluding knobs
with Li-Ion standard battery	1.77 x 2.56 x 5.35in (45 x 65 x 136mm) - excluding knobs
Weight	
with Li-Ion standard battery	11.46oz (325g) - no antenna
with Li-Ion standard battery	13.12oz (372g) - no antenna
Channel spacing	12.5/15/20/25/30kHz
Frequency increment	2.5/5/6.25
Operating temperature	-22°F to +140°F (-30°C to +60°C)
Water and dust protection	IP67
Rated audio	0.5W
Speaker rating	2W
Signaling options (analog)	MDC1200 encode and decode, Two Tone decode, PL (CTCSS), DPL (DCS)

TRANSMITTER[1]

Frequency band	VHF	UHF	700/800MHz
Transmit frequency ranges	136–174MHz	400-470MHz: 450-520MHz	762–870MHz
Output power	5W, 3W, 2W, 1W	4W, 2.5W, 2W, 1W	3W, 2.5W, 2W, 1W
Modulation limiting			
12.5/15kHz channel	±2.5kHz	±2.5kHz	±2.5kHz
25/30kHz channel	±5kHz	±5kHz	±5kHz
FM hum and noise (analog)			
12.5kHz channel	-45dB	-40dB	-40dB
25kHz channel	-48dB	-45dB	-45dB
Radiated and conducted emissions	-75dBc	-72dBc	-70dBc
Audio response (analog)	+1/-3dB	+1/-3dB	+1/-3dB
Audio distortion (analog)	1.5% @ 1kHz, 60% deviation	1.5%	1.5%

RECEIVER[1]

Frequency band	VHF	UHF	700/800MHz
Receive frequency ranges	136–174MHz	400-470MHz 450-520MHz	762-776MHz 851-870MHz
Sensitivity (analog)			
12dB SINAD	0.22µV (-120dBm)	0.22µV (-120dBm)	0.22µV (-118dBm)
Sensitivity (P25)			
5% BER	0.22µV (-120dBm)	0.22µV (-120dBm)	0.22µV (-120dBm)
Intermodulation rejection (P25) TIA-102	75dB	75dB	75dB
Adjacent channel rejection			
12.5kHz (P25) TIA-102	60dB	60dB	60dB
25kHz TIA-603 (2-tone)	73dB	70dB	70dB
Spurious response rejection (P25)	75dB	80dB	70dB
Residual audio noise ratio (P25) TIA-102	45dB	45dB	45dB
Audio distortion (rated audio)	1.5%	1.5%	1.5%
FM hum and noise			
12.5kHz channel	-45dB	-40dB	-40dB
25kHz channel	-48dB	-45dB	-45dB

MILITARY STANDARDS 810C, D, E, F AND G

Applicable MIL-STD	Method	Procedure
Low pressure	500.5	2
High temperature	501.5	1, 2
Low temperature	502.5	1, 2
Temperature shock	503.5	1
Solar radiation	505.5	1
Rain	506.5	1, 3
Humidity	507.5	2
Salt fog	509.5	1
Dust	510.5	1
Immersion	512.5	1
Vibration	514.6	1
Shock	516.6	1, 4, 5, 6

BATTERY

Battery shift life: Li-Ion premium	12 hours (5/5/90)
Battery shift life: Li-Ion standard	9 hours (5/5/90)

CHARGER

Charger options (Li-Ion)	Fast desktop single charger, 6-way multi charger, vehicle charger

TAIT P25 PHASE 2 SOLUTION

Backed up by our proven radio network expertise, the TP9400 base station/repeater is part of our larger P25 Phase 2 offering. This solution consists of terminals, infrastructure, applications, services and integration with third party interfaces to ensure that your organization can reap all the benefits of the spectrally-efficient P25 standard.

Authorized Partners

Specifications are subject to change without notice and shall not form part of any contract. They are issued for guidance purposes only. All specifications shown are typical.

*Contact your local Tait representative for more information.

For further information please check with your nearest Tait office or authorized dealer

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Tait Limited facilities are certified for ISO9001:2008 (Quality Management System), ISO14001:2004 (Environmental Management System) and ISO18001:2007 (Occupational Health and Safety Management System) for aspects associated with the design, manufacture and distribution of radio communications and control equipment, systems and services. In addition, all our Regional Head Offices are certified to ISO9001:2008

TP9400 P25 Portable Radios

Specifications Manual

MPD-00009-03 · Issue 3 · October 2014

www.taitradio.com

Contact Information

Tait Communications
Corporate Head Office

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

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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

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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

This manual lists some of the regulatory requirements and industry standards that the TP9400 series of portable radios satisfy, and explains how the radio specifications were derived. Separate chapters compare the performance of the receiver (Section 2) and of the transmitter (Section 3) with requirements specified by the European Telecommunications Standards Institute (ETSI) and the Telecommunications Industry Association (TIA). Section 4 provides general radio, battery, and charger specifications.

Notice The TP9400 specifications in this manual are typical performance figures and are intended only to provide guidance. They are subject to change without notice and shall not form part of any contract. To establish whether the radio meets the regulatory requirements that apply to you, please contact your regional Tait office.

Notice For known issues and limitations that may cause a radio to perform outside the specifications listed here, see the software release notes for the TP9400. Software release notes are on the Tait support website, http://support.taitradio.com.

Regulatory Requirements and Industry Standards

Regulatory Requirements

TP9400 radios meet and exceed the following **regulatory requirements** (where applicable):

- CFR 47
- AS4295-2004
- EN 300 086-1[1]
- EN 300 113-1[1]
- EN 300 219-1[1]
- EN 301 489-1[1]
- EN 60950-1[1]
- RSS-119

[1] A regulatory requirement issued by ETSI. ETSI requirements do not apply to radios operating in the 700/800/900MHz frequency bands.

Industry Standards

TP9400 radios also meet and exceed **industry standards** that include:

- Relevant sections of TIA-102.CAAB-D (Land Mobile Radio Transceiver Performance Recommendations, Project 25 - Digital Radio Technology, C4FM/CQPSK Modulation)
- Relevant sections of TIA-102.CCAB-A (Project 25 Two-Slot Time Division Multiple Access Transceiver Performance Recommendations)
- Relevant sections of TIA-102.BCAF (Project 25 Trunked TDMA Voice Channel Conformance Profiles)
- Relevant sections of TIA-603-D (Land Mobile FM or PM Communications Equipment Measurement and Performance Standards)
- P25-CAB-CAI_TEST_REQ (Project 25 Compliance Assessment Program, Baseline Common Air Interface Testing Requirements)
- MIL-STD 810 G (Environmental Engineering Considerations and Laboratory Tests, see also "Environmental" on page 23)

TIA standards are adopted by TIA in accordance with the American National Standards Institute (ANSI) patent policy.

For applicable Ingress Protection (IP) ratings and military standards, as well as details of the applicable Electrostatic Discharge (ESD) standard, see "Environmental" on page 23.

Quality Assurance

Tait is an ISO9001: 2000 and ISO14001: 2004 certified supplier.

Vocoder

TP9400 radios use AMBE+2™ voice coding technology.

Performance Figures

TP9400 specifications were derived by measuring **typical performance** and then averaging that measurement across multiple points in each RF band.

In contrast, all figures quoted as regulatory requirements are **guaranteed minimum performance** figures for equipment operated at standard room temperature, +71.6°F to +82.4°F (+22°C to +28°C) and standard test voltage (7.5VDC).

Performance figures quoted as 'typical' are generally better than performance figures quoted as 'guaranteed minimum'.

Definition of NB and WB

The terms 'narrow bandwidth' and 'wide bandwidth' are used as follows:

Term	Abbreviation	Channel spacing	Modulation 100% deviation
Narrow bandwidth	NB	12.5kHz/15kHz	±2.5kHz
Wide bandwidth	WB	25kHz/30kHz	±5.0kHz

Frequency Bands

Tait uses a unique alpha-numeric code to represent each frequency band. Frequency codes currently used with the TP9400 series of radios include:

Frequency code	Frequency band
B1	136MHz to 174MHz
H5	400MHz to 470MHz[a]
H7	450MHz to 520MHz[a]
K5	762MHz to 870MHz (Tx) 762MHz to 776MHz (Rx) 850MHz to 870MHz (Rx)

a. H5- and H7-band radios are also approved for operation on the Australia and New Zealand Citizens Band frequencies (476.425 to 477.4125MHz). Citizens Band performance limits apply to radios used in this band.

These codes are used throughout this manual.

Australia and New Zealand Citizens Band

AS/NZS 4365 deals with the use of frequencies in the 476.425 to 477.4125 MHz band. Products capable of operating in this band have been approved for operation in the UHF Citizens Band Radio Service which is licensed in Australia by the ACMA Radiocommunications (Citizens Band Radio Stations) Class Licence and in New Zealand by the MBIE General User Radio Licence for Citizens Band Radio. Operation is subject to conditions contained within those licences.

Repeaters operate by receiving a transmission on one channel and re-transmitting it on another. Operators are required to avoid using local repeater input channels, which will be in the range of 31 to 38 (and 71 to 78 when authorized), unless it is intended to use the repeater facility, and to avoid using local repeater output channels, which will be in the range 1 to 8 (and 41 to 48 when authorized), at any time. Operators must always listen in on a channel (or observe a channel-busy indicator) to ensure it is not already being used before transmitting.

No voice transmissions are permitted on data channels 22 and 23. Equipment meeting this standard will inhibit voice operation on channels 22 and 23.

Operators must be aware of the consequences of narrowband (2.5 kHz deviation) transmissions being received on older wideband equipment, and wideband (5.0 kHz deviation) transmissions being received on newer narrowband equipment. They should also be aware of the possibility of interference due to older equipment being operated on channels adjacent to new narrowband channels. The list of currently authorized channels can be obtained from the ACMA website in Australia and the MBIE website in New Zealand.

In Australia:

- Except in an emergency, a CB transmitter must not be operated on UHF channels 5 and 35.
- Channel 11 is the customary calling channel for establishing communications.
- Channel 40 is the customary road vehicle channel.

FCC Narrowbanding Regulations

The following information applies to all radios, not just to those sold in countries where FCC regulations apply.

From 1 January 2013 it is an FCC requirement that land mobile radio systems must not operate channels with a bandwidth greater than 12.5kHz in the 150–174MHz and 421–470MHz frequency bands. From this date all radios will be supplied with firmware that requires a software feature license to operate a medium or wide bandwidth channel in these frequency bands.

The 20/25kHz Unrestricted Wideband feature license is available to any customer who is not subject to the relevant FCC regulations, or who has an FCC waiver. Note that this feature license is also required to operate a medium or wide bandwidth channel on the spot frequencies which are exempt from the FCC requirement:

- 152.0075, 157.450, 152.480, 157.740 and 158.460MHz in the 150–174MHz frequency band
- 462.750, 462.775, 462.800, 462.825, 462.850, 462.875, 462.900, 462.925, and 465MHz in the 421–470MHz frequency band.

To obtain the feature license, or for more information about it, contact your regional Tait office.

If your network is in the 700MHz band and falls under the jurisdiction of the FCC, you may be required to move to P25 Phase 2 operation so as to obtain a spectrum efficiency equivalent to 6.25kHz per channel.

Associated Documentation

Title	IPN/Item code
Safety and Compliance Information	MTA-00011-xx
Battery Safety Information	MPC-00006-xx
Battery Charging Guide	MPD-00002-xx
TP9400 User's Guide	MPD-00003-xx
TP9300/TP9400 Service Manual	MPD-00004-xx

Always get the latest issue of a manual from the Tait support website. Also available on the website are software release notes, and technical notes (TNs) which provide technical details not yet in the manuals, or solve any problems that may have arisen.

Product Codes

The product code (T03-xxxxx-xxxx) printed on a radio label identifies both the radio model and the configuration of that particular radio. Item codes for accessories, antennas, batteries, chargers, and options boards are included in the relevant chapters, but this manual does not list all possible radio product codes. For a detailed explanation of product codes and how to interpret them, please refer to the TP9300/TP9400 Service Manual (MPD-00004-xx).

Publication Record

Issue	Date	Description
1	September 2013	First release
2	April 2014	Information added for H5 band
3	October 2014	Information added for: ■ H7 band ■ P25 Phase 2 operation ■ emission designators. Minor corrections and additions.

2 Receiver Specifications

This chapter compares the performance of the receiver in a TP9400 radio with receiver requirements specified by ETSI and TIA.

Where an ANSI/TIA or ETSI EN 300 113 test method was used to measure TP9400 performance, this is indicated in parentheses. Where the ETSI test method EN 300 086-1 was used, no test method is named. Please see also the footnotes to the tables.

> **Notice** The TP9400 specifications in this manual are typical performance figures that are intended only to provide guidance. They are subject to change without notice and shall not form part of any contract. To establish whether the radio meets the regulatory requirements that apply to you, please contact your regional Tait office.

For important information about how radio performance figures were derived, see Chapter 1 Introduction.

Analog

Parameter	Compliance limit	Measured performance		
	All bands[a]	B1	H5, H7	K5
Adjacent channel selectivity				
NB channel[b] WB channel	> 60dB > 70dB	65dB 74dB		n/a[c]
Adjacent channel selectivity (TIA/EIA603 one-tone test method)				
NB channel WB channel	> 50dB > 60dB	65dB 74dB		63dB 72dB
Audio distortion at rated audio (TIA-603-D)				
	< 5%	1.5%		
Audio response (TIA-603-D)				
	+1dB, –3dB	+0.5dB, –2.5dB		
Blocking				
	> 84dB	> 110dB	> 100dB	n/a
Frequency stability (TIA-603-D)				
	±2.5ppm	±0.5ppm		
Intermodulation rejection				
NB channel WB channel	> 65dB > 65dB	66dB 67dB	68dB 69dB	n/a
Intermodulation rejection (TIA-603-D)				
NB channel WB channel	> 70dB > 70dB	75dB 75dB	77dB 77dB	75dB 75dB
Rated audio (TIA-603-D)				
		0.5W into external 16Ω load		
Speaker rating				
		2W		

Parameter	Compliance limit	Measured performance (continued)		
	All bands[a]	B1	H5, H7	K5
Hum and noise (TIA-603-D)				
NB channel	34dB	40dB		
WB channel	40dB	45dB		
Sensitivity[d] (TIA-603-D)				
NB channel	< –116dBm (0.35µV)	–120dBm (0.22µV)		
WB channel	< –116dBm (0.35µV)			
Spurious response rejection (TIA-603-D)				
NB channel	> 70dB	80dB	76dB	70dB[e]
WB channel	> 70dB	80dB	76dB	70dB[e]

a. See "Frequency Bands" on page 7.

b. See "Definition of NB and WB" on page 7.

c. Not applicable.

d. 12dB SINAD.

e. 1/2-IF spurious response degrades at the edges of the band.

Sensitivity, distortion, and signal-to-noise figures are for standard operating conditions that include audio de-emphasis.

Digital

Parameter	Compliance limit	Measured performance		
	All bands[a]	B1	H5, H7	K5
Sensitivity[b] (TIA-102)				
	< –116dBm	–120dBm (0.22µV)		
Selectivity[b] (TIA-102)				
	60dB	60dB		
Residual audio noise ratio (TIA-102)				
	45dB	50dB		
Intermodulation rejection (TIA-102)				
	70dB	75dB		
Spurious response rejection (TIA-102)				
	70dB	75dB		70dB[c]

a. See "Frequency Bands" on page 7.

b. APCO Phase 1 C4FM receiver and Phase 2 H-DQPSK receiver.

c. 1/2-IF spurious response degrades at the edges of the band.

3 Transmitter Specifications

This chapter compares the performance of the transmitter in a TP9400 radio with transmitter requirements specified by ETSI and TIA.

Where an ANSI/TIA or ETSI EN 300 113 test method was used to measure TP9400 performance, this is indicated in parentheses. Where the ETSI test method EN 300 086-1 was used, no test method is named. Please see also the footnotes to the tables.

This equipment is compatible with the emissions listed in the following table.

Notice Some emission designators may not apply in all regions. Not all models support all emission designators. Contact your regional Tait office for details.

Emission Designator	Common Name	Modulation Scheme	Operating Modes
11K0F3E	analog voice	analog FM	NB voice
16K0F3E	analog voice	analog FM	WB voice
6K60F2D	FFSK data	FFSK	NB data - 1200 bps
7K80F2D	FFSK data	FFSK	NB data - 2400 bps
9K60F2D	FFSK data	FFSK	WB data - 1200 bps
10K8F2D	FFSK data	FFSK	WB data - 2400 bps
8K10F1E	P25 Phase 1	C4FM	digital voice
8K10F1D	P25 Phase 1	C4FM	data/control channel
8K10F7W	P25 Phase 1	C4FM	digital voice/data/ control channel
8K10F1W	P25 Phase 2	H-CPM	digital voice /data

Notice The TP9400 specifications in this manual are typical performance figures that are intended only to provide guidance. They are subject to change without notice and shall not form part of any contract. To establish whether the radio meets the regulatory requirements that apply to you, please contact your regional Tait office.

For important information about how radio performance figures were derived, see Chapter 1 Introduction.

Analog

Parameter	Compliance limit	Measured performance			
	All bands[a]	B1	H5	H7	K5
Audio distortion at 1kHz with 60% modulation[b]					
	< 2%	0.6%			
Audio response[b]					
	+1dB, −3dB	+0.5dB, −2.5dB			+0.5dB, −1.5dB
Conducted emissions					
< 1GHz	< −36dBm	−38dBm	−45dBm		n/a[c]
> 1GHz	< −30dBm	−40dBm	−41dBm		
Conducted emissions (TIA-603-D)					
	> 57dBc	75dBc			73dBc
FM hum and noise (TIA-603-D)					
NB channel[d]	> 34dB	47dB	49dB		44dB
WB channel	> 40dB	48dB	53dB		50dB
Adjacent channel power (TIA-603-D)					
NB channel	60dBc	65dBc	65dBc		65dBc
WB channel	70dBc	74dBc	77dBc		73dBc
Wideband noise					
100kHz offset	n/a (Tait in-house test only)	−130dBc/Hz	−134dBc/Hz	−139dBc/Hz	−132dBc/Hz
1MHz offset		−145dBc/Hz	−140dBc/Hz	−145dBc/Hz	−138dBc/Hz
1.5MHz offset		−149dBc/Hz	n/a	n/a	n/a
4MHz offset		n/a	−139dBc/Hz	−144dBc/Hz	n/a
12MHz offset		n/a	n/a	n/a	−141dBc/Hz
10MHz offset		−154dBc/Hz	−138dBc/Hz	−143dBc/Hz	n/a
45MHz offset		n/a	n/a	n/a	−149dBc/Hz
Modulation limiting[b]					
NB channel	±2.5kHz	±2.2kHz			
WB channel	±5.0kHz	±4.4kHz			

Parameter	Compliance limit	Measured performance (continued)			
	All bands[a]	B1	H5	H7	K5
Radiated emissions					
<1 GHz >1 GHz	< –36 dBm < –30 dBm	< –46 dBm < –40 dBm			n/a
Radiated emissions (TIA-603-D)					
	57 dBc	> 90 dBc			> 84 dBc
RF power output[b]					
High Medium Low Very low		5W 3W 2W 1W	4W 2.5W 2W 1W		3W 2.5W 2W 1W

a. See "Frequency Bands" on page 7.

b. EN 300 086-1 and TIA-603-D test methods.

c. Not applicable.

d. See "Definition of NB and WB" on page 7.

Digital

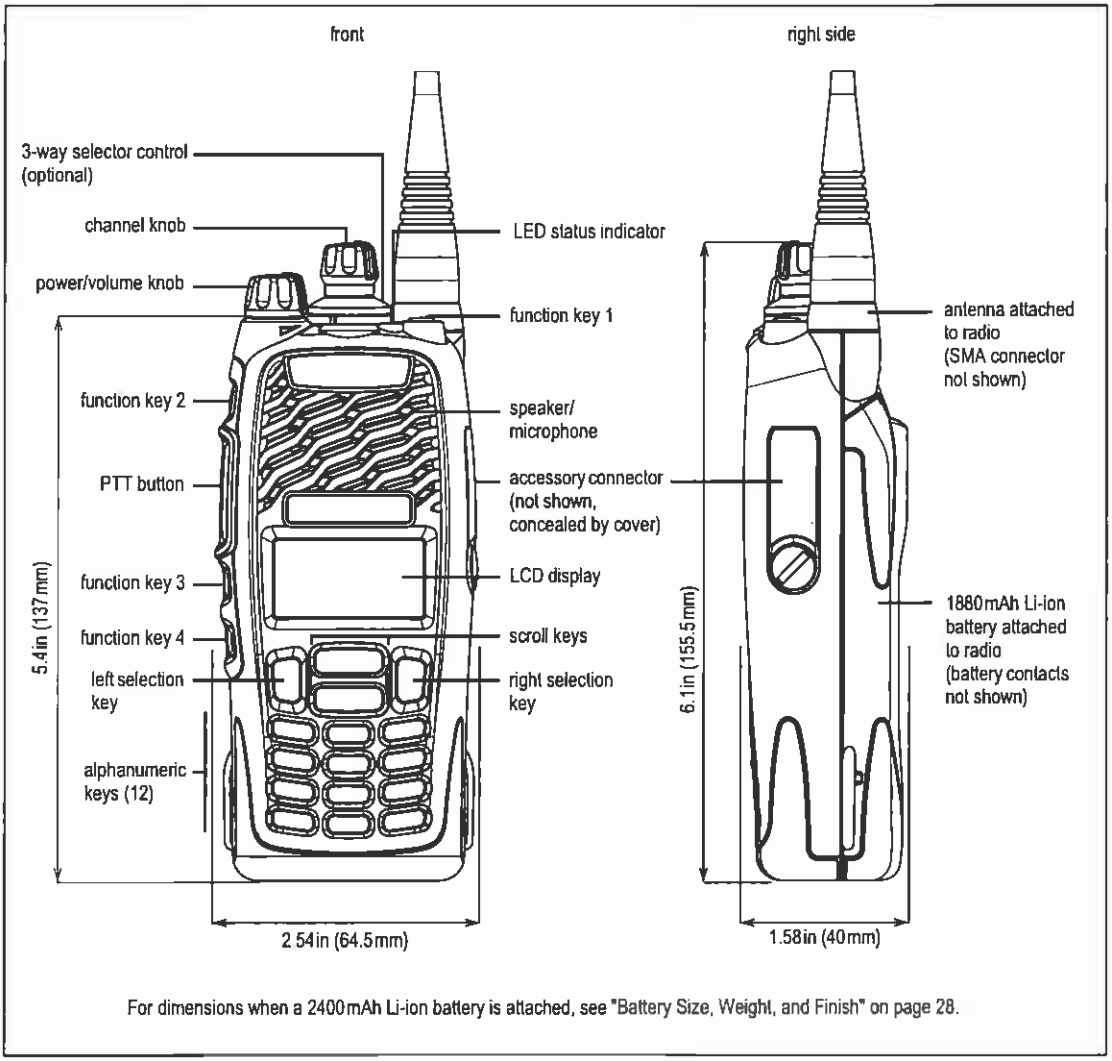
Parameter	Compliance limit	Measured performance		
	All bands[a]	B1	H5, H7	K5
Adjacent channel power ratio (TIA-102)				
P25 Phase 1 P25 Phase 2	67dBc 65dBc	67dBc 65dBc		
Transmitter power attack time (TIA-102)				
	< 50ms	< 50ms		
Transmitter encoder attack time (TIA-102)				
	< 100ms	< 100ms		
Throughput delay (TIA-102)				
	< 125ms	< 125ms		
Modulation fidelity (TIA-102)				
P25 Phase 1 P25 Phase 2	< 5% < 5%	1% 2%		

a. See "Frequency Bands" on page 7.

4 General Specifications

This chapter provides general specifications for the TP9400 portable radios, and for the batteries and chargers used with them.

Figure 4.1 TP9400 (16-key radio) dimensions and user interface



For dimensions when a 2400mAh Li-ion battery is attached, see "Battery Size, Weight, and Finish" on page 28.

Radio Specifications

This section lists general radio specifications.

- For radio compliance specifications, see "Regulatory Requirements and Industry Standards" on page 6.
- For receiver performance specifications, see Chapter 2 Receiver Specifications.
- For transmitter performance specifications, see Chapter 3 Transmitter Specifications.

The product code printed on the radio label identifies both the radio model and the configuration of that particular radio. For an explanation of product codes, please refer to the TP9300/TP9400 Service Manual (MPD-00004-xx).

User Interface

For the location of the keys, see Figure 4.1 on page 19.

Connectors	
Accessory connector	Standard interface for compatible accessories, on the right side of the front panel (see "Accessory Connector" on page 22); when not in use, the nine contacts are protected by a plastic cover (which should remain on the radio when the connector is not in use)
Battery contacts	Two self-cleaning swipe contacts on the rear panel
Antenna connector	Stainless steel SMA connector
Display	128x60 pixel backlit LCD screen, menu driven
Function keys	Four programmable keys: three silicone rubber keys on the left of the front panel and a colored key, sometimes called the 'emergency key', on the top
Keypad	Two scroll keys, an enter/menu key, and a clear/back key; 12 alpha-numeric keys in some models
Knobs	
3-way selector Channel knob Volume knob	Plastic knob Textured rubber knob Textured rubber knob
LED status indicator	Opaque silicone rubber lens that can be lit green, amber, or red
Press To Talk (PTT) button	Large silicone rubber button on the left of the front panel
Speaker-microphone	Combined speaker and microphone inside front panel; speaker with 8Ω impedance

Radio Size, Weight, and Finish

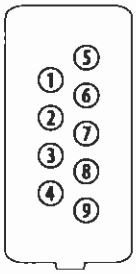
	Radio with 1880 mAh battery	Radio with 2400 mAh battery
Size (WxH[a]xD)	2.4in x 5.4in x 1.58in (61mm x 137mm x 40mm)	2.4in x 5.4in x 1.77in (61mm x 137mm x 45mm)
Weight[b]	12.13oz (344g)	13.76oz (390g)
Finish, body	Two-shot moulded construction, easy grip, with toughened rubber armor corners	

a. Height measured to base of channel knob.

b. Includes antenna TPA-AN-001 (136-225MHz). For battery dimensions see "Battery Specifications" on page 28.

