TELEX
RADIO DISPATCH PRODUCTS

Application Guide

Tait P25
Interface for IP-224

VOIProven

TELEX
Radio Dispatch

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CLAIMS

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WARNING

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Do not open the unit. No user serviceable parts are contained within. Bosch cannot be responsible for damage. If the unit is opened, the warranty can be voided.

OPENSSL PROJECT

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/). This product includes cryptographic software written by Eric Young (eay@cryptosoft.com). This product includes cryptographic software written by Tim Hudson (tjh@cryptsoft.com).

Table of Contents

1.0 Introduction

The Tait P25 radio interface is designed as an add-on option in the Telex Radio Dispatch system. This application guide describes the Telex Radio Dispatch Tait P25 feature set and how to configure the interface for the IP-224 and C-Soft.

NOTE: For more information, see the IP-224 Technical Manual (P/N F.01U.218.562), the C-Soft Software Console Administrator's Guide (P/N F.01U.218.561), and the radio manufacturer's technical documentation.

2.0 Hardware Requirements

- IP-224 Ethernet Adapter Panel (P/N F.01U.306.547)
- IP-224 to Tait P25 and DMR Interface Cable (P/N F.01U.306.543)
- Tait TM91xx or TM94xx P25 Radio

NOTE: See IP-224 Firmware Release Notes for the radio firmware revision tested.

3.0 Software Requirements

- C-Soft version 6.500 or later
- IP-224 version 2.300 or later
- IP-224 Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key
- Telex System Manager (TSM) 2.300 or later
- Windows 7 (32-bit or 64-bit)
- Windows 8.1
- Windows 10
- Tait TM9100/TM9400/TP9400 Programming Application
- Tait TMAS060 Tait Radio API Optional Feature

NOTE: This is necessary to enable CCDI communications to allow the IP-224 to serially control the radio.

- Tait TMAS051 P25 Administrator Services Optional Feature

NOTE: This is only necessary to enable Admin Services for Radio Check, Radio Disable, Radio Enable, Radio Remote Monitor, and Radio Status Request.

- Tait TMAS059 MDC1200

NOTE: This is only necessary if the Tait radio is responsible for serially sending MDC1200 ANI Decode information to the IP-224.

- Tait TMAS092 5-Tone Selcall

NOTE: This is only necessary if the Tait radio is responsible for serially sending Selcall ANI Decode information to the IP-224.

4.0 Supported Features

Tait P25 Supported Features					
Feature	**Analog Support**	**Digital Support**	**Feature**	**Analog Support**	**Digital Support**
Channel/Talkgroup Change	Yes	Yes	Emergency Acknowledgement	No	No
Zone Change	No	No	Encryption On/Off	No	Yes
			GPS Read	No	No
Group Call	No	*	GPS Trigger On/Off	No	No
Private Call	No	Yes	Monitor On/Off	Yes	Yes
			Radio Call Alert	No	No
ANI Decode	*	Yes	Radio Check	No	Yes
Call Alert Decode	No	Yes	Radio Enable/Disable	No	Yes
Emergency Decode	No	Yes	Radio Select Call	No	*
Status Message Decode	No	Yes	Radio Remote Monitor	No	Yes
Text Message Decode	No	No	Radio Send Text Message	No	No
			Radio Status (Send Status Message)	No	Yes
Query Encryption	No	No	Radio Status Request	No	Yes
Query Monitor	No	No	Scan Add/Delete	No	No
Query Scan	No	No	Scan On/Off	Yes	Yes
Query Talk Around	No	No	Talk Around On/Off	Yes	Yes

** Not fully supported, see Known Limitations section.*

NOTE: The above list of features are supported when using the latest version of C-Soft. Hardware IP Consoles only support the following:

- Channel/Talkgroup Change
- ANI Decode
- Emergency Decode
- Status Message Decode
- Encryption On/Off
- Monitor On/Off
- Scan On/Off
- Talk Around On/Off

5.0 Known Limitations

5.1 Group Call / Radio Select Call

When using C-Soft to perform a Group Call or Radio Select Call to a group, the Tait P25 radio channel remains on the new talkgroup until the radio channel is changed. For example, if Channel 1 is programmed for talkgroup 1 and C-Soft performs a Group Call to talkgroup 2, Channel 1's talkgroup remains on talkgroup 2 until the channel is changed.

5.2 ANI Decode (Analog MDC1200)

If an MDC1200 ANI is aliased in the Tait radio's ANI List, the Tait radio will not serially send MDC1200 ANI information to the IP-224. To circumvent this limitation, clear the Tait radio's ANI List with the Tait Programming Application.

NOTE: The Tait radio does not serially send MDC1200 Emergency Decode or Status Decode information to the IP-224.

5.3 ANI Decode (Analog Selcall)

A limit of 8 digits is supported for Analog Selcall ANI Decode.

NOTE: The Tait radio does not serially send Selcall Emergency Decode information or Selcall Status information to the IP-224.

6.0 Cable Diagram

The IP-224 to Tait P25 and DMR Interface Cable allows the IP-224 to serially control a Tait TM91xx or TM94xx P25 radio.

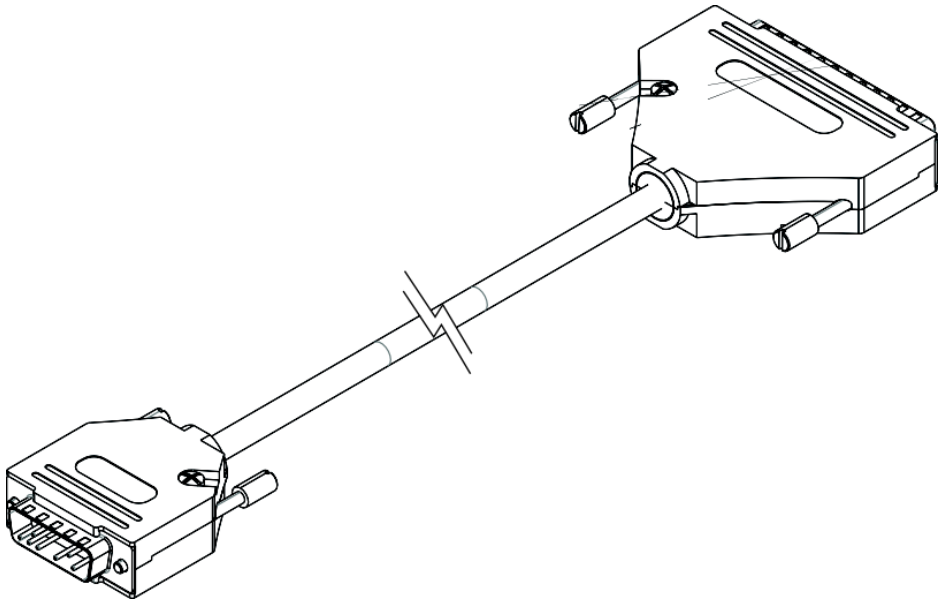


FIGURE 1. Tait P25 Serial Interface Cable

Cable diagram for Tait P25 Radio and IP-224 Interface		
Function	**Tait**	**IP-224**
RS-232/TTL TXD	PIN 3	PIN 17
RS-232/TTL RXD	PIN 11	PIN 36
GROUND	PIN 15	PIN 29
PTT RELAY COM CONTACT	PIN 15	PIN 5
TX+ AUDIO	PIN 7	PIN 1
RX+ AUDIO	PIN 13	PIN 20
PTT RELAY NO CONTACT	PIN 9	PIN 24
COR INPUT	PIN 10	PIN 15

