

Tait DMR Tier II Interface for IP-224

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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@cryptosoft.com).

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1.0 Introduction

The Tait DMR Tier II radio interface is designed as an add-on option in the Telex Radio Dispatch system. The Tait DMR Tier II radio interface allows the IP-224 to serially control a Tait TM93xx DMR radio. This application guide describes the Telex Radio Dispatch Tait DMR Tier II 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 TM93xx DMR Radio (Note, Only Tier II is supported)

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
- TM8200/TM9300/TP9300 Programming Application

4.0 Supported Features

Tait DMR Tier II 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	*	*	Radio Check	No	Yes
Call Alert Decode	No	Yes	Radio Enable/Disable	No	Yes
Emergency Decode	No	*	Radio Select Call	No	*
Status Message Decode	*	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	No
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 the 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 DMR radio channel remains on the new talk group until the radio channel is changed. For example, if Channel 1 is programmed for talkgroup 100 and C-Soft performs a Group Call to talkgroup 101, Channel 1's talkgroup will remain on talkgroup 101 until the channel is changed.

5.2 ANI Decode (Analog MDC1200)

If a MDC1200 ANI is aliased in the Tait radio's ANI List, the Tait radio does 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 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 to the IP-224.

5.4 ANI Decode (Digital DMR)

The Tait DMR radio only passes serial DMR ANI information to the IP-224 at the start of a new DMR call session. Therefore, if the radio receives other DMR calls while the initial DMR call session is active, the serial DMR ANI of the subsequent calls will not be sent to IP-224.

NOTE: Verify the radio firmware version is at least 2.12.03 to avoid this issue.

5.5 Emergency Decode (Digital DMR)

The Tait DMR radio does not pass serial DMR Emergency Call information to the IP-224. Therefore, an Emergency Call is seen as a Group Call on IP Consoles.

NOTE: Verify the radio firmware version is at least 2.10.01 to avoid this issue.

5.6 Status Message Decode (Analog)

Status Message Decode for Analog Selcall is supported.

Status Message Decode for Analog MDC1200 is not supported.

6.0 Cable Diagram

The IP-224 to Tait P25 and DMR Interface Cable allows the IP-224 to serially control a Tait TM93xx DMR radio.

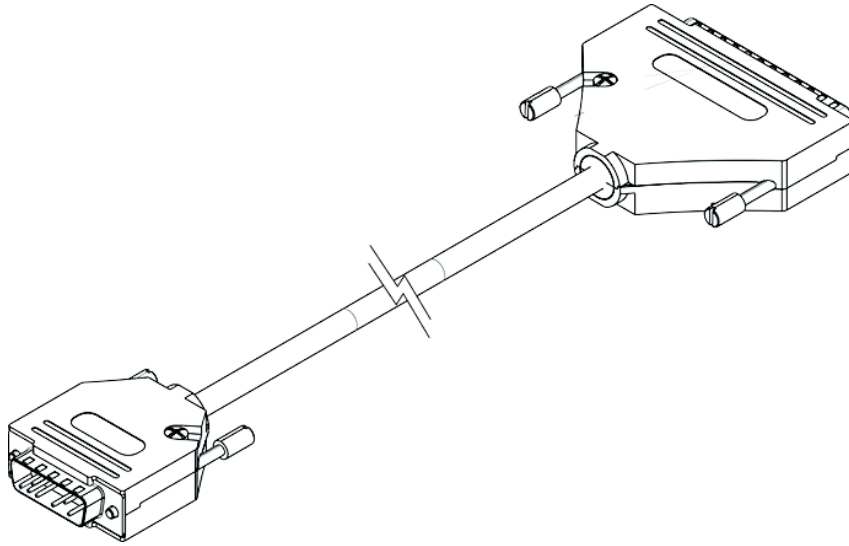


FIGURE 1. IP-224 to Tait P25 and DMR Interface Cable

Cable Diagram for Tait DMR Tier II 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
COR INPUT	PIN 10	PIN 15
PTT RELAY N.O CONTACT	PIN 9	PIN 24

