Technical Note TN-1896-SR

APCO P25 Terminal Firmware v7.84.02 and PC App v1.8.0.9

25 March 2013

This Technical Note applies to the Firmware used in the TM9100 mobile and TP9100 portable APCO P25 radios.

1. Introduction

APCO P25 SU Firmware **v7.84.02.0013** has been released to replace the previous commercial APCO P25 SU Firmware v7.81.05 (see TN-1836-SR).

Note: Because of the extensive feature additions, customers should confirm suitability of this release via trials and limited deployment before considering large-scale field deployment.

Compatibility

This Firmware is compatible with:

- TM9000/TP9000 P25 Programming Application **v1.8.0.9** (or later).
- TM9000/TP9000 Common Calibration Application **v2.3.0.123** (or later).

Also available on CD as part number T02-00031-0004.

References

- TN-1234-AN TM8000, TM/TP9000 Firmware Upgrade Process
- TN-1283c APCO Terminals Upgrade and Downgrade Paths

2. What's new in this Release

Service Hunt Changes

This Firmware incorporates a number of hunting changes from earlier releases.

- The site quality is now determined using a new algorithm that weights the RSSI measurement for a site with data relating to the message error rate. A high signal strength – but poor quality signal – will not be deemed a good site.
- This removes the need to blacklist sites – except for one condition where a Control Channel is not responding to the radio uplink requests. This stops the radio 'spamming' ineffectual retries.
  Note that this does not affect systems with single sites as the terminals will recognise the frequency and site information previously captured.
- Hunting will remember previously listed adjacent sites (TIMS 99628).

Mixed Mode Scanning

Mixed mode scan essentially provides the ability to add up to (5) conventional (Analog or P25) channels to a trunked talkgroup scan group.

The radio will monitor the control channel and traffic channel (while in a call) for other talkgroup identities. It will also scan for signals on the conventional channels that are members of the group.

Vote Within Scan

This release includes new capability to permit the inclusion of up to two vote groups within standard or background scan groups.
Vote groups (composed of conventional channels) can be added at programming time or by the user editing the scan group during operation.
There are two configurations; vote groups can either be:

- added to standard or background scan groups and will appear and behave like a normal member channels, or
- excluded from the group, in which case if the user selects a vote group while background scan is active, the radio will leave the group and operate on the vote group separately(SC2086, Focus47587 and TIMS96109).

MDC1200 Emergency Acknowledge

Instituted MDC1200 Emergency Acknowledge functionality to stop emergency call-outs on reception of emergency acknowledgement from a despatcher using MDC1200 signalling (SC 6148 TIMS 100254).

3. Overview of Mixed Mode Functionality

Group Affiliation

The radio will initially affiliate with the talkgroup through which talkgroup scanning was activated from, which essentially becomes the 'home talkgroup'. If the home channel is conventional the radio will affiliate with the first talkgroup on the scan group member list.

The radio will affiliate with another talkgroup only if an attempt is made to transmit on a captured group call. Once the group call has ended, the radio will return to the control channel and affiliate with the home talkgroup.

Group Call termination

The radio will stay on the traffic channel until a call termination data unit (LC_CALL_TERM_CAN) is received. The radios will then return to the control channel and continue to monitor it for group voice channel grants and updates.

Encrypted/Clear Talkgroups

The radio supports both encrypted and clear talkgroups/channels when in talkgroup scanning mode.

Supplementary Services

The radio supports all supplementary services i.e. message, status updates and call alerts during talkgroup scanning and extended function commands such as radio inhibit/uninhibit.

Prioritising Calls

The table below shows the prioritising of different call types when in talkgroup scanning mode.

Priority (Highest to Lowest)	Call type
1	Transmitting call
2	Emergency group/individual calls
3	System calls
4	Individual calls
5	Priority group calls
6	Group/Supergroup calls
7	Announcement group calls

Emergency Call

An emergency call will take precedence over all other call types.
An emergency alert is indicated to the user.

System Call

A system call is from the network administrator of an FNE. The radio will always obey grants and updates for this type of call in talkgroup scanning mode, unless an emergency call is currently in progress.

Individual Call

Individual calls take precedence over group calls.

Supergroup Call

The radio complies with patch operations as per the proprietary Motorola 'Group regrouping' protocol when in talkgroup scanning mode.

Announcement Group Call

A radio can make a call to an announcement group where it can address a collection of different talkgroups.
These calls have the lowest priority when in talkgroup scanning mode.

Pre-emption of Calls

A radio participating in a group call monitors the link control messages to check for activity on other groups as mentioned above.

On receipt of a valid link control group voice update message, i.e. an update for a talkgroup(s) that the radio is a member of and is of a higher priority than the current talkgroup, the radio will pre-empt the current lower priority channel and switch to monitor the priority channel as specified by the message. Conventional channels cannot be pre-empted.

The radio will ignore call updates received via link control if the call is of a lower priority than the call currently in progress.

Basic Operation

The basic functionality of the radio with talkgroup scanning activated is detailed below.