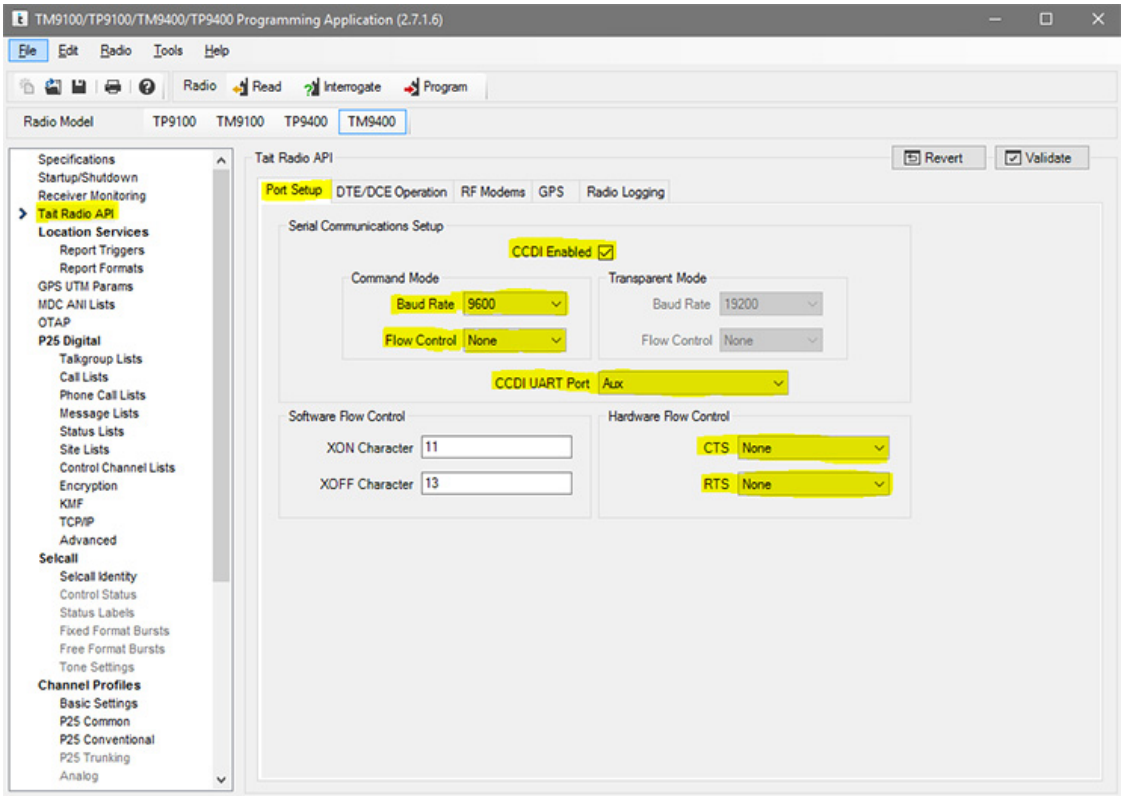
7.0 Radio Programming Application Setup

The Tait TM9100/TP9100/TM9400/TP9400 Programming Application is used to configure the Tait P25 radio to interface properly with the IP-224.

7.1 Serial Communications Setup

To **configure the Serial Communications**, do the following:

1. From the left navigation, select **Tait Radio API**.
   The Tait Radio API window appears.
2. Select the **Port Setup tab**.
   The Port Setup window appears.

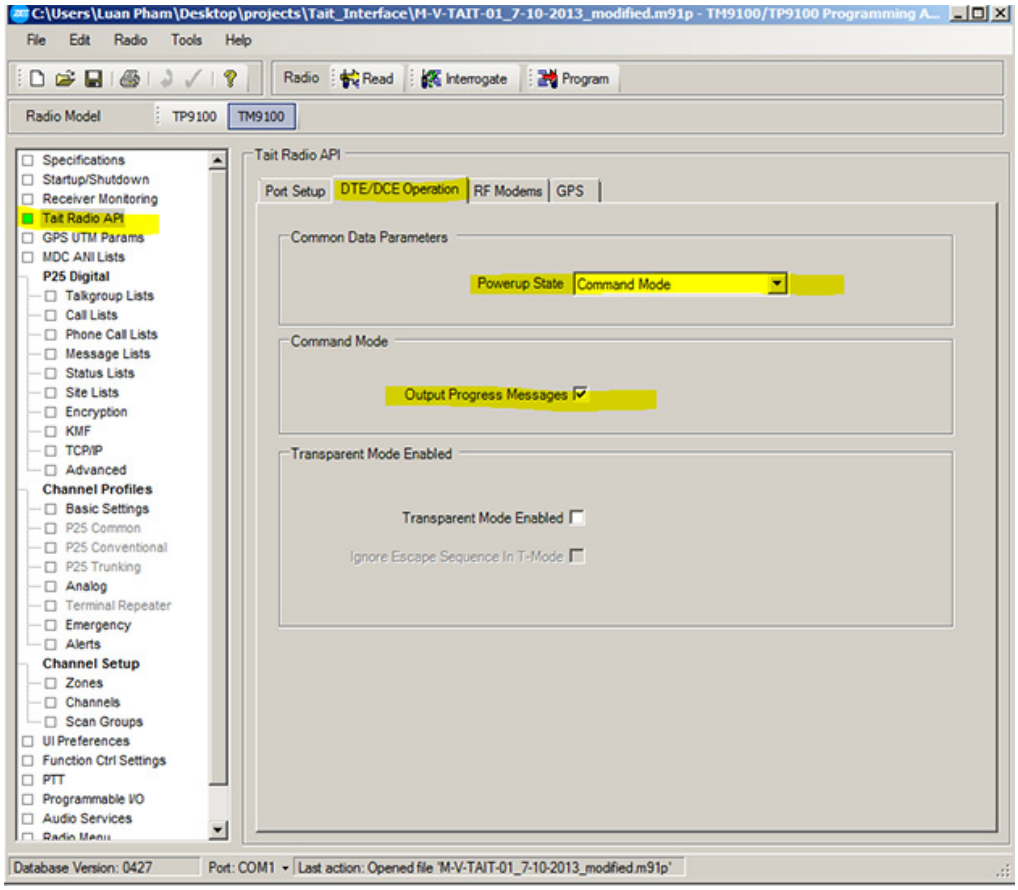


3. Select the **CCDI Enabled check box**.

NOTE: CCDI is an optional feature for the Tait radio. If it is not enabled, please contact a Tait representative for instructions.

4. From the Baud Rate drop down menu, select **9600**.
5. From the Flow Control drop down menu, select **None**.
6. From the CCDI UART Port drop down menu, select **Aux**.
7. From the CTS drop down menu, select **None**.
8. From the RTS drop down menu, select **None**.

9. Select the **DTE/DCE Operation tab**.
   The DTE/DCE Operation window appears.



10. From the Powerup State drop down menu, select **Command Mode**.

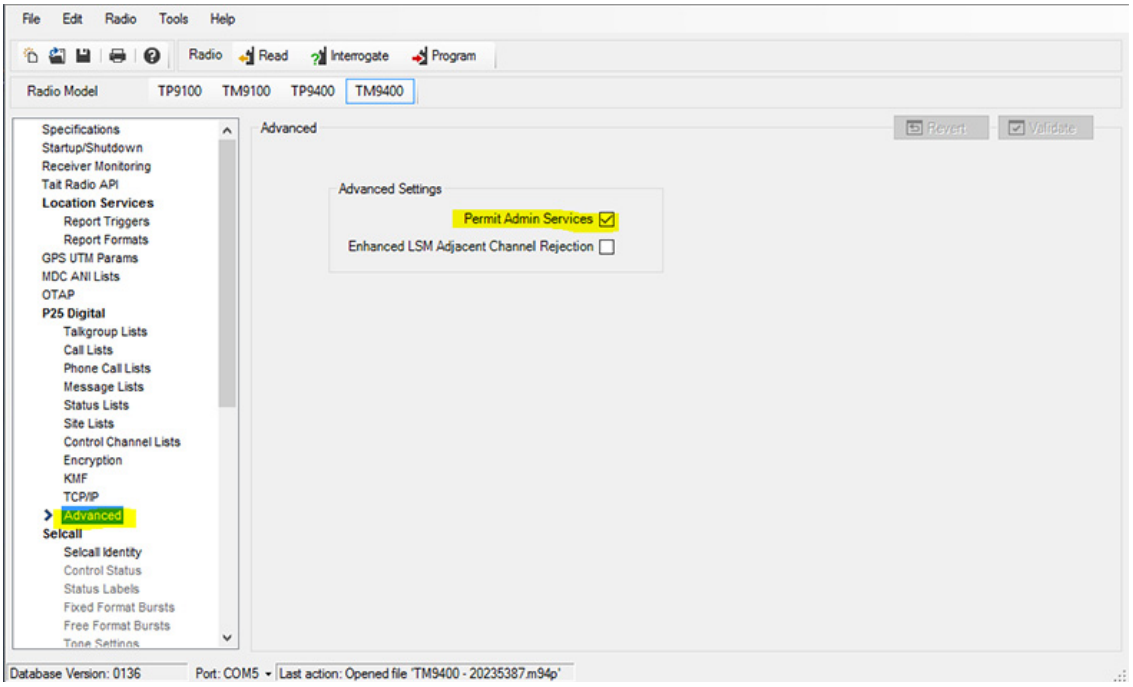
NOTE: Command mode sends commands or messages back and forth between the radio and the IP-224.

