Tait P25 products

Encryption Key Loading Guide

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Introduction

The encryption and decryption of radio voice communications requires the use of encryption keys. Tait mobiles and portables provide a standard P25 key-fill interface for the loading of encryption keys. Currently, Tait recommends using the Motorola KVL3000+ key fill device for this task. First you enter into the KVL3000+ the encryption keys required, and then you connect the KVL3000+ to each radio in turn, loading one or more keys into it. If your system has P25 Console Gateways, they must also be supplied with encryption keys, as they are an encryption and decryption point.

This guide gives an overview of encryption and supplements the KVL3000+ documentation with information on how to use the KVL3000+ with Tait equipment.

For instructions on how to use the KVL3000+, see the KVL3000+ User's Guide.

Equipment Required

- Motorola KVL3000+ key fill device with the following:
    - battery
    - charger
    - user's guide
    - option for ASTRO P25 mode
    - option for ASN mode (required for operation in ASTRO P25 mode)
    - option for DES/DES-XL/DES-OFB encryption.
    - option for AES encryption (if you plan to use AES encryption)
- Tait 9000 series to KVL3000+ adapter (TPA-SV-020). This includes a cable for connecting to the KVL3000+.
- Cabling for connecting the adapter to the radio.

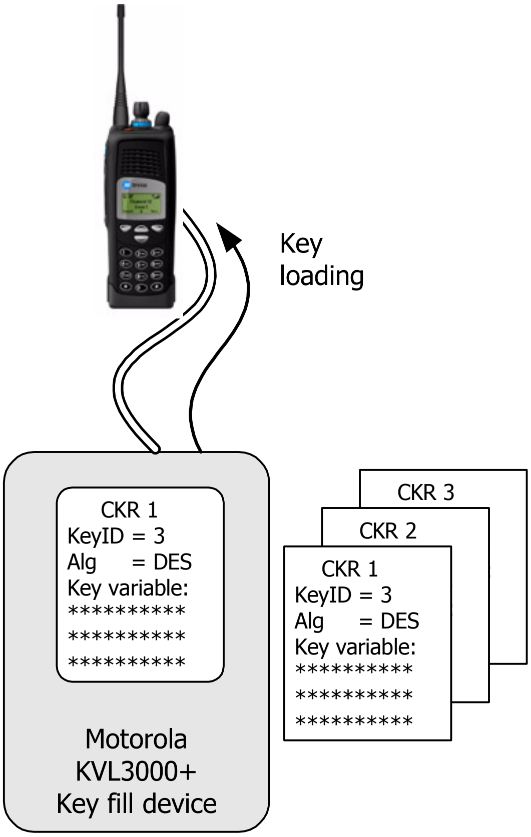
Note Tait TM9100/TP9100 radios and P25 Console Gateways require the Base encryption feature license. This license enables P25-compliant DES encryption. With mobiles and portables you must obtain the license before loading encryption keys. An additional license is required to enable AES encryption.

Encryption Overview

When you enter a key into the KVL3000+, you need to specify a Common Key Reference (CKR). This is the reference number for a set of secure key data.

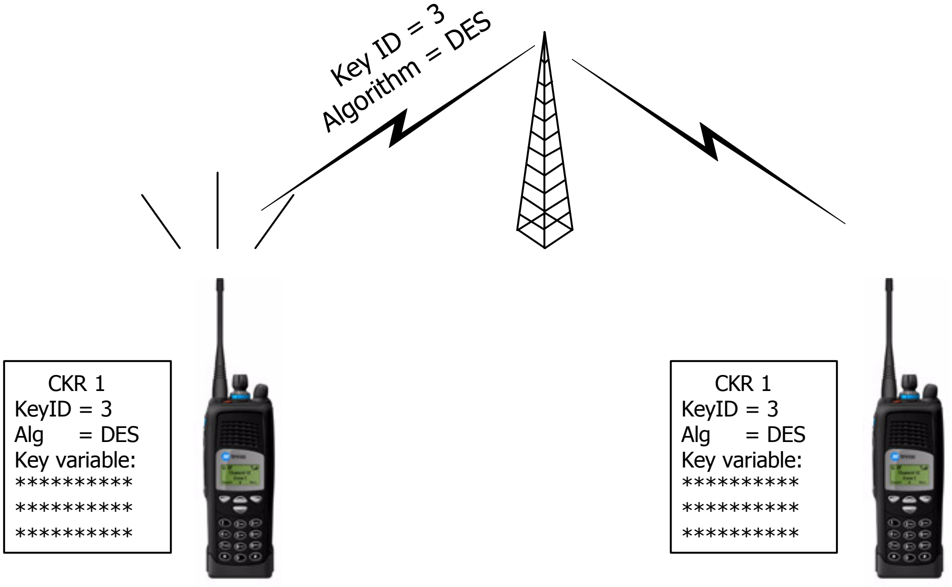
This key data consists of the following information:

- Key ID, used to identify the key over the air to the device decrypting the call.
- Algorithm ID, which specifies which encryption algorithm is to be used (DES-OFB or AES).
- Key variable, a multi-digit number that the crypto-module uses when encrypting and decrypting.