Accessory Connector

The accessory connector has nine contacts. These are described in the following table. For more information, refer to the TP9300/TP9400 Service Manual (MPD-00004-xx).



Pin	Signal name	Description
1	ACC TXD[a]	Asynchronous serial port. Data direction is from the radio to the PC.
2	ACC SPKR–	External speaker negative output. Balanced load configuration. (Differential drive with ACC SPKR+.)
3	ACC GPI01[a]	General purpose input/output. Function and direction depends on the radio model.
4	ACC PWR	Power output. Switched and current-limited supply from the radio to the accessory. Supply is switched off when the radio is powered off.
5	GND	Ground
6	ACC PTT[a]	External PTT or button input. Analog signal allows multiplexed buttons in external devices such as speaker-microphones. Two levels are defined for button presses, which creates three inputs to the system on the single wire.
7	ACC SPRK+	External speaker positive output. Balanced load configuration. (Differential drive with ACC SPKR–.)
8	ACC MIC[a]	Accessory (auxiliary) microphone input. Electret microphone biasing is provided inside the radio. Dynamic microphones are not supported.
9	ACC RXD[a]	Asynchronous serial port. Data direction is from the computer to the radio.

a. Safe DC limit: –12V (minimum), +12V (maximum).

Environmental

Operating temperature	–22°F to +140°F (–30°C to +60°C)		
Ingress Protection (IP) rating	IP65, IP67		
Electrostatic Discharge (ESD) standard	International Electrotechnical Commission (IEC) 61000-4-2		
Military standard (MIL-STD)	MIL-STD-810G[a]		
		Method	**Procedure**
	Low pressure	500.5	2
	High temperature	501.5	1 and 2
	Low temperature	502.5	1 and 2
	Temperature shock	503.5	1
	Solar radiation	505.5	1
	Rain	506.5	1 and 3
	Humidity	507.5	2
	Salt fog	509.5	1
	Dust	510.5	1 and 2
	Immersion	512.5	1
	Vibration	514.6	1
	Shock	516.6	1, 4, 5 and 6

a. The TP9400 also meets the equivalent superseded standards MIL-STD-810C, D, E, and F.

See also "Regulatory Requirements and Industry Standards" on page 6.

Frequencies and Channels

	B1	H5	H7	K5
Frequency increments				
	2.5kHz, 5kHz, 6.25kHz			
Channel spacing				
NB channel WB channel	12.5kHz/15kHz 25kHz/30kHz			
Frequency range (MHz)				
	136–174	400–470[a]	450–520[a]	Tx 762–870 Rx 762–776 Rx 850–870
Frequency stability, see Chapter 2 Receiver Specifications				
IF bandwidth				
NB channel WB channel	9kHz 15kHz			
RF power output				
High Medium Low Very low	5W 3W 2W 1W	4W 2.5W 2W 1W		3W 2.5W 2W 1W

a. H5- and H7-band radios are also approved for operation on the Australia and New Zealand Citizens Band frequencies (476.425 to 477.4125MHz). Citizens Band performance limits apply to radios used in this band.

Number of Networks, Zones, Channels and Groups

	Minimum	Maximum	
		Standard	With optional software license
Conventional networks	1	26	26
Zones	1	50	100
Channels (simplex or semi-duplex)	1	1000	2000
Talk groups Total talk group members	1 1	50 1000	50 2000
Scan/vote groups Members per group Total scan/vote group members	0 2 0	300 50 2000	300 50 2000

Operational Features

	Analog operation	P25 digital operation
Channels: simplex or semi duplex, with repeater talkaround option	✔	✔[a]
Voting/scanning	✔	✔
Predefined status messaging	✔	✔
GPS	Internal (send and receive position reports), GPS display	Internal (send and receive position reports), GPS display
2-tone signaling format	Decode only	✘
5-tone Selcall	✔	✘
CTCSS signaling format	✔	✘
DCS signaling format	✔	✘
DTMF signaling format	Encode only	✘
MDC1200 signaling format	✔	✘
Single in-band tone signalling format	✔	✘
Security/Encryption	voice inversion scrambler (standard)	DES (optional) FIPS certified AES (optional)
Emergency		
■ Lone Worker inactivity detection	✔	✔
■ Man down (an additional Lone Worker feature)	✔	✔

a. P25 conventional only.

P25 Phase 1 and Phase 2 Features

P25 Phase 2 is an extension of P25 Phase 1. A Phase 2 radio can still use Phase 1 features, but with less spectrum efficiency.

		P25 Phase 1	P25 Phase 2
Standard	Unit-to-unit call	✔	✘
	PSTN calls	✔	✘
	Supplementary messages	✔	✘
	Group call	✔	✔
	Emergency	✔	✔
	Pre-emption	limited	✔
	Encryption	✔	✔
Motorola-specific	Dynamic regrouping	✔	✔
	Supergroup	✔	✔

Current Consumption

	B1	H5, H7	K5
Current consumption			
Receiver squelched	100mA	105mA	110mA
Receiver (rated audio)	215mA	225mA	225mA
Transmitter current			
Very low power	1A	1A	1A
Low power	1.3A	1.3A	1.3A
Medium power	1.5A	1.4A	1.4A
High power	1.9A	1.8A	1.5A

Current consumption was tested using conventional radios equipped with the latest radio hardware. All measurements were made in the middle frequencies of each band. Battery voltage was 7.5 V, and radios transmitted into a 50Ω load.

Battery Specifications

Observe all safety precautions that relate to the handling of Li-ion batteries.

Warning **LI-ION BATTERY. This radio uses a Lithium-ion battery. If the battery is damaged or handled in an unsafe manner, it can cause personal injury and/or damage to property. Read the important safety information in the Li-ion Battery Safety Information document (MPC-00006-xx). The document is on the Tait support website.**

Warning **LI-ION BATTERY. Do not allow anything to obstruct the vent hole in the battery. If the battery vent is obstructed, the battery may explode, causing personal injury and/or damage to property. Make sure that no customized label attached to the battery or radio will obstruct the battery vent hole.**

Battery Size, Weight, and Finish

	1880 mAh 'standard' T03-00011-Axxx	2400mAh 'performance' T03-00011-Cxxx
Size (WxHxD)	2.4in x 4.7in x 0.7in (61mm x 118mm x 17mm)	2.4in x 4.7in x 0.8in (61mm x 118mm x 21mm)
Weight	4.6oz (130g)	6.2oz (175g)
Finish	Two-shot moulded construction, with toughened rubber armor corners	

Expected Shift Life

The following table shows the expected shift life for a fully charged, healthy Li-ion battery when the radio is used in analog mode, and when the radio is used in P25 digital mode.

Notice To maximize battery life and performance, and to charge batteries correctly, follow the instructions provided in the Battery Charging Guide (MPD-00002-xx) supplied with the charger.

	1880 mAh[a] 'standard' T03-00011-Axxx	2400 mAh[a] 'performance' T03-00011-Cxxx
P25 Phase 1 and analog mode		
Duty cycle 5 / 5 / 90[b]	8.5 hours	12 hours
Duty cycle 5 / 35 / 60[c]	7.5 hours	10 hours
P25 Phase 2 TDMA operation		
Duty cycle 5 / 5 / 90	12 hours	16 hours
Duty cycle 5 / 35 / 60	10 hours	13 hours

a. These figures assume that the battery has been subjected to typical use at 77 °F (25 °C) for one year, with approximately 300 charge and discharge cycles. The correct antenna is being used and backlighting is off. Bluetooth and GPS are off.

b. 5% transmitting, 5% receiving, 90% standby.

c. 5% transmitting, 35% receiving, 60% standby.

Temperature Range for Charging and Operating

	1880 mAh 'standard' T03-00011-Axxx	2400 mAh 'performance' T03-00011-Cxxx
Operating temperature range	+14 °F to +140 °F (–10 °C to +60 °C)	–4 °F to +140 °F (–20 °C to +60 °C)
Charging temperature range	+41 °F to +104 °F (+5 °C to +40 °C)	

Battery Charger Specifications

Use only the following chargers to charge a TP9400 Li-ion battery:

- multicharger (T03-00013-xxxx)
- desktop charger (T03-00012-xxxx, sometimes called a 'single fast charger')
- vehicle charger (T03-00014-AAAA, see the Installation Instructions (402-00078-xx) for more information.).

Notice To maximize battery life and performance, and to charge batteries correctly, follow the instructions provided in the Battery Charging Guide (MPD-00002-xx) supplied with the charger.

Notice If the radio is attached to the battery while the battery is being charged, the radio must be switched off.

Charge Temperature

A Li-ion battery will charge correctly only when the temperature of the battery and the charger is between +41 °F (+5 °C) and +104 °F (+40 °C).

Charge Time

	1880 mAh 'standard' T03-00011-Axxx	**2400 mAh 'performance' T03-00011-Cxxx**
Typical time to full charge	1.5 hours to 2 hours	2 hours to 2.5 hours
Maximum time to full charge	2.5 hours	3 hours

LED Indicators

The chargers display a red LED when the battery is charging, a green LED when the battery is fully charged, and an amber LED if there is a problem.

TP8100/TP9300/TP9400

Battery Charging Guide

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www.taitradio.com

English

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About this document

This guide explains how to charge your battery as well as care for it, to ensure maximum performance and prolonged battery life. For information about the way your radio operates, see the user's guide or contact your radio provider.

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TP9300 and TP9400 only: This product may also be made under license under one or more of the following U.S. Patents: 4,590,473 4,636,791 4,716,407 4,972,460 5,146,497 5,148,482 5,164,986 5,185,795 5,185,796 5,271,017 5,377,229 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.

English

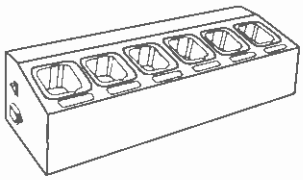
About the chargers

Unless otherwise indicated, the charging advice and instructions in this document apply to all chargers.

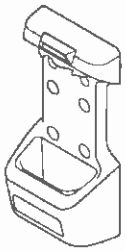
There are three types of charger available for your Talt radio battery:

- Desktop charger: Small enough to fit on a desk, it charges one battery at a time.

- Multicharger: Charges up to six batteries. It can be mounted on a desk, on a wall, or in an equipment rack.



- Vehicle charger: Charges one battery at a time while installed in a vehicle.



Multicharger safety information

Warning This device must be connected to an earthed mains socket-outlet.

Norsk (no): Apparatet må tilkoples jordet stikkontakt.

Suomi (fi): Laite on liitettävä suojamaadoitus-koskettimilla varustettuun pistorasiaan.

Svenska (sv): Apparaten skall anslutas till jordat uttag.

Special conditions when using IS radios

Warning Fit only an IS-approved battery to an IS radio. Fitting a battery or accessory that is not IS-approved exposes the customer to a risk of explosion which could cause serious injury or death.

For detailed information about identifying IS radios, refer to the Safety and Compliance Information (MTA-00011-xx) provided with the radio.

Before using the charger

Handle the battery safely

Warning Handle the battery safely. Failure to observe the following handling recommendations could result in personal injury and/or equipment damage.

- Before using a Li-ion battery, please read the Li-ion Battery Safety Information (MPC-00006-xx) included with your battery, and follow the instructions it provides. Incorrect use of a Li-ion battery can cause explosion or fire.
- Do not short-circuit the battery contacts, neither intentionally nor accidentally, e.g. by placing the battery with conductive materials such as keys or jewelry inside a pocket or container. Short-circuiting the battery contacts can heat up the conductive material.

Attaching of labels

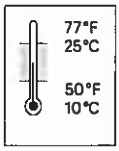
Warning Do not obstruct the vent hole on the battery. If the vent on the battery is obstructed the battery may explode, causing personal injury and/or equipment damage. If the vent on the radio is obstructed, audio quality and/or key function may deteriorate and radio seals may be damaged.

English

Charging temperatures

Notice Do not expose a battery to very high or very low temperatures for extended periods of time. Doing so will shorten the usable life ('service life') of the battery.

To achieve the best results when charging your battery:



- Before you begin to charge your battery, make sure that the battery temperature is close to the room temperature in which the battery is to be charged.
- If possible, charge the battery in temperatures between 50°F and 77°F (between 10°C and 25°C). This temperature range is the optimal charging range.

Charging only starts when the battery is between 32°F to 104°F (0°C to 40°C).

Temperature indications

○○● When the battery temperature is outside the normal charging range, the orange LED on the charger is lit. Charging will start or resume once the temperature is within normal limits, and no action is required by you.

Leaving the battery on charge

You can leave a battery/radio in the charger once charging is complete. Leaving a battery in the charger will not overcharge or damage it.

You can remove a battery/radio from the charger at any time without harming the battery, the radio, or the charger. When you return the battery/radio to the charger, charging is automatically resumed.

Vehicle charger only

It is safe to switch off the ignition while there is still a battery in the charger. But if the vehicle will not be used again for some time, check whether charging will continue while the ignition is off, and consider what effect this might have on the vehicle battery.

To check, place the battery in the charger and switch off the vehicle ignition:

- If no charger LED stays lit, the charger will resume charging only when the ignition is switched on again. Minimal charger standby power will be drawn from the vehicle battery until then.
- If a charger LED stays lit, the charger will continue to charge the radio battery even while the ignition is off, and will continue to draw power from the vehicle battery. Once the battery is charged, the charger draws minimal current and has little effect on a healthy vehicle battery.

Receiving calls while charging (desktop charger and multicharger only)

Notice For best charging performance, switch off the radio before placing it in the charger.

You can receive a call while the radio is in the charger, but your radio performance may be degraded. If you do remove the radio from the charger to answer a call, the call will not be disrupted.

Removing the radio from the charger to make or receive a call ends the charging process. Charging safely recommences when the radio is reinserted into the charger.

If a radio was turned on while being charged, the battery indicator may not be accurate when the radio is initially removed from the charger. After a few seconds, the battery indicator is updated to display the amount of charge available in the battery.

Low battery warning

Notice Do not allow a radio battery to fully discharge every time you use it, or you will shorten the service life of the battery.

When the battery is low, your radio warns you in the following ways:

- The battery symbol on the radio display looks empty.
- The status LED on the radio slowly flashes red.
- A high-pitched beep sounds.

You should recharge or replace the battery as soon as possible.

When the battery is completely empty, the message **Battery is flat** appears on the display. The radio emits a long, low-pitched beep and then stops working. Turn off the radio.

English

Charging the battery

Charging a battery for the first time

Fully charge a battery before using it for the first time. This will take up to 2.5 hours.

○●○ The red LED stays lit while the battery charges.

Charging a battery

Notice For best charging performance, switch off the radio before placing it in the charger (desktop charger or multicharger only).

1 Desktop charger: Connect the charger to the correct Tait power adaptor.

Multicharger and vehicle charger: Power on the charger.

●●● Initially, all three LEDs are lit for 2 seconds.

2 Place just a battery in the charger, or a radio with a battery attached (desktop charger or multicharger only). There is no need to remove a belt clip, antenna, or any accessory that is attached to the accessory connector.

○●○ The red LED lights up, and stays lit while the battery charges. For a battery that is almost completely discharged, allow two hours.

●○○ When charging is complete, the green LED stays lit.

LED behavior

If there is a battery in the charger when power is supplied to the charger, the LEDs behave as follows:

LED	Meaning
● ● ● briefly	The charger has been connected to a power supply.
○ ● ○ steady	The battery is charging.
● ○ ○ steady	Charging complete. Remove the battery, or leave it in the charger.
○ ○ ● steady	■ The battery temperature is outside the normal charging range. Charging will start or resume once the temperature is within normal limits. No action is required by you. ■ There is a fault. Contact your local regional Tait office.

If the charger does not behave as expected:

- Make sure the radio or battery is seated properly in the charger.
- Check that the charger is properly plugged in.
- Check that the battery and charger contacts are clean. To clean, wipe the contacts with a dry lint-free cloth to remove any dirt, oil or grease.

Removing the battery from the charger

- Desktop charger and multicharger: Lift the battery/radio out of the charger.
- Vehicle charger: Pull up the top clip of the vehicle charger, and then lift out the battery.

You can remove a battery/radio from the charger at any time without harming the battery, the radio, or the charger. When you return the battery/radio to the charger, charging is automatically resumed. You can also leave a battery/radio in the charger once charging is complete.

English

Maintaining battery life and performance

With proper care and maintenance you will maintain the performance and life of the battery. It is recommended that you:

- Use only Tait chargers and batteries.
- Do not expose a battery to very high or very low temperatures for extended periods of time. Doing so will shorten the service life of the battery.
  Very high: above 140°F (60°C)
  Very low: less than –22°F (–30°C)
- Charge the battery at a room temperature of between 50°F and 77°F (between 10°C and 25°C). This temperature range is the optimal charging range.
- Store batteries properly when not in use. See "Storing batteries".

Storing batteries

When not in use for a month or more, batteries should be stored correctly to prolong their life.

- Remove the battery from the radio before storage.
- Fully charge the battery if storing for less than one month.
- Charge the battery to about 30% if storing for longer than one month.
- Store in a cool dry place.

Using batteries after storage

Batteries that have been stored for any length of time must be charged before being used. See "Charging the battery".

Disposing of batteries

Run the battery flat before disposing of it. When disposing of the battery, be sure to do so in an environmentally sensitive manner. Please contact your radio provider for information about recycling programs in your area. See "Environmental responsibilities" for more information.

Charger compliance information

United States

This battery charger has been tested and found to comply with the limits for a Class B digital device, in accordance with part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This battery charger generates, and can radiate, radio frequency energy. If it is not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur. If this charger does cause harmful interference to radio or television reception (which can be determined by turning the charger off and on), try to correct the interference by:

- Reorienting or relocating the receiving antenna.
- Increasing the separation between the equipment and receiver.
- Connecting the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consulting the dealer or an experienced radio/TV technician for help.

Canada

This Class B digital apparatus complies with Canadian ICES-003.

TM9400
SPECIFICATIONS

tait communications

More efficient networks. More possibilities.

The Tait TM9400 has the means and flexibility to meet the operational needs of your organization today and tomorrow. The TM9400 provides analog, 12.5kHz P25 Phase 1 FDMA conventional/trunked, 6.25kHz equivalent P25 Phase 2 TDMA trunked and LSM (CQPSK) decode capability in a single device.

The TM9400 is capable of AES encryption, Over-the-air Rekeying (OTAR), various emergency modes and is IP54 rated to keep those relying on the mobiles safe and efficient. The TM9400 also has an options slot allowing extension of capabilities and a range of remote mounting and control head options.

KEY FEATURES

- Manage migration risk with a multi-mode mobile – analog, P25 Phase 1 conventional/trunked and upgradable to P25 Phase 2 for enhanced interoperability
- Future proofed with software-upgradability to P25 Phase 2 TDMA for increased capacity
- Variety of options to suit your application – remote mount and control head
- Flexibility with an options slot for expansion and addition of future capabilities
- P25 standards compliance for greater choice and interoperability
- Engineered for demanding environments with IP54 rating and water-resistant control head
- AES encryption, voice and data, simulcast support and pre-set status messages for effective operations

TM9400
SPECIFICATIONS

FEATURES AND BENEFITS

Delivers on the P25 standards

Benefit from the spectral efficiency, multi-vendor interoperability, security, migration and data capability demanded by the P25 standards.

- TIA-102 P25 CAP tested and certified, providing multi-vendor interoperability
- 12.5kHz P25 Phase 1 FDMA and 6.25kHz equivalent P25 Phase 2 TDMA capable
- Product compliances satisfy FCC 2015 and 2017 ultra-narrowbanding mandates
- FCC and IC compliances include P25 Phase 2 emission designator (8K10F1W)

Designed for demanding environments

Designed with users to ensure effective every-day operation

- IP54 rated: protected against dust and splashing water
- Exceeds MIL-STD-810G
- Large four-line LCD with icons to display key parameters
- Configurable to suit your needs: dual head and remote mount (6m and 12m options)
- Four programmable function keys on the standard mobile head
- Programmable orange emergency key

High-performing, voice communications

Robust design delivers clear, mission-critical voice communications.

- Analog, P25 Phase 1 conventional/ trunked and P25 Phase 2 trunked
- Automatic dual mode between analog and P25 Phase 1 conventional
- Programmable power level options
- Option to operate with dual band functionality
- AMBE+2 enhanced vocoder reduces background noise in demanding environments
- Voting ensures priority selection of the channel with optimum receive quality
- Dynamic regrouping and super-group operation for mission-critical workforce management
- Increased channel capacity with up to 2,000 channels
- Scanning modes include: priority, dual priority, editable, zone, background scan

Keeping your people safe

- Supports end-to end encryption, including AES encryption
- Lone Worker, covert microphone and stealth emergency mode as standard
- Radio inhibit and uninhibit to allow management of radios during vehicle servicing
- Trunked failsoft reverts to conventional operation during trunked network failure

Effective operations with voice and data

- Support for a variety of simulcast modes such as LSM and C4FM
- Pre-set status messages
- P25 data such as emergency GPS location
- Conventional and trunked IP data
- Location services over a conventional network
- Software configurable, including feature upgrades through software licenses

Efficient, security-focused management

The TM9400 management facilities and applications allow you to efficiently manage your radio fleet.

- OTAR (Over-the-air Rekeying)
- EnableProtect Key Fill Device (KFD) for quick, reliable encryption key programming
- Programming application for efficient fleet programming
- EnableProtect Advanced System Key allows administrators to authorize and restrict subscriber units on their network

TM9400 Accessories

Digital and analog interfaces allow a range of accessory options for the TM9400.

TM9400
SPECIFICATIONS

GENERAL[1]

Frequency stability	±0.5ppm (-22°F to +140°F/-30°C to +60°C)
Channels/zones	1,000 channels/50 zones (2,000 channels/100 zones optional enhancement with software license)
Talk groups	50 talk groups, up to 1,000 members total (2,000 members optional enhancement with software license)
Scan groups	300 with up to 50 members each, maximum of 2,000 members total
Power supply	10.8-16VDC
Active standby current	0.15A
Channel spacing	12.5/15/20/25/30kHz
Frequency increment	2.5/5/6.25
Dimensions (DxWxH)	
Control head	1.38 x 7.24 x 2.8in (35 x 184 x 71mm)
Radio body – 25W	6.9 x 6.3 x 2.1in (175 x 160 x 52mm)
Radio body – 30/35/50W	7.7 x 6.3 x 2.1in (195 x 160 x 52mm)
Weight	
Control head	0.73lb (0.33kg)
Radio body – 25W	2.6lb (1.2kg)
Radio body – 30/35/50W	3.1lb (1.4kg)
Operating temperature	-22°F to +140°F (-30°C to +60°C)
Water and dust protection	IP54
RF connector	50 ohm BNC or mini UHF
Interface connectors	3 interface connectors with serial ports
Signaling options (analog)	MDC1200 encode and decode, Two Tone decode, PL (CTCSS), DPL (DCS)

TRANSMITTER[1]

Frequency band	VHF	VHF	UHF	700/800MHz
Transmit power	25W, 12W, 5W, 1W	50W, 25W, 15W, 10W	25W, 12W, 5W, 1W 40W, 25W, 15W, 10W	<806MHz: 30W, 15W, 5W, 2W >806MHz: 35W, 15W, 5W, 2W
Transmit frequency ranges	136-174MHz	136-174MHz	400-470MHz 450-520MHz	762–870MHz
Transmit current	5.5A max.	10.5A max.	(25W, 12W, 5W, 1W) <6A (40W, 25W, 15W, 10W) <10.5A	10A max
Modulation limiting				
12.5/15kHz channel	±2.5kHz	2.5kHz	2.5kHz	±2.5kHz
25/30kHz channel	±5kHz	±5kHz	±5kHz	±5kHz
FM hum and noise				
12.5kHz channel	-45dB	-45dB	-40dB	-40dB
25kHz channel	-48dB	-48dB	-45dB	-45dB
Radiated and conducted emissions	-85dBc	-80dBc	-80dBc	-80dBc
Audio response (analog)	+1/-3dB	+1/-3dB	+1/-3dB	+1/-3dB
Audio distortion (analog)	1.5% @ 1kHz, 60% deviation			
Duty cycle	25W: 2min Tx, 4min Rx for 8 hrs @ +140°F (+60°C) 35/50W: 1min Tx, 4min Rx for 8 hrs @ +140°F (+60°C) 5W: continuous @ +104°F (+40°C)			

TM9400
SPECIFICATIONS

RECEIVER[1]

Frequency band	VHF	UHF	700/800MHz
Receive frequency ranges	136–174MHz	400-470MHz 450-520MHz	762-776MHz 850-870MHz
Sensitivity (analog)			
12dB SINAD	0.22µV (-120dBm)	0.22µV (-120dBm)	0.28µV (-118dBm)
Sensitivity (P25)			
5% BER	0.22µV (-120dBm)	0.22µV (-120dBm)	0.22µV (-120dBm)
Intermodulation rejection (P25) TIA-102	76dB	75dB	75dB
Adjacent channel rejection			
12.5kHz (P25) TIA-102	60dB	60dB	60dB
25kHz TIA-603 (2-tone)	73dB	70dB	70dB
Spurious response rejection (P25) TIA-102	80dB	80dB	80dB
Residual audio noise ratio (P25) TIA-102	45dB	45dB	45dB
FM hum and noise			
12.5kHz channel	-45dB	-40dB	-40dB
25kHz channel	-48dB	-45dB	-45dB
Audio distortion (3W rated audio)	1.5% at 1kHz 60% modulation		
Optional external speaker output	10W (into 4 ohm)		

MILITARY STANDARDS 810C, D, E, F AND G

Applicable MIL-STD Method	Method	Procedure
Low pressure	500.5	2
High temperature	501.5	1, 2
Low temperature	502.5	1, 2
Temperature shock	503.5	1
Solar radiation	505.5	1
Rain	506.5	1, 3
Humidity	507.5	2
Salt fog	509.5	1
Dust	510.5	1
Vibration	514.6	1
Shock	516.6	1, 5, 6

TAIT P25 PHASE 2 SOLUTION

Backed up by our proven radio network expertise, the TP9400 base station/repeater is part of our larger P25 Phase 2 offering. This solution consists of terminals, infrastructure, applications, services and integration with third party interfaces to ensure that your organization can reap all the benefits of the spectrally-efficient P25 standard.