11. Select the **Output Progress Messages check box**.

NOTE: Output Progress Messages must be enabled so the mobile radio automatically reports state changes to the IP-224.

IMPORTANT: Steps 12-19 are necessary only if Radio Check, Radio Disable, Radio Enable, Radio Remote Monitor, or Radio Status Request commands are needed.

12. From the left navigation, select **P25 Digital | Advanced.**
The Advanced window appears.

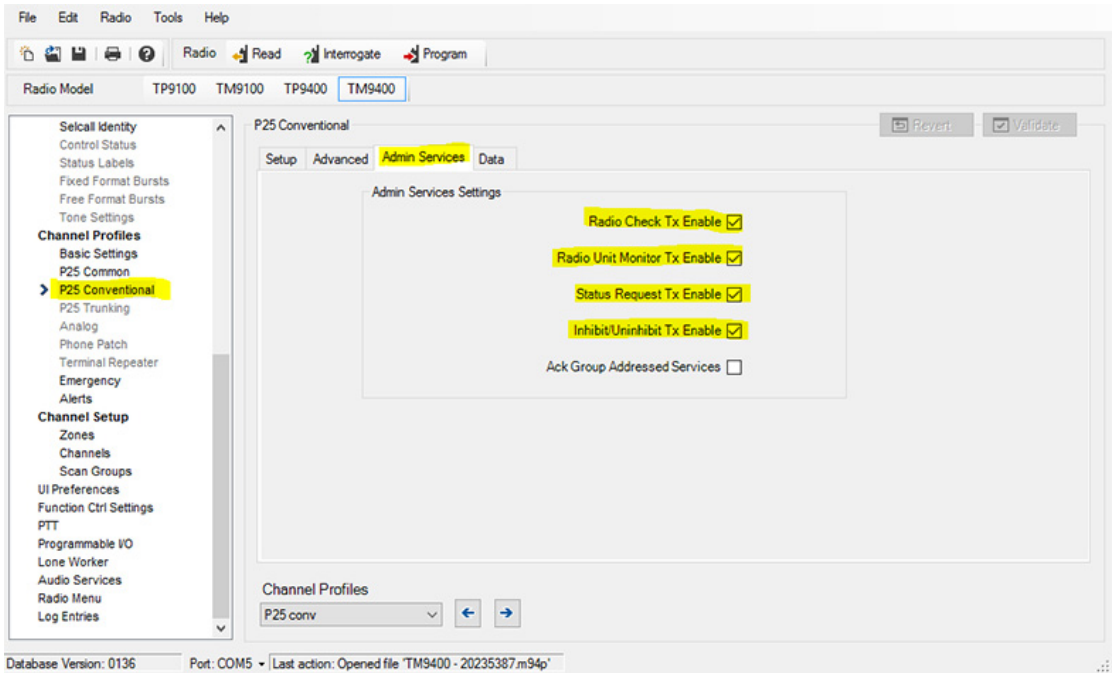


Under Advanced Settings

13. Select the **Permit Admin Services** check box.

NOTE: Permit Admin Services is an optional feature for the Tait radio. If it is not enabled, please contact a Tait representative for instructions.

14. From the left navigtion, select **Channel Profiles | P25 Conventional**.
    The P25 Conventional window appears.
15. Select the **Admin Services tab.**
    The Admin Services window appears.



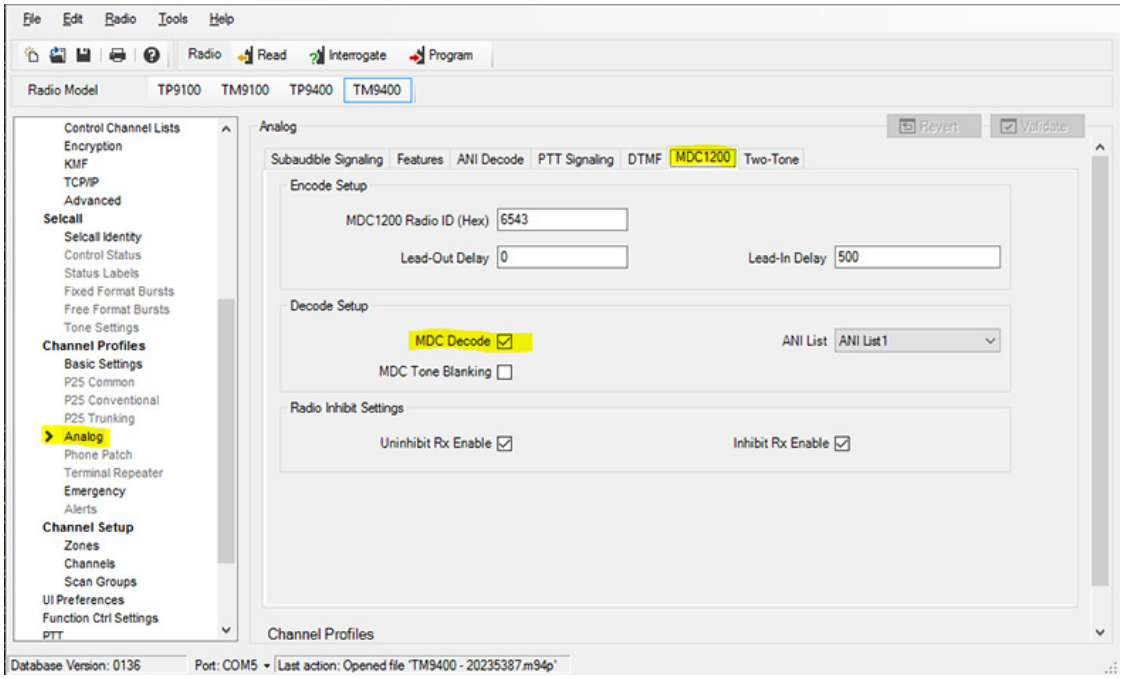
Under Admin Services Settings

16. Select the **Radio Check Tx Enable** check box.
17. Select the **Radio Unit Monitor Tx Enable** check box.
18. Select the **Status Request Tx Enable** check box.
19. Select the **Inhibit/Uninhibit Tx Enable** check box.

7.2 ANI Setup (Analog MDC1200)

IMPORTANT: Section 7.2 is necessary only if the Tait radio is responsible for serially sending MDC1200 ANI information to the IP-224.

1. From the left navigation, select **Channel Profiles** | **Analog**.
   The Analog window appears.
2. Select the **MDC1200 tab**.
   The MDC1200 window appears.