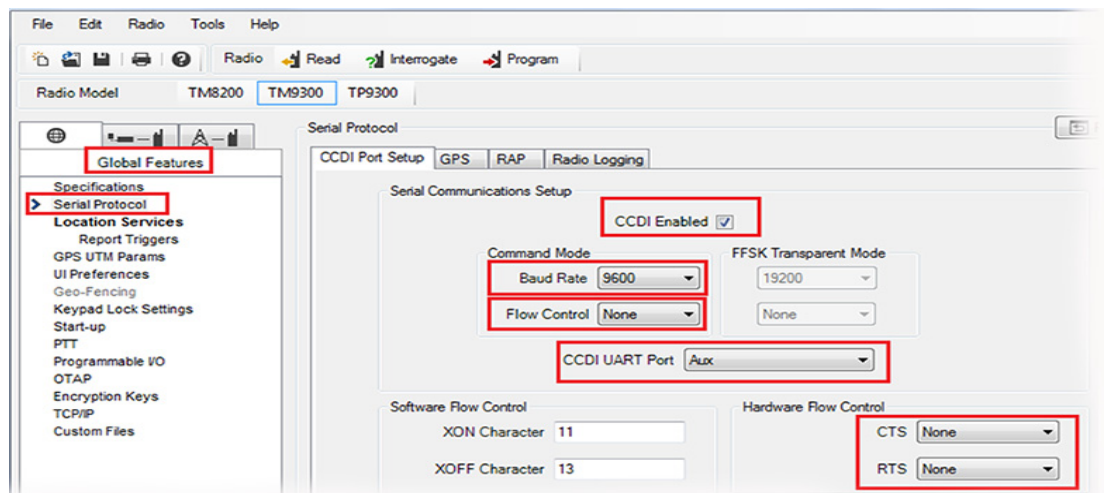
7.0 Radio Programming Application Setup

The TM8200/TM9300/TP9300 Programming Application is used to configure the Tait DMR radio to interface properly with the IP-224.

7.1 Serial Communications Setup

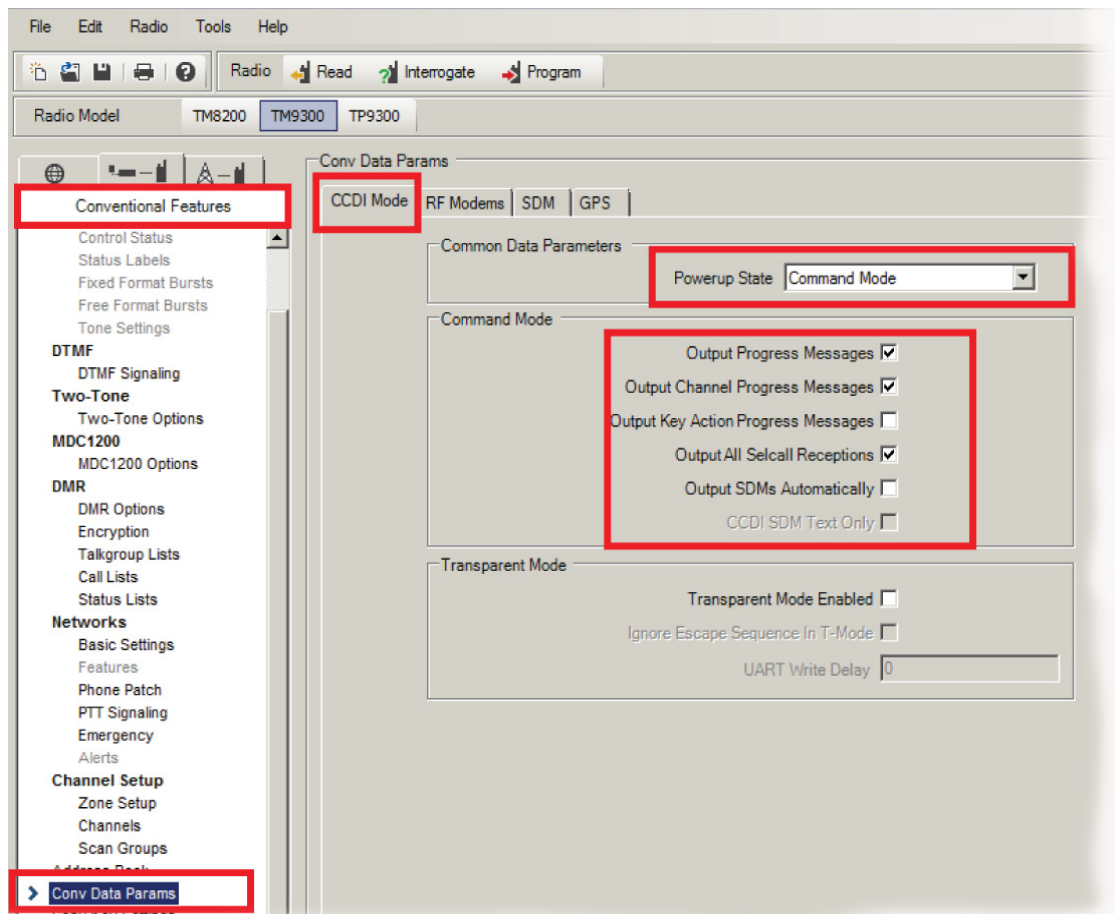
To **configure Serial Communications**, do the following:

1. From the left navigation, select **Global Features | Serial Protocol**.
The Serial Protocol window appears.
2. Select the **CCDI Port Setup** tab.
The CCDI Port Setup window appears.



3. Select the **CCDI Enabled** check box.
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. From the left navigation, select **Conventional Features | Conv Data Params**.
The Conv Data Params window appears.
10. Select the **CCDI Mode** tab.
The CCDI Mode window appears.

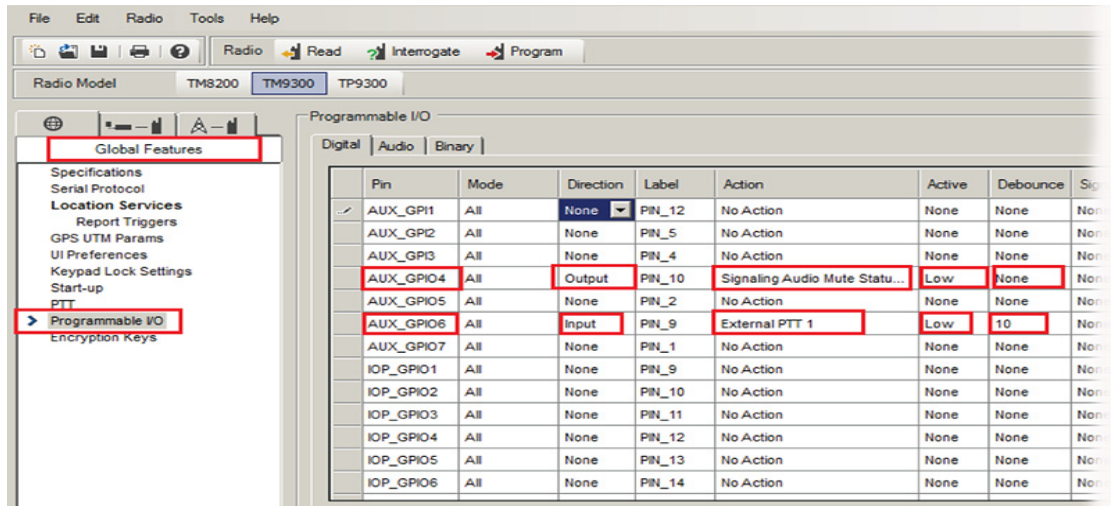


11. From the Powerup State drop down menu, select **Command Mode**.
NOTE: Command mode sends commands or messages back and forth between the radio and the IP-224.
12. Select the **Output Progress Messages** check box.
NOTE: Output Progress Messages must be enabled so the mobile radio automatically reports state changes to the IP-224.
13. Select the **Output Channel Progress Messages** check box.
14. Select the **Output All Selcall Receptions** check box.