Authorized Partners

Specifications are subject to change without notice and shall not form part of any contract. They are issued for guidance purposes only. All specifications shown are typical.

[1]Contact your local Tait representative for more information.

For further information please check with your nearest Tait office or authorized dealer.

Tait Limited facilities are certified for ISO9001:2008 (Quality Management System), ISO14001:2004 (Environmental Management System) and ISO18001:2007 (Occupational Health and Safety Management System) for aspects associated with the design, manufacture and distribution of radio communications and control equipment, systems and services. In addition, all our Regional Head Offices are certified to ISO9001:2008.

TM9400 P25 Mobile Radios

Specifications Manual

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www.taitradio.com

Contact Information

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Corporate Head Office

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

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

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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 be protected by one or more patents or designs of Tait Limited together with their international equivalents, pending patent or design applications, and registered trade marks: NZ409837, NZ409838, NZ415277, NZ415278, NZ508806, NZ511155, NZ516280/NZ519742, NZ521450, NZ524369, NZ524378, NZ524509, NZ524537, NZ530819, NZ534475, NZ534692, NZ547713, NZ569985, NZ577009, NZ579051, NZ579364, NZ580361, NZ584534, NZ586889, NZ592624, NZ593887, NZ593888, NZ600346, NZ601933 , NZ607046, NZ607046, NZ610426, NZ610563, NZ612027, NZ613565, NZ615898, NZ615954, AU2004216984, AU321864, AU321868, AU339127, AU339391, CN1031871, CN1070368, CN200930004199.5, CN200930004200.4, CN200930009301.0, EU000915475-0001, EU000915475-0002, GB2413445, US12/870840, US13/082767, US13/185498, US13/465664, US13/542062, US13/542147, US13/763531, US13/896969, US14/032876, US29/401234, US29/401235, US5745840, US640974, US640977, US7411461, US7758996, US7937661, US8301682.

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

This manual lists some of the regulatory requirements and industry standards that the TM9400 series of mobile radios satisfy, and explains how the radio specifications were derived. Separate chapters compare the performance of the receiver (Section 2) and of the transmitter (Section 3) with requirements specified by the European Telecommunications Standards Institute (ETSI) and the Telecommunications Industry Association (TIA). Section 4 provides general radio specifications.

Notice The TM9400 specifications in this manual are typical performance figures and are intended only to provide guidance. They are subject to change without notice and shall not form part of any contract. To establish whether the radio meets the regulatory requirements that apply to you, please contact your regional Tait office.

Notice For known issues and limitations that may cause a radio to perform outside the specifications listed here, see the software release notes for the TM9400. Software release notes are on the Tait support website, http://support.taitradio.com.

Regulatory Requirements and Industry Standards

Regulatory Requirements

TM9400 radios meet and exceed the following **regulatory requirements** (where applicable):

- CFR 47
- AS4295-2004
- EN 300 086-1[1]
- EN 300 113-1[1]
- EN 300 219-1[1]
- EN 301 489-1[1]
- EN 60950-1[1]
- RSS-119

[1] A regulatory requirement issued by ETSI. ETSI requirements do not apply to radios operating in the 700/800/900 MHz frequency bands.

Industry Standards

TM9400 radios also meet and exceed **industry standards** that include:

- Relevant sections of TIA-102-CAAB-D (Land Mobile Radio Transceiver Performance Recommendations, Project 25 - Digital Radio Technology, C4FM/CQPSK Modulation)
- Relevant sections of TIA-102.CCAB-A (Project 25 Two-Slot Time Division Multiple Access Transceiver Performance Recommendations)
- Relevant sections of TIA-102.BCAF (Project 25 Trunked TDMA Voice Channel Conformance Profiles)
- Relevant sections of TIA-603-D (Land Mobile FM or PM Communications Equipment Measurement and Performance Standards)
- P25-CAB-CAI_TEST_REQ (Project 25 Compliance Assessment Program, Baseline Common Air Interface Testing Requirements)
- MIL-STD 810 G (Environmental Engineering Considerations and Laboratory Tests, see also "Environmental" on page 32)

TIA standards are adopted by TIA in accordance with the American National Standards Institute (ANSI) patent policy.

For applicable Ingress Protection (IP) ratings and military standards, as well as details of the applicable Electrostatic Discharge (ESD) standard, see "Environmental" on page 32.

Quality Assurance

Tait is an ISO9001: 2000 and ISO14001: 2004 certified supplier.

Vocoder

TM9400 radios use AMBE+2™ voice coding technology.

Performance Figures

TM9400 specifications were derived by measuring **typical performance** and then averaging that measurement across multiple points in each RF band.

In contrast, all figures quoted as regulatory requirements are **guaranteed minimum performance** figures for equipment operated at standard room temperature, +71.6°F to +82.4°F (+22°C to +28°C) and standard test voltage (13.8VDC).

Performance figures quoted as 'typical' are generally better than performance figures quoted as 'guaranteed minimum'.

Definition of NB and WB

The terms 'narrow bandwidth' and 'wide bandwidth' are used as follows:

Term	Abbreviation	Channel spacing	Modulation 100% deviation
Narrow bandwidth	NB	12.5kHz/15kHz	±2.5kHz
Wide bandwidth	WB	25kHz/30kHz	±5kHz

Frequency Bands

Tait uses a unique alpha-numeric code to represent each frequency band. Frequency codes currently used with the TM9400 series of radios include:

Frequency code	Frequency band
B1	136MHz to 174MHz
H5	400MHz to 470MHz[a]
H7	450MHz to 520MHz[a]
K5	762MHz to 870MHz (Tx) 762MHz to 776MHz (Rx) 850MHz to 870MHz (Rx)

a. H5- and H7-band radios are also approved for operation on the Australia and New Zealand Citizens Band frequencies (476.425 to 477.4125MHz). Citizens Band performance limits apply to radios used in this band.

These codes are used throughout this manual.

Australia and New Zealand Citizens Band

AS/NZS 4365 deals with the use of frequencies in the 476.425 to 477.4125MHz band. Products capable of operating in this band have been approved for operation in the UHF Citizens Band Radio Service which is licensed in Australia by the ACMA Radiocommunications (Citizens Band Radio Stations) Class Licence and in New Zealand by the MBIE General User Radio Licence for Citizens Band Radio. Operation is subject to conditions contained within those licences.

Repeaters operate by receiving a transmission on one channel and re-transmitting it on another. Operators are required to avoid using local repeater input channels, which will be in the range of 31 to 38 (and 71 to 78 when authorized), unless it is intended to use the repeater facility, and to avoid using local repeater output channels, which will be in the range 1 to 8 (and 41 to 48 when authorized), at any time. Operators must always listen in on a channel (or observe a channel-busy indicator) to ensure it is not already being used before transmitting.

No voice transmissions are permitted on data channels 22 and 23. Equipment meeting this standard will inhibit voice operation on channels 22 and 23.

Operators must be aware of the consequences of narrowband (2.5kHz deviation) transmissions being received on older wideband equipment, and wideband (5.0kHz deviation) transmissions being received on newer narrowband equipment. They should also be aware of the possibility of interference due to older equipment being operated on channels adjacent to new narrowband channels. The list of currently authorized channels can be obtained from the ACMA website in Australia and the MBIE website in New Zealand.

In Australia:

- Except in an emergency, a CB transmitter must not be operated on UHF channels 5 and 35.
- Channel 11 is the customary calling channel for establishing communications.
- Channel 40 is the customary road vehicle channel.

FCC Narrowbanding Regulations

The following information applies to all radios, not just to those sold in countries where FCC regulations apply.

From 1 January 2013 it is an FCC requirement that land mobile radio systems must not operate channels with a bandwidth greater than 12.5kHz in the 150–174MHz and 421–470MHz frequency bands. From this date all radios will be supplied with firmware that requires a software feature license to operate a medium or wide bandwidth channel in these frequency bands.

The 20/25kHz Unrestricted Wideband feature license is available to any customer who is not subject to the relevant FCC regulations, or who has an FCC waiver. Note that this feature license is not required to operate a medium or wide bandwidth channel on the spot frequencies which are exempt from the FCC requirement:

- 152.0075, 157.450, 152.480, 157.740 and 158.460MHz in the 150–174MHz frequency band
- 462.750, 462.775, 462.800, 462.825, 462.850, 462.875, 462.900, 462.925, and 465MHz in the 421–470MHz frequency band.

To obtain the feature license, or for more information about it, contact your regional Tait office.

If your network is in the 700MHz band and falls under the jurisdiction of the FCC, you may be required to move to P25 Phase 2 operation so as to obtain a spectrum efficiency equivalent to 6.25kHz per channel.

RF Output Power

TM9400 mobile radios are available with >25 W and 25 W RF output power. These RF output power options are implemented by different main boards in the radio body and mechanically different radio bodies. The control heads are identical for all RF output power options.

The >25 W radio is available in the following frequency bands:

- B1 (50 W)
- H5 (40 W)
- H7 (40 W)
- K5 (30 W for 762–806 MHz, 35 W for 806–870 MHz)

The 25 W radio is available in the following frequency bands:

- B1
- H5[1]
- H7[1]

Product Codes

The product code (T02-xxxxx-xxxx) printed on a radio label identifies both the radio model and the configuration of that particular radio. For a detailed explanation of product codes and how to interpret them, please refer to the TM9300/TM9400 Service Manual (MMB-00004-xx).

1. Radios approved for operation on the Australia and New Zealand Citizens Band have a maximum RF output power of 5 W.

Associated Documentation

Title	IPN/Item code
Safety and Compliance Information	MTA-00011-xx
TM9400 User's Guide	MMB-00003-xx
TM9300/TM9400 Installation Guide	MMB-00002-xx
TM9300/TM9400 Service Manual	MMB-00004-xx

Always get the latest issue of a manual from the Tait support website. Also available on the website are software release notes, and technical notes (TNs) which provide technical details not yet in the manuals, or solve any problems that may have arisen.

Document Conventions

Please follow exactly any instruction that appears in the text as an 'alert'. An alert provides necessary safety information as well as instruction in the proper use of the product. This manual uses the following types of alert:

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.

Publication Record

Issue	Date	Description
1	January 2014	First release
2	October 2014	Information added for: ■ H7 band ■ P25 Phase 2 operation ■ emission designators. Minor corrections and additions.

2 Receiver Specifications

This chapter compares the performance of the receiver in a TM9400 radio with receiver requirements specified by ETSI and TIA.

Where an ANSI/TIA or ETSI EN 300 113 test method was used to measure TM9400 performance, this is indicated in parentheses. Where the ETSI test method EN 300 086-1 was used, no test method is named. Please see also the footnotes to the tables.

Notice The TM9400 specifications in this manual are typical performance figures that are intended only to provide guidance. They are subject to change without notice and shall not form part of any contract. To establish whether the radio meets the regulatory requirements that apply to you, please contact your regional Tait office.

For important information about how radio performance figures were derived, see Chapter 1 Introduction.

Analog

Parameter	Compliance limit	Measured performance			
	All bands[a]	B1	H5	H7	K5
Adjacent channel selectivity					
NB channel[b] WB channel	> 60dB > 70dB	65dB 74dB	64dB 73dB		n/a[c]
Adjacent channel selectivity (TIA/EIA603 one-tone test method)					
NB channel WB channel	> 60dB > 70dB	65dB 74dB	64dB 72dB		63dB 72dB
Audio distortion at rated audio[d]					
	< 5%	0.6%			0.9%
Audio bandwidth					
		300–3000Hz (flat or with de-emphasis)			
Audio response[d]					
	+1dB, –3dB	+0.5dB, –2.5dB			
Blocking					
	> 84dB	> 110dB			n/a
Co-channel rejection					
NB channel WB channel	> –12dB > –8dB	> –7dB > –2.5dB			n/a
Frequency stability (TIA-603-D)					
	±2.5ppm	±0.5ppm			

3 Transmitter Specifications

This chapter compares the performance of the transmitter in a TM9400 radio with transmitter requirements specified by ETSI and TIA.

Where an ANSI/TIA or ETSI EN 300 113 test method was used to measure TM9400 performance, this is indicated in parentheses. Where the ETSI test method EN 300 086-1 was used, no test method is named. Please see also the footnotes to the tables.

This equipment is compatible with the emissions listed in the following table.

Notice Some emission designators may not apply in all regions. Not all models support all emission designators. Contact your regional Tait office for details.

Emission Designator	Common Name	Modulation Scheme	Operating Modes
11K0F3E	analog voice	analog FM	NB voice
16K0F3E	analog voice	analog FM	WB voice
6K60F2D	FFSK data	FFSK	NB data - 1200 bps
7K80F2D	FFSK data	FFSK	NB data - 2400 bps
9K60F2D	FFSK data	FFSK	WB data - 1200 bps
10K8F2D	FFSK data	FFSK	WB data - 2400 bps
8K10F1E	P25 Phase 1	C4FM	digital voice
8K10F1D	P25 Phase 1	C4FM	data/control channel
8K10F7W	P25 Phase 1	C4FM	digital voice/data/ control channel
8K10F1W	P25 Phase 2	H-CPM	digital voice /data

Notice The TM9400 specifications in this manual are typical performance figures that are intended only to provide guidance. They are subject to change without notice and shall not form part of any contract. To establish whether the radio meets the regulatory requirements that apply to you, please contact your regional Tait office.

For important information about how radio performance figures were derived, see Chapter 1 Introduction.

Analog

Parameter	Compliance limit	Measured performance				
		B1		H5, H7		K5
	All bands[a]	25W	50W	25W	40W	30/35W
Audio distortion at 1kHz with 60% modulation[b]						
	< 2%	0.6%				1.4%
Audio response[b]						
	+1dB, −3dB	+0.5dB, −2.5dB				+0.6dB, −2dB
Conducted emissions						
< 1GHz	< −36dBm	−38dBm	n/a[c]	−38dBm	n/a	n/a
> 1GHz	< −30dBm	−40dBm		−36dBm		
Conducted emissions (TIA-603-D)						
25W radios	> 64dBc	75dBc		84dBc		80dBc
> 25W radios	> 67dBc		87dBc		94dBc	
FM hum and noise (TIA-603-D)						
NB channel[d]	> 34dB	47dB	47dB	51dB	50dB	40dB
WB channel	> 40dB	48dB	48dB	52dB	55dB	48dB
Adjacent channel power (TIA-603-D)						
NB channel	60dB	65dB	66dB	64dB	65dB	63dB
WB channel	70dB	74dB	76dB	73dB	74dB	73dB
Wideband noise[e]						
100kHz offset	n/a (Tait in-house test only)	−130dBc/Hz		−135dBc/Hz		−126dBc/Hz
1MHz offset		−145dBc/Hz		−142dBc/Hz		−138dBc/Hz
1.5MHz offset		−149dBc/Hz		n/a		n/a
4MHz offset		n/a		−147dBc/Hz		n/a
12MHz offset		n/a		n/a		−144dBc/Hz
10MHz offset		−154dBc/Hz		−148dBc/Hz		n/a
45MHz offset		n/a		n/a		−145dBc/Hz

Parameter	Compliance limit	Measured performance (continued)				
		B1		H5, H7		K5
	All bands[a]	25W	50W	25W	40W	30/35W
Modulation						
		Analog FM				
Modulation limiting[b]						
NB channel WB channel	±2.5kHz ±5.0kHz	±2.2kHz ±4.4kHz				
RF power output[b]						
High Medium Low Very low		25W 12.5W 5W 1W	50W 25W 15W 10W	25W 12.5W 5W 1W	40W 25W 15W 10W	30/35W[f] 15W 5W 2W
Transmit timer						
		Programmable. 1 to 250 seconds, or 0 (no timer)				
Duty cycle						
25W radios at 25W[g] (+60°C ambient temperature)		33%[h]	n/a	33%[h]	n/a	n/a
25W radios at 5W[i] (+40°C ambient temperature)		100%[j]	n/a	100%[j]	n/a	n/a
> 25W radios at rated output power[g] (+60°C ambient temperature)		n/a	20%[k]	n/a	20%[k]	20%[k]

a. See "Frequency Bands" on page 7.

b. EN 300 086-1 and TIA-603-D test methods.

c. Not applicable.

d. See "Definition of NB and WB" on page 7.

e. These figures are typical across the frequency band and can vary ±6dB with frequency.

f. 30W for 762–806MHz, 35W for 806–870MHz.

g. At 16V.

h. 2min Tx, 4min Rx.

i. At 13.8V.

j. Continuous Tx.

k. 1min Tx, 4min Rx.

Digital

Parameter	Compliance limit	Measured performance				
		B1		H5, H7		K5
	All bands[a]	25W	50W	25W	40W	30/35W
Modulation						
		FFSK, C4FM, H-CPM				
Adjacent channel power ratio (TIA-102)						
P25 Phase 1 P25 Phase 2	67dBc 65dBc	67dBc 65dBc				
Adjacent channel power ratio (EN 300 113)						
	60dBc	60dBc	n/a[b]	60dBc	n/a	n/a
Transient adjacent channel power ratio (EN 300 113)=						
	50dBc	58dBc	n/a	56dBc	n/a	n/a
Transmitter power attack time (TIA-102)						
	< 50ms	35ms		43ms	38ms	39ms
Transmitter encoder attack time (TIA-102)						
	< 100ms	57ms		67ms	62ms	61ms
Throughput delay (TIA-102)						
	< 125ms	55ms	50ms	55ms		47ms
Modulation fidelity (TIA-102)						
	< 5%	0.5%		0.5%	0.6%	0.6%

a. See "Frequency Bands" on page 7.

b. Not applicable.

Figure 4.2 Connectors of the radio body (25W radio shown)

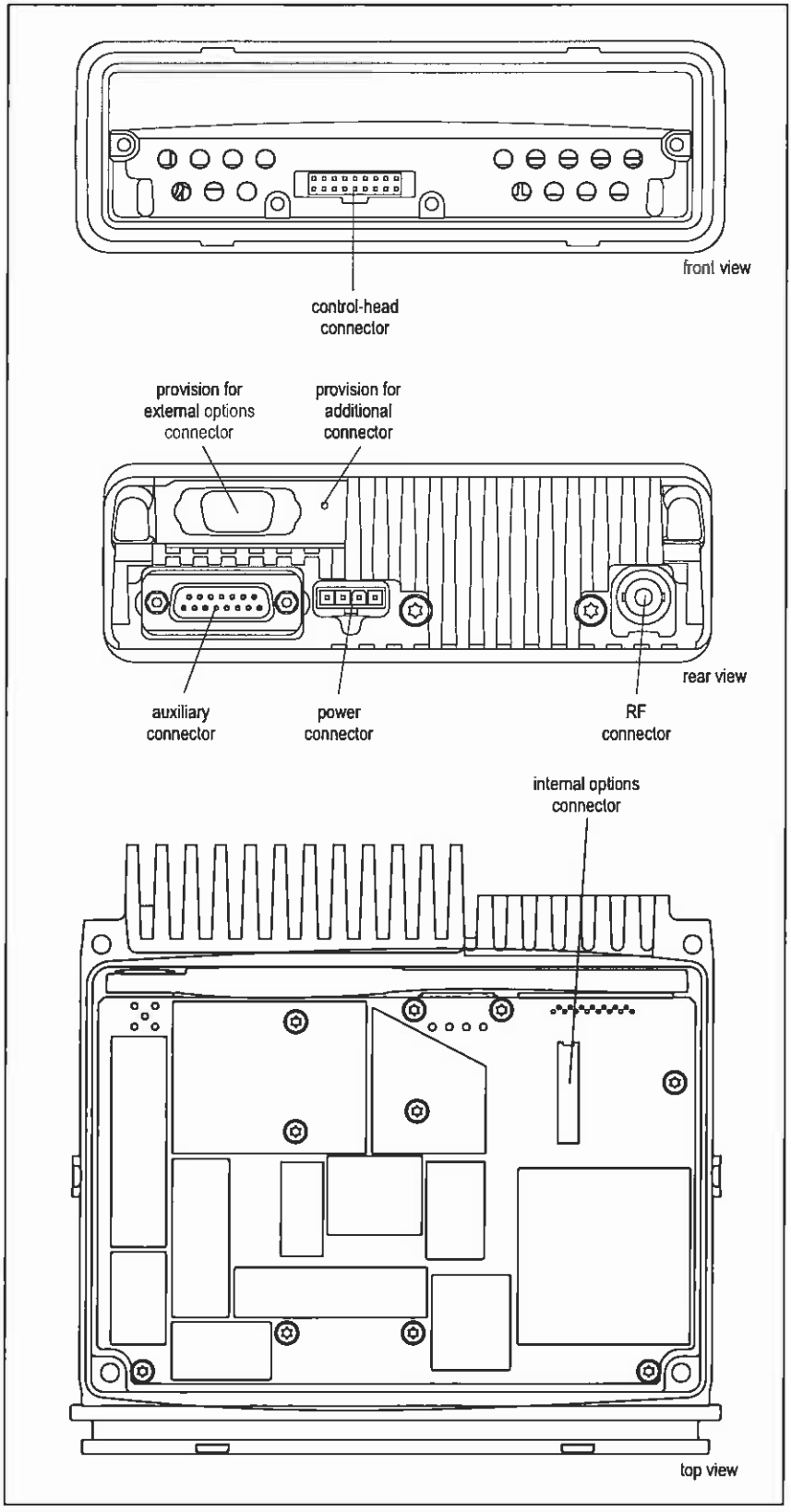


Figure 4.3 Connectors of the control head

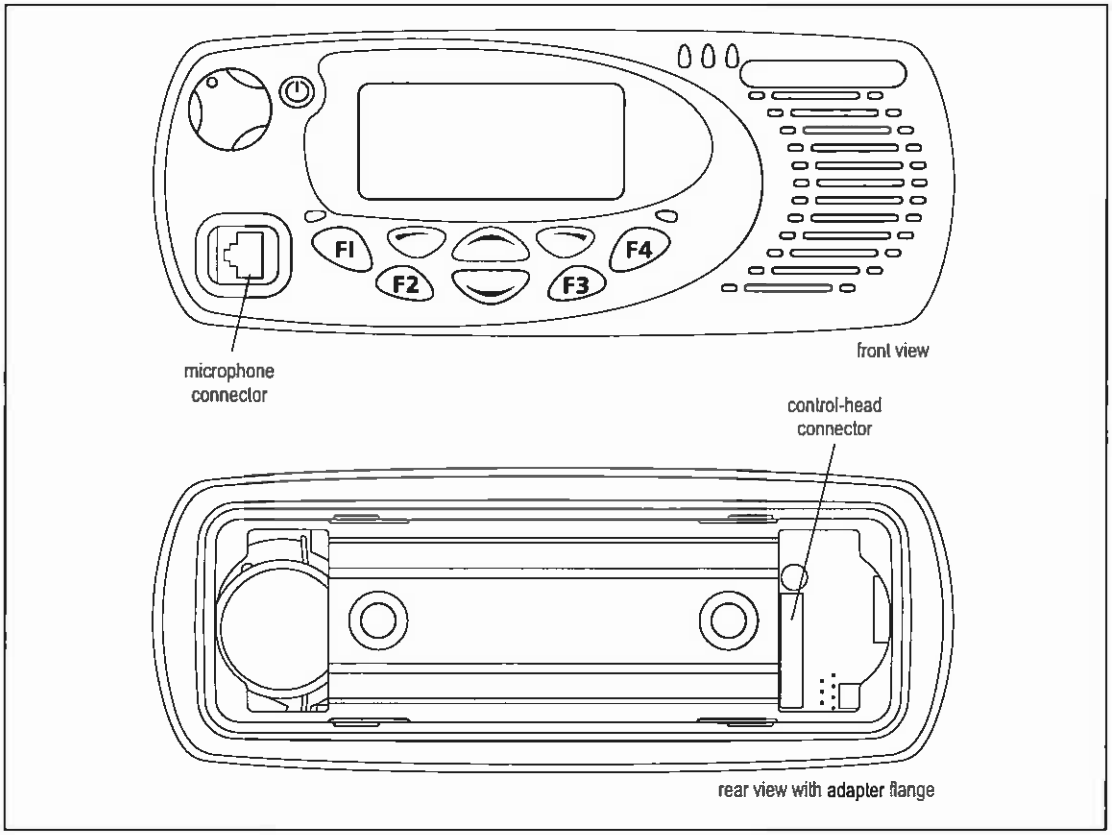
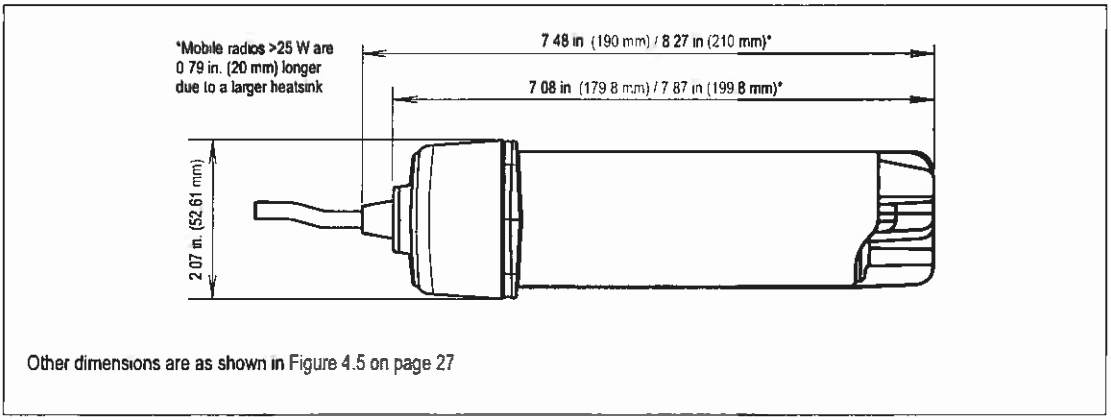