On control channel

When there are no calls in progress, the radio will stay on the control channel and monitor it for group voice channel grants, updates and individual call messages. Also the radio will scan any conventional channels in the scan group member list for activity.
On receipt of any of these call messages or activity on conventional, it performs a 'priority check' as per the table on page 2 and the appropriate higher priority call is chosen and set up accordingly.

On a trunked traffic channel

If the radio is on a traffic channel and participating in a call, it will monitor link control messages for other calls.
Every call undergoes the priority check and if it is of a higher priority than the current call, the radio will leave and setup the new call as appropriate.

Out of service
No control channel

The radio performs an extended hunt when there is no service available.
On successfully acquiring a new control channel, the radio will resume talkgroup scanning. The radio will continue to scan conventional channels.

On a conventional channel

If the radio is on a conventional traffic channel it will stay on this channel until the voice transmission is over and then return to the control channel.

4. Problems Resolved

Problems resolved since Firmware v7.81.05

- Radio was transmitting back with the incorrect encryption key when 'Channel to Respond On' was set to 'Selected' (TIMS 100259).

MDC1200

- Increased the preamble from 24 to 56 bits and removed the extra data that was being added to the end of the MDC1200 transmission and minor improvements around MDC1200 Encode and Decode (TIMS 99349).

GPS

- Corrected an issue where the terminal might ignore GPS data from a receiver if the GPS data output sentences weren't already present when the terminal powered-on (TIMS 100149).
- If attempts to send GPS positions are made - without a GPS encryption key being enabled in the terminal - the display will now pop-up 'GPS key fail' on the first line and the GPS encryption key's name/label on the second line. Previously it would only show 'keys not found' or 'cannot transmit' (TIMS 93845).
- Support has been included for future use of GPS sentence GPGGA for altitude (TIMS 100150).

PC App v1.8.0.9

- TM/TP9100 PC App v9.27 had an issue where clicking on the scroll bar on the right hand side of the control channel table in an attempt to scroll to the bottom of the control channel list would cause the application to report 'An unexpected error has occurred. The application will now close' (Focus 48750, TIMS 100250).
- TM/TP9100 PC App v9.27 would crash if a SFE Key was imported that had an incorrect extension where earlier applications (e.g. v6.19) would accept the incorrectly suffixed key. PC App v1.8.0.9 will now display 'Cannot open selected file. Invalid Filename.' (SC 6122, TIMS 100231).

Known Problems or Limitations

Firmware **v7.84.02.0013** has the following known limitations:

- Audio bursts may occur during Priority Scan if the Priority channel signal has an incorrect sub-audible (TIMS 100330).
- The Mic Sensitivity Level on the UI PREFERENCES page is not functional unless Enhanced ALC is ticked in each CHANNELS > ADVANCED page. We recommend users activate Enhanced ALC with a setting of '3' in order to gain acceptable audio performance. An enhancement to make this the default has been raised.
- From the Vote-In-Scan implementation - Vote Groups are not displayed in the Edit Groups or View Member lists in the radio menu (TIMS 98347).
- If a datafile profile in a PC App is created using 'Repeat' and the transmit mode is changed e.g. Analog to Digital – Some of the analog only features may still be enabled even if grayed-out. This will cause terminals to reset if those invalid features are initiated. To resolve, un-gray invalid fields and untick configurations (TIMS 99564).
- This release does not support dual-torso single-head configurations to a commercial level.

Important Information

- Once Firmware has been upgraded from **v3.08** (or earlier) to **v4.00** (or later) it's not possible to downgrade to v3.08 again. Refer to TN-1283.
- Radios must have the **32Mbit** flash IC fitted. 16Mbit versions won't support this. To determine if the radio has a 32Mbit Flash IC:
  - Using a suitable terminal application, place in CCTM Mode (^%%)
  - Send CCTM Command 139 <Enter>
- If the response is "(CO1)", the connected radio does not have a 32Mbit Flash fitted
- If the response is either 7FFFFFFFFFFFFFF or FFFFFFFFFFFFFE the radio does have a 32Mbit Flash.
- When upgrading to **v7.84.02** you must ensure you follow the information in TN-1234-AN - TM8k, TM9k and TP9k Firmware Upgrade Process. The radio must have its existing Programming and Calibration datafiles read in order to be re-programmed at the conclusion of the upgrade. Please contact your local support center for any additional information or assistance.

5. Publication Information

Related Documentation

- TN-1234-AN – TM8k, TM9k and TP9k Firmware Upgrade Process
- TN-1283c – APCO Terminals Upgrade and Downgrade Paths
- TN-1842 – FCC Narrowbanding Overview

First Serial Numbers

The first production TP9100 Portable with Firmware v7.84.02 is **TBA**.
The first production TM9100 Mobile with Firmware v7.84.02 is **TBA**.

Compliance Issues

None.

Compatibility Issues

None.

CSO Instruction

Advise service and sales staff of the release.

Confidentiality

Distribution Level

Associate.

Document History

Issue	Date	Description	Author
–	25 March 2013	First release	G. Brenchley