

Hytera DMR Interface for IP-224

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For warranty and service information, refer to www.telex.com/warranty.

FACTORY SERVICE CENTER

Factory Service Center
Bosch Security Systems, Inc.
Radio Dispatch Products
8601 East Cornhusker Highway
Lincoln, Nebraska, 68507

CONTACT INFORMATION

Sales:

Phone (800) 752-7560

Fax (402) 467-3279

E-mail..... TelexDispatch@us.bosch.com

Customer Service Repair:

E-mail..... repair@us.bosch.com

Phone..... (800) 553-5992

Technical Support:

Knowledge Database .. <http://knowledge.boschsecurity.com/>

LiveChat www.telex.com/us/dispatch/support

E-mail TelexDispatchtechsupport@us.bosch.com

Web www.telex.com

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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 (ey@cryptosoft.com). This product includes cryptographic software written by Tim Hudson (tjh@cryptosoft.com).

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1.0 Introduction

The Hytera DMR radio interface is designed as an add-on option in the Telex Radio Dispatch system. This application guide describes the Telex Radio Dispatch Hytera DMR 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 Hytera DMR Interface Cable (P/N F.01U.319.163)
- Hytera MD782 DMR Radio

NOTE: The radio requires a hardware modification to serially communicate with the IP-224.

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
- Hytera Customer Programming Software

4.0 Supported Features

Hytera DMR Radio 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	No
			GPS Read	No	No
Group Call	No	Yes	GPS Trigger On/Off	No	No
Private Call	No	Yes	Monitor On/Off	No	No
			Radio Call Alert	No	No
ANI Decode	No	Yes	Radio Check	No	Yes
Call Alert Decode	No	Yes	Radio Enable/Disable	No	Yes
Emergency Decode	No	Yes	Radio Select Call	No	Yes
Status Message Decode	No	No	Radio Remote Monitor	No	Yes
Text Message Decode	No	No	Radio Send Text Message	No	No
			Radio Status (Send Status Message)	No	No
Query Encryption	No	No	Radio Status Request	No	No
Query Monitor	No	No	Scan Add/Delete	No	No
Query Scan	Yes	Yes	Scan On/Off	*	*
Query Talk Around	No	No	Talk Around On/Off	No	No

* *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
- Scan On/Off

5.0 Known Limitations

5.1 Scan On/Off

- The Hytera DMR radio does not pass the correct serial channel information to the IP-224 while scan is active so the IP Console's channel will not be updated correctly.

6.0 Cable Diagram

The IP-224 to Hytera DMR Interface Cable allows the IP-224 to serially control a Hytera MD782 DMR radio.