In addition, the Tait TM9000/TP9000 programming software (for mobiles and portables) or Customer Service Software (for the P25 Console Gateway) gives each CKR a name. Only the CKR is visible to the software.

When a radio makes an encrypted call, it includes in the call the Key ID and the Algorithm ID that it used. If the receiving radio has the same key, it can decrypt the call. The Key ID that it received tells it what key to use and the Algorithm ID tells it the encryption algorithm to use.



Entering Encryption Keys

Note Before encryption keys are entered, your organization should have developed a policy and procedures for encryption key management. This will answer questions such as "How many keys will be needed?" "How will re-keying occur?" and "How and when will users change from one key to another?"

Enter into the KVL3000+ all the keys that your system will need, following the instructions for ASTRO 25 operation in the KVL3000+ User's Guide.

Important Make sure that you follow your organization's security policy when handling keys. If encryption information falls into unauthorized hands, the security of voice communications could be compromised.

- The CKR can be any number from 1 to 4095. For example, if all radios will use the same keys, you can use 1–16 as the CKR numbers. If you need two groups of keys, use 1–16 for the first group and 17-32 for the second group.
- The Key ID can be any hexadecimal number 0–FFFF.
- For DES encryption, you must select DES-OFB. OFB (Output Feedback mode) is the only DES mode specified by the P25 common air interface.
- For DES encryption, the key variable is an 8-octet number, for example 01 23 45 67 89 AB CD EF. An octet is two hexadecimal

numbers. Each octet must have odd parity (an odd number of 1s in the binary number).

- For AES encryption, enter a key variable of the required length. There are no parity restrictions. For example, enter 32 octets for AES 256.

Important Once you have entered a key variable into the KVL3000+, you can no longer view it.

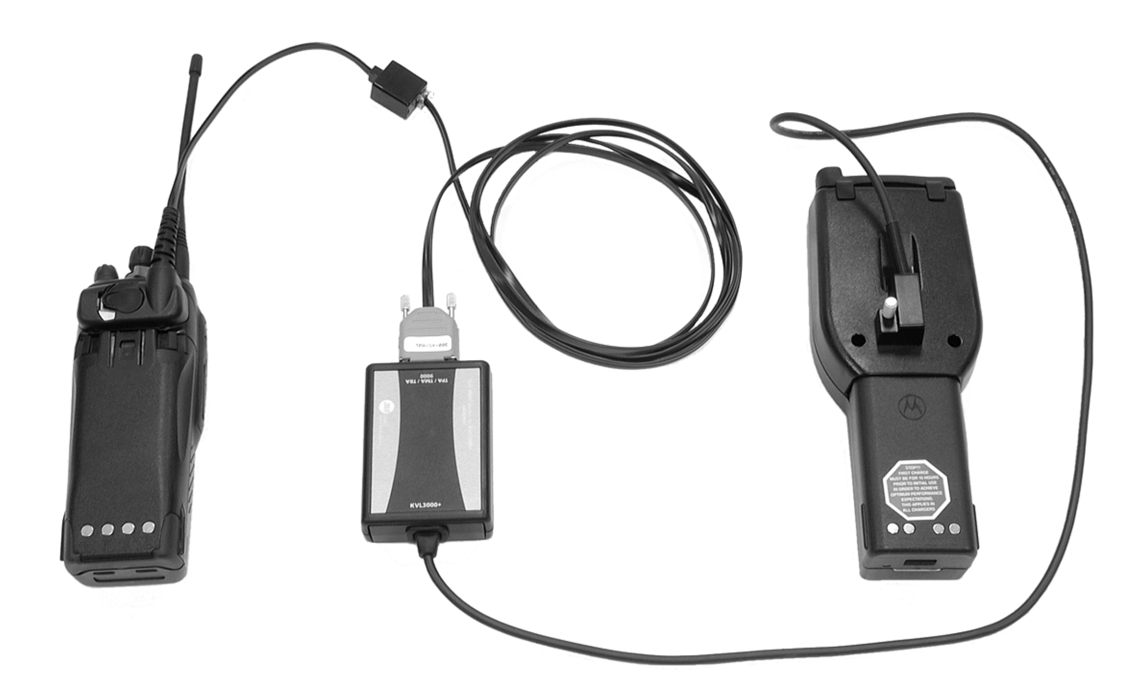
The KVL3000+ also lets you group keys into key groups for easier loading or zeroize keys you no longer want to use.

Connecting the KVL3000+ to the Target Device

1. Connect the cable attached to the Tait adapter to the keyload port on the back of the KVL3000+. (This cable provides power from the KVL3000+ to the adapter.)

2. Connect the other end of the adapter to the target device using the appropriate cabling.
   - For a TM9100 mobile, connect a TPA-SV-006 programming lead (9-pin to RJ12) to the programming (microphone) port.
   - For a TP9100 portable, you need the above programming lead and a TPA-SV-007 cable (RJ12 to TPA) as well.
   - For a P25 Console Gateway, connect an ordinary DB9 to DB9 extension cable to the connector marked DIG at the rear of the gateway module.