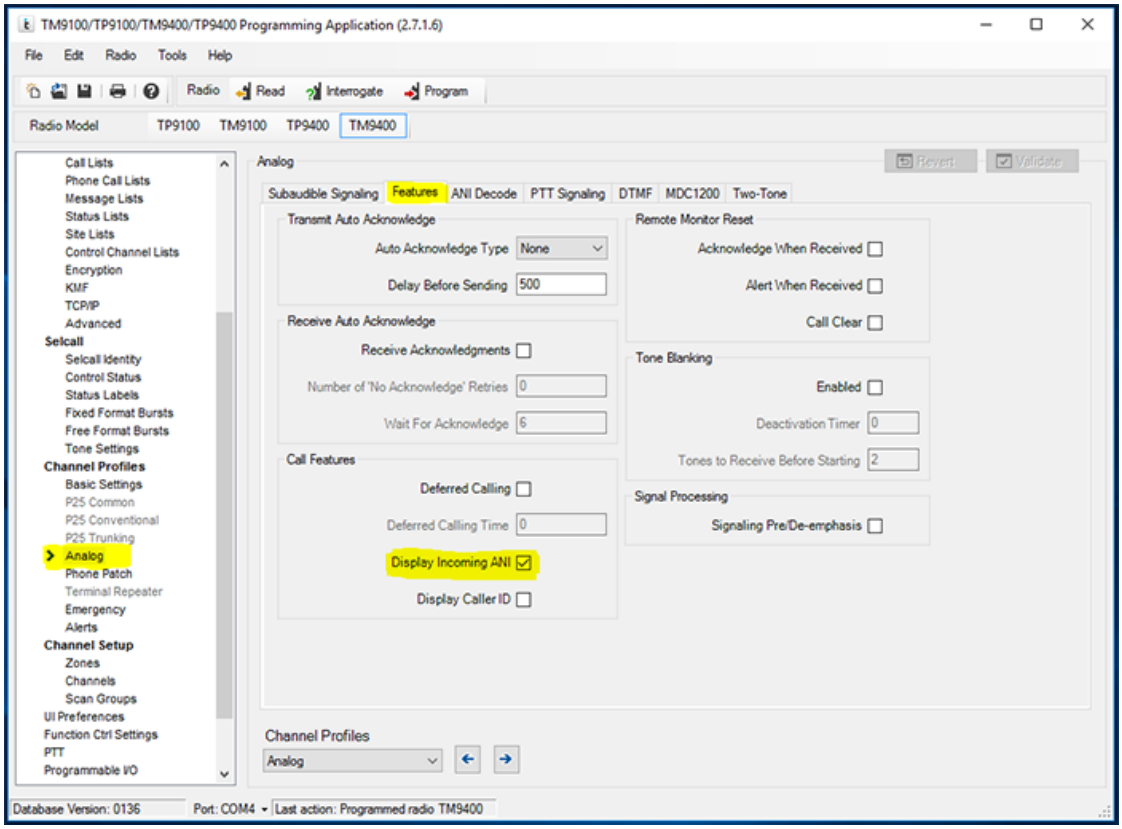
3. In the Decode Setup group box, select the **MDC Decode check box**.

NOTE: MDC1200 is an optional feature for the Tait radio. If it is not enabled, please contact a Tait representative for instructions.

7.3 ANI Setup (Analog Selcall)

IMPORTANT: Section 7.3 is necessary only if the Tait radio is responsible for serially sending Selcall ANI information to the IP-224.

1. From the left navigation, select **Channel Profiles** | **Analog**.
   The Analog window appears.
2. Select the **Features** tab.
   The Features window appears.



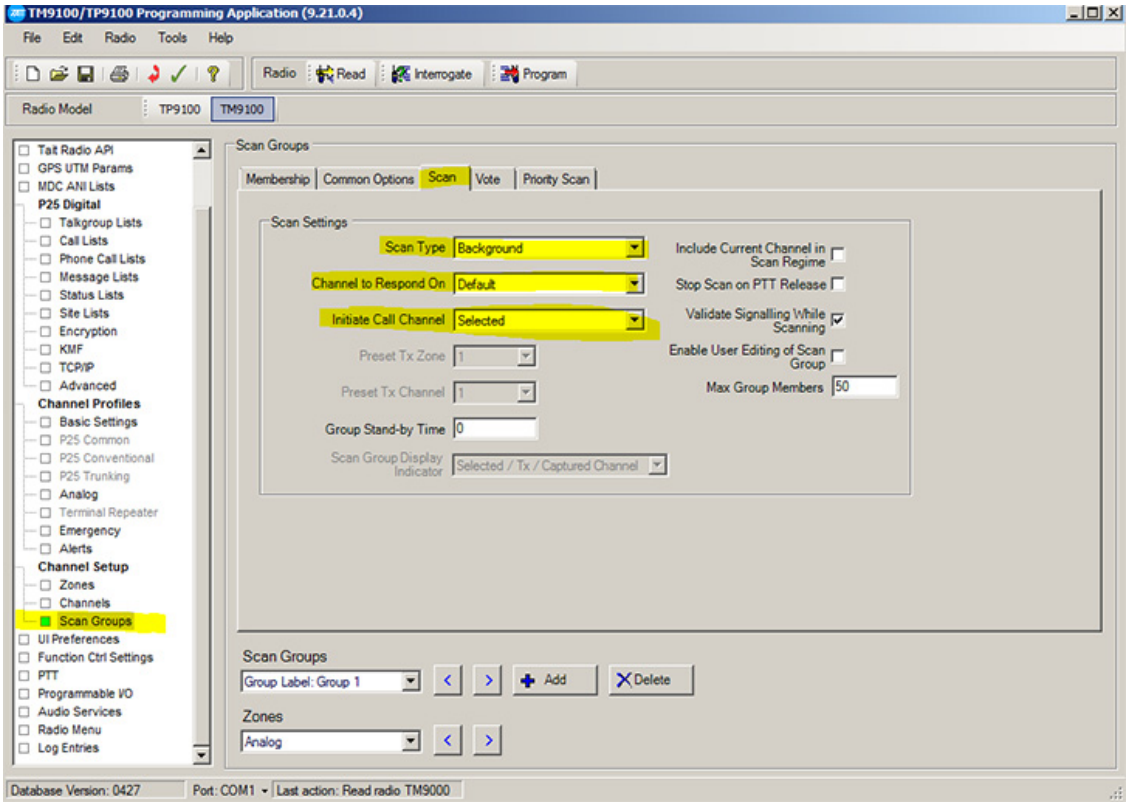
3. In the Call Features group box, select the **Display Incoming ANI check box**.

NOTE: Selcall is an optional feature for the Tait radio. If it is not enabled, contact a Tait representative for more information.

7.4 Scan Setup

To **configure Scan**, do the following:

1. From the left navigation, select **Channel Setup | Scan Groups**.
   The Scan Groups window appears
2. Select the **Scan tab**.
   The Scan window appears.