7.2 COR and External PTT Setup

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

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

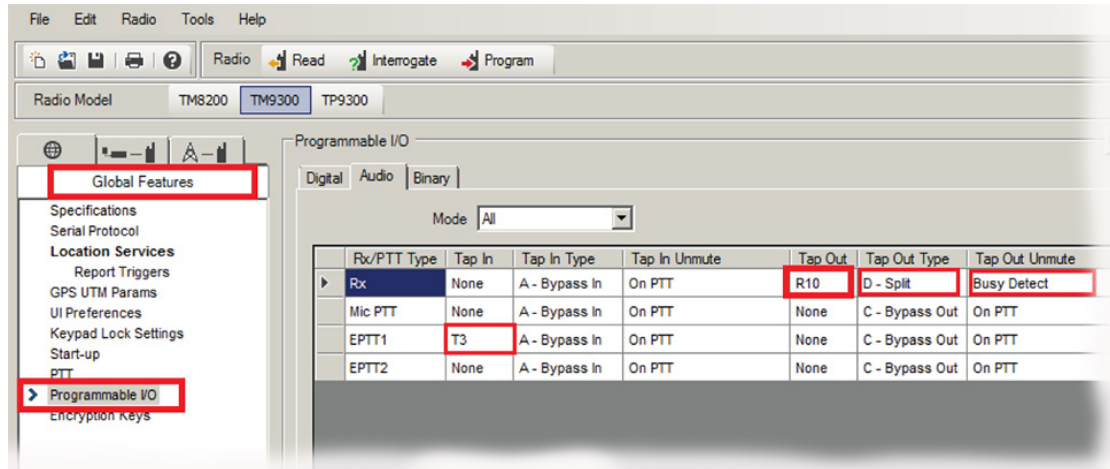


3. In the AUX_GPIO4 row, from the Direction drop down menu, select **Output**.
4. In the AUX_GPIO4 row, from the Action drop down menu, select **Signaling Audio Mute Status**.
5. In the AUX_GPIO4 row, from the Active drop down menu, select **Low**.
6. In the AUX_GPIO4 row, from the Debounce drop down menu, select **None**.
7. In the AUX_GPIO6 row, from the Direction drop down menu, select **Input**.
8. In the AUX_GPIO6 row, from the Action drop down menu, select **External PTT 1**.
9. In the AUX_GPIO6 row, from the Active drop down menu, select **Low**.
10. In the AUX_GPIO6 row, from the Debounce drop down menu, select **10**.

7.3 Receive Audio and Transmit Audio Setup

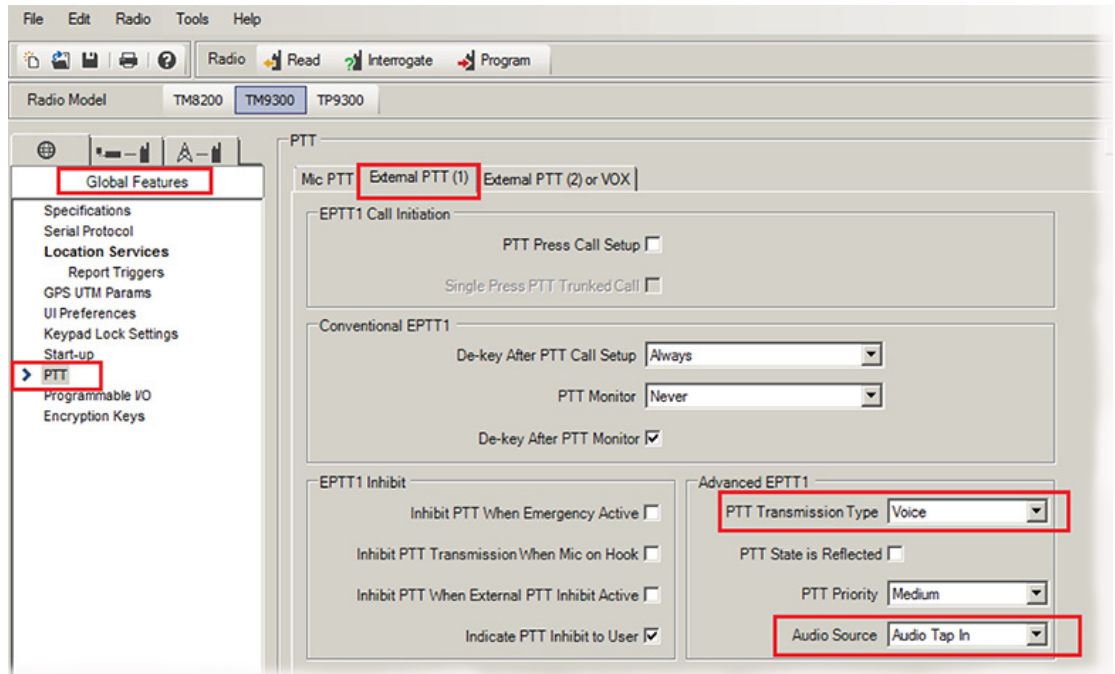
To **configure the Receive and Transmit Audio**, do the following:

1. From the left navigation, select **Global Features | 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 **Global Features | PTT**.
The PTT window appears.
8. Select the **External PTT (1)** tab.
The External PTT (1) window appears.