Figure 1 Connecting the KVL3000+ to a TP9100 Portable



Loading Keys

1. With Tait mobiles and portables, wait for the display ‘Keyloading mode.’ With P25 Console Gateways, wait for the control panel LEDs to all go on.

2. Following the instructions in the KVL3000+ user’s guide, load the desired keys into the target device. Tait P25 equipment can store up to 16 keys. You can use the KVL3000+ to load a single key, a key group, or all the keys it has.

3. When you are finished, disconnect the adapter. This takes mobiles and portables out of Keyloading mode. If the target device is a P25 Console Gateway, it automatically resets.

Supported KVL3000+ Tasks

The following table indicates which KVL3000+ tasks can be carried out on Tait target devices. These tasks must be carried out in ASTRO P25 mode. (The KVL3000+ has two operational modes, ASTRO P25 and ASN. Only ASTRO P25 mode applies to Tait equipment.)

KVL3000+ Task	Supported by Tait Equipment?
Load a key	Yes
Load a group of keys	Yes
Load all keys	Yes
Zeroize a keys	Yes
Zeroize a group of keys	Yes
Zeroize all keys	Yes
View keys[a]	Yes
View/Load OTAR parameters	No
Change Keyset[b]	No
Store and forward keys that have been downloaded from a Key Management Facility	No

[a] This task can only display information about loaded keys, not the key variables themselves.

[b] Tait equipment operates with a single keyset

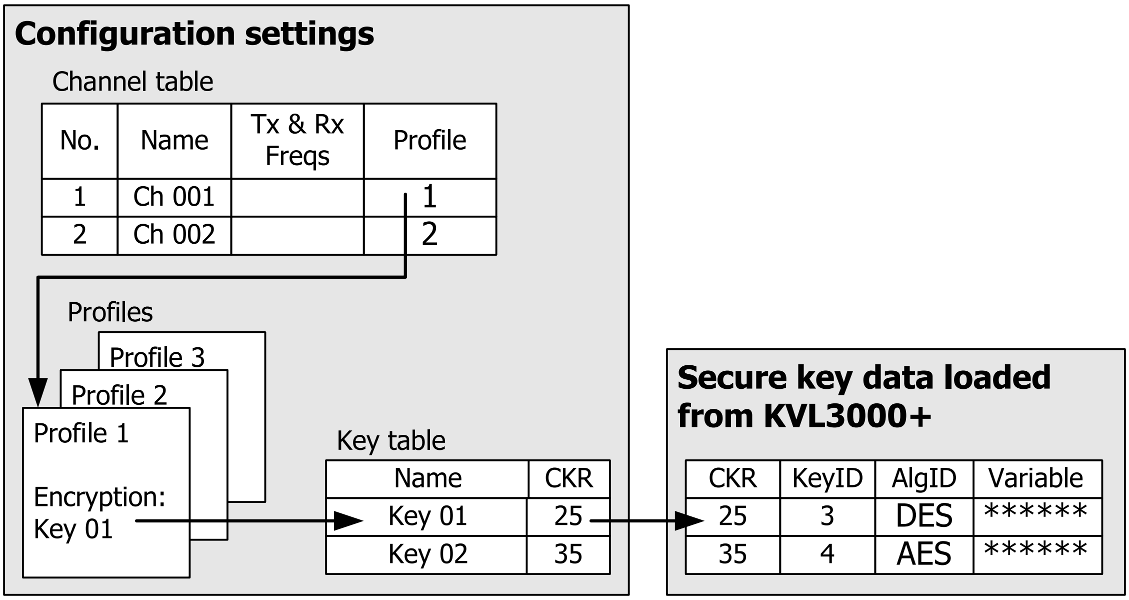
Configuring Encryption Operation

In addition to loading secure key data into the Tait P25 equipment, you need to configure the way the equipment uses these keys. Configuration settings refer to keys by name, so before you can select a key, you must give it a name.

Because the secure key data is invisible, you have to name keys by mapping a name to a CKR number. This is done in a Keys table. You add a row for each key and ensure that each row contains a suitable name and CKR.

Once you have a set of named keys, you can choose which one to assign to each channel profile (mobiles and portables) or calling profile (P25 Console Gateway) that supports encryption.

When the equipment encrypts a call, its default operation is to look in the current profile for the key name, and then to read the CKR number corresponding to that name. The CKR number tells it where to go in the secure key data storage area to obtain the encryption key data it needs.



Configuration settings

Channel table

No.	Name	Tx & Rx Freqs	Profile
1	Ch 001		1
2	Ch 002		2

Profiles

Profile 3

Profile 2

Profile 1

Encryption:
Key 01

Key table

Name	CKR
Key 01	25
Key 02	35

Secure key data loaded from KVL3000+

CKR	KeyID	AlgID	Variable
25	3	DES	******
35	4	AES	******

This indirect way of referring to keys by name makes it possible to update keys without changing the configuration. You simply use the key fill device to load different secure key data using the same CKR numbers.

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