

# COMREX

## Matrix Portable

Unlimited versatility...



...for remote broadcast  
over dialup landlines,  
wireless and ISDN



## About Matrix Portable

Matrix Portable provides the most convenient way to deliver superior audio quality on any dialup telephone circuit. Combining the most practical user features with Comrex's technology advancements, it is unquestionably the first choice for those who seek flexible audio remotes.

Compact and modular, Matrix Portable is designed to withstand the rigors of the road. It's delivered equipped to handle full duplex audio, with up to 15 kHz audio bandwidth, over standard dialup POTS. Audio quality scales automatically to compensate for poor phone lines, keeping you connected and on the air.

Program and cueback can be sent over the same phone line. This is a real advantage when off-air monitoring is delayed from real-time, such as with HD Radio or when using a profanity delay.

The optional Matrix GSM Module frees you from the tether of landlines. It has an integrated mobile phone, is compatible with any GSM carrier and operates nearly everywhere on the planet. Our optimized audio codec delivers broadcast-quality, 7 kHz audio using standard GSM cellular connections.

Choose the Matrix Portable ISDN Module when ISDN is available, rather than purchasing an additional codec. It offers MPEG Audio Layer III, G.722 and Comrex's Turbo G.722, allowing you to select the most appropriate combination of fidelity, compatibility and low delay for your needs.

When you purchase Matrix Portable, you can be confident that you are using the most rugged and reliable remote broadcast equipment available.

Doing a remote? Put Comrex on the line.

# Features & Benefits



## Audio quality

Comrex audio coding algorithms are uniquely suited to the task of moving high-quality audio along narrow data channels. Hardware is designed to exceed broadcast audio quality expectations. Note that actual performance may vary with phone circuit conditions.

POTS performance:

- Full duplex FM quality (15 kHz) audio bandwidth at connect rates of 24 kbps and above.
- Full duplex audio scales from 12 kHz to 5 kHz at connect rates of 21.6 kbps to 9.6 kbps.
- Selectable "Voice Mode" allows 7 kHz audio with a 300 bps ancillary data channel and extra forward error correction.
- Short coding delay (100 mS) allows seamless two-way conversation.

GSM performance:

- Comrex voice algorithm boosts frequency response to 7 kHz on bit rates as low as 9600 kbps with fewer digital artifacts.

ISDN performance:

- MPEG Audio Layer III—15 kHz mono over a single ISDN B channel.
- G.722—7.5 kHz mono, low delay, over a single ISDN B channel.
- Comrex Turbo G.722—15 kHz mono, low delay, over two ISDN B channels.

TelCell performance:

- Standard POTS response of 300 Hz–3 kHz.

## Line connection reliability

Dialup telephone networks can be unpredictable. Comrex combines our years of experience and the latest technologies to keep you in control of your remotes.

For POTS:

- Automatic modem negotiation connects at the optimal rate supported by telephone connection.
- Phone line quality is monitored continuously, and modem renegotiates if the line degrades during the call. Renegotiation may be disabled to prevent dropouts at inconvenient times.
- Maximum data rate can be preset manually to provide a guardband against line errors.
- A brief two-second renegotiation can be forced manually by pressing a single button on either end of the call.

For GSM:

- Proprietary Comrex coding, error correction and modem innovations overcome both bandwidth and network limitations.
- Quick recovery from errors, avoiding the stuttering effect often found with handheld phones.
- Greater stability due to greater available power and external antenna.





## Easy-to-use dialing and configuration interface

Useful features that nontechnical personnel can readily understand save you time and money on training, preparation and configuration.

- Quick-dial stores 20 phone numbers in nonvolatile memory.
- One-touch redial.
- Auto-answer (on first or sixth ring) and manual answer.
- POTS connection works with external phones, for PABXs and operator-assisted calls.
- Accepts dialing strings of up to 44 digits with pauses.
- Menu-selectable dialing parameters of analog telephone protocols for 20 countries.
- Backlit LCD displays modem connection speed.