Figure 4.4 Dimensions of radio with remote body interface (25W radio shown)



Other dimensions are as shown in Figure 4.5 on page 27

Figure 4.5 Dimensions of radio installation with U-bracket (25W radio shown)

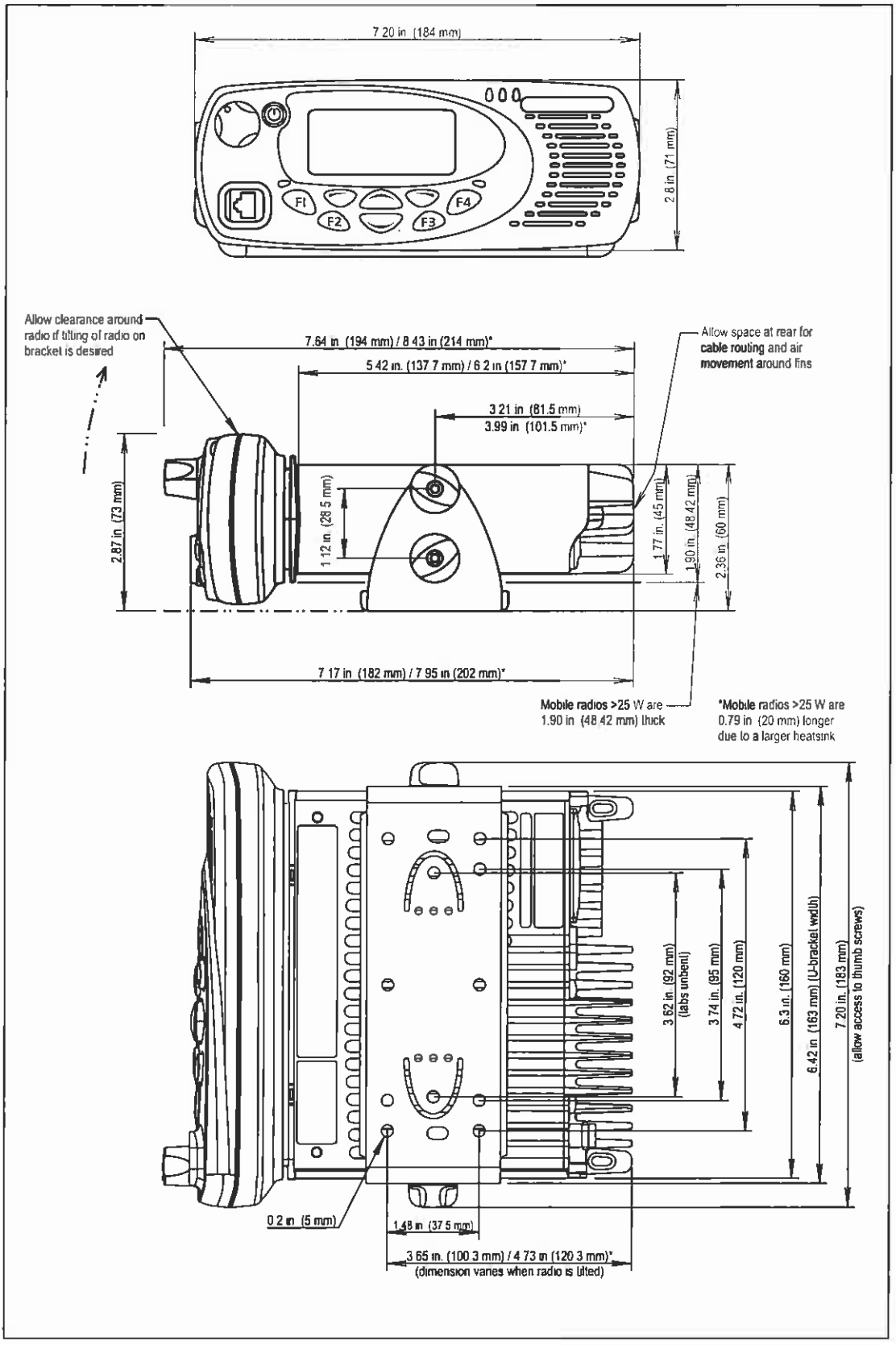


Figure 4.6 Dimensions of remote control head installation

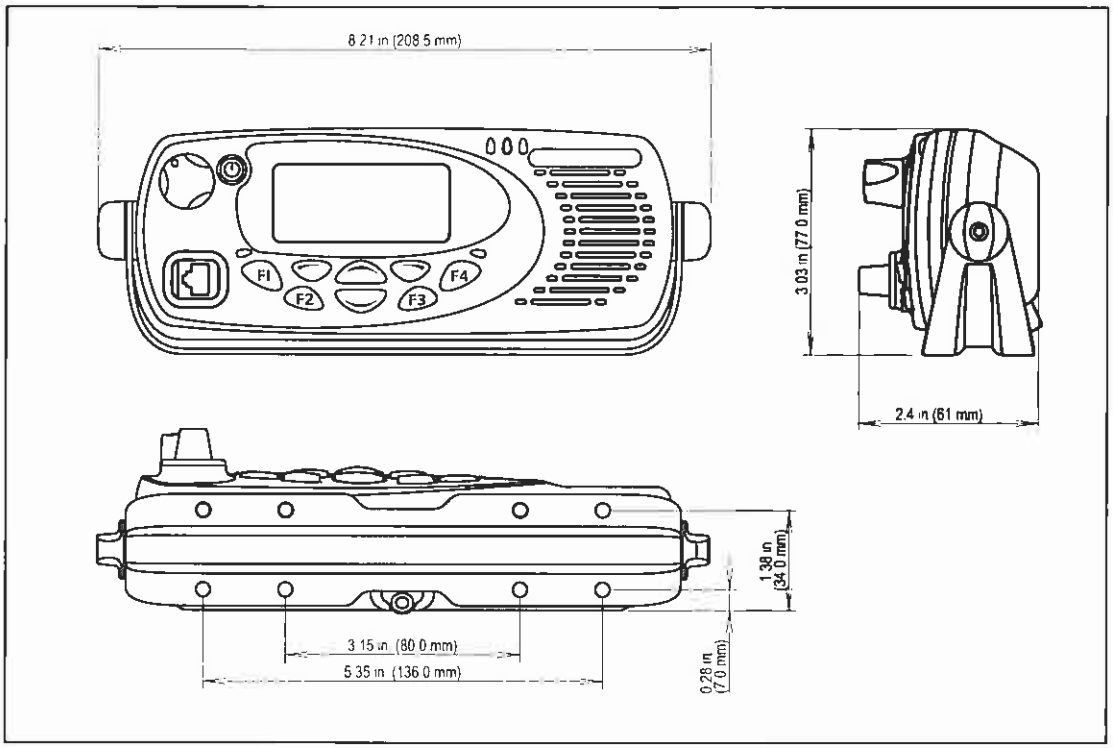
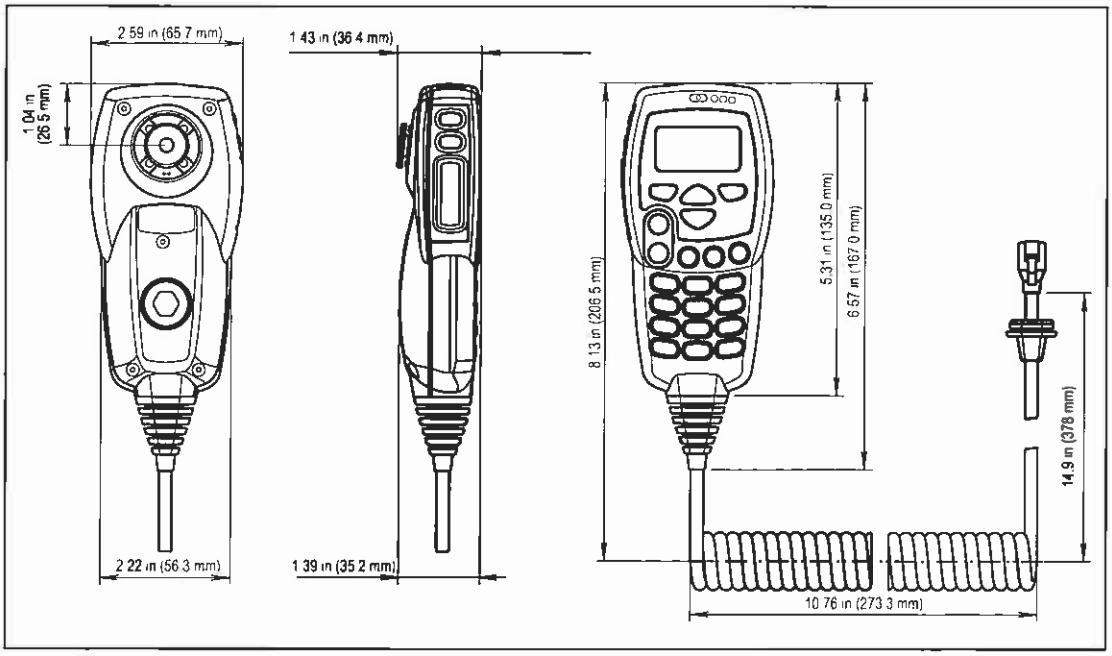


Figure 4.7 Dimensions of hand-held control head



User Interface

Control Head

	Standard control head	Hand-held control head
Display	4-line graphical (160x64 pixels)	4-line graphical (96x62 pixels)
Connectors	one 8-way RJ45 (microphone/programming)	one 8-way RJ45 (programming)
Function keys	4	6
Keypad		
Function keys	✔	✔
Scroll keys	✔	✔
Selection keys	✔	✔
Volume keys		✔
Alphanumeric keys	Via keypad microphone (if connected)	✔
LED status indicators		
Status LED	3	3
Function key LED	2	None
Push-to-talk (PTT) button	Via connected microphone	On left side
Hookswitch and hanger plate	Included with microphone	Included with control head
Speaker	Internal, 16Ω impedance, >3W	None
Microphone	Via connected microphone; covert microphone (internal)	Internal
Volume	Rotary control	Volume keys
On-off	On-off key	On-off key

Radio Body

Connectors	
RF	50Ω BNC or mini-UHF
Power	Between 10.8 and 16V DC, negative ground
Auxiliary	15-way D-range[a]
Internal options	18-pin Micro-MaTch connector[b]
Speaker	Optional external (using power connector), maximum power 10W into 4Ω, balanced load configuration
Microphone	Optional auxiliary (e.g. handsfree)
On-off	Optional external (e.g. ignition sense)

a. Includes 1 serial, 3 input, 4 I/O, 1 audio tap in, 1 audio tap out.

b. Includes 1 serial, 7 I/O, 1 audio tap in, 1 audio tap out.

Radio Size, Weight, and Finish

	Body (25W)	Body (>25W)	Standard control head	Remote control head with backing	Hand-held control head
Dimensions					
Depth	5.9in (150mm)	6.7in (170mm)	1.97in[b] (50mm)	2.4in[b] (61mm)	1.38in (35mm)
Width	6.3in (160 mm)	6.3in (160mm)	7.2in (184mm)	7.2in (184mm)	2.56in (65mm)
Height	1.8in[a] (45mm)	1.9in[a] (48.5mm)	2.8in (71mm)	2.8in (71mm)	5.31in (135mm)[c]
Weight (radio body and control heads)	37.1oz (1050g)	44.9oz (1270g)	12oz (340g)	14.1oz (400g)	10.2oz (289g)
Weight (accessories)					
Rugged microphone	7oz (200g)				
Keypad microphone	7.5oz (212g)				
Control head bracket	4.6oz (130g)				
Finish	Plastic: black, with coarse texture. Keys and keypads: silicone rubber. Aluminium: diecast				

a. 2in (52mm) across the chassis flange.

b. Including the control knob.

c. Height measured to top of curly cord connector.

Environmental

Operating temperature	–22°F to +140°F (–30°C to +60°C)		
Ingress Protection (IP) rating	The radio body and control head, when installed correctly with seals and socket bungs, is IP54 rated. This includes the standard and keypad microphones, and hand-held control head.		
Electrostatic Discharge (ESD) standard	International Electrotechnical Commission (IEC) 61000-4-2		
Military standard (MIL-STD)	MIL-STD-810G[a]		
		Method	**Procedure**
	Low pressure	500.5	2
	High temperature	501.5	1 and 2
	Low temperature	502.5	1 and 2
	Temperature shock	503.5	1
	Solar radiation	505.5	1
	Rain	506.5	1 and 3
	Humidity	507.5	2
	Salt fog	509.5	1
	Dust	510.5	1 and 2
	Vibration	514.6	1
	Shock	516.6	1, 5 and 6

a. The TM9400 also meets the equivalent superseded standards MIL-STD-810C, D, E, and F.

See also "Regulatory Requirements and Industry Standards" on page 6.

Frequencies and Channels

	B1		H5		H7		K5
	25W	50W	25W	40W	25W	40W	30/35W
Frequency increments							
	2.5kHz, 3.125kHz, 5kHz, 6.25kHz						
Channel spacing							
NB channel WB channel	12.5 kHz/15kHz 25kHz/30kHz						
Frequency range (MHz)							
	136–174		400–470[a]		450–520[a]		Tx 762–870 Rx 762–776 Rx 850–870
Frequency stability, see Chapter 2 Receiver Specifications							
IF bandwidth							
NB channel WB channel	7.5kHz 15kHz						
RF power output[a]							
High	25W	50W	25W	40W	25W	40W	30/35W[b]
Medium	12.5W	25W	12.5W	25W	12.5W	25W	15W
Low	5W	15W	5W	15W	5W	15W	5W
Very low	1W	10W	1W	10W	1W	10W	2W

a. H5- and H7-band radios are also approved for operation on the Australia and New Zealand Citizens Band frequencies (476.425 to 477.4125MHz) with a maximum RF output power of 5W.

b. 30W for 762–806MHz, 35W for 806–870MHz.

Number of Networks, Zones, Channels and Groups

	Minimum	Maximum	
		Standard	With optional software license
Conventional networks	1	26	26
Zones	1	50	100
Channels (simplex or semi-duplex)	1	1000	2000
Talk groups Total talk group members	1 1	50 1000	50 2000
Scan/vote groups Members per group Total scan/vote group members	0 2 0	300 50 2000	300 50 2000

Operational Features

	Analog operation	P25 digital operation
Channels: simplex or semi duplex, with repeater talkaround option	✔	✔[a]
Voting/scanning	✔	✔
Predefined status messaging	✔	✔
GPS	Direct connect (send and receive position reports), GPS display	Direct connect (send and receive position reports), GPS display
2-tone signaling format	Decode only	✘
5-tone Selcall	✔	✘
CTCSS signaling format	✔	✘
DCS signaling format	✔	✘
DTMF signaling format	Encode only	✘
MDC1200 signaling format	✔	✘
Single in-band tone signalling format	✔	✘
Security/Encryption	voice inversion scrambler (standard)	DES (optional) FIPS certified AES (optional)
Emergency: Lone Worker inactivity detection	✔	✔

a. P25 conventional only.

P25 Phase 1 and Phase 2 Features

P25 Phase 2 is an extension of P25 Phase 1. A Phase 2 radio can still use Phase 1 features, but with less spectrum efficiency.

		P25 Phase 1	P25 Phase 2
Standard	Unit-to-unit call	✔	✘
	PSTN calls	✔	✘
	Supplementary messages	✔	✘
	Group call	✔	✔
	Emergency	✔	✔
	Pre-emption	limited	✔
	Encryption	✔	✔
Motorola-specific	Dynamic regrouping	✔	✔
	Supergroup	✔	✔

Current Consumption

Current consumption was tested using conventional radios equipped with the latest radio hardware. All measurements were made in the middle frequencies of each band. Battery voltage was 13.8 V, and radios transmitted into a 50 Ω load.

Radio Body When Off or Receiving

Radio off (no links fitted)	3 mA
Radio off (links LK1, LK2, LK3 fitted) (using ignition control to switch radio on and off)	4 mA
Radio on stand-by (links LK1, LK2, LK3 fitted) (using ON/OFF key on control head to switch radio on and off)	60 mA
Receiver idle (not scanning)	120 mA
Receiver active, mute on	120 mA
Receiver active, 3W audio into 16 Ω	680 mA
Receiver active, 10W audio into 4 Ω	2A

Radio Body When Transmitting

	B1		H5/H7		K5
	25W	50W	25W	40W	30/35W
Power output					
High	4.7A	8A	5.5A	7.2A	8.8A
Medium	3.2A	5.5A	3.2A	4.8A	6.6A
Low	2.3A	4.5A	2.2A	4.1A	4.2A
Very low	1.5A	3.6A	1.7A	3.3A	2A

Control Head Only

Notice The standard control head configurations assume the use of a standard microphone. If the keypad microphone is used, add 60mA to the figures listed below.

Standard Control Head - Local Configuration

Backlighting off, standby, LCD heater off	25mA
Backlighting on high, standby, LCD heater off	50mA
Backlighting on high, standby, LCD heater on	295mA

Standard Control Head - Remote Configuration

The remote configuration comprises the remote body interface, control head interface box (radio powered), remote control head interface, and the control head itself.

Backlighting on high, standby, LCD heater off	75mA
Backlighting on high, standby, LCD heater on	320mA
Backlighting on high, full speaker audio, LCD heater off	540mA
Backlighting on high, full speaker audio, LCD heater on	785mA

Hand-held Control Head - Remote Configuration

The remote configuration has the hand-held control head connected directly to the remote body interface. The remote interface kit is not used.

Backlighting off	30mA
Backlighting on high	50mA

SVR **P250** P25 Compliant

MULTI CHANNEL
2 WATT COVERAGE
NEW ESP™ PRIORITY STRUCTURE
WIDE OR NARROW BAND
EMERGENCY SIGNALING
P25 PHASE 1 COMPLIANT
AES/DES ENCRYPTION

- ▲ **P25 Phase 1 Compliant**
- ▲ 20 Channels
- ▲ New ESP™ Multi Vehicle Format
- ▲ AES / DES Encryption
- ▲ Programmable P25 or Analog Per Channel
- ▲ SVR-200 and SVR-250 Compatible
- ▲ Wide or Narrow Band Programmable Per Channel
- ▲ Emergency Signaling
- ▲ Factory Interface Cables for Most Popular Public Safety Radios

SVR **P250** P25 Twenty-Channel Digital Vehicular Repeater

The SVR-**P250** is the next generation vehicular repeater from Pyramid Communications that is fully compliant with the **APCO Project 25 Phase 1 Digital Common Air Interface** (CAI) protocol.

Advanced features include **secure communications** with P25 portable radios, **AES and DES encryption**, and **emergency signaling** from portable to dispatch. **PC programmable** for up to **20 channels**, with P25, wideband/narrowband, CTCSS/DCS, and emergency signaling on a per channel basis.

The **SVR-P250** utilizes the new **ESP™ priority structure** that **resolves priority conflicts during repeater idle time** rather than at the critical start of a conversation. With ESP™, priority vehicles are assigned without user intervention to ensure **uninterrupted communications** when users exit their vehicles. ESP™ also ensures a quick recovery if two vehicles get in a priority mode at one scene.

The SVR-**P250** is **both P25 and analog capable** and can interface to analog or P25 mobiles providing **flexible inter-operability between systems** that wouldn't normally be able to communicate. The SVR-**P250** will **interface to analog, digital, conventional or trunking mobiles** and is capable of operating with Lightsquared (formally SkyTerra) mobile satellite phones. In trunking mode, the SVR-**P250** ensures proper acquisition of the trunking channel and uses the **Smart Trunking Access™** mechanism of alerting the portable users of trunking status information.

In analog mode, the SVR-**P250** is **fully compatible with existing** SVR-**200 and SVR-250** vehicular repeaters to provide seamless integration while users upgrade their systems from analog to P25 digital.

714 901-5462
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PYRAMID
COMMUNICATIONS

Specifications SVR P250

TRANSMITTER	VHF	UHF	764-870
Frequency Range	136-174 MHz	450-530 MHz	764-776 MHz + 850-870 MHz
RF power out	0.5 - 2W	0.5 - 2W	0.25 - 1W
Spurious emissions	-70dBc	-70dBc	-70dBc
Frequency stability -30°~+60°C	±1.5PPM	±1.5PPM	±1.5PPM
Modulation	10K0F1D, 10K0F1E, 10K0F7D,10K0F7E, 11K0F3E, 12K3F1D, 16K0F3E, 4K80F2D, 7K60F1D,8K10F1D, 8K10F1E, 8K10F7D, 8K10F7E, 8K40F2D	10K0F1D, 10K0F1E, 10K0F7D,10K0F7E, 11K0F3E, 12K3F1D, 16K0F3E, 4K80F2D, 7K60F1D,8K10F1D, 8K10F1E, 8K10F7D, 8K10F7E, 8K40F2D	10K0F1D, 10K0F1E, 10K0F7D,10K0F7E, 11K0F3E, 12K3F1D, 16K0F3E, 4K80F2D, 7K60F1D,8K10F1D, 8K10F1E, 8K10F7D, 8K10F7E, 8K40F2D
Hum and noise			
25/30kHz	-43dB	-43dB	-40dB
12.5kHz	-38dB	-38dB	-33dB
Audio response (300-3kHz)	Flat or -6dB/octave	Flat or -6dB/octave	Flat or -6dB/octave
Audio distortion	<3% @ 1kHz 60% deviation	<3% @ 1kHz 60% deviation	<3% @ 1kHz 60% deviation
Local mic sensitivity	300mV - 5VPP	300mV - 5VPP	300mV - 5VPP
FCC Type Acceptance	LRUSVR-P250V	LRUSVR-P250U	LRUSVR-P250M
Industry Canada Approval	2390A-SVRP250V	2390A-SVRP250U	2390A-SVRP250M

RECEIVER	VHF	UHF	764-870
Frequency Range	136-174 MHz	450-530 MHz	764-776 MHz + 850-870 MHz
Analog sensitivity	0.28uV	0.28uV	0.28uV
Digital sensitivity (5% BER)	0.20uV	0.20uV	0.20uV
Squelch sensitivity	.2µV to 2µV adjustable	.2µV to 2µV adjustable	.2µV to 2µV adjustable
Selectivity			
25/30kHz channel	75dB	75dB	75dB
12.5kHz channel	65dB	65dB	65dB
Spurious/image rejection	75dB	75dB	75dB
IMD response	75dB	75dB	75dB
Frequency stability	±1.5PPM	±1.5PPM	±1.5PPM
Audio response (300-3kHz)	Flat or +6dB/octave	Flat or +6dB/octave	Flat or +6dB/octave
Audio output	0-5VPP AC coupled 600/2.2K	0-5VPP AC coupled 600/2.2K	0-5VPP AC coupled 600/2.2K
Local Rx audio	400 mW 8 Ohms@ <5% distortion	400 mW 8 Ohms@ <5% distortion	400 mW 8 Ohms@ <5% distortion

Power Requirements

DC Supply	13.6VDC negative ground ± 25%
Standby	170mA
Receive	250mA @ 400mW Rx Audio
Transmit	<2A @ rated output
Physical Dimensions	5.75"W x 10"L x 2.25"H
Weight	38 ounces
Case	One piece extruded aluminium

Mil-Std-810D/E Ratings

501.2	Procedure II High Temp +60°C
502.3	Procedure II Low Temp -30°C
507.2	Procedure II Humidity
510.2	Procedure II Blowing Dust
514.3	Procedure I Category 8 Vibration, Ground Vehicle
516.3	Procedure I Shock

Section 6

Product Catalog

tait
communications

Tait 9400 P25 Product Catalogue

Version 1.1 • April 2013

www.taitradio.com

Welcome to the Tait 9400 P25 Product Catalogue.

The catalogue provides information for the Tait 9400 P25 product range. Please contact Tait Limited (www.taitradio.com) if you require information on any Tait product.

At Tait we are keen to ensure that this information meets the needs of our customers. We welcome your comments on how we can improve it.

Company Overview

The Company

Tait Communications is a global leader in designing, delivering and managing innovative voice and data communication solutions that help utilities and public safety organisations to keep the lights on and communities safe.

We have been designing and manufacturing mobile radio products and solutions for over four decades, developing the Tait name to be synonymous with innovation, flexibility and commitment to our customers.

Tait delivers global support to customers through wholly owned subsidiaries in Europe, North America, Asia, and Australia, with a design and manufacturing base in Christchurch, New Zealand. A wider global network of strategic partners and authorised dealers complements our dedicated customer-services and support teams.

Tait has worked with customers in more than 150 countries, providing world-class turnkey solutions for challenging environments from the Gobi Desert to South American jungles, from highly populated cities to vast rural communities. A global Services division of dedicated training teams, 24-hour technical support and experienced installation engineers are committed to our customers' long-term success.