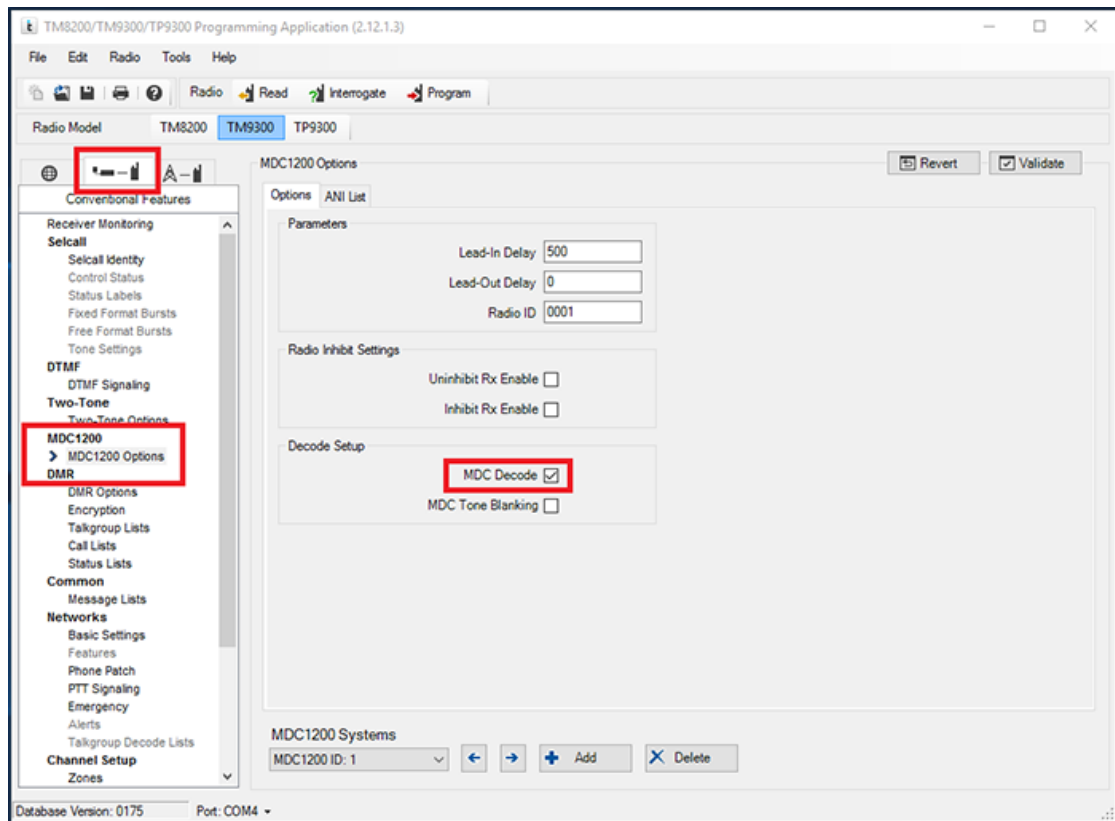
9. From the PTT Transmission Type drop down menu, select **Voice**.
10. From the Audio Source drop down menu, select **Audio Tap In**.

7.4 ANI Setup (Analog MDC1200)

IMPORTANT: Section 7.4 is necessary only if the Tait radio is responsible for serially sending MDC1200 ANI information to the IP-224.

To **configure the MDC1200 ANI**, do the following:

1. From the left navigation, select **Conventional Features | MDC1200**.
The MDC1200 Options window appears.
2. Select the **Options** tab.
The Options window appears.