3. From the Scan Type drop down menu, select **Background**.

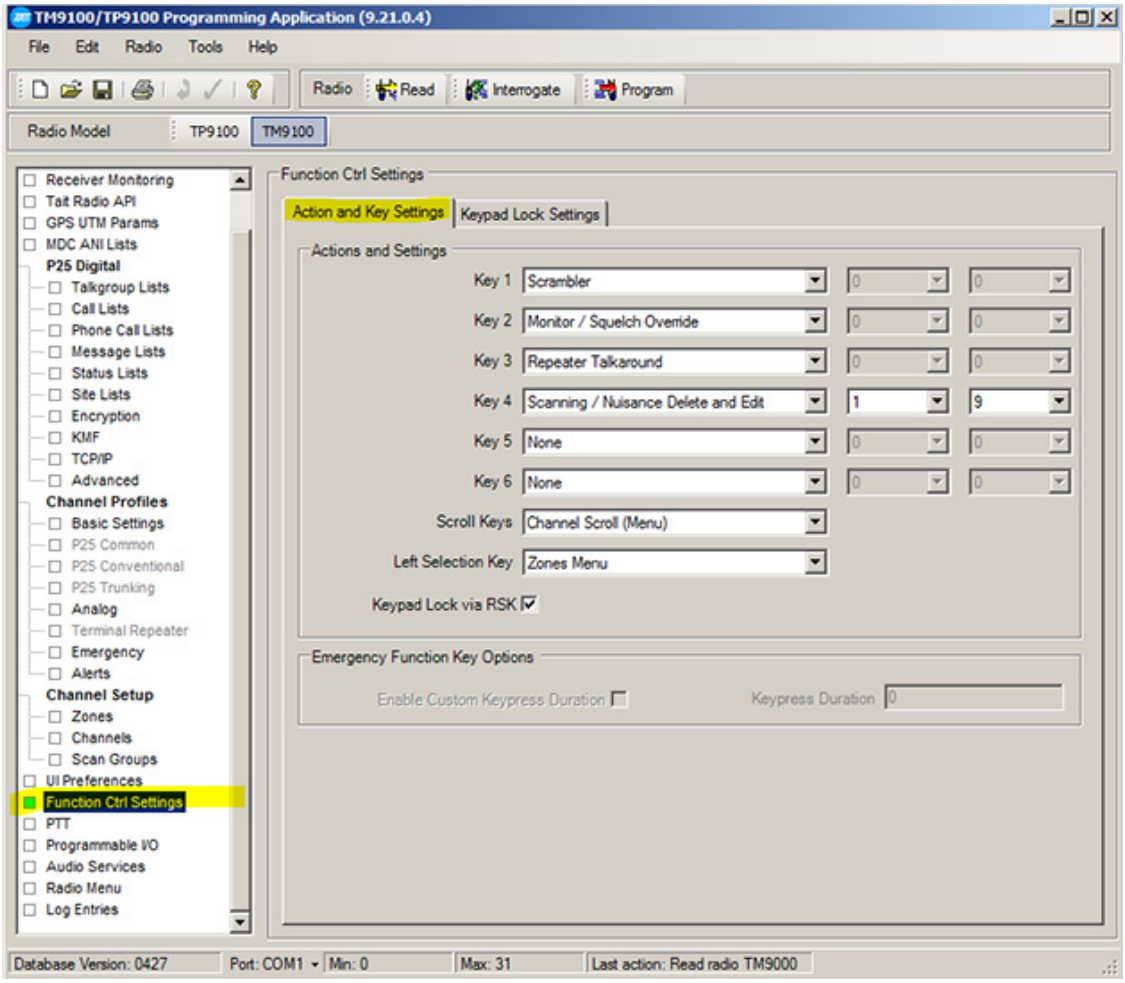
NOTE: **Scan Type** must be set to Background so the mobile radio does not stop scanning when the IP-224 sends a change channel command.

4. From the Channel to Respond On drop down menu, select **Default**.
5. From the Initiate Call Channel drop down menu, select **Selected**.

7.5 Radio Buttons Setup

To **configure the Radio Buttons**, do the following:

1. From the left navigation, select **Function Ctrl Settings**.
   The Function Ctrl Settings window appears.
2. Select the **Action and Key Settings tab**.
   The Action and Key Settings window appears.

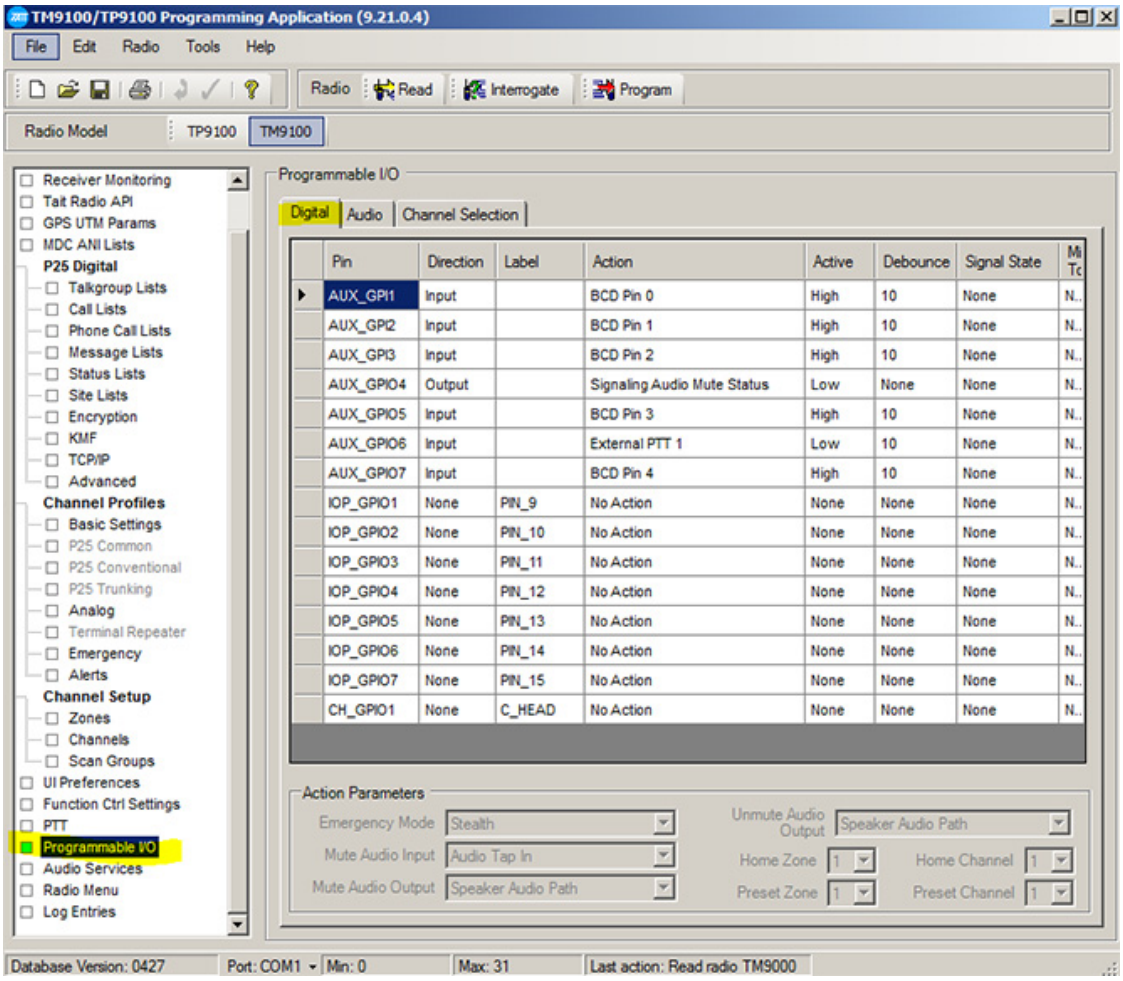


3. From the Key 3 drop down menu, select **Repeater Talkaround**.
4. From the Key 4 drop down menu, select S**canning/Nuisance Delete and Edit**.

7.6 COR and External PTT Setup

To configure the COR and External PTT, do the following:

1. From the left navigation, select **Programmable I/O**.
   The Programmable I/O window appears.
2. Select the **Digital tab**.
   The Digital window appears.



AUX_GPIO4

3. From the Direction drop down menu, select **Output**.
4. From the Action drop down menu, select **Signaling Audio Mute Status**.
5. From the Active drop down menu, select **Low**.
6. From the Debounce drop down menu, select **None**.