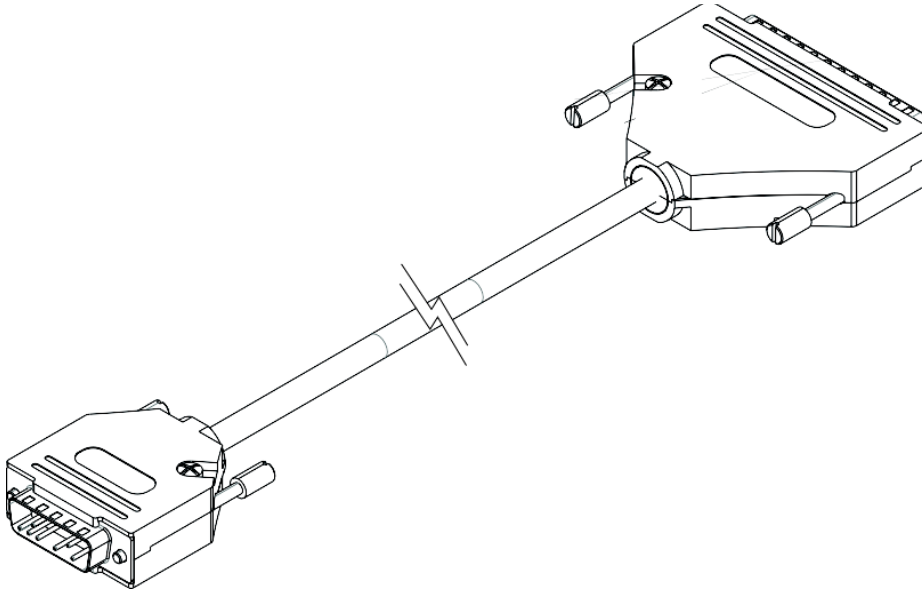


FIGURE 1. IP-224 to Hytera DMR Interface Cable

TABLE 1. Cable Diagram for Hytera DMR Radio and IP-224 Interface

Function	Hytera Radio DB-26	IP-224 DB-37
UART3_RX	PIN 19	PIN 17
UART3_TX	PIN 10	PIN 36
TX AUDIO	PIN 7	PIN 1
RX AUDIO	PIN 8	PIN 20
PRGM_IN_PTT	PIN 16	PIN 24
GROUND	PIN 2+6	PIN 5+29
COR	PIN 3	PIN 15

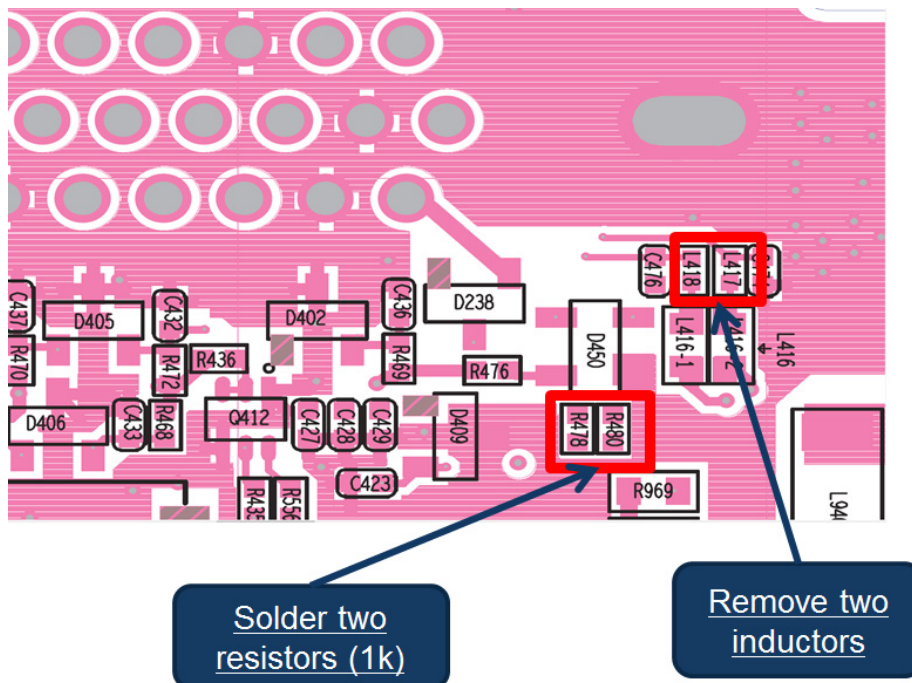
7.0 Radio Hardware Modifications

The Hytera MD782 radio must be modified to serially communicate with the IP-224.

To **modify the radio**, do the following:

1. In the Hytera MD782 product manual, refer to the **Disassembly and Assembly** section to properly open the radio and locate the main board.
2. On the main board, solder **resistors at R478 and R480** (1k, $\pm 5\%$, 0402).
3. On the main board, remove **inductors from L417 and L418**.

NOTE: These modifications are based upon board information supplied to Telex by Hytera. If you have questions or different hardware, please contact Hytera.