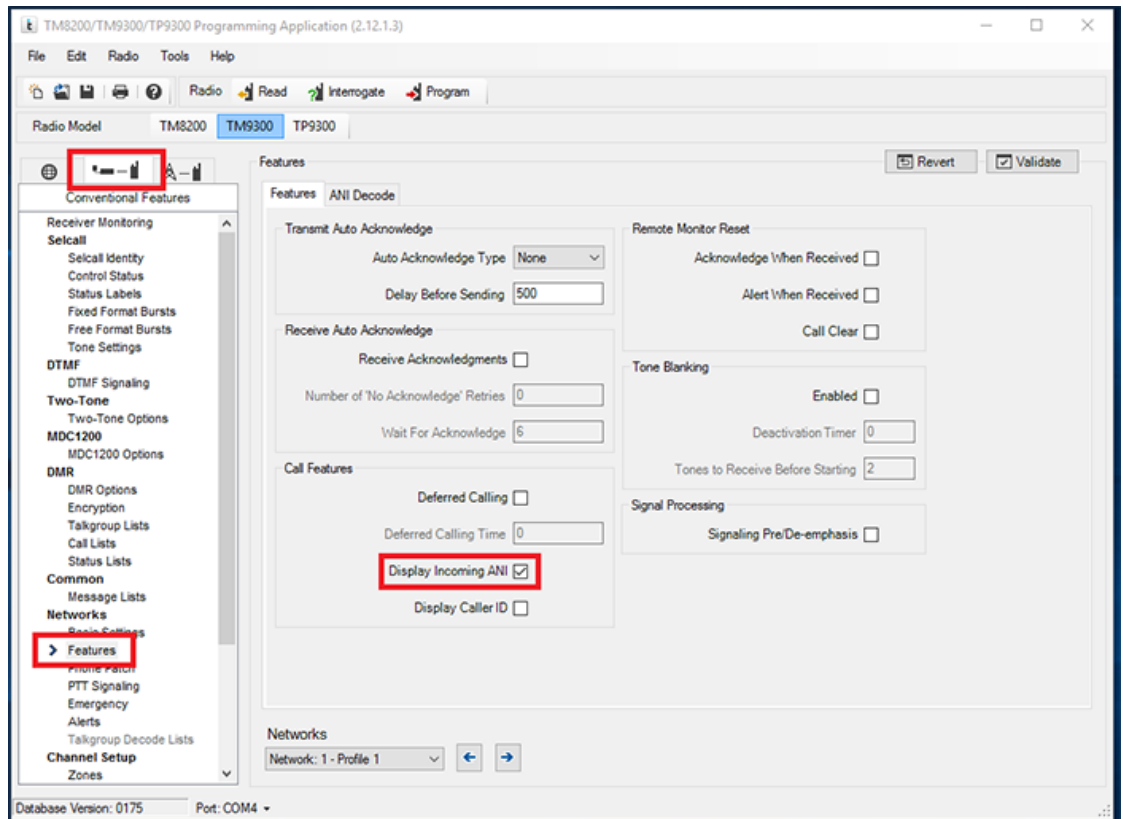
3. In the Decode Setup group box, select the **MDC Decode** check box.

7.5 ANI Setup (Analog Selcall)

IMPORTANT: Section 7.5 is necessary only if the Tait radio is responsible for serially sending Selcall ANI information to the IP-224.

To **configure the Selcall ANI**, do the following:

1. From the left navigation, select **Conventional Features | Networks | Features**.
The Features window appears.
2. Select the **Features** tab.
The Features window appears.