Our vision is to be the leading global company in the design, delivery and management of critical communication solutions for safe and resilient communities.

Our Customers

Tait has built a wealth of world-class RF engineering expertise and experience in customising, installing and supporting radio communication solutions for organisations around the world.

Some of our customers include:

Pacific Gas and Electric (USA), Eskom (South Africa), Puget Sound Energy (USA), São Paulo Civil Police (Brazil), Victoria Country Fire Authority (Australia), London Buses (UK), New Zealand Police, Gongan Chinese Civil Police, Moscow Fire (Russia), Egypt Police, City of Augusta (USA), San Luis Obispo (USA).

Our Products and Solutions

We design, manufacture, install and support an entire range of high quality portable and mobile radios, base stations and network solutions based on open standards including P25, MPT 1327 and DMR. Our radio solutions are modular, scalable, reliable and available on either digital or analog platforms.

Our customers turn to us for the complete communications system – sourced, delivered, deployed and supported in a fully integrated way, demonstrating an intimate understanding of their requirements.

Preface

Please read before using this product catalogue.

Copyright:

Scope:

This Product Catalogue outlines the Tait P25 Phase 2 upgradable product range.

Custom product and non-standard equipment is not listed. Please contact Tait Limited if you require information on any P25 Phase 2 upgradable product not listed within this book.

Product Status:

Every care has been taken to assure that the products meet the respective regulatory requirements. However, Tait does not warrant that all products meet specific country requirements.

If you have any questions regarding product suitability please contact Tait Limited.

Disclaimer:

Please confirm all pricing with Tait Limited.

Hard Copy:

To receive a hard copy of this Product Catalogue, please contact Tait Limited.

Terms and Conditions of Sale:

All sales and quotations for Tait products and services are subject to the current version of the Tait Standard Terms and Conditions for Supply. For a copy of the Terms and Conditions please refer to your account manager or contact Tait Limited.

Confidentiality:

This Product catalogue contains information which is confidential and is solely for the use of the intended recipient. If you are not the intended recipient, be aware that any review, disclosure, copying, distribution, or use of the contents of this catalogue is strictly prohibited. If you have received this in error, please destroy it and notify us immediately (ph +64 3 358 3399).

Trademarks:

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

Update and Changes:

Specifications and prices are subject to change without notice and shall not form part of any contract. They are issued for guidance purposes only. Please note that not all frequency bands, power outputs or certain functions are available in all markets.

Table of contents

9400 P25

P25 PHASE 2 UPGRADABLE • MOBILE

TM9400 Mobile Radios

- Radios
- Options & Accessories

Improved efficiency and enhanced connectivity

The Tait TM9400 has the means and flexibility to meet the operational needs of your organization today and tomorrow.
The TM9400 provides analog, P25 Phase 1 conventional/trunked, 6.25kHz equivalent P25 Phase 2 TDMA trunked and LSM (CQPSK) decode capability in a single device.

The TM9400 is capable of AES encryption, Over-the-air Rekeying (OTAR), various emergency modes and is IP54 rated to keep those relying on the mobile safe and efficient. The TM9400 also has an options slot allowing extension of capabilities, a range of remote mounting, control head and display options.

Key Features:

- Manage migration risk with a multi-mode mobile – analog, P25 Phase 1 conventional/trunked and upgradable to P25 Phase 2 for enhanced interoperability
- Future proofed with software-upgradability to P25 Phase 2 TDMA for increased capacity
- Variety of options to suit your application – remote mount and control head
- Flexibility with an options slot for expansion and addition of future capabilities
- P25 standards compliance for greater choice and interoperability
- Engineered for demanding environments with IP54 rating and water-resistant control head
- AES encryption, voice and data, simulcast support and pre-set status messages for effective operations

Frequency Code	Frequency Band	TM9435	TM9455	TM9457
B1	136–174MHz	✓	✓	✓
K5	762-870MHz	✓	✓	✓
Note: K5 (762-870MHz) FCC and IC Approval only				

TM9435 P25 General Service Radio

Designed to offer a basic range of Tait functionality intended for public works staff and commercial users who do not require security features. The TM9435 mobiles offer state of the art radio design coupled with robust specifications and excellent digital audio clarity.

The TM9435 meets full P25 compliance and is designed with the same user interface as the TP9435 and TP9440 portables, making training and interoperability even easier with the full Tait range of P25 digital products.

TM9455 & TM9457 P25 Mission Critical Radios

Designed to offer the full range of Tait functionality intended for frontline, public safety and public service organizations. The TM9455 and TM9457 mobiles offer state of the art radio design coupled with robust specifications and excellent digital audio clarity.

The TM9455 and TM9457 meets full P25 compliance and is designed with the same user interface to the TP9455 and TP9460 portables, making training and interoperability even easier with the full Tait range of P25 digital products. A suite of security options are available including DES and AES encryption, as well as key management devices.

The TM9457 provides the ability to utilize two standard radio heads with a single radio body (dual control head configuration).

TM9400

Product Codes for Commercial Packages

Edition: 05

Mobile Configuration

Product Type | Mobile Options | Package Options | Common License / SFE Options | Point of Package Assembly or Custom Product

T M 9 4 X X - X X X X - X X X X - X X X X - X X

Product Type

35 = P25 PH2 Upgradable, Restricted Functionality - Mobile, Single Head, Single Body

55 = P25 PH2 Upgradable, Full Functionality - Mobile, Single Head, Single Body

57 = P25 PH2 Upgradable, Full Functionality - Mobile, Dual Head, Single Body

Frequency Band

B1 = 136-174MHz

K5 = 762-870MHz

Options

0 = None

Control Head Color

A = Black (Default Color)

Microphone \ Control Head Options

0 = None
A = Standard
B = Keypad

E = Dual LCHS
F = Dual LCHK
G = Dual LCHS \ LCHK

RF Power and Antenna Connection

A = 25 Watts - BNC antenna connection
B = 25 Watts - M-UHF antenna connection
C = 35-50 Watts - BNC antenna connection
D = 35-50 Watts - M-UHF antenna connection

Remote Head Options

0 = None
A = 6-Metre SHSB kit
B = 12-Metre SHSB kit with CHIB
C = 18-Metre SHSB kit with CHIB
D = 18-Metre DHSB Kit with CHIB

Breakout Cable Kits

0 = None
A = Telemetry/Horn Breakout Cable
C = Ignition Sense Cable

Cradle Options

0 = None
U = U-Cradle
E = Secure
S = Slide-in (25Watts Only)
D = Desktop U-Cradle

External Speaker

0 = None
1 = x1 External Speaker Kit
2 = x2 External Speaker Kit

Location / SFE Software Options

00 = Default
AA = TMAS810 - P25 Common Air Interface
BA = TMAS850 & TMAS855
(Software Options will be allocated as required)

Point of Package Assembly or Custom Product

10 = TEL
40 = TAP
60 = TAW
80 = TEWA

SHSB = Single Head, Single Body
DHSB = Dual Head, Single Body
CHIB = Control Head Interface Box

Example of: TM9455-B1A0-AAU0-0000-10

Product Type
TM9455 = P25 PH2 Mobile with Large Control Head (T02-00071-AAAB) TM9400 Large Control Head Local Black

Mobile Configuration
B1 = 136-174MHz — Frequency Band
A = 25 Watts, BNC — RF Power and Antenna Con
0 = None — Options
A = Color Black — Mobile Color
A = Standard Mic — Microphone/Control Head (T02-00005-AAAA) Standard Microphone

Package Options
U = U-Cradle — Cradle (TMAA03-01) U-Cradle Install Kit for 25W Radio BNC
0 = No Remote Head — Remote Head Kit
0 = No External Speaker — External Speaker Kit
0 = No Breakout/ Surveillance

Common License / SFE Options
00 = No SFE's

Point of Manufacture or Custom Product
10 = TEL Built — Manufacture Point or Custom Product

(T02-00014-BBAA) TM9400 FullCrypto 25W 136-174MHz BNC

Dual Control Head Radio Info
If Dual Control Head (37 or 57) has been selected from the Product Type options, then you must select an option from Microphone \ Control Head for your Control Head and Microphone configuration. NOTE: The ONLY Remote Head Option for Dual Heads is "D" 18-Metre DHSB kit with CHIB

LCHS = Large Control Head with Standard Microphone
LCHK = Large Control Head with Keypad Microphone

* Current Default SFE's are
TMAS055 - Two Tone Decode

(55 & 57 only) = Only used with "Product Type" codes 55 or 57

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Doc ID: 4775

TM9435 - 25W General Service Radio

Standard package includes:

- TM9435 mobile radio: 25W, 12.5W, 5W, 1W
- Standard microphone
- U-Cradle vehicle installation kit (excluding antenna)
- BNC connector (please note that mini-UHF connector is also available)
- User Manual

Supported Modes:

- Analog Conventional
- P25 Conventional - Phase 1
- P25 Trunking - Phase 1 (License Required)
- P25 Trunking - Phase 2 upgradable

Features:

- LCD display
- Lone Worker operation
- PSTN Dialing
- Remote stun and revive
- 4 programmable function keys (including emergency key)
- Internal options space
- IP54 certified
- MIL-Std 810C, D, E, F and G

Options:

- External Speaker
- Direct connect GPS
- Microphone/Control Head options: Choose the Microphone/Control Head ("X" value) from the TM9400 Mobile configuration table on page 10.
- Cradle options: Choose the Cradle ("Y" value) from the TM9400 Mobile configuration table on page 10.
- Remote Head options: Choose the Remote Head ("Z" value) from the TM9400 Mobile configuration table on page 10.

Note:

- For package configurations, please refer to the TM9400 Mobile configuration table on page 10
- For Software license options, please refer to Software License table on page 19

ITEM CODE	DESCRIPTION
P25 CONVENTIONAL	
TM9435-B1A0-AXYZ-00AA-10	Mobile 136-174M BNC
TM9435-B1B0-AXYZ-00AA-10	Mobile 136-174M Mini UHF
P25 TRUNKING	
TM9435-B1A0-AXYZ-00BA-10	Mobile 136-174M BNC
TM9435-B1B0-AXYZ-00BA-10	Mobile 136-174M Mini UHF

TM9435 - 35-50W General Service Radio

Standard package includes:

- TM9435 mobile radio: 50W, 40W, 35W, 30W
- Standard microphone
- U-Cradle vehicle installation kit (excluding antenna)
- BNC connector (please note that mini-UHF connector is also available)
- User Manual

Supported Modes:

- Analog Conventional
- P25 Conventional - Phase 1
- P25 Trunking - Phase 1 (License Required)
- P25 Trunking - Phase 2 upgradable

Features:

- LCD display
- Lone Worker operation
- PSTN Dialing
- Remote stun and revive
- 4 programmable function keys (including emergency key)
- Internal options space
- IP54 certified
- MIL-Std 810C, D, E, F and G

Options:

- External Speaker
- Direct connect GPS
- Microphone/Control Head options: Choose the Microphone/Control Head ("X" value) from the TM9400 Mobile configuration table on page 10.
- Cradle options: Choose the Cradle ("Y" value) from the TM9400 Mobile configuration table on page 10.
- Remote Head options: Choose the Remote Head ("Z" value) from the TM9400 Mobile configuration table on page 10.

Note:

- For package configurations, please refer to the TM9400 Mobile configuration table on page 10
- For Software license options, please refer to Software License table on page 19

ITEM CODE	DESCRIPTION
P25 CONVENTIONAL	
TM9435-B1C0-AXYZ-00AA-10	Mobile 136-174M BNC
TM9435-B1D0-AXYZ-00AA-10	Mobile 136-174M Mini UHF
TM9435-K5C0-AXYZ-00AA-10	Mobile 762-870M BNC
TM9435-K5D0-AXYZ-00AA-10	Mobile 762-870M Mini UHF
P25 TRUNKING	
TM9435-B1C0-AXYZ-00BA-10	Mobile 136-174M BNC
TM9435-B1D0-AXYZ-00BA-10	Mobile 136-174M Mini UHF
TM9435-K5C0-AXYZ-00BA-10	Mobile 762-870M BNC
TM9435-K5D0-AXYZ-00BA-10	Mobile 762-870M Mini UHF

TM9455 - 25W Mission Critical Radio

Standard package includes:

- TM9455 mobile radio: 25W, 12.5W, 5W, 1W
- Standard microphone
- U-Cradle vehicle installation kit (excluding antenna)
- BNC connector (please note that mini-UHF connector is also available)
- User Manual

Supported Modes:

- Analog Conventional
- P25 Conventional - Phase 1
- P25 Trunking - Phase 1 (License Required)
- P25 Trunking - Phase 2 upgradable

Features:

- LCD display
- Text and status messaging capabilities
- Lone Worker operation
- PSTN Dialing
- Remote stun and revive
- 4 programmable function keys (including emergency key)
- Internal options space
- IP54 certified
- MIL-Std 810C, D, E, F and G

Options:

- External Speaker
- Direct connect GPS
- Microphone/Control Head options: Choose the Microphone/Control Head ("X" value) from the TM9400 Mobile configuration table on page 10.
- Cradle options: Choose the Cradle ("Y" value) from the TM9400 Mobile configuration table on page 10.
- Remote Head options: Choose the Remote Head ("Z" value) from the TM9400 Mobile configuration table on page 10.

Note:

- For package configurations, please refer to the TM9400 Mobile configuration table on page 10
- For Software license options, please refer to Software License table on page 19

ITEM CODE	DESCRIPTION
ANALOG CONVENTIONAL	
TM9455-B1A0-AXYZ-0000-10	Mobile 136-174M BNC
TM9455-B1B0-AXYZ-0000-10	Mobile 136-174M Mini UHF
P25 CONVENTIONAL	
TM9455-B1A0-AXYZ-00AA-10	Mobile 136-174M BNC
TM9455-B1B0-AXYZ-00AA-10	Mobile 136-174M Mini UHF
P25 TRUNKING	
TM9455-B1A0-AXYZ-00BA-10	Mobile 136-174M BNC
TM9455-B1B0-AXYZ-00BA-10	Mobile 136-174M Mini UHF

TM9455 - 35-50W Mission Critical Radio

Standard package includes:

- TM9455 mobile radio: 50W, 40W, 35W, 30W
- Standard microphone
- U-Cradle vehicle installation kit (excluding antenna)
- BNC connector (please note that mini-UHF connector is also available)
- User Manual

Supported Modes:

- Analog Conventional
- P25 Conventional - Phase 1
- P25 Trunking - Phase 1 (License Required)
- P25 Trunking - Phase 2 upgradable

Features:

- LCD display
- Text and status messaging capabilities
- Lone Worker operation
- PSTN Dialing
- Remote stun and revive
- 4 programmable function keys (including emergency key)
- Internal options space
- IP54 certified
- MIL-Std 810C, D, E, F and G

Options:

- External Speaker
- Direct connect GPS
- Microphone/Control Head options: Choose the Microphone/Control Head ("X" value) from the TM9400 Mobile configuration table on page 10.
- Cradle options: Choose the Cradle ("Y" value) from the TM9400 Mobile configuration table on page 10.
- Remote Head options: Choose the Remote Head ("Z" value) from the TM9400 Mobile configuration table on page 10.

Note:

- For package configurations, please refer to the TM9400 Mobile configuration table on page 10
- For Software license options, please refer to Software License table on page 19

ITEM CODE	DESCRIPTION
ANALOG CONVENTIONAL	
TM9455-B1C0-AXYZ-0000-10	Mobile 136-174M BNC
TM9455-B1D0-AXYZ-0000-10	Mobile 136-174M Mini UHF
TM9455-K5C0-AXYZ-0000-10	Mobile 762-870M BNC
TM9455-K5D0-AXYZ-0000-10	Mobile 762-870M Mini UHF
P25 CONVENTIONAL	
TM9455-B1C0-AXYZ-00AA-10	Mobile 136-174M BNC
TM9455-B1D0-AXYZ-00AA-10	Mobile 136-174M Mini UHF
TM9455-K5C0-AXYZ-00AA-10	Mobile 762-870M BNC
TM9455-K5D0-AXYZ-00AA-10	Mobile 762-870M Mini UHF
P25 TRUNKING	
TM9455-B1C0-AXYZ-00BA-10	Mobile 136-174M BNC
TM9455-B1D0-AXYZ-00BA-10	Mobile 136-174M Mini UHF
TM9455-K5C0-AXYZ-00BA-10	Mobile 762-870M BNC
TM9455-K5D0-AXYZ-00BA-10	Mobile 762-870M Mini UHF

TM9457 - 25W Dual Control Head Mission Critical Radio

Standard package includes:

- TM9457 mobile radio: 25W, 12.5W, 5W, 1W
- Dual control heads
- Standard microphone
- U-Cradle vehicle installation kit (excluding antenna)
- BNC connector (please note that mini-UHF connector is also available)
- User Manual

Features:

- LCD display
- Text and status messaging capabilities
- Lone Worker operation
- PSTN Dialing
- Remote stun and revive
- 4 programmable function keys (including emergency key)
- Internal options space
- IP54 certified
- MIL-Std 810C, D, E, F and G

Options:

- External Speaker
- Direct connect GPS
- Microphone/Control Head options: Choose the Microphone/Control Head ("X" value) from the TM9400 Mobile configuration table on page 10.
- Cradle options: Choose the Cradle ("Y" value) from the TM9400 Mobile configuration table on page 10.
- Remote Head options: Choose the Remote Head ("Z" value) from the TM9400 Mobile configuration table on page 10.

Note:

- For package configurations, please refer to the TM9400 Mobile configuration table on page 10
- For Software license options, please refer to Software License table on page 19

ITEM CODE	DESCRIPTION
ANALOG CONVENTIONAL	
TM9457-B1A0-AXYZ-0000-10	Mobile 136-174M BNC
TM9457-B1B0-AXYZ-0000-10	Mobile 136-174M Mini UHF
P25 CONVENTIONAL	
TM9457-B1A0-AXYZ-00AA-10	Mobile 136-174M BNC
TM9457-B1B0-AXYZ-00AA-10	Mobile 136-174M Mini UHF
P25 TRUNKING	
TM9457-B1A0-AXYZ-00BA-10	Mobile 136-174M BNC
TM9457-B1B0-AXYZ-00BA-10	Mobile 136-174M Mini UHF

TM9457 - 35-50W Dual Control Head Mission Critical Radio

Standard package includes:

- TM9457 mobile radio: 50W, 40W, 35W, 30W
- Dual control heads
- Standard microphone
- U-Cradle vehicle installation kit (excluding antenna)
- BNC connector (please note that mini-UHF connector is also available)
- User Manual

Features:

- LCD display
- Text and status messaging capabilities
- Lone Worker operation
- PSTN Dialing
- Remote stun and revive
- 4 programmable function keys (including emergency key)
- Internal options space
- IP54 certified
- MIL-Std 810C, D, E, F and G

Options:

- External Speaker
- Direct connect GPS
- Microphone/Control Head options: Choose the Microphone/Control Head ("X" value) from the TM9400 Mobile configuration table on page 10.
- Cradle options: Choose the Cradle ("Y" value) from the TM9400 Mobile configuration table on page 10.
- Remote Head options: Choose the Remote Head ("Z" value) from the TM9400 Mobile configuration table on page 10.

Note:

- For package configurations, please refer to the TM9400 Mobile configuration table on page 10
- For Software license options, please refer to Software License table on page 19

ITEM CODE	DESCRIPTION
ANALOG CONVENTIONAL	
TM9457-B1C0-AXYZ-0000-10	Mobile 136-174M BNC
TM9457-B1D0-AXYZ-0000-10	Mobile 136-174M Mini UHF
TM9457-K5C0-AXYZ-0000-10	Mobile 762-870M BNC
TM9457-K5D0-AXYZ-0000-10	Mobile 762-870M Mini UHF
P25 CONVENTIONAL	
TM9457-B1C0-AXYZ-00AA-10	Mobile 136-174M BNC
TM9457-B1D0-AXYZ-00AA-10	Mobile 136-174M Mini UHF
TM9457-K5C0-AXYZ-00AA-10	Mobile 762-870M BNC
TM9457-K5D0-AXYZ-00AA-10	Mobile 762-870M Mini UHF
P25 TRUNKING	
TM9457-B1C0-AXYZ-00BA-10	Mobile 136-174M BNC
TM9457-B1D0-AXYZ-00BA-10	Mobile 136-174M Mini UHF
TM9457-K5C0-AXYZ-00BA-10	Mobile 762-870M BNC
TM9457-K5D0-AXYZ-00BA-10	Mobile 762-870M Mini UHF

TM9400 - Features Comparison

Note:

- Please note that some features require software licenses

RADIO FEATURES	TM9435	TM9455/TM9457
Ruggedness		
Military Standard 810 B, C, D, E, F & G Specifications	Yes	Yes
IP54 Specifications	Yes	Yes
Audio Quality		
Distortion of <1.5%	Yes	Yes
Minimal Audio Delay	Yes	Yes
2W Rated internal speaker	Yes	Yes
Usability		
Control Head	Yes	Yes
Multi Head Support	-	Yes
Remote Mount	Yes	Yes
Multi-lingual Capability	Yes	Yes
GPS Receive & Display	Yes	Yes
GPS Data Transmission ***Note: Available on Analog & P25 Conventional only***	Yes	Yes
Programmable Backlighting	Yes	Yes
Automatic & Manual LCD contrast adjustment	Yes	Yes
Status Icons	Yes	Yes
Silent Mode	Yes	Yes
Quiet Mode	Yes	Yes
Shared Menu Structure (Common with 9400 Portables)	Yes	Yes
Interoperability		
Analog Operation	Yes	Yes
P25 Compliant Digital Operation	Yes	Yes
Dual Mode Operation	Yes	Yes
Receives Linear Simulcast Modulation (LSM)	Yes	Yes
Analog Functionality		
12.5/25kHz Operation	Yes	Yes
CTCSS (PL)	Yes	Yes
DCS (DPL)	Yes	Yes
MDC1200 ANI Encode/Decode	Yes	Yes
DTMF ANI Encode	Yes	Yes
DTMF Dialing	-	Yes
Built-in Frequency Inversion Scrambler with Selectable Inversion Frequency	Yes	Yes
Two Tone Decode (Type 99)	Yes	Yes

TM9400 - Features Comparison

Note:

- Please note that some features require software licenses

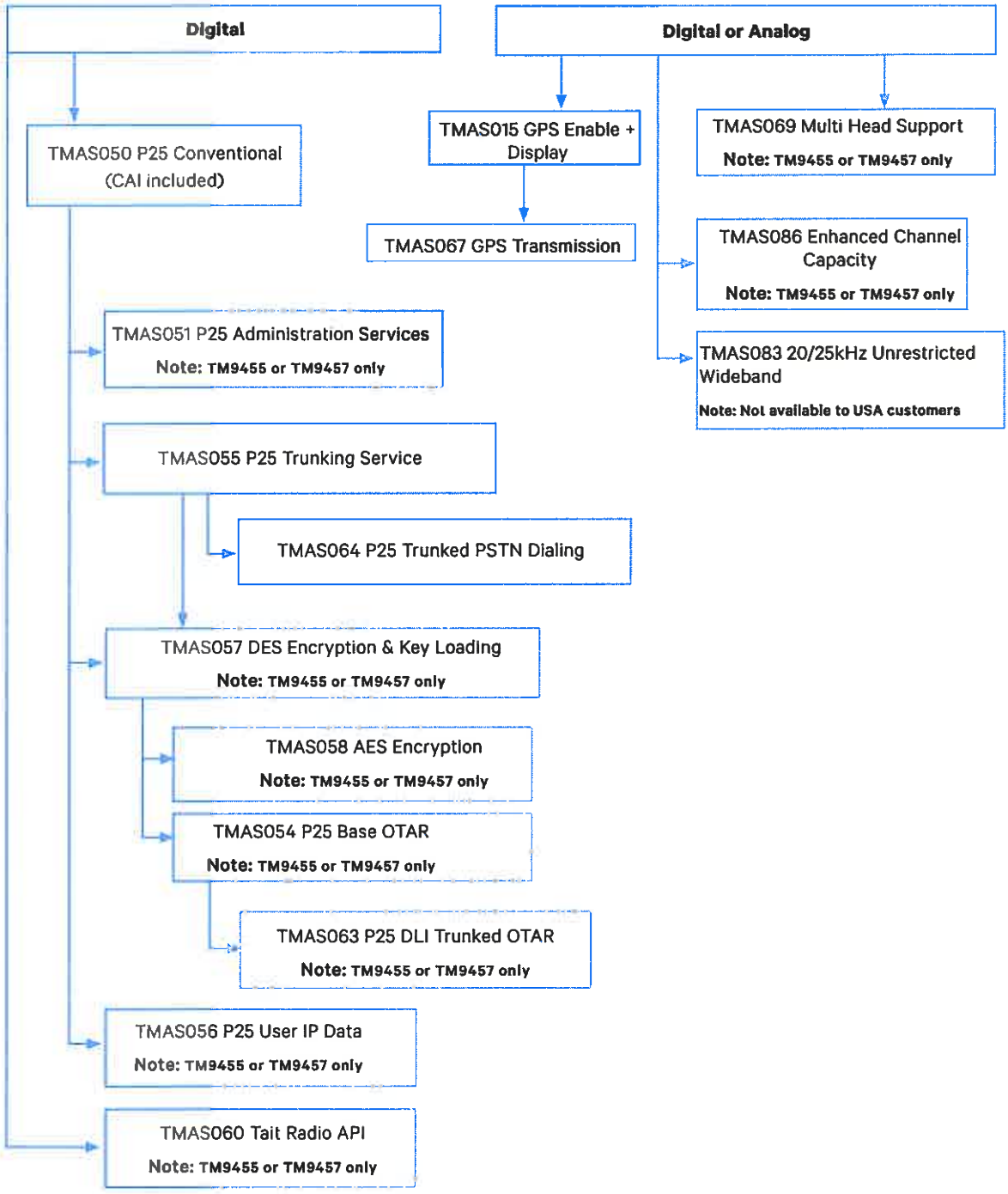
Radio Features	TM9435	TM9455/TM9457
Product Functionality		
Key Lock	Yes	Yes
Security PIN	Yes	Yes
Intelligent Scanning	Yes	Yes
In zone scanning	Yes	Yes
Voting	Yes	Yes
Zone Scanning	Yes	Yes
Editable Scanning	Yes	Yes
Editable Scan Groups	Yes	Yes
Simplified System Key	Yes	Yes
Tait Advanced System Key (TASK)	Yes	Yes
Dual Priority Scanning	Yes	Yes
Nuisance Channel Delete	Yes	Yes
Repeater Talk-around	Yes	Yes
RSSI Display	Yes	Yes
Digital Functionality		
Trunking "Failsoft"	Yes	Yes
P25 Administration Services	-	Yes
P25 Conventional Operation	Yes	Yes
P25 Trunked Operation	Yes	Yes
Software Upgradable to P25 Phase 2 Trunked (TDMA operation)	Yes	Yes
In zone scanning	Yes	Yes
Individual, Group & Broadcast Calls	Yes	Yes
P25 Talkgroup Scanning	Yes	Yes
P25 PSTN Dialing	Yes	Yes
OTAR (Over-The-Air-Rekeying)	-	Yes
Encryption (DES & AES)	-	Yes
Radio Inhibit/Uninhibit (please note that radio responds to the command but does not generate the call)	Yes	Yes
Talking Party ID	Yes	Yes
Call Alerting (please note that radio responds to the command but does not generate the call)	Yes	Yes
Radio Check (please note that radio responds to the command but does not generate the call)	Yes	Yes
Preset Status Messages (please note that radio responds to the command but does not generate the call)	Yes	Yes
Emergency Modes		
Easily Identified Programmable Emergency Button	Yes	Yes
Configurable Lone Worker Functionality	Yes	Yes