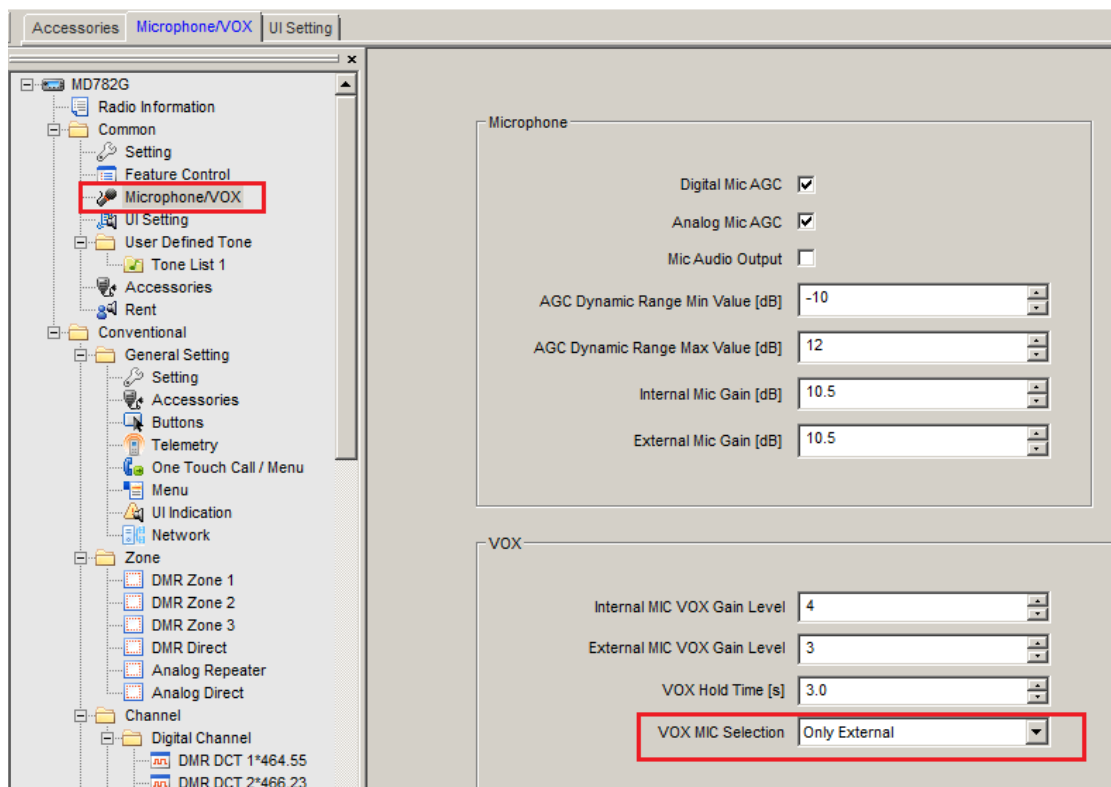
8.0 Radio Programming Application Setup

The Hytera Customer Programming Software is used to configure the Hytera DMR radio to interface properly with the IP-224.