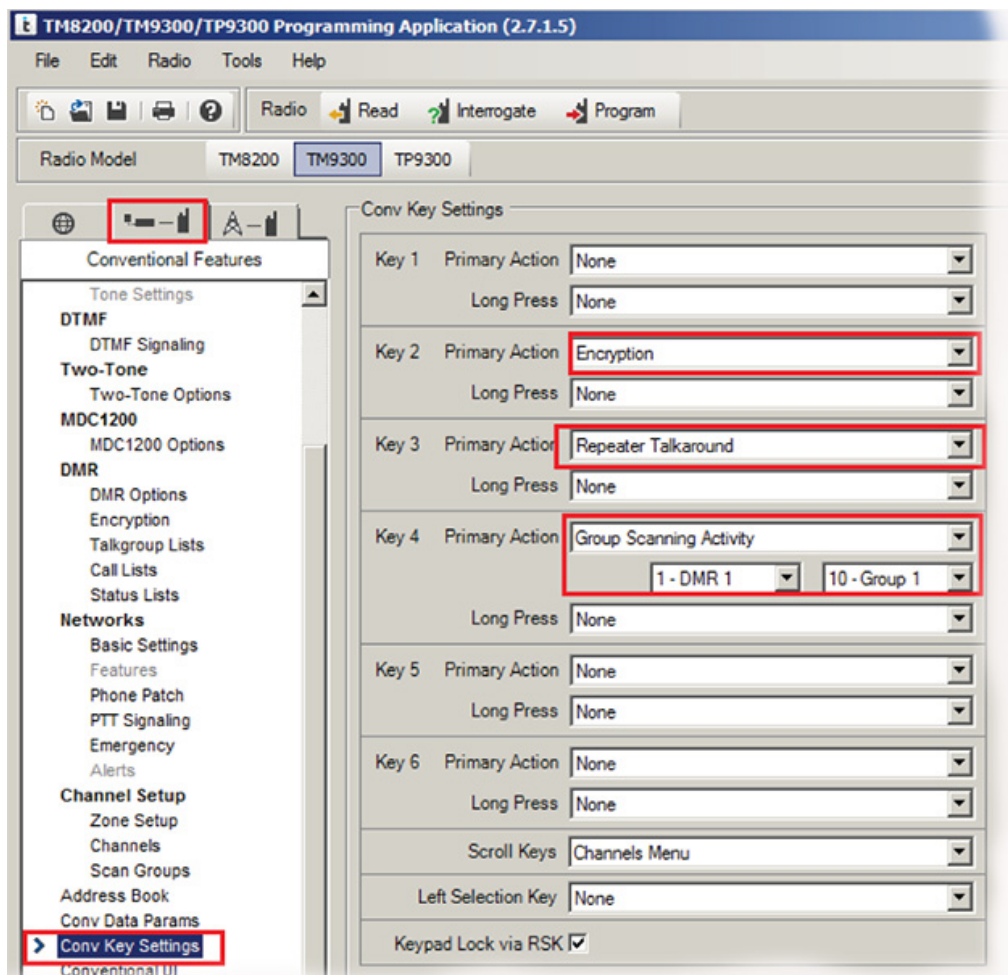


3. In the Call Features group box, select the **Display Incoming ANI** check box.

7.6 Radio Buttons Setup

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

1. From the left navigation, select **Conventional Features | Conv Keys Settings**.
The Conv Keys Settings window appears.



2. From the Key 2 Primary Action drop down menu, select **Encryption**.
3. From the Key 3 Primary Action drop down menu, select **Repeater Talkaround**.
4. From the Key 4 Primary Action drop down menu, select **Group Scanning Activity**.
5. Under Key 4, from the Zone ID drop down menu, select the **Zone ID**.
6. Under Key 4, from the Group Number drop down menu, select the **Group Number**.

8.0 IP-224 Access Key Installation

The Tait DMR Tier II 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 select the TM93xx 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) 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 web application**.
2. From the left navigation, select **Additional Features**.
The Additional Features page appears.

TELEX IP-224

- Home
- Ethernet Setup
- Multicast Setup
- Hardware Setup
- Gain Setup
- Per Line Setup
- Crosspatch Setup
- Account Management
- Backup & Restore
- Firmware Upgrade
- Additional Features**
- Save Parameters
- System Status

SUCCESS: Features are now available. Save Parameters step still required.

ACCESS ADDITIONAL FEATURES

Access Key:

Feature Name	State
Advanced Interface Option (North American)	Enabled

Serial Type	Available
EFJ 5300/VMx00	Yes
Hytera MD782	Yes
Hytera MT680	Yes
Icom	Yes
iDEN	Yes
Kenwood 5x10	Yes
Kenwood NEXEDGE	Yes
Kenwood NX-5x00	Yes
Kenwood x150	Yes
Kenwood x180	Yes
Kenwood x80	Yes
Kenwood x90	Yes
MOTOTRBO Interface*	Yes
MTRBi	Yes
PowerTrunk	Yes
Sepura	Yes
Serial Over IP	Yes
Sprint Direct Connect	Yes
Tait TM91xx/TM94xx	Yes
Tait TM93xx	Yes
Telex Generic	Yes

** MOTOTRBO Interface is only available on one line with the Advanced Interface Option (North American)*

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**.