Software Licenses

ITEM CODE	DESCRIPTION
General	
TMAS050	SFE Key - P25 Conventional (CAI included)
TMAS055	SFE Key - P25 Trunking Service (TMAS050 Prerequisite)
TMAS051	SFE Key - P25 Administration Services ***Note: TM9455 or TM9457 only***
TMAS059	SFE Key - MDC1200 Encode/Decode
TMAS065	SFE Key - Two Tone Decode
TMAS069	SFE Key - Multi Head Support ***Note: TM9455 or TM9457 only***
TMAS083	SFE Key - 20/25kHz Unrestricted Wideband ***Note: Not available to USA customers***
TMAS086	SFE Key - Enhanced Channel Capacity ***Note: TM9455 or TM9457 only***
TMAS056	SFE Key - P25 User IP Data ***Note: TM9455 or TM9457 only***
TMAS064	SFE Key - P25 Trunked PSTN Dialing
TMAS060	SFE Key - Tait Radio API ***Note: TM9455 or TM9457 only***
Encryption	
TMAS057	SFE Key - DES Encryption & Key Loading ***Note: TM9455 or TM9457 only***
TMAS058	SFE Key - AES Encryption (TMAS057 Prerequisite) ***Note: TM9455 or TM9457 only***
TMAS054	SFE Key - P25 Base OTAR ***Note: TM9455 or TM9457 only***
TMAS063	SFE Key - P25 DLI/Trunked OTAR (TMAS054 Prerequisite) ***Note: TM9455 or TM9457 only***
GPS	
TMAS015	SFE Key - GPS Enable + Display
TMAS067	SFE Key - GPS Transmission (TMAS015 Prerequisite) ***Note: Available on Analog & P25 Conventional only***

Software Licenses Per Radio

All software enhancements are enabled on a per feature per radio. Please note that TMAS059 (MDC1200 ANI Encode/ Decode) & TMAS065 (Two Tone Decode) are software features fitted as standard



TM9435 - Outline of Software Feature Sets

Baseline Feature Set
All radios have the following features: • 1000 Channels / 50 zones • CTCSS/DCS • Dual priority scanning • Voting • Emergency mode • Stealth emergencies • Programmable menu structures • Nuisance channel delete • Repeater talk-around • Numeric RSSI Display • MDC1200 ANI Encode/Decode • Two Tone Decode
General
TMAS050 P25 Conventional (CAI included)
Enables P25 operation with all features in base feature set, which come standard with radio bodies, plus the following: • Individual, group & broadcast calls • Talking Party ID • Trunking "Failsoft" • Talkgroup scanning
Note: These services are available on conventional and trunked radio systems.
TMAS055 P25 Trunking - Requires TMAS050 to be installed.
Enables the radio to operate on P25 Trunking systems • Registration • Affiliation • Broadcast & announcement calls • Call restrictions • Priority calls • All features as described above in TMAS050 and the base feature set • Operates on Tait and other TIA compliant systems
Note. System Key required to program the radio to join the Trunking System, see the P25 Security section for more details.
TMAS064 P25 PSTN Dialing
Only available for use on some trunked networks.
GPS
TMAS015 GPS Enable + Display
Enables the mobile radio to display the user's latitude and longitude.
TMAS067 GPS Transmission
Enables transmission of GPS information on a P25 Conventional or Analog network.

TM9455 & TM9457 - Outline of Software Feature Sets

Baseline Feature Set
All radios have the following features: • 1000 Channels / 50 zones • CTCSS/DCS • Dual priority scanning • Voting • Emergency mode • Stealth emergencies • Programmable menu structures • Nuisance channel delete • Repeater talk-around • Numeric RSSI Display • MDC1200 ANI Encode/Decode • Two Tone Decode
General
TMAS050 P25 Conventional (CAI included)
Enables P25 operation with all features in base feature set plus the following: • Individual, group & broadcast calls • Talking Party ID • Trunking "Failsoft" • Talkgroup scanning • OTAR
Note. These services are available on conventional and trunked radio systems.
TMAS055 P25 Trunking Service - Requires TMAS050 to be installed.
Enables the radio to operate on P25 Trunking systems • Registration • Affiliation • Broadcast & announcement calls • Call restrictions • Priority calls • All features as described above in TMAS050 and the base feature set • Operates on Tait and other TIA compliant systems
Note. System Key required to program the radio to join the Trunking System, see the P25 Security section for more details.
TMAS051 Administration Services - Requires TMAS050 to be installed.
Enables Terminal control of some dispatch type features on conventional P25 systems • Transmit radio inhibits & uninhibits • Status Requests • Call alert requests • Radio check requests • Radio unit monitoring • Messages.
TMAS064 P25 Trunked PSTN Dialing
Only available for use on some trunked networks.
TMAS060 Tait Radio API - Requires TMAS050 to be installed.
Enables access to CCDI and CCR radio control protocols. • Confirmed and unconfirmed data access • Access to API functions for trunking, encryption etc functions require access to appropriate SFEs.
TMAS069 Multi Head Support
Enables two standard control heads to be used with a single radio body.
Encryption
TMAS057 DES Encryption & Key Loading - Requires TMAS050 to be installed. Subject to Export License Control.
• DES-OFB Encryption algorithm
TMAS058 AES Encryption - Requires TMAS057 to be installed. Subject to Export License Control.
AES Encryption • 256 bit security
TMAS054 P25 Base OTAR - Requiries TMAS057 to be installed.
Over-The-Air-Rekeying (OTAR) of encryption keys • Allows checking radios for keys • All key zeroizing • Individual Key Deleting • Key loading to an individual or a group of radios • Key set changeover
TMAS063 P25 DLI/Trunked OTAR - Requires TMAS057 to be installed.
• Over-The-Air-Rekeying (OTAR) of encryption Allows checking radios for keys • Individual key deleting • All key zeroizing • Key loading to an individual or a group of radios • Key set changeover • Operates on Tait and other TIA compliant systems
GPS
TMAS015 GPS Enable + Display
Enables the mobile radio to display the user's latitude and longitude.
TMAS067 GPS Transmission
Enables transmission of GPS information on a P25 Conventional or Analog network.

Control Head Remote Kits

ITEM CODE	DESCRIPTION
SINGLE	
T02-00061-2001	Remote Head Upgrade Kit 6m (20ft)
T02-00061-2002	Remote Head Upgrade Kit 12m (40ft)
T02-00061-2003	Remote Head Upgrade Kit 18m (60ft)
DUAL	
T02-00062-2002	Dual Remote Head Upgrade Kit 18m (60ft)

Options Boards

ITEM CODE	DESCRIPTION
INTERNAL OPTION BOARDS	
T02-00007-ABAA	Line Interface Board
T02-00007-BAAA	RS232 Interface Board

Microphones & Speakers

ITEM CODE	DESCRIPTION
T02-00004-0101	Telephone Handset TDMA
T02-00004-0201	Horn Speaker Kit 112dB SPL for 25W Radio
T02-00004-0202	Horn Speaker Kit 112dB SPL for 30-50W Radio
T02-00005-AAAA	Standard Microphone TDMA
T02-00005-ABAA	Keypad Microphone TDMA
T02-00005-ACAA	Desktop Microphone TDMA
T02-00005-ADAA	Handsfree Microphone TDMA
T02-00005-ADCA	Remote PTT + Microphone TDMA
TMAA10-03	External Speaker 10W for 25W Radio
TMAA10-06	External Speaker 10W for 30-50W Radio

T02-00004-0101
Telephone Handset TDMA

T02-00004-0201
Horn Speaker Kit 112dB SPL for 25W Radio

T02-00004-0202
Horn Speaker Kit 112dB SPL for 30-50W Radio

T02-00005-AAAA
Standard Microphone TDMA

T02-00005-ABAA
Keypad Microphone TDMA

T02-00005-ACAA
Desktop Microphone TDMA

T02-00005-ADCA
Remote PTT + Microphone

T02-00005-ADAA
Handsfree Kit

TMAA10-03
External Speaker 10W for 25W Radio

TMAA10-06
External Speaker 10W for 30-50W Radio

Installation Kits

ITEM CODE	DESCRIPTION
T02-00009-0101	Cable Shielded 8 Core with RJ45 Grommet 0.6m (2ft)
T02-00009-0102	Cable Shielded 8 Core with RJ45 Grommet 1.5m (4.92ft)
T02-00009-0103	Cable Shielded 8 Core with RJ45 Grommet 6m (20ft)
T02-00009-0104	Cable Sheilded 8 Core Twisted Pair wth RJ45 Grommet 12m (40ft)
TMAA03-01	Install Kit BNC 25W U-Cradle
TMAA03-22	Install Kit BNC 30-50W U-Cradle
TMAA03-23	Install Kit M-UHF 25W U-Cradle
TMAA03-02	Security Cradle
TMAA03-11	Reinstall Kit BNC 25W
TMAA03-20	Reinstall Kit BNC 30-50W
TMAA11-01	Reinstall Kit x3 sets U-Cradle
TMAA03-14	U-Cradle
TMAA03-18	Install Kit BNC 25W Slide in Cradle

T02-00009-0101
Cable Shielded 8 Core with RJ45 Grommet 0.6m (2ft)

T02-00009-0102
Cable Shielded 8 Core with RJ45 Grommet 1.5m (4.92ft)

T02-00009-0103
Cable Shielded 8 Core with RJ45 Grommet 6m (20ft)

T02-00009-0104
Cable Sheilded 8 Core Twisted Pair wth RJ45 Grommet 12m (40ft)

TMAA03-02
Security Cradle

TMAA03-14
U-Cradle

TMAA03-01
Install Kit BNC 25W U-Cradle

TMAA03-22
Install Kit BNC 30-50W U-Cradle

TMAA03-23
Install Kit M-UHF 25W U-Cradle

TMAA03-11
Reinstall Kit for 25 Radio BNC

TMAA03-20
Reinstall Kit for 30-50W Radio BNC

TMAA11-01
Reinstall Kit x3 sets U-Cradle

TMAA03-18
Install Kit BNC 25W Slide in Cradle

GPS Receivers & Accessories

ITEM CODE	DESCRIPTION
TMAA04-05	Cable Ignition Sense 4m (13.12ft)
TMAA05-01	GPS Receiver Garmin-16HVS
TMAA05-02	Magnetic Mount only for Garmin-16HVS GPS Receiver
TMAA05-03	GPS Receiver Plate Mount for Garmin-16HVS
TMAA05-04	GPS Receiver Garmin-16HVS with Magnetic Mount
TMAA05-05	GPS Receiver DB15 Wi-Sys WS5012 Magnetic Mount
TMAA05-06	GPS Receiver DB15 Through hole mount

TMAA04-05
Cable Ignition Sense 4m (13.12ft)

TMAA05-01
GPS Receiver Garmin-16HVS

TMAA05-03
GPS Receiver Plate Mount for Garmin-16HVS

TMAA05-04
GPS Receiver Garmin-16HVS with Magnetic Mount

TMAA05-05
GPS Receiver DB15 Wi-Sys WS5012 Magnetic Mount

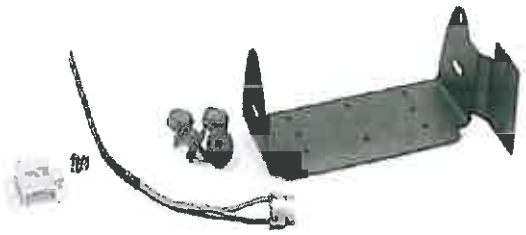
TMAA05-06
GPS Receiver DB15 Through hole mount

Desktop Power Supplies Mounting Options

ITEM CODE	DESCRIPTION
TMAA03-06	Install Kit Desktop Power Supply U-Cradle 25W Radio
TMAA03-13	Install Kit Desktop Power Supply U-Cradle 30-50W Radio
TMAA03-09	Install Kit Desktop Power Supply Plinth 25W Radio
TMAA03-12	Install Kit Desktop Power Supply Plinth 30-50W Radio
TMAA13-21	Desktop Power Supply 23A DC 230V AC ANZ
TMAA13-22	Desktop Power Supply 23A DC 120V AC US/CAN
TMAA13-23	Desktop Power Supply 23A DC 230V AC UK
TMAA13-24	Desktop Power Supply 23A DC 230V AC EU

TMAA03-06
Install Kit Desktop Power Supply U-Cradle 25W Radio

TMAA03-13
Install Kit Desktop Power Supply U-Cradle 30-50W Radio



TMAA13-21
Desktop Power Supply 23A DC 230V AC ANZ

TMAA13-22
Desktop Power Supply 23A DC 120V AC US/CAN

TMAA13-23
Desktop Power Supply 23A DC 230V AC UK

TMAA13-24
Desktop Power Supply 23A DC 230V AC EU

Note:
Mounting bracket is required but not included, please order one of the listed Install Kit (TMAA03-06, TMAA03-09, TMAA03-12 or TMAA03-13)

Programming Kits

ITEM CODE	DESCRIPTION
T02-00031-0002	Programming/Calibration Kit
T02-00031-0004	Programming/Calibration CD
T02-00031-0006	User Documentation CD
T02-00031-0007	Service Kit
T02-00031-0008	Service Manual CD
TMAA20-02	Adaptor RJ45 to DB9 Adaptor
TMAA20-03	Cable 25W Radio Power Connector to Banana Plug
TMAA20-04	Adaptor RJ12 Socket/RJ45 Plug
TMAA21-01	Cable DB15 Socket/RJ45 Plug

TP9400 Portable Radios

- Radios
- Options & Accessories

Improved efficiency and enhanced usability

The Tait TP9400 may be the smallest P25 Phase 2-capable portable but it is uncompromising in meeting the demands of those serving our communities. With analog, 12.5kHz P25 Phase 1 FDMA conventional/trunked and 6.25kHz equivalent P25 Phase 2 TDMA trunked capability in a single device, you can transition to a more spectrally efficient solution in a time frame that suits you.

The TP9400 portable enables first responder effectiveness and safety with internal GPS, Bluetooth® wireless technology, IP67 protection and AES encryption.

Note: Please contact your local Tait representative to discuss your GPS and/or Bluetooth® solution requirements.

Key Features:

- Manage migration risk with a multi-mode portable – analog, P25 Phase 1 conventional/trunked and upgradable to P25 Phase 2 for enhanced interoperability
- Future proofed with software-upgradability to P25 Phase 2 TDMA for increased capacity
- P25 standards compliance for greater choice and interoperability
- Smaller and lighter, Li-Ion premium battery gives 12hr shift life
- AES encryption, voice and data, pre-set status messages and Internal GPS for safe and efficient operations
- Engineered for demanding environments with IP67 rating and new water-shedding grill

Frequency Code	Frequency Band	TP9435 4 Key	TP9440 16 Key	TP9455 4 Key	TP9460 16 Key
B1	136–174MHz	✓	✓	✓	✓
K5	762-870MHz	✓	✓	✓	✓
Note: K5 (762-870MHz) FCC and IC Approval only					

P25 General Service Radios

TP9435 and TP9440 P25 Portable Radios

Designed to offer a basic range of Tait functionality intended for public works staff and commercial users who do not require security features. The TP9435 and TP9440 portables offer state of the art radio design coupled with robust specifications and excellent digital audio clarity.

Available in limited keypad (TP9435) and full alphanumeric keypad (TP9440), both models meet full P25 compliance. They are designed with the same user interface to the TM9435 mobile radio, making training and interoperability even easier with the full Tait range of P25 digital products.

P25 Mission Critical Radios

TP9455 and TP9460 P25 Portable Radios

Designed to offer the full range of Tait functionality intended for public safety and public service organizations. The TP9455 and TP9460 portables offer state of the art radio design coupled with robust specifications and excellent digital audio clarity.

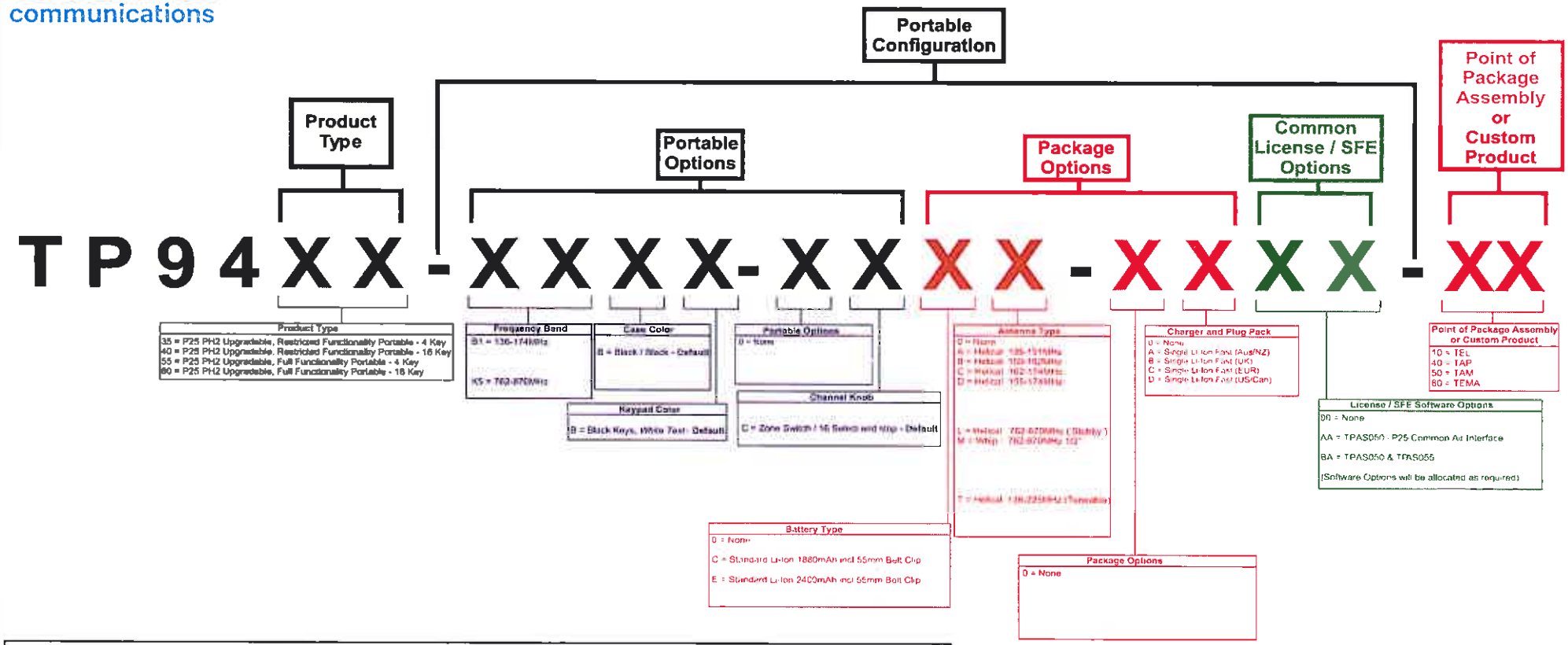
Available in limited keypad (TP9455) and full alphanumeric keypad (TP9460), both models meet full P25 compliance, as well as DES and AES encryption capabilities. They are designed with the same user interface to the TM9455 mobile radio, making training and interoperability even easier with the full Tait range of P25 digital products.

TP9400

Product Codes for Commercial Packages

Edition: 03

tait communications



Example of: TP9460-B1BB-0CCA-0A00-10

Product Type
TP9460 = P25 Portable Crypto Capable with 16 Button Keypad (T03-00037-0002) KOP TPD TP9400 rad 16Key

Mobile Configuration

B1 = 136-174MHz,	Frequency Band	(T03-00033-BDAA)	PROTO PBA TPD TRX B1 3C16 C6505A 128MbRAM 128MbPflash 16MbSflash
B = Black / Black	Portable Case Color	(T03-00032-AAAA)	PROTO PBA TPD MMI
B = Black	Keypad Color		
0 = None	Portable Options		
C = Zone Switch / 16 Select	Channel Knob Type		

Package Options

C = Li-Ion 1880mAh with clip	Battery Type	(T03-00011-ABAA)	TPB100 Battery - Std Li-Ion 1880mAh c/w Belt Clip
A = Helical 136-151MHz	Antenna Type	(TPA-AN-002)	TPB/TPB Antenna 136-151MHz Helical
0 = None	Microphone / Headset Options		
A = Single Li-Ion Fast (Aus/NZ)	Charger and Plug Pack Type	(T03-00012-AAAA)	TPB/TPB Single Fast Charger Li-Ion
		(009-00014-00)	Plug Pack A/NZ

Common License / SFE Options
00 = No SFE's

Point of Package Assembly or Custom Product
10 = TEL Built Package Assembly Point or Custom Product

08 April 2013

Doc ID: 4776

TP9435 - 4 Key General Service Radio

Standard package includes:

- TP9435 Radio
- Antenna
- Li-Ion Battery
- Belt Clip
- Manual
- Single Charger and Plug Pack

Supported Modes:

- Analog Conventional
- P25 Conventional - Phase 1
- P25 Trunking - Phase 1 (License Required)
- P25 Trunking - Phase 2 upgradable

Options:

- Battery
  - Choose the Battery ("X value) from the TP9400 Portable configuration table on page 36
- Antenna
  - Choose the Antenna ("Y" value) from the TP9400 Portable configuration table on page 36
- Charger & Plug Pack
  - Choose the Charger & Plug Pack ("Z" value) from the TP9400 Portable configuration table on page 36

Features:

- Water shedding grill
- Advanced scanning
- LCD display
- Internal GPS (license required)
- Bluetooth connectivity (license required)
- Man Down
- IP67 Certified (1 meter water for 30 minutes)
- MIL-Standard 810 C, D, E F & G
- Programmable emergency key
- 3 Programmable function keys
- Side mounted accessory connector
- Two-shot moulding for extra durability
- Zone Selector Switch

Note:

- For package configurations, please refer to the TP9400 Portable configuration table on page 36
- For Software license options, please refer to the Software License table on page 44

ITEM CODE	DESCRIPTION
P25 CONVENTIONAL	
TP9435-B1BB-0CXY-0ZAA	Portable 136-174M
TP9435-K5BB-0CXY-0ZAA	Portable 762-870M
P25 TRUNKING	
TP9435-B1BB-0CXY-0ZBA	Portable 136-174M
TP9435-K5BB-0CXY-0ZBA	Portable 762-870M

TP9440 - 16 Key General Service Radio

Standard package includes:

- TP9440 Radio
- Antenna
- Li-Ion Battery
- Belt Clip
- Manual
- Single Charger and Plug Pack

Supported Modes:

- Analog Conventional
- P25 Conventional - Phase 1
- P25 Trunking - Phase 1 (License Required)
- P25 Trunking - Phase 2 upgradable

Options:

- Battery
  - Choose the Battery ("X value) from the TP9400 Portable configuration table on page 36
- Antenna
  - Choose the Antenna ("Y" value) from the TP9400 Portable configuration table on page 36
- Charger & Plug Pack
  - Choose the Charger & Plug Pack ("Z" value) from the TP9400 Portable configuration table on page 36

Features:

- Water shedding grill
- LCD display
- Alphanumeric keypad
- Internal GPS (license required)
- Bluetooth connectivity (license required)
- Man Down
- Lone Worker
- IP67 Certified (1 meter water for 30 minutes)
- MIL-Standard 810 C, D, E, F & G
- Programmable emergency key
- 3 Programmable function keys
- Side mounted accessory connector
- Two-shot moulding for extra durability

Note:

- For package configurations, please refer to the TP9400 Portable configuration table on page 36
- For Software license options, please refer to the Software License table on page 44