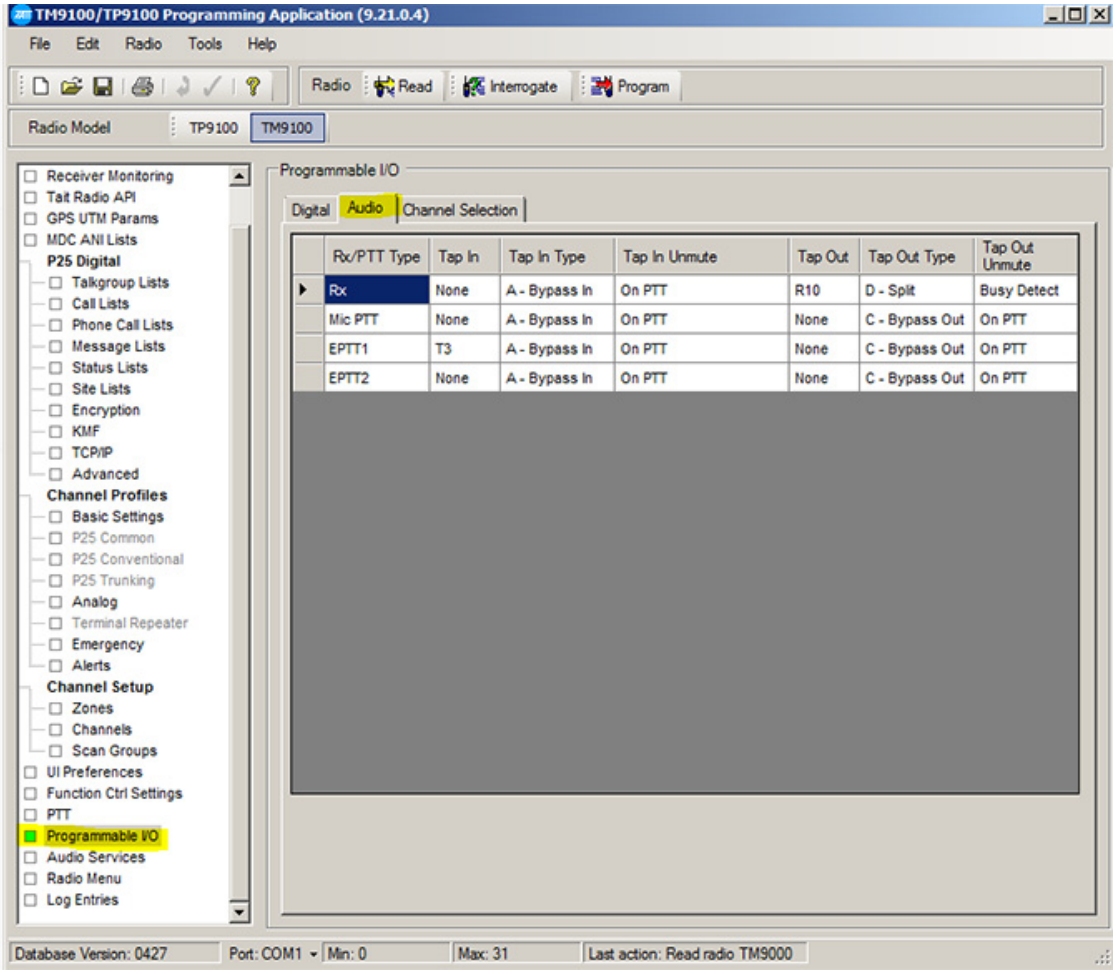
AUX_GPIO6

7. From the Direction drop down menu, select **Input**.
8. From the Action drop down menu, select **External PTT 1**.
9. From the Active drop down menu, select **Low**.
10. From the Debounce drop down menu, select **10**.

7.7 Receive Audio and Transmit Audio Setup

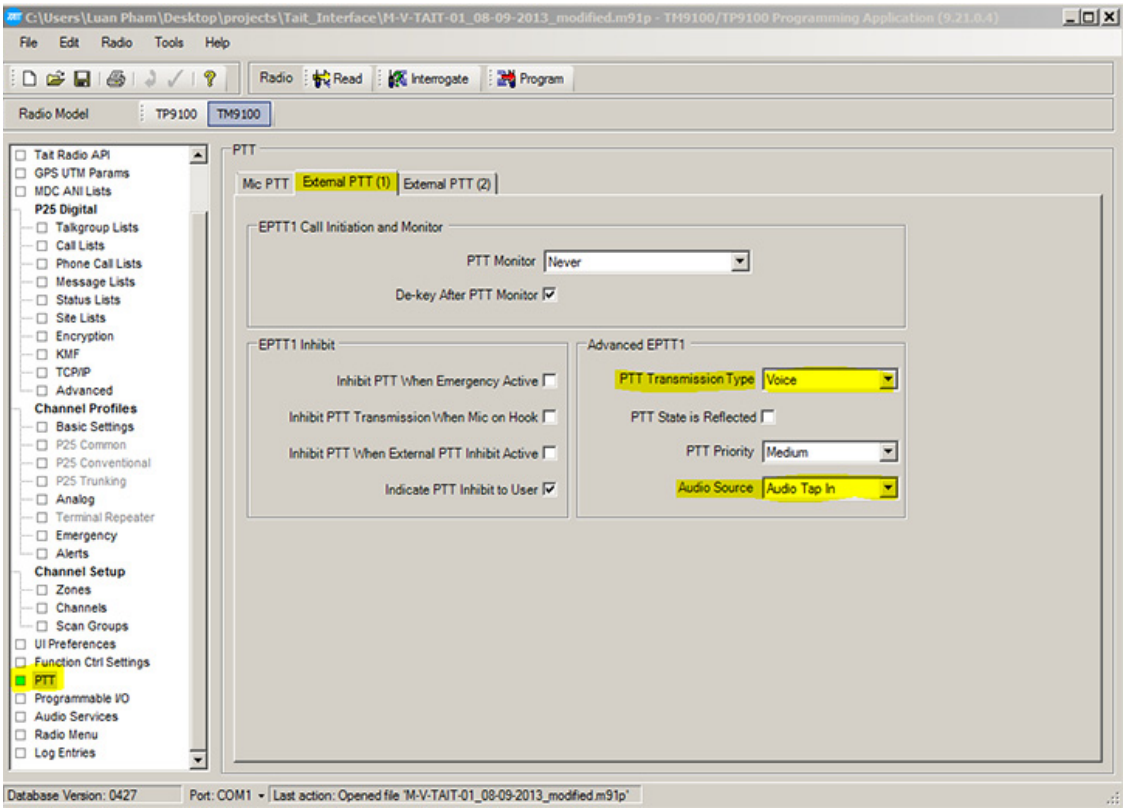
To **configure the Receive Audio and Transmit Audio**, do the following:

1. From the left navigation, select **Programmable I/O**.
   The Programmable I/O window appears.
2. Select the **Audio tab**.
   The Audio window appears.



3. In the Rx row, from the Tap Out drop down menu, select **R10**.
4. In the Rx row, from the Tap Out Type drop down menu, select **D-Split**.
5. In the Rx row, from the Tap Out Unmute drop down menu, select **Busy Detect**.
6. In the EPTT1 row, from the Tap In drop down menu, select **T3**.

7. From the left navigation, select **PTT**.
   The PTT window appears
8. From the PTT window, select **External PTT(1)**.
   The External PTT(1) window appears.



Under Advanced EPTT1

9. From the PTT Transmission Type drop down menu, select **Voice**.
10. From the Audio Source drop down menu, select **Audio Tap In**.