The screenshot shows the 'TELEX IP-224' web application interface. On the left is a navigation menu with options: Home, Ethernet Setup, Multicast Setup (selected), Line Setup, IP Recorder Setup, Hardware Setup, Gain Setup, Per Line Setup, Crosspatch Setup, Account Management, Additional Features, Save Parameters, and System Status. The main content area is titled 'LINE SETUP' and includes a 'Submit' button and an 'Auto Configuration' checkbox (checked). Below the title is a table for configuring two lines. Line 1 and Line 2 are both enabled. Line 1 has a name 'Line 1', 'Local Mode' type, 'Tait TM93xx' serial type, and 'TELEX 32K' vocoder type. Line 2 has a name 'Line 2', 'Local Mode' type, 'Tait TM93xx' serial type, and 'TELEX 32K' vocoder type. Below this is another table for multicast settings. Line 1 has RX Mcast '225.8.11.81', RX Port '1054', TX Mcast '225.8.11.81', TX Port '1072', TX Group Port A '0', TX Group Port B '0', and TTL '6'. Line 2 has RX Mcast '225.8.11.81', RX Port '1055', TX Mcast '225.8.11.81', TX Port '1073', TX Group Port A '0', TX Group Port B '0', and TTL '6'. At the bottom is the 'IP RECORDER SETUP' section with a table for two recorders. Recorder 1 has 'Recorder 1' name, 'TELEX 32K' vocoder type, '225.8.11.81' mcast address, '2250' outgoing port, and TTL '6'. Recorder 2 has 'Recorder 2' name, 'TELEX 32K' vocoder type, '225.8.11.81' mcast address, '2251' outgoing port, and TTL '6'.

Line:	Line Enable:	Line Name:	Line Type:	Serial Type:	Vocoder Type:
1	☒	Line 1	Local Mode	Tait TM93xx	TELEX 32K
2	☒	Line 2	Local Mode	Tait TM93xx	TELEX 32K

Line:	Mcast Enable:	RX Mcast:	RX Port:	TX Mcast:	TX Port:	TX Group Port A:	TX Group Port B:	TTL:
1	☒	225.8.11.81	1054	225.8.11.81	1072	0	0	6
2	☒	225.8.11.81	1055	225.8.11.81	1073	0	0	6

Line:	Mcast Enable:	Line Name:	Vocoder Type:	Mcast Address:	Outgoing Port:	TTL:
1	☐	Recorder 1	TELEX 32K	225.8.11.81	2250	6
2	☐	Recorder 2	TELEX 32K	225.8.11.81	2251	6

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

Under LINE SETUP

4. From the Serial Type drop down menu, select **Tait TM93xx**.
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.

FUNCTION TONE SETUP

Jump to Entry: << < 1 to 10 > >>

Boot Up Frequency: 1 ▾

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.

Line Number	Line Type	Line Name	Rx Multicast Address	Rx Port	Tx Multicast Address	Tx Port	Base Radio IP	TTL	Packet Delay
1	Telex	Fire Department	225. 8 . 11 . 81	1054	225. 8 . 11 . 81	1254	0 . 0 . 0 . 0	2	10
		Echo Packets Enable:	0 . 0 . 0 . 0	1054	0 . 0 . 0 . 0	1254			
2	Telex	Sidney Police	225. 8 . 11 . 81	1055	225. 8 . 11 . 81	1255	0 . 0 . 0 . 0	2	10
		Echo Packets Enable:	0 . 0 . 0 . 0	1055	0 . 0 . 0 . 0	1255			
3	Telex	Newport Police	225. 8 . 11 . 81	1056	225. 8 . 11 . 81	1256	0 . 0 . 0 . 0	2	10
		Echo Packets Enable:	0 . 0 . 0 . 0	1056	0 . 0 . 0 . 0	1256			
4	Telex	iDen Line	225. 8 . 11 . 81	1057	225. 8 . 11 . 81	1257	0 . 0 . 0 . 0	2	10
		Echo Packets Enable:	0 . 0 . 0 . 0	1057	0 . 0 . 0 . 0	1257			
5	Telex	16kb Vocoder	225. 8 . 11 . 81	1058	225. 8 . 11 . 81	1258	0 . 0 . 0 . 0	2	10
		Echo Packets Enable:	0 . 0 . 0 . 0	1058	0 . 0 . 0 . 0	1258			
6	Telex	Supervisor Line	225. 8 . 11 . 81	1059	225. 8 . 11 . 81	1259	0 . 0 . 0 . 0	2	10

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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