ITEM CODE	DESCRIPTION
P25 CONVENTIONAL	
TP9440-B1BB-0CXY-0ZAA	Portable 136-174M
TP9440-K5BB-0CXY-0ZAA	Portable 762-870M
P25 TRUNKING	
TP9440-B1BB-0CXY-0ZBA	Portable 136-174M
TP9440-K5BB-0CXY-0ZBA	Portable 762-870M

TP9455 - 4 Key Mission Critical Radio

Standard package includes:

- TP9455 Radio
- Antenna
- Li-Ion Battery
- Belt Clip
- Manual
- Single Charger and Plug Pack

Supported Modes:

- Analog Conventional
- P25 Conventional - Phase 1
- P25 Trunking - Phase 1 (License Required)
- P25 Trunking - Phase 2 upgradable

Options:

- Battery
  - Choose the Battery ("X value) from the TP9400 Portable configuration table on page 36
- Antenna
  - Choose the Antenna ("Y" value) from the TP9400 Portable configuration table on page 36
- Charger & Plug Pack
  - Choose the Charger & Plug Pack ("Z" value) from the TP9400 Portable configuration table on page 36

Features:

- Water shedding grill
- Advanced scanning
- LCD display
- Internal GPS (license required)
- Bluetooth connectivity (license required)
- Man Down
- IP67 Certified (1 meter water for 30 minutes)
- MIL-Standard 810 C, D, E, F & G
- Programmable emergency key
- 3 Programmable function keys
- Side mounted accessory connector
- Two-shot moulding for extra durability
- Zone Selector Switch

Note:

- For package configurations, please refer to the TP9400 Portable configuration table on page 36
- For Software license options, please refer to the Software License table on page 44

ITEM CODE	DESCRIPTION
ANALOG CONVENTIONAL	
TP9455-B1BB-0CXY-0Z00	Portable 136-174M
TP9455-K5BB-0CXY-0Z00	Portable 762-870M
P25 CONVENTIONAL	
TP9455-B1BB-0CXY-0ZAA	Portable 136-174M
TP9455-K5BB-0CXY-0ZAA	Portable 762-870M
P25 TRUNKING	
TP9455-B1BB-0CXY-0ZBA	Portable 136-174M
TP9455-K5BB-0CXY-0ZBA	Portable 762-870M

TP9460 - 16 Key Mission Critical Radio

Standard package includes:

- TP9460 Radio
- Antenna
- Li-Ion Battery
- Belt Clip
- Manual
- Single Charger and Plug Pack

Supported Modes:

- Analog Conventional
- P25 Conventional - Phase 1
- P25 Trunking - Phase 1 (License Required)
- P25 Trunking - Phase 2 upgradable

Options:

- Battery
  - Choose the Battery ("X value) from the TP9400 Portable configuration table on page 36
- Antenna
  - Choose the Antenna ("Y" value) from the TP9400 Portable configuration table on page 36
- Charger & Plug Pack
  - Choose the Charger & Plug Pack ("Z" value) from the TP9400 Portable configuration table on page 36

Features:

- Water shedding grill
- LCD display
- Alphanumeric keypad
- Internal GPS (license required)
- Bluetooth connectivity (license required)
- Man Down
- Lone Worker
- IP67 Certified (1 meter water for 30 minutes)
- MIL-Standard 810 C, D, E, F & G
- Programmable emergency key
- 3 Programmable function keys
- Side mounted accessory connector
- Two-shot moulding for extra durability

Note:

- For package configurations, please refer to the TP9400 Portable configuration table on page 36
- For Software license options, please refer to the Software License table on page 44

ITEM CODE	DESCRIPTION
ANALOG CONVENTIONAL	
TP9460-B1BB-0CXY-0Z00	Portable 136-174M
TP9460-K5BB-0CXY-0Z00	Portable 762-870M
P25 CONVENTIONAL	
TP9460-B1BB-0CXY-0ZAA	P25 Portable 136-174M
TP9460-K5BB-0CXY-0ZAA	P25 Portable 762-870M
P25 TRUNKING	
TP9460-B1BB-0CXY-0ZBA	P25 Portable 136-174M
TP9460-K5BB-0CXY-0ZBA	P25 Portable 762-870M

TP9400 - Features Comparison

Note:

- Please note that some features require software licenses

RADIO FEATURES	TP9435	TP9440	TP9455	TP9460
Ruggedness				
Two-shot Molding	Yes	Yes	Yes	Yes
Military Standard 810 B, C, D, E, F & G Specifications	Yes	Yes	Yes	Yes
IP67 Specifications	Yes	Yes	Yes	Yes
Strong & Secure Belt Clip	Yes	Yes	Yes	Yes
Audio Quality				
Distortion of <1.5%	Yes	Yes	Yes	Yes
Minimal Audio Delay	Yes	Yes	Yes	Yes
2W Rated internal speaker	Yes	Yes	Yes	Yes
Battery Technology				
Battery Overcharge Protection	Yes	Yes	Yes	Yes
Battery Charge Indication	Yes	Yes	Yes	Yes
Lithium Ion	Yes	Yes	Yes	Yes
Sanyo Cells	Yes	Yes	Yes	Yes
Choice of battery size / capacity	Yes	Yes	Yes	Yes
Usability				
16 Button Keypad	-	Yes	-	Yes
4 Button Keypad	Yes	-	Yes	-
3 Programmable side function buttons	Yes	Yes	Yes	Yes
One top surface programmable "orange" function button	Yes	Yes	Yes	Yes
Multi-lingual Capability	Yes	Yes	Yes	Yes
Internal GPS receiver	Yes	Yes	Yes	Yes
GPS Receive & Display	Yes	Yes	Yes	Yes
GPS Data Transmission ***Note: Available on Analog & P25 Conventional only***	Yes	Yes	Yes	Yes
Protective Power-down	Yes	Yes	Yes	Yes
Large 4 Line LCD Display	Yes	Yes	Yes	Yes
Programmable Backlighting	Yes	Yes	Yes	Yes
Automatic & Manual LCD contrast adjustment	Yes	Yes	Yes	Yes
Status Icons	Yes	Yes	Yes	Yes
Silent Mode	Yes	Yes	Yes	Yes
Quiet Mode	Yes	Yes	Yes	Yes
Shared Menu Structure (Common with Mobiles)	Yes	Yes	Yes	Yes
3 Position zone switch	Yes	Yes	Yes	Yes

TP9400 - Features Comparison

Note:

- Please note that some features require software licenses

Radio Features	TP9435	TP9440	TP9455	TP9460
Interoperability				
Analog Operation	Yes	Yes	Yes	Yes
P25 Compliant Digital Operation	Yes	Yes	Yes	Yes
Dual Mode Operation	Yes	Yes	Yes	Yes
Receives Linear Simulcast Modulation (LSM)	Yes	Yes	Yes	Yes
Product Functionality				
Key Lock	Yes	Yes	Yes	Yes
Security PIN	Yes	Yes	Yes	Yes
Intelligent Scanning	Yes	Yes	Yes	Yes
In zone scanning	Yes	Yes	Yes	Yes
Voting	Yes	Yes	Yes	Yes
Zone Scanning	Yes	Yes	Yes	Yes
Editable Scanning	Yes	Yes	Yes	Yes
Editable Scan Groups	Yes	Yes	Yes	Yes
Simplified System Key	Yes	Yes	Yes	Yes
Tait Advanced System Key (TASK)	Yes	Yes	Yes	Yes
Dual Priority Scanning	Yes	Yes	Yes	Yes
Nuisance Channel Delete	Yes	Yes	Yes	Yes
Repeater Talk-around	Yes	Yes	Yes	Yes
RSSI Display	Yes	Yes	Yes	Yes

TP9400 - Features Comparison

Note:

- Please note that some features require software licenses

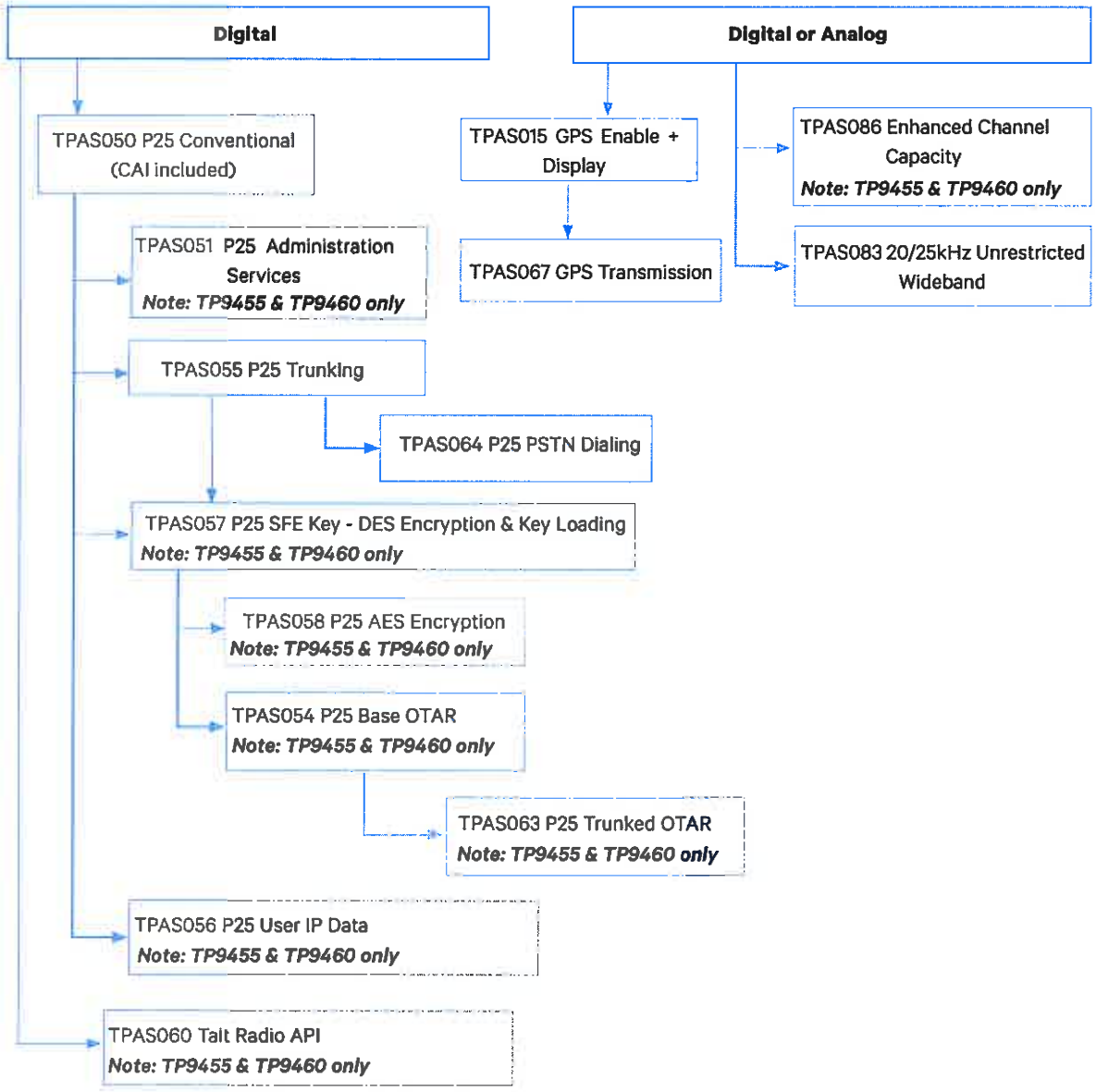
Radio Features	TP9435	TP9440	TP9455	TP9460
Digital Functionality				
Trunking "Failsoft"	Yes	Yes	Yes	Yes
P25 Administration Services	-	-	Yes	Yes
P25 Conventional Operation	Yes	Yes	Yes	Yes
P25 Trunked Operation	Yes	Yes	Yes	Yes
In zone scanning	Yes	Yes	Yes	Yes
Individual, Group & Broadcast Calls	Yes	Yes	Yes	Yes
P25 Talkgroup Scanning	Yes	Yes	Yes	Yes
P25 PSTN Dialing	Yes	Yes	Yes	Yes
OTAR (Over-The-Air-Rekeying)	-	-	Yes	Yes
Encryption (DES & AES)	-	-	Yes	Yes
Radio Inhibit/Uninhibit (please note that radio responds to the command but does not generate the call)	Yes	Yes	Yes	Yes
Talking Party ID	Yes	Yes	Yes	Yes
Call Alerting (please note that radio responds to the command but does not generate the call)	Yes	Yes	Yes	Yes
Radio Check (please note that radio responds to the command but does not generate the call)	Yes	Yes	Yes	Yes
Preset Status Messages (please note that radio responds to the command but does not generate the call)	Yes	Yes	Yes	Yes
Software Upgradable to P25 Phase II (TDMA operation)	Yes	Yes	Yes	Yes
Analog Functionality				
12.5/25kHz Operation **Note: 25kHz operation is not available in North America**	Yes	Yes	Yes	Yes
CTCSS (PL)	Yes	Yes	Yes	Yes
DCS (DPL)	Yes	Yes	Yes	Yes
MDC1200 ANI Encode/Decode	Yes	Yes	Yes	Yes
DTMF ANI Encode	Yes	Yes	Yes	Yes
DTMF Dialing	-	Yes	-	Yes
Built-In Frequency Inversion Scrambler with Selectable Inversion Frequency	Yes	Yes	Yes	Yes
Two Tone Decode (Type 99)	Yes	Yes	Yes	Yes
Emergency Modes				
Easily Identified Programmable Emergency Button	Yes	Yes	Yes	Yes
Configurable Lone Worker Functionality	Yes	Yes	Yes	Yes
Man-Down Tilt Sensor	Yes	Yes	Yes	Yes
Flexible Emergency Functionality	Yes	Yes	Yes	Yes

Software Licenses

ITEM CODE	DESCRIPTION
General	
TPAS050	SFE Key - P25 Conventional (CAI included)
TPAS055	SFE Key - P25 Trunking Services (TPAS050 Prerequisite)
TPAS051	SFE Key - P25 Administration Service ***Note: TP9455 or TP9460 only***
TPAS059	SFE Key - MDC1200 Encode/Decode
TPAS065	SFE Key - Two Tone Decode
TPAS083	SFE Key - 20/25kHz Unrestricted Wideband ***Note: Not available to USA customers***
TPAS086	SFE Key - Enhanced Channel Capacity ***Note: TP9455 or TP9460 only***
TPAS082	SFE Key - Bluetooth
TPAS056	SFE Key - P25 User IP Data ***Note: TP9455 or TP9460 only***
TPAS064	SFE Key - P25 Trunked PSTN Dialing
TPAS060	SFE Key - Tait Radio API ***Note: TP9455 or TP9460 only***
Encryption	
TPAS057	SFE Key - DES Encryption & Key Loading ***Note: TP9455 or TP9460 only***
TPAS058	SFE Key - AES Encryption (TPAS057 Prerequisite) ***Note: TP9455 or TP9460 only***
TPAS054	SFE Key - P25 Base OTAR ***Note: TP9455 or TP9460 only***
TPAS063	SFE Key - P25 DLI/Trunked OTAR (TPAS054 Prerequisite) ***Note: TP9455 or TP9460 only***
GPS	
TPAS015	SFE Key - P25 GPS Enable + Display
TPAS067	SFE Key - GPS Transmission (TPAS015 Prerequisite) ***Note: Available on Analog & P25 Conventional only***

Software Enhancements per Radio

All software enhancements are enabled on a per feature per radio. Please note that TPAS059 (MDC1200 ANI Encode/ Decode) & TPAS065 (Two Tone Decode) are software features fitted as standard



TP9435 and TP9440 - Software Feature Sets

Baseline Feature Set All radios have the following features: • 1000 Channels / 50 zones • CTCSS/DCS • Dual priority scanning • Voting • Emergency mode • Stealth emergencies • Programmable menu structures • Man Down & Lone Worker • Nuisance channel delete • Repeater talk-around • Numeric RSSI Display • MDC1200 ANI Encode/Decode • Two Tone Decode
General
TPAS050 P25 Conventional (CAI included) Enables P25 operation with all features in base feature set plus the following: • Individual, group & broadcast calls • Talking party ID • Trunking "Failsoft" • Talk-group scanning *Note: These services are available on conventional and trunked radio systems.*
TPAS055 P25 Trunking Services - Requires TPAS050 to be installed. Enables the radio to operate on P25 Trunking systems • Registration • Affiliation • Broadcast & announcement calls • Call restrictions • Priority calls • All features as described above in TPAS050 and the base feature set • Operates on Tait and other TIA compliant systems *Note: System Key required to program the radio to join the Trunking System, see the P25 Security section for more details*
TPAS064 P25 Trunked PSTN Dialing Only available for use on some trunked networks.
GPS
TPAS015 GPS Enable + Display Enables the portable radio to display the user's latitude and longitude.
TPAS067 GPS Transmission Enables transmission of GPS information on a P25 Conventional network.

TP9455 and TP9460 - Software Feature Sets

Baseline Feature Set All radios have the following features: • 1000 Channels / 50 zones • CTCSS/DCS • Dual priority scanning • Voting • Emergency mode • Stealth emergencies • Programmable menu structures • Man Down & Lone Worker • Nuisance channel delete • Repeater talk-around • Numeric RSSI Display • MDC1200 ANI Encode/Decode • Two Tone Decode
General
TPAS050 P25 Conventional (CAI included) Enables P25 operation with all features in base feature set plus the following: • Individual, group & broadcast calls • Talking party ID • Trunking "Failsoft" • Talk-group scanning • OTAR *Note: These services are available on conventional and trunked radio systems.*
TPAS055 P25 Trunking Services - Requires TPAS050 to be installed. Enables the radio to operate on P25 Trunking systems • Registration • Affiliation • Broadcast & announcement calls • Call restrictions • Priority calls • All features as described above in TPAS050 and the base feature set • Operates on Tait and other TIA compliant systems *Note: System Key required to program the radio to join the Trunking System, see the P25 Security section for more details*
TPAS051 Administration Services - Requires TPAS050 to be installed. Enables Terminal control of some dispatch type features on conventional P25 systems • Transmit radio inhibits & uninhibits • Status requests • Call alert requests • Radio check requests • Radio unit monitoring • Messages.
TPAS064 P25 Trunked PSTN Dialing Only available for use on some trunked networks.
TPAS060 Tait Radio API - Requires TPAS050 to be installed. Enables access to CCDI and CCR radio control protocols. • Confirmed and unconfirmed data access. • Access to API functions for trunking, encryption etc functions require access to appropriate SFEs.
Encryption
TPAS057 DES Encryption & Key Loading - Requires TPAS050 to be installed. Subject to Export License Control. • DES-OFB Encryption algorithm
TPAS058 AES Encryption - Requires TPAS057 to be installed. Subject to Export License Control. • AES Encryption • 256 bit security
TPAS054 P25 Base OTAR - Requires TPAS057 to be installed. Over-The-Air-Rekeying (OTAR) of Encryption Keys • Allows checking radios for keys • All key zeroizing • Individual Key deleting • Key loading to an individual or a group of radios • Key set changeover
TPAS063 P25 DLI/Trunked OTAR - Requires TPAS057 to be installed. • Over-The-Air-Rekeying (OTAR) of encryption • Allows checking radios for keys • Individual key deleting • All key zeroizing • Key loading to an individual or a group of radios • Key set changeover • Operates on Tait and other TIA compliant systems
GPS
TPAS015 GPS Enable + Display Enables the mobile radio to display the user's latitude and longitude.
TPAS067 GPS Transmission Enables transmission of GPS information.

Batteries & Chargers

ITEM CODE	DESCRIPTION
BATTERIES	
T03-00011-AAAA	Battery - Standard Li-Ion 1880mAh
T03-00011-CAAA	Battery - Performance LI-Ion 2400mAh
T03-00011-FAAA	DC Service Adaptor
CHARGERS	
T03-00012-ABAA	Charger Single Fast Li-Ion ANZ Plug Pack
T03-00012-ACAA	Charger Single Fast Li-Ion UK Plug Pack
T03-00012-ADAA	Charger Single Fast Li-Ion EU Plug Pack
T03-00012-AEAA	Charger Single Fast Li-Ion US/CAN Plug Pack
T03-00013-ABAA	Multi Charger Li-Ion Wall Kit ANZ Mains Cable
T03-00013-ACAA	Multi Charger Li-Ion Wall Kit UK Mains Cable
T03-00013-ADAA	Multi Charger Li-Ion Wall Kit EU Mains Cable
T03-00013-AEAA	Multi Charger Li-Ion Wall Kit US/CAN Mains Cable
T03-00014-AAAA	Vehicle Charger Battery Only

Audio Accessories - Speaker Microphones

ITEM CODE	DESCRIPTION
T03-00045-ADAA	Speaker Microphone Pro Series IP54 TDMA E-Button 3.5mm Jack
T03-00045-BFAA	Speaker Microphone Evolution TDMA IS (FM) E-Button 2.5mm Jack
T03-00045-CFAA	Speaker Microphone Storm IP68 TDMA IS (FM) E-Button 2.5mm Jack
T03-00045-DMAA	Speaker Microphone Genesis IP68 TDMA E-Button

T03-00045-ADAA
Speaker Microphone Pro Series IP54 TDMA E-Button 3.5mm Jack

T03-00045-BFAA
Speaker Microphone Evolution TDMA IS (FM) E-Button 2.5mm Jack

T03-00045-CFAA
Speaker Microphone Storm IP68 TDMA IS (FM) E-Button 2.5mm Jack

T03-00045-DMAA
Speaker Microphone Genesis IP68 TDMA E-Button

Audio Accessories - Ear Pieces

ITEM CODE	DESCRIPTION
T952-051	Earphone In-Ear 2.5mm IS (FM)
T952-055	Earhanger 2.5mm
T03-00120-AAAD	Eartube In-Ear 2.5mm
T03-00120-AAAE	Eartube In-Ear 3.5mm
T03-00120-BAAD	Earhook 2.5mm
T03-00120-BAAE	Earhook 3.5mm
T03-00120-FAAD	Eartube Earhook 2.5mm
T03-00120-FAAE	Eartube Earhook 3.5mm
T03-00120-GAAD	Earhook Transparent Hi-Volume 2.5mm
T03-00120-GAAE	Earhook Transparent Hi-Volume 3.5mm
T03-00120-HAAD	Earphone Transparent D-Ring Hi-Volume 2.5mm
T03-00120-HAAE	Earphone Transparent D-Ring Hi-Volume 3.5mm

T952-051
Earphone In-Ear 2.5mm IS (FM)

T952-055
Earhanger 2.5mm

T03-00120-AAAD
Eartube In-Ear 2.5mm

T03-00120-AAAE
Eartube In-Ear 3.5mm

T03-00120-BAAD
Earhook 2.5mm

T03-00120-BAAE
Earhook 3.5mm

T03-00120-FAAD
Eartube Earhook 2.5mm

T03-00120-FAAE
Eartube Earhook 3.5mm

T03-00120-GAAD
Earhook Transparent Hi-Volume 2.5mm

T03-00120-GAAE
Earhook Transparent HI-Volume 3.5mm

T03-00120-HAAD
Earphone Transparent D-Ring Hi-Volume 2.5mm

T03-00120-HAAE
Earphone Transparent D-Ring Hi-Volume 3.5mm

Audio Accessories - Ear Insert & Headset

ITEM CODE	DESCRIPTION
EAR INSERT	
TPA-AA-214	Earpiece Quick Disconnect Acoustic Tube - Set of 5
TPA-AA-215	Flexible Open Ear Insert - Left Ear Small
TPA-AA-216	Flexible Open Ear Insert - Left Ear Medium
TPA-AA-217	Flexible Open Ear Insert - Left Ear Large
TPA-AA-218	Flexible Open Ear Insert - Right Ear Small
TPA-AA-219	Flexible Open Ear Insert - Right Ear Medium
TPA-AA-220	Flexible Open Ear Insert - Right Ear Large
HEADSET	
T03-00046-CEAA	Headset Hurricane-II Behind-Head TDMA IS (FM)
T03-00046-DAAA	Headset Heavy-Duty Overhead TDMA IS (FM)
T03-00046-DEAA	Headset Heavy-Duty Behind-Head TDMA IS (FM)

T03-00046-CEAA
Headset Hurricane-II Behind-Head TDMA IS (FM)

T03-00046-DAAA
Headset Heavy-Duty Overhead TDMA IS (FM)

T03-00046-DEAA
Headset Heavy-Duty Behind-Head TDMA IS (FM)

Carry Case - Heavy Duty & Soft Leather

ITEM CODE	DESCRIPTION
HEAVY DUTY	
T03-00038-0004	Carry Case Heavy Duty Leather 4 Key D-Stud Belt Loop
T03-00038-0005	Carry Case Heavy Duty Leather 4 Key Spring Clip
T03-00038-0006	Carry Case Heavy Duty Leather 4 Key Belt Loop
T03-00038-0007	Carry Case Heavy Duty Leather 16 Key D-Stud Belt Loop
T03-00038-0008	Carry Case Heavy Duty Leather 16 Key Spring Clip
T03-00038-0009	Carry Case Heavy Duty Leather 16 Key Belt Loop
SOFT LEATHER	
T03-00038-0020	Carry Case Soft Leather 4 Key Use Battery Belt Clip
T03-00038-0021	Carry Case Soft Leather 16 Key Use Battery Belt Clip