8.1 Transmit Audio Setup

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

1. From the left navigation, select **Common | Microphone/VOX**.
The Microphone/VOX window appears.

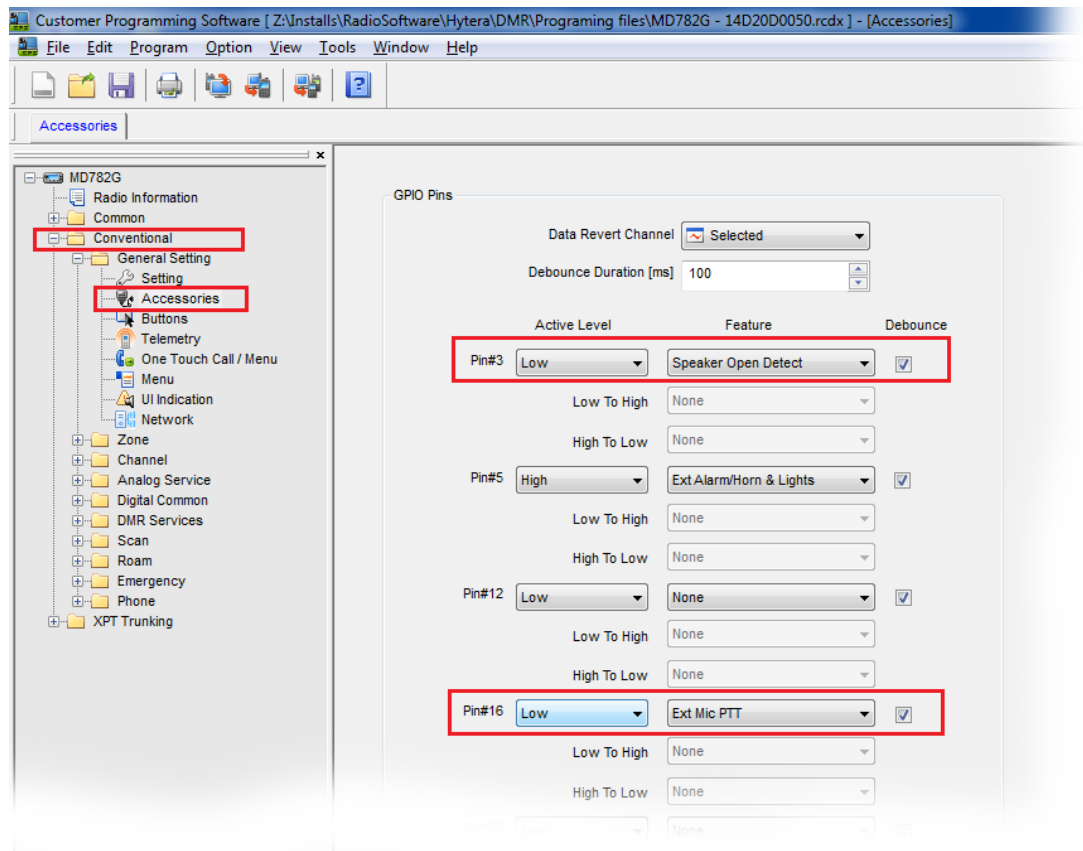


2. From the VOX MIC Selection drop down menu, select **Only External**.

8.2 COR and External PTT Setup

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

1. From the left navigation, select **Conventional | General Setting | Accessories**.
The Accessories window appears.

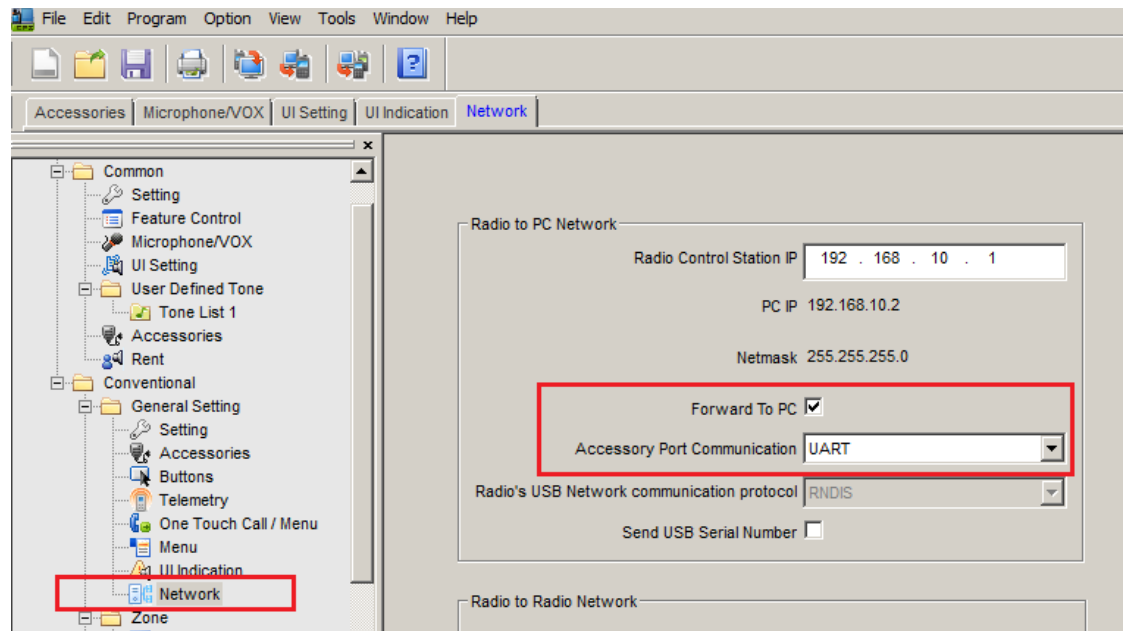


2. From the Pin#3 Active Level drop down menu, select **Low**.
3. From the Pin#3 Feature drop down menu, select **Speaker Open Detect**.
4. Select the **Pin#3 Debounce check box**.
5. From the Pin#16 Active Level drop down menu, select **Low**.
6. From the Pin#16 Feature drop down menu, select **Ext Mic PTT**.
7. Select the **Pin#16 Debounce check box**.