8.0 IP-224 Access Key Installation

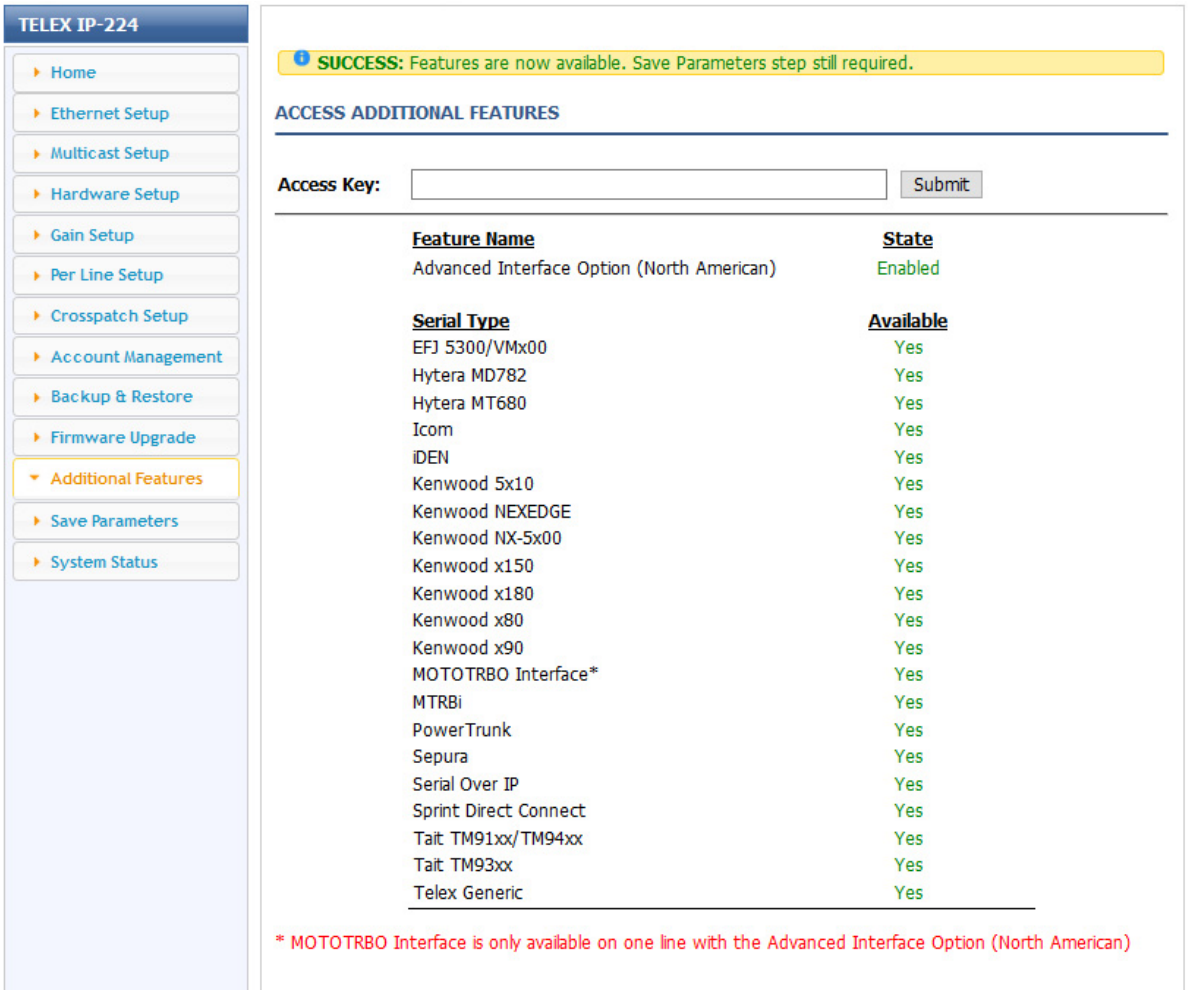
The Tait P25 radio interface requires an additional Advanced Interface Option (export) or Advanced Interface Option (North American) on the IP-224.

NOTE:

- The Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key must be purchased before you can activate the TM91xx/TM94xx Serial Type. The Advanced Interface Option (Export) or Advanced Interface Option (North American) requires an access key to be generated specifically for each IP-224.
- If the Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key was purchased as a factory installation [(F.01U.347.906) IP-224 Radio Gateway Advanced Options Export or (F.01U.347.907) IP-224 Radio Gateway Advanced Options NA (factory installed)], the access key was activated by the factory prior to shipping.
- Activating the Advanced Interface Option (Export) or Advanced Interface Option (North American) via the IP-224 web interface is only required if this is a field installation [(F.01U.343.868) IP-224 Field Code Advanced Options Export or (F.01U.343.869) IP-224 Field Code Advanced Options NA (customer purchased option)].

To **activate the Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key**, do the following:

1. Open the **IP-224 webpage**.
2. From the left navigation, select **Additional Features**.
   The Additional Features page appears.

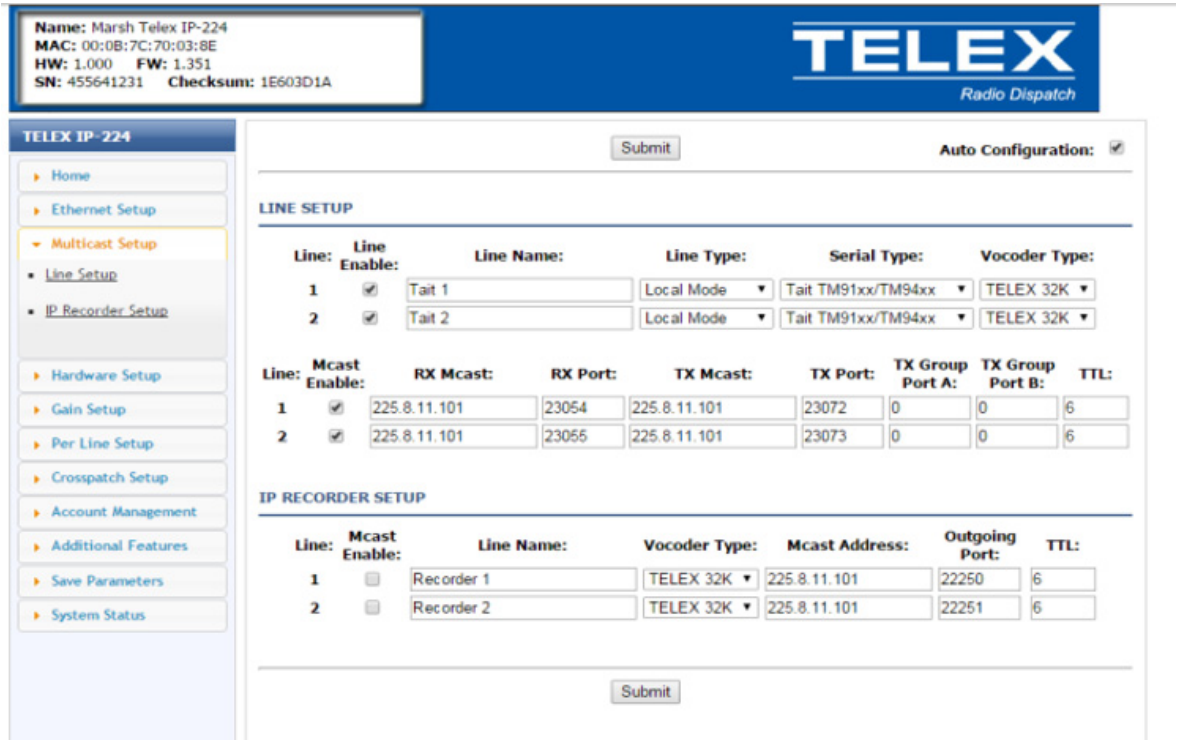


3. In the Access Key field, enter the **32-character access key**.
4. Click the **Submit button**.
   The changes are sent to the IP-224 in temporary storage.
5. From the left navigation, select **Save Parameters**.
   The Save Parameters page appears.
6. Click the **Save Parameters button**.
   Changes are now permanently saved to the IP-224 console.