T03-00038-0004
Carry Case Heavy Duty Leather 4 Key with D-Stud Belt Loop

T03-00038-0005
Carry Case Heavy Duty Leather 4 Key with Spring Clip

T03-00038-0006
Carry Case Heavy Duty Leather 4 Key with Belt Loop

T03-00038-0007
Carry Case Heavy Duty Leather 16 Key with D-Stud Belt Loop

T03-00038-0008
Carry Case Heavy Duty Leather 16 Key with Spring Clip

T03-00038-0009
Carry Case Heavy Duty Leather 16 Key with Belt Loop

T03-00038-0021
Carry Case Soft Leather 16 Key use Battery Belt Clip

Carry Case - Nylon & Accessories

ITEM CODE	DESCRIPTION
NYLON	
T03-00038-0013	Carry Case Nylon 4 Key D-Stud Belt Loop
T03-00038-0014	Carry Case Nylon 4 Key Belt Loop
T03-00038-0015	Carry Case Nylon 4 Key Use Battery Belt Clip
T03-00038-0016	Carry Case Nylon 16 Key D-Stud Belt Loop
T03-00038-0017	Carry Case Nylon 16 Key Belt Loop
T03-00038-0018	Carry Case Nylon 16 Key Use Battery Belt Clip
ACCESSORIES	
T03-00038-0022	Belt Loop For D-Stud 55mm
T03-00038-0023	Spring Clip For D-Stud 40mm
TPA-CA-207	Belt Loop For D-Clip 75mm

T03-00038-0013
Carry Case Nylon 4 Key D-Stud Belt Loop

T03-00038-0014
Carry Case Nylon 4 Key Belt Loop

T03-00038-0015
Carry Case Nylon 4 Key Use Battery Belt Clip

T03-00038-0022
Belt Loop For D-Stud 55mm

T03-00038-0023
Spring Clip For D-Stud 40mm

T03-00038-0016
Carry Case Nylon 16 Key D-Stud Belt Loop

T03-00038-0017
Carry Case Nylon 16 Key Belt Loop

T03-00038-0018
Carry Case Nylon 16 Key Use Battery Belt Clip

TPA-CA-207
Belt Loop For D-Clip 75mm

Antennas

ITEM CODE	DESCRIPTION
ANTENNAS	
TPA-AN-001	Antenna 136-225MHz Helical Tunable
TPA-AN-002	Antenna 136-151MHz Helical
TPA-AN-003	Antenna 150-162MHz Helical
TPA-AN-004	Antenna 162-174MHz Helical
TPA-AN-005	Antenna VHF Selection Kit
TPA-AN-022	Antenna 762-870MHz 1/2 Wave Whip
TPA-AN-028	Antenna 762-870MHz Helical
TPA-AN-032	Antenna 155-174M Helical

TPA-AN-003
Antenna 150-162MHz Helical

TPA-AN-004
Antenna 162-174MHz Helical

TPA-AN-022
Antenna 762-870MHz 1/2 Wave Whip

Programming Kits

ITEM CODE	DESCRIPTION
T02-00031-0002	Programming/Calibration Kit
T02-00031-0004	Programming/Calibration CD
T02-00031-0005	User Documentation CD
T03-00118-0601	USB to RJ11 Programming Cable
T03-00118-0101	Programming Adaptor
T03-00118-0201	Calibration Adaptor
T03-00118-0202	Calibration Low Pass Filter
TOPA-SV-024	Calibration Box

Section 7

Pricing

7. Pricing

All pricing and discount information will be provided at auction event on January 14th, 2015

Including:

- 7.1 Pricing for items in Product Information Sheets Section 5.6
- 7.2 Pricing for Portable Radio Chargers
- 7.3 Pricing for Mobile Installation and Programming Services
- 7.4 Pricing for Extended Warranty

As Instructed in Section 1.1.7 of the RFP # 207-2014, submitters shall supply a catalog of additional accessories that are available for the radios offered which shows the list price of these accessories. We are presenting the price list of accessories in this section:

- 7.5 Standard Price List of Options and Accessories

2.5 Standard Price List - Options and Accessories Only

P25 Digital Mobile - Options & Accessories

TM9400 - Software Licenses

Item Code	Description of Software Feature Enabler (SFE)		Price
General			
TMAS050	SFE Key - P25 Conventional (CAI included) (TM91/94)	$	464.00
TMAS055	SFE Key - P25 Trunking Service (TMAS050 Prerequisite) (TM91/94)	$	361.00
TMAS051	SFE Key - P25 Administration Services (TM91/94)	$	515.00
TMAS059	SFE Key - MDC1200 Encode/Decode (TM91/94)	$	67.00
TMAS065	SFE Key - Two Tone Decode (TM91/94)	$	77.00
TMAS069	SFE Key - Multi Head Support (TM91/94)	$	309.00
TMAS083	SFE Key - 20/25khz Unrestricted Wideband (TB71/TM81/82/91/93/94) - ***Not available to USA customers***		FOC
TMAS086	SFE Key - Enhanced Channel Capacity (TM94)	$	80.00
TMAS056	SFE Key - P25 User IP Data (TM91/94)	$	130.00
TMAS064	SFE Key - P25 Trunked PSTN Dialing (TM91/94)	$	77.00
TMAS060	SFE Key - Tait Radio API (TM91/94)	$	129.00
Encryption			
TMAS057	SFE Key - DES Encryption & Key Loading (TM91/94)	$	412.00
TMAS058	SFE Key - AES Encryption (TMAS057 Prerequisite) (TM91/94)	$	247.00
TMAS054	SFE Key - P25 Base OTAR (TM91/94)	$	515.00
TMAS063	SFE Key - P25 DLI/Trunked OTAR (TMAS054 Prerequisite) (TM91/94)	$	515.00
GPS			
TMAS015	SFE Key - GPS Enable + Display (TM91/93/94)	$	52.00
TMAS067	SFE Key - GPS Transmission (TMAS015 Prerequisite) (TM91/93/94)	$	77.00

Mobile Control Head Remote Kits

Item Code	Description		Price
T02-00061-2001	TM93/94 Remote Head Upgrade Kit 6m (20ft)	$	250.00
T02-00061-2002	TM93/94 Remote Head Upgrade Kit 12m (40ft)	$	390.00
T02-00061-2003	TM93/94 Remote Head Upgrade Kit 18m (60ft)	$	415.00
T02-00062-2002	TM9400 Dual Remote Head Upgrade Kit 18m (60ft)	$	825.00

Option Boards

Item Code	Description		Price
T02-00007-ABAA	I	$	149.00
T02-00007-BAAA	TM81/82/93/94 RS232 Interface Board (Installation fee will apply)	$	80.00

Microphones & Speakers

Item Code	Description		Price
T02-00004-0101	TM Telephone Handset TDMA	$	620.00
T02-00005-AAAA	TM Standard Microphone TDMA	$	58.00
T02-00005-ABAA	TM Keypad Microphone TDMA	$	157.00
T02-00005-ABBA	TM Keypad Microphone TDMA 3m Curly Cord	$	169.00
T02-00005-ACAA	TM Desktop Microphone TDMA	$	170.00
T02-00005-ADAA	TM Handsfree Microphone TDMA	$	110.00
T02-00005-ADCA	TM Remote PTT + Microphone TDMA	$	137.00
TMAA10-03	TM External Speaker 10W for 25W Radio	$	69.00
TMAA10-06	TM External Speaker 10W for 30-50W Radio	$	69.00
T02-00004-0201	TM Horn Speaker Kit 112dB SPL For 25W Radio	$	176.00
T02-00004-0202	TM Horn Speaker Kit 112dB SPL For 30-50W Radio	$	176.00

Installation Kits

Item Code	Description		Price
T02-00009-0101	Cable Shielded 8 Core with RJ45 Grommet 0.6m (2ft)	$	20.00
T02-00009-0102	Cable Shielded 8 Core with RJ45 Grommet 1.5m (4.92ft)	$	25.00
T02-00009-0103	Cable Shielded 8 Core with RJ45 Grommet 6m (20ft)	$	55.00
T02-00009-0104	Cable Shielded 8 Core Twisted Pair with RJ45 Grommet 12m (40ft)	$	85.00
T02-00034-ABAA	Cable Breakout Telemetry / Horn	$	120.00
TMAA04-05	Cable Ignition Sense 4m (13.12ft)	$	25.00
TMAA03-32	Install Kit Handheld Control Head Remote Breakout Box	$	275.00
TMAA03-01	Install Kit BNC 25W U-Cradle	$	55.00
TMAA03-22	Install Kit BNC 30-50W U-Cradle	$	55.00
TMAA03-23	Install Kit M-UHF 25W U-Cradle	$	55.00
TMAA03-17	Install Kit M-UHF 30-50W U-Cradle	$	55.00
TMAA03-02	Security Cradle	$	99.00
TMAA03-11	Reinstall Kit BNC 25W	$	35.00
TMAA03-20	Reinstall Kit BNC 30-50W	$	35.00
TMAA03-15	Reinstall Kit M-UHF 25W	$	35.00
TMAA03-10	Reinstall Kit M-UHF 30-50W	$	35.00
TMAA11-01	Reinstall Kit x3 sets U-Cradle	$	103.00
TMAA03-14	U-Cradle	$	20.00
TMAA03-18	Install Kit BNC 25W Slide in Cradle	$	65.00

GPS Receivers & Accessories

Item Code	Description		Price
TMAA05-01	GPS Receiver Garmin Flush Mount	$	364.00
TMAA05-02	Magnetic Mount Kit For TMAA05-01	$	39.00
TMAA05-03	Plate Mount Kit For TMAA05-01	$	19.00
TMAA05-04	GPS Receiver Garmin Magnetic Mount	$	399.00
TMAA05-05	GPS Receiver PCTEL Magnetic Mount	$	289.00
TMAA05-06	GPS Receiver PCTEL Through Hole Mount	$	299.00

Desktop Power Supplies

Item Code	Description		Price
TMAA13-22	Desktop Power Supply 23A DC 120V AC US/CAN	$	232.00

Desktop Install Kits

Item Code	Description		Price
TMAA03-06	Install Kit Desktop Power Supply U-Cradle 25W Radio	$	99.00
TMAA03-13	Install Kit Desktop Power Supply U-Cradle 30-50W Radio	$	99.00
TMAA03-09	Install Kit Desktop Power Supply Plinth 25W Radio	$	99.00
TMAA03-12	Install Kit Desktop Power Supply Plinth 30-50W Radio	$	99.00

Programming Kits

Item Code	Description		Price
T02-00031-0002	P25 Terminals Programming & Calibration Kit	$	330.00
T02-00031-0004	P25 Terminals Programming & Calibration CD	$	25.00
T02-00031-0006	TM94/TP94 User Documentation CD	$	10.00
T02-00031-0007	TM93/94 Service Kit	$	433.00
TMAA20-02	Adaptor RJ45 to DB9 Adaptor	$	18.00
TMAA20-03	Cable 25W Radio Power Connector to Banana Plug	$	56.00
TMAA20-04	Adaptor RJ12 Socket/RJ45 Plug	$	25.00
TMAA21-01	Cable DB15 Socket/RJ45 Plug	$	35.00

P25 Digital Portable - TP9400 Options & Accessories

TP9400 - Software Licenses

Item Code	Description of Software Feature Enabler (SFE)		Price
General			
TPAS050	SFE Key - P25 Conventional (CAI Included) (TP91/94)	$	464.00
TPAS055	SFE Key - P25 Trunking Services (TPAS050 Prerequisite) (TP91/94)	$	361.00
TPAS051	SFE Key - P25 Administration Service (TP91/94)	$	515.00
TPAS059	SFE Key - MDC1200 Encode/Decode (TP91/94)	$	67.00
TPAS065	SFE Key - Two Tone Decode (TP91/94)	$	77.00
TPAS083	SFE Key - 20/25khz Unrestricted Wideband (TP91/93/94) - ***Not available to USA customers***		FOC
TPAS086	SFE Key - Enhanced Channel Capacity (TP94)	$	80.00
TPAS082	SFE Key - Bluetooth (/94)	$	120.00
TPAS056	SFE Key - P25 User IP Data (TP91/94)	$	130.00
TPAS064	SFE Key - P25 Trunked PSTN Dialling (TP91/94)	$	77.00
TPAS060	SFE Key - Tait Radio API (TP91/94)	$	129.00
Encryption			
TPAS057	SFE Key - DES Encryption & Key Loading (TP91/94)	$	412.00
TPAS058	SFE Key - AES Encryption (TPAS057 Prerequisite) (TP91/94)	$	247.00
TPAS054	SFE Key - P25 Base OTAR (Conventional) (TP91/94)	$	515.00
TPAS063	SFE Key - P25 DLI/Trunked OTAR (TPAS054 Prerequisite) (TP91/94)	$	515.00
GPS			
TPAS015	SFE Key - P25 GPS Enable + Display (TP91/93/94)	$	52.00
TPAS067	SFE Key - GPS Transmission (TP91/93/94)	$	77.00

Batteries

Item Code	Description		Price
T03-00011-AAAA	TP81/93/94 Battery - Standard Li-Ion 1880mAh	$	88.00
T03-00011-CAAA	TP81/93/94 Battery - Performance Li-Ion 2400mAh	$	108.00
T03-00011-FAAA	TP81/93/94 DC Service Adaptor	$	98.00

Chargers

Item Code	Description		Price
T03-00012-AEAA	TP81/93/94 Charger Single Fast Li-Ion US/CAN Plug Pack	$	77.00
T03-00013-AEAA	TP81/93/94 Charger Multi Li-Ion Wall Kit US/CAN Mains Cable	$	700.00
T03-00014-AAAA	TP81/93/94 Vehicle Charger Battery Only	$	130.00
T03-00055-AAAA	TP81/93/94 Vehicle Charger	$	240.00

Audio Accessories - Speaker Microphones

Item Code	Description		Price
T03-00045-ADAA	TP81/93/94 Speaker Microphone Pro Series IP54 TDMA E-Button 3.5mm Jack	$	134.00
T03-00045-BFAA	TP81/93/94 Speaker Microphone Evolution TDMA IS(FM) E-Button 2.5mm Jack	$	199.00
T03-00045-CFAA	TP81/93/94 Speaker Microphone Storm IP68 TDMA IS(FM) E-Button 2.5mm Jack	$	229.00
T03-00045-DMAA	TP81/93/94 Speaker Microphone Genesis IP68 TDMA E-Button	$	299.00

Audio Accessories - Ear Pieces

Item Code	Description		Price
T952-051	Earphone In-Ear 2.5mm IS(FM)	$	65.00
TPA-AA-214	Earpiece Quick Disconnect Acoustic Tube - Set of 5	$	54.00
TPA-AA-215	Flexible Open Ear Insert - Left Ear Small	$	16.00
TPA-AA-216	Flexible Open Ear Insert - Left Ear Medium	$	16.00
TPA-AA-217	Flexible Open Ear Insert - Left Ear Large	$	16.00

TPA-AA-218	Flexible Open Ear Insert - Right Ear Small	$	16.00
TPA-AA-219	Flexible Open Ear Insert - Right Ear Medium	$	16.00
TPA-AA-220	Flexible Open Ear Insert - Right Ear Large	$	16.00
T952-055	Earhanger 2.5mm	$	37.00
T03-00120-AAAD	Eartube In-Ear 2.5mm	$	19.00
T03-00120-AAAE	Eartube In-Ear 3.5mm	$	19.00
T03-00120-BAAD	Earhook 2.5mm	$	11.00
T03-00120-BAAE	Earhook 3.5mm	$	11.00
T03-00120-FAAD	Eartube Earhook 2.5mm	$	19.00
T03-00120-FAAE	Eartube Earhook 3.5mm	$	19.00
T03-00120-GAAD	Earhook Transparent Hi-Volume 2.5mm	$	11.00
T03-00120-GAAE	Earhook Transparent Hi-Volume 3.5mm	$	11.00
T03-00120-HAAD	Earphone Transparent D-Ring Hi-Volume 2.5mm	$	11.00
T03-00120-HAAE	Earphone Transparent D-Ring Hi-Volume 3.5mm	$	11.00

Carry Case - Heavy Duty Leather

Item Code	Description		Price
T03-00038-0004	TP93/94 Carry Case Heavy Duty Leather 4Key D-Stud Belt Loop	$	62.00
T03-00038-0005	TP93/94 Carry Case Heavy Duty Leather 4Key Spring Clip	$	54.00
T03-00038-0006	TP93/94 Carry Case Heavy Duty Leather 4Key Belt Loop	$	48.00
T03-00038-0007	TP93/94 Carry Case Heavy Duty Leather 16Key D-Stud Belt Loop	$	62.00
T03-00038-0008	TP93/94 Carry Case Heavy Duty Leather 16Key Spring Clip	$	54.00
T03-00038-0009	TP93/94 Carry Case Heavy Duty Leather 16Key Belt Loop	$	48.00

Carry Case - Soft Leather

Item Code	Description		Price
T03-00038-0020	TP93/94 Carry Case Soft Leather 4Key Use Battery Belt Clip	$	33.00
T03-00038-0021	TP93/94 Carry Case Soft Leather 16Key Use Battery Belt Clip	$	33.00

Carry Case - Nylon

Item Code	Description		Price
T03-00038-0013	TP93/94 Carry Case Nylon 4Key D-Stud Belt Loop	$	51.00
T03-00038-0014	TP93/94 Carry Case Nylon 4Key Belt Loop	$	36.00
T03-00038-0015	TP93/94 Carry Case Nylon 4Key Use Battery Belt Clip	$	36.00
T03-00038-0016	TP93/94 Carry Case Nylon 16Key D-Stud Belt Loop	$	51.00
T03-00038-0017	TP93/94 Carry Case Nylon 16Key Belt Loop	$	36.00
T03-00038-0018	TP93/94 Carry Case Nylon 16Key Use Battery Belt Clip	$	36.00
T03-00038-0025	TP93/94 Carry Case Nylon Orange 4Key Use Battery Belt Clip	$	36.00
T03-00038-0026	TP93/94 Carry Case Nylon Orange 16Key Use Battery Belt Clip	$	36.00

Carry Case - Accessories

Item Code	Description		Price
T03-00038-0022	TP8/9 Belt Loop For D-Stud 55mm	$	19.00
T03-00038-0023	TP8/9 Spring Clip For D-Stud 40mm	$	19.00
TPA-CA-201	TP8/9 Belt Clip 55mm	$	10.00
TPA-CA-207	TP8/9 Belt Loop For D-Clip 75mm	$	19.00

Antenna

Item Code	Description		Price
TPA-AN-001	TP8/9 Antenna 136-225MHz Helical Tunable	$	20.00
TPA-AN-002	TP8/9 Antenna 136-151MHz Helical	$	20.00
TPA-AN-003	TP8/9 Antenna 150-162MHz Helical	$	20.00
TPA-AN-004	TP8/9 Antenna 162-174MHz Helical	$	20.00
TPA-AN-010	TP8/9 Antenna 380-420MHz Whip	$	20.00
TPA-AN-011	TP8/9 Antenna 400-470MHz Whip	$	20.00
TPA-AN-012	TP8/9 Antenna 450-520MHz Whip	$	20.00
TPA-AN-013	TP8/9 Antenna 400-470MHz Helical	$	20.00
TPA-AN-015	TP8/9 Antenna 450-520MHz Helical	$	20.00
TPA-AN-028	TP8/9 Antenna 762-870MHz Stubby	$	20.00
TPA-AN-022	TP8/9 Antenna 762-870MHz ½ Wave Whip	$	20.00
TPA-AN-027	TP8/9 Antenna 380-420MHz Helical	$	20.00
TPA-AN-032	TP9 Antenna 155-174MHz Helical	$	20.00
TPA-AN-033	TP8/9 Antenna 136-174MHz Helical	$	80.00

Antenna - Kit

Item Code	Description		Price
TPA-AN-005	TP8/9 Antenna VHF Selection Kit	$	46.00
TPA-AN-016	TP8/9 UHF Antenna Selection Kit	$	77.00

Programming Kits

Item Code	Description		Price
T02-00031-0002	P25 Terminals Programming Kit with Programming & Calibration CD	$	330.00
T02-00031-0004	P25 Terminals Programming & Calibration CD	$	25.00
T03-00118-0601	USB to RJ11 Programming Cable	$	99.00
T03-00118-0101	TP81/93/94 Programming Adaptor	$	36.00
T03-00118-0201	TP81/93/94 Calibration Adaptor	$	41.00
T03-00118-0202	TP81/93/94 Calibration Low Pass Filter	$	15.00
TOPA-SV-024	Terminals Calibration Box	$	143.00

Tait Enable Protect: P25 Security - Key Fill Device (KFD)

Key Fill Device (KFD)

Item Code	Description		Price
TPA-SV-023	P25 Standard Key Fill Device - Universal Power Supply Yellow	$	7,000.00

TPA-SV-920	XTS5000 Encryption Key Fill Adaptor Tait KFD	$	773.00
TPA-SV-921	XTL5000 Encryption Key Fill Adaptor Tait KFD	$	773.00
TE1002-BA00-0000-AAAA-10	KFD IP65 yellow- standard key fill - 1 year maintenance	$	7,350.00
TE1002-BB00-0000-AAAA-10	KFD IP68 grey - standard key fill - 1 year maintenance	$	8,400.00
TE1002-BA00-0000-ABAA-10	KFD IP65 yellow - fast key fill - 1 year maintenance	$	6,150.00
TE1002-BB00-0000-ABAA-10	KFD IP68 grey - fast key fill - 1 year maintenance	$	7,200.00
TE1002-BA00-0000-ACAA-10	KFD IP65 yellow - standard key fill with fast key fill compatibility - 1 year maintenance	$	8,250.00
TE1002-BB00-0000-ACAA-10	KFD IP68 grey - standard key fill with fast key fill compatibility - 1 year maintenance	$	9,300.00

KFD - Accessories

Item Code	Description		Price
TE1002-00AA-0000-0000-10	Anti-Reflective Screen Protector	$	87.00
TE1002-00AB-0000-0000-10	Deluxe carry case	$	166.00
TE1002-00AC-0000-0000-10	Vehicle charging kit	$	201.00
TE1002-00AD-0000-0000-10	Stylus	$	78.00
TE1002-00AE-0000-0000-10	Large Battery pack	$	966.00
TE1002-00AG-0000-0000-10	Juno Serial cable	$	245.00
TE1002-00AF-0000-0000-10	Micro SD Card	$	27.00
TE1002-00AH-0000-0000-10	TP M9100 TP/M9400 TB9100 Encryption capable Motorola KVL Adaptor	$	571.00
TE1002-00AJ-0000-0000-10	Tait KFD Encryption Key Fill Adaptor (Motorola radios XTS5000 special config XTL5000 APX7	$	135.00

KFD - License

Item Code	Description		Price
TKAS030	Key Fill Device SFE - Fast Key Fill	$	927.00
TKAS035	Key Fill Device SFE - Standard Key Fill (TE1002)	$	1,705.00
TKAS036	Key Fill Device SFE - Fast Key Fill (TE1002)	$	731.00
Item Code	**Description**		**Price**
TKSM030	Software Maintenance - Fast Key Fill	$	47.00
TKSM035	Software Maintenance - Standard Key Fill (TE1002)	$	85.00
TKSM036	Software Maintenance - Fast Key Fill (TE1002)	$	36.00

Tait Enable Protect: P25 Security - Tait Advanced System Key (TASK)

TASK

Item Code	Description		Price
TMAA23-03	TASK Starter Kit - x 1 Prime Key x3 Pass Keys	$	1,400.00
TMAA23-04	TASK Prime Key	$	650.00
TMAA23-05	TASK Pass Key	$	250.00

TASK - System Key

Item Code	Description		Price
TMAA23-10	System Key CD P25 Trunked	$	23.00

Addendums

Lexington-Fayette Urban County Government
DEPARTMENT OF FINANCE & ADMINISTRATION

Jim Gray
Mayor

William O'Mara
Commissioner

ADDENDUM #1

Bid Number: **#207-2014**

Date: December 29, 2014

Address inquiries to:
Todd Slatin
(859) 258-3320

Subject: Public Safety Radio System Subscriber Units

TO ALL PROSPECTIVE SUBMITTERS:

Please be advised of the following clarifications to the above referenced Bid:

1. "Batch cloning of radios" as listed in system compatibility section of 1.1.2 Mobile Radio. Trunked radios require an individual ID so they can't be cloned in batches. Please define further what is desired here.
   This is an oversight on our part. It is understood that trunked radios require an individual ID and programming.
2. How will the auction work? Will each vendor be requested to bid only one model of radio per user group as defined in 1.1.1 "Overview"?
   It is intended that the vendor will limit the radio offering to the models that were submitted for testing under RFI 6-2014. There should be one radio per vendor per defined radio group which are listed in Section 1.1.7.
3. For "public service" radios, will AES encryption be required like in the other "public safety" user groups?
   The option for AES encryption is required. AES encryption may be purchased with some public service radios.
4. Are there any additional costs to participate in the auction other than those bore by the winner of the auction as described in the bid packet?
   There is no cost to participate.
5. Will Buy-Rites fee structure also include awards for labor costs associated w/ programming and installation of radios?
   Yes, the fee will be based on the total amount of the Purchase Order.

6. Will LFUCG be using credit cards or procurement cards in the payment of invoices received for this project? If so, what are the fees charged by these credit card companies to the vendors?
   Purchase Orders will be used.
7. Will there be a specific set of specifications for each of the four user groups described? For example, for commander level radios it states in the bid spec "these radios may have additional features available including multi-band operation". If this is desired it will have to be known prior to the auction.
   A list of requirements/features for each level of radio is provided in Section 1.1.7. It is intended that the Command Level Radio will operate in the 700/800MHz frequency band and the VHF frequency band at a minimum.

Todd Slatin, Director
Division of Central Purchasing

All other terms and conditions of the Bid and specifications are unchanged.
This letter should be signed, attached to and become a part of your Bid.

COMPANY NAME: Tait North America, Inc.

ADDRESS: 15342 Park Blvd., Houston, Texas 77084

SIGNATURE OF BIDDER: _____

Lexington-Fayette Urban County Government
DEPARTMENT OF FINANCE & ADMINISTRATION

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