8.3 Serial Communications Setup

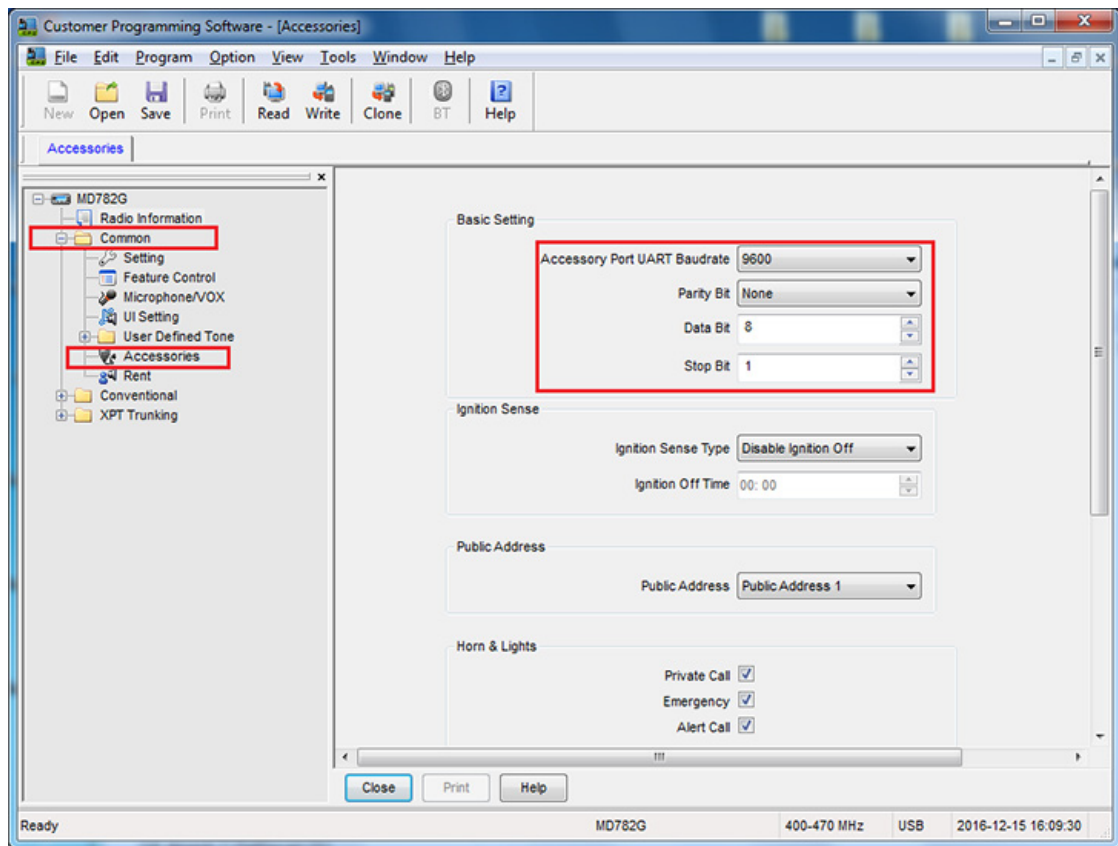
To **configure the Serial Communications**, do the following:

1. From the left navigation, select **Conventional | General Setting | Network**.
The Network window appears.



2. Select the **Forward to PC** check box.
3. From the Accessory Port Communication drop down menu, select **UART**.

4. From the left navigation, select **Common | Accessories**.
The Accessories window appears.

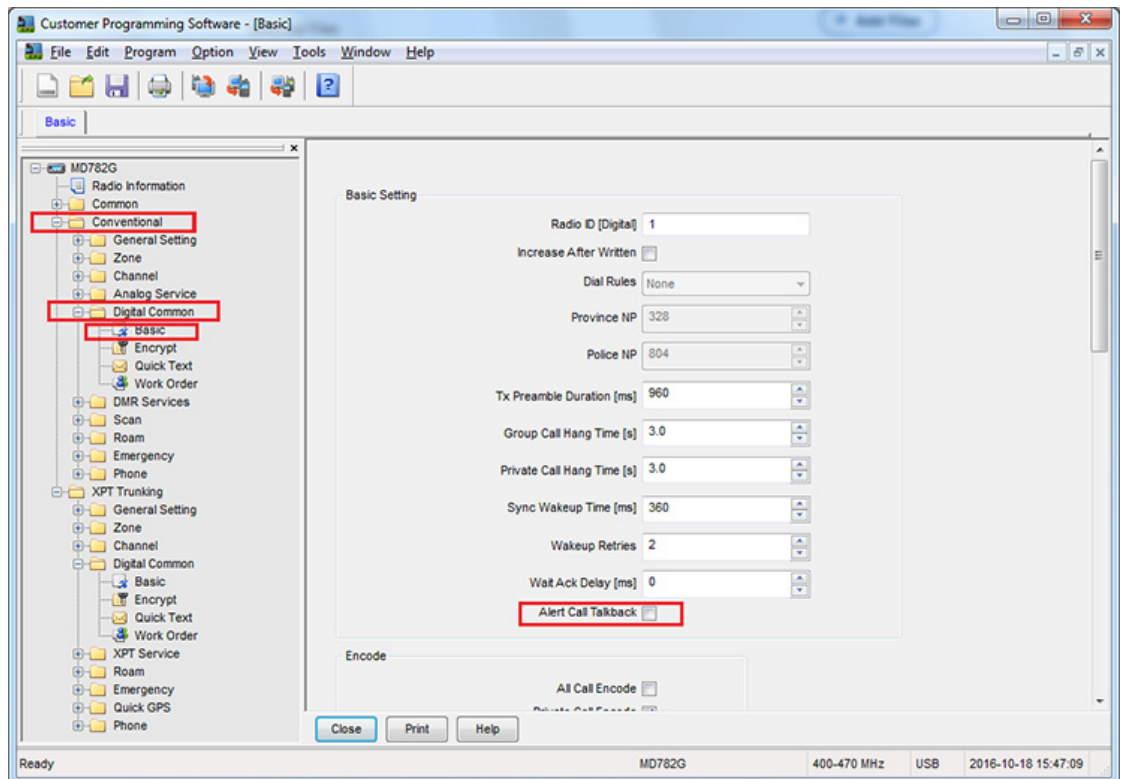


5. From the Accessory Port UART Baudrate drop down menu, select **9600**.
6. From the Parity Bit drop down menu, select **None**.
7. From the Data Bit drop down menu, select **8**.
8. From the Stop Bit drop down menu, select **1**.

8.4 Call Alert Decode Setup

To **configure the Call Alert Decode**, do the following:

1. From the left navigation, select **Conventional** | **Digital Common** | **Basic**.
The Basic window appears.

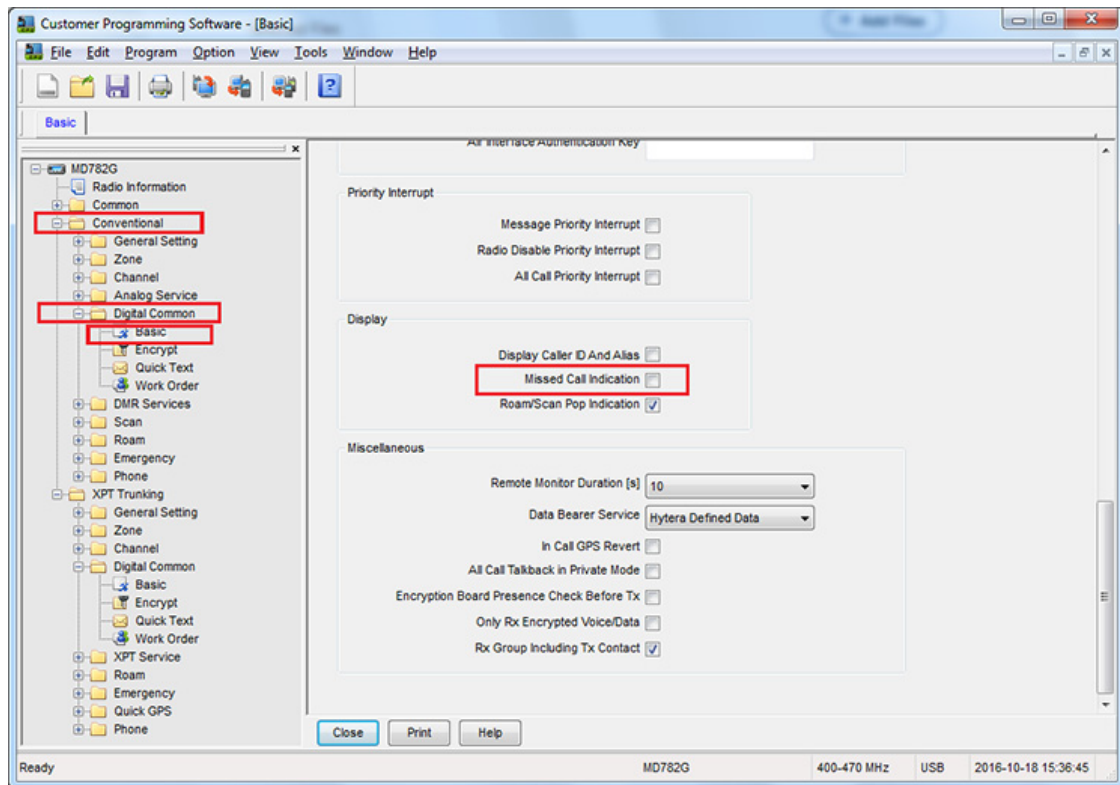


2. In the Basic Setting group box, clear the **Alert Call Talkback** check box.

8.5 Private Call Decode Setup

To configure the **Private Call Decode**, do the following:

1. From the left navigation, select **Conventional** | **Digital Common** | **Basic**.
The Basic window appears.



2. From the Display section, clear the **Missed Call Indication** check box.

9.0 IP-224 Access Key Installation

The Hytera DMR 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 Hytera MD782 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** webpage.
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:

<u>Feature Name</u>	<u>State</u>
Advanced Interface Option (North American)	Enabled

<u>Serial Type</u>	<u>Available</u>
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.

10.0 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**.

Name: Telex IP-224
MAC: 00:0B:7C:70:03:A2
HW: 1.010 **FW:** 2.102
SN: 224010802 **Checksum:** 9E1734BC



TELEX IP-224

[Home](#)
[Ethernet Setup](#)

▼ Multicast Setup

[Line Setup](#)
[IP Recorder Setup](#)

[Hardware Setup](#)
[Gain Setup](#)
[Per Line Setup](#)
[Crosspatch Setup](#)
[Account Management](#)
[Additional Features](#)
[Save Parameters](#)
[System Status](#)

Auto Configuration: ☒

LINE SETUP

Line:	Line Enable:	Line Name:	Line Type:	Serial Type:	Vocoder Type:
1	☒	Line 1	Local Mode	Hytera MD782	TELEX 32K
2	☒	Line 2	Local Mode	Hytera MD782	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	1254	0	0	6
2	☒	225.8.11.81	1055	225.8.11.81	1255	0	0	6

IP RECORDER SETUP

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 **Hytera MD782**.
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.

11.0 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	Echo Packets Enable	Options	Freqs	Signal Setup	SIP
1	Telex	Fire Department	225.8.11.81	1054	225.8.11.81	1254	0.0.0.0	2	10	☒	Options	Freqs	Signal Setup	SIP
2	Telex	Sidney Police	225.8.11.81	1055	225.8.11.81	1255	0.0.0.0	2	10	☒	Options	Freqs	Signal Setup	SIP
3	Telex	Newport Police	225.8.11.81	1056	225.8.11.81	1256	0.0.0.0	2	10	☒	Options	Freqs	Signal Setup	SIP
4	Telex	Iden Line	225.8.11.81	1057	225.8.11.81	1257	0.0.0.0	2	10	☒	Options	Freqs	Signal Setup	SIP
5	Telex	16kb Vocoder	225.8.11.81	1058	225.8.11.81	1258	0.0.0.0	2	10	☒	Options	Freqs	Signal Setup	SIP
6	Telex	Supervisor Line	225.8.11.81	1059	225.8.11.81	1259	0.0.0.0	2	10	☒	Options	Freqs	Signal Setup	SIP
7	Disabled	Line 7	225.8.11.81	1060	225.8.11.81	1260	0.0.0.0	6	10	☐	Options	Freqs	Signal Setup	SIP
8	Disabled	Line 8	225.8.11.81	1061	225.8.11.81	1261	0.0.0.0	6	10	☐	Options	Freqs	Signal Setup	SIP
9	Disabled	Line 9	225.8.11.81	1062	225.8.11.81	1262	0.0.0.0	6	10	☐	Options	Freqs	Signal Setup	SIP
10	Disabled	Line 10	225.8.11.81	1063	225.8.11.81	1263	0.0.0.0	6	10	☐	Options	Freqs	Signal Setup	SIP

AutoFill

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.

Technical Support:

Email: TelexDispatchtechsupport@us.bosch.com

Fax: 1-402-467-3279

Phone: 1-800-898-6723

Bosch Security Systems, Inc
8601 East Cornhusker Highway
Lincoln, Nebraska 68507