9.0 IP-224 Setup

To **configure the IP-224**, do the following:

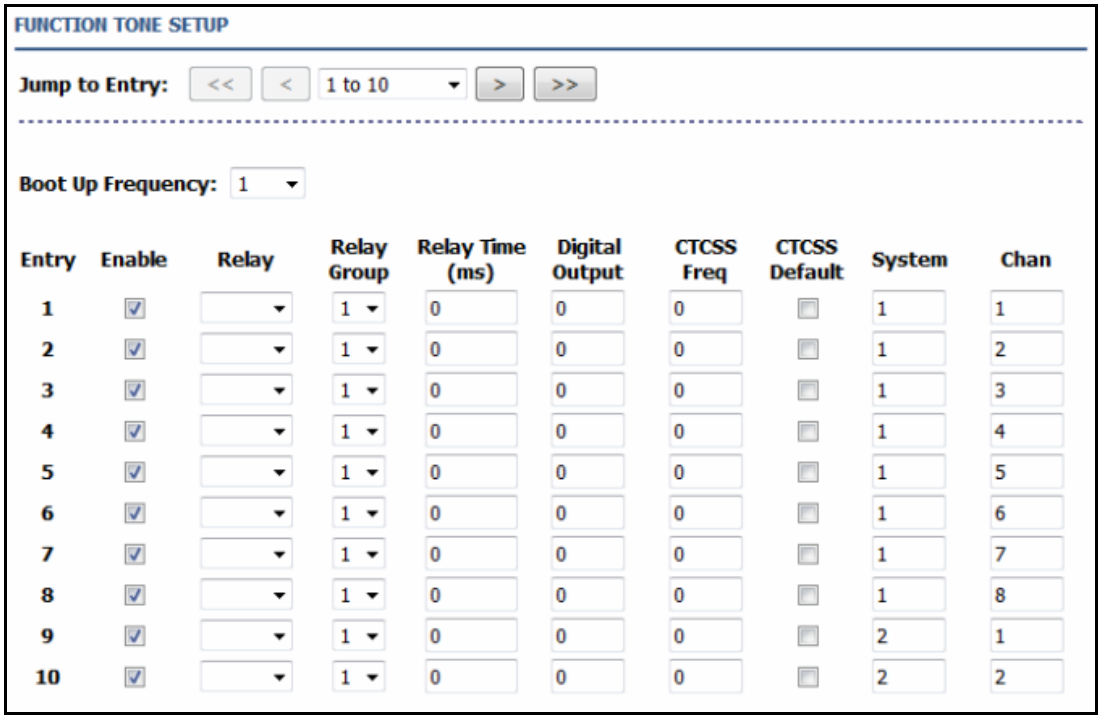
1. Open the **IP-224 web application**.
   The IP-224 web page appears.
2. From the left navigation, select **Multicast Setup**.



3. Select the **Auto Configuration** check box.

Under LINE SETUP

4. From the Serial Type drop down menu, select **Tait TM91xx/TM94xx**.
5. In the RX Mcast field, enter **Receive Multicast IP Address**.
6. In the RX Port field, enter the **Receive Multicast Port number**.
7. In the TX Mcast field, enter the **Transmit Multicast IP Address**.
8. In the TX Port field, enter the **Transmit Multicast Port number**.
9. Click the **Submit button**.
   The changes are sent to the IP-224 in temporary storage.
10. From the left navigation, select **Per Line Setup**.
    The Per Line Setup window appears.



Entry	Enable	Relay	Relay Group	Relay Time (ms)	Digital Output	CTCSS Freq	CTCSS Default	System	Chan
1	☑		1	0	0	0	☐	1	1
2	☑		1	0	0	0	☐	1	2
3	☑		1	0	0	0	☐	1	3
4	☑		1	0	0	0	☐	1	4
5	☑		1	0	0	0	☐	1	5
6	☑		1	0	0	0	☐	1	6
7	☑		1	0	0	0	☐	1	7
8	☑		1	0	0	0	☐	1	8
9	☑		1	0	0	0	☐	2	1
10	☑		1	0	0	0	☐	2	2

Under Function Tone Setup

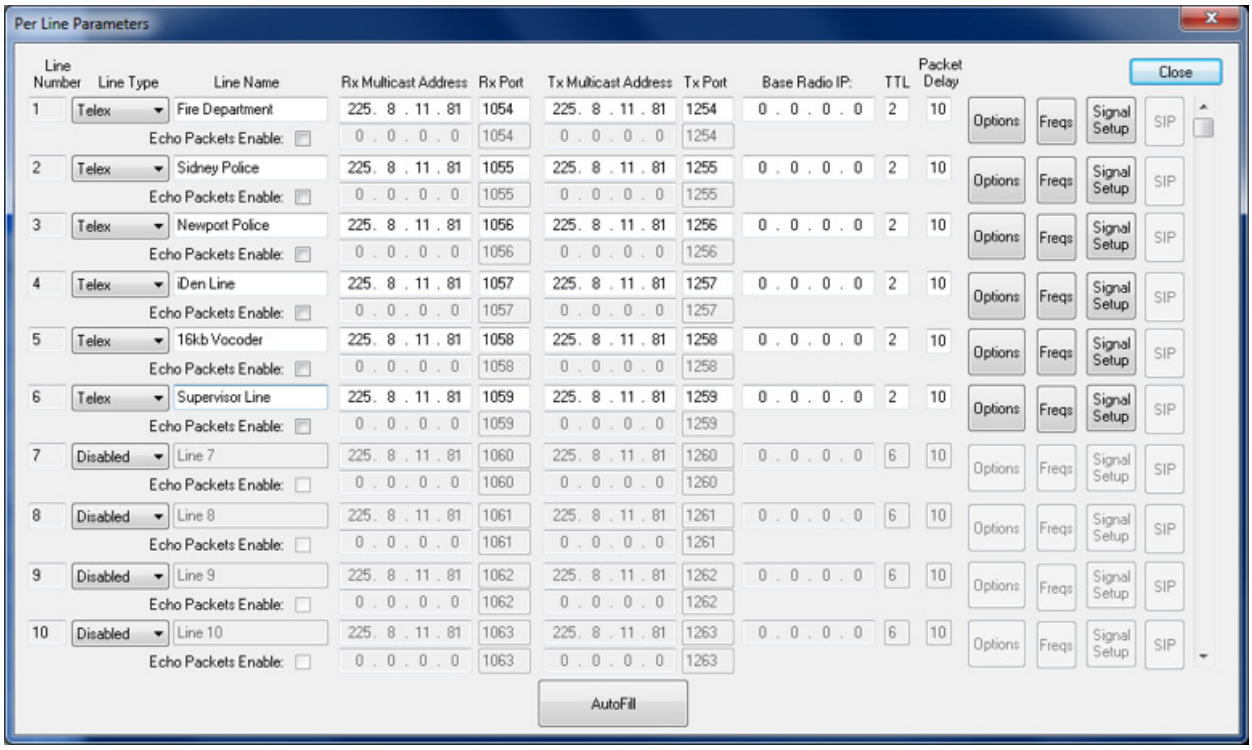
11. In the System Column field, enter the **desired radio system/zone**.
12. In the Chan Column field, enter the **desired radio channel**.
13. Click the **Submit button**.
    The changes are sent to the IP-224 in temporary storage.
14. In the left navigation, select **Save Parameters**.
    The Save Parameters page appears.
15. Click the **Save Parameters button**.
    Changes are now saved permanently to the IP-224 console.

10.0 C-Soft Designer Setup

The **Per Line Parameters** window is used to configure C-Soft to IP-224 communications.

To **configure Per Line Parameters**, do the following:

1. Open **C-Soft Designer**.
2. From the Edit menu, select **Setup Per Line Parameters**.
   The Per Line Parameters window appears.



3. In the Rx Multicast Address field, enter the **Receive Multicast IP Address** of the connected IP-224.
4. In the Rx Port field, enter the **Receive Multicast Port number** of the connected IP-224.
5. In the Tx Multicast Address field, enter the **Transmit Multicast IP Address** of the connected IP-224.
6. In the Tx Port field, enter the **Transmit Multicast Port number** of the connected IP-224.
7. In the Base Radio IP field, enter the **IP address** of the connected IP-224.
8. Click the **Close button**.

NOTE: The Multicast settings of IP-224 and C-Soft must match for the interface to function properly. Verify the RX and TX Multicast Addresses match, as well as RX and TX Ports.

NOTES:

Suggestions or comments:
Contact technical support with suggestions or comments concerning this application note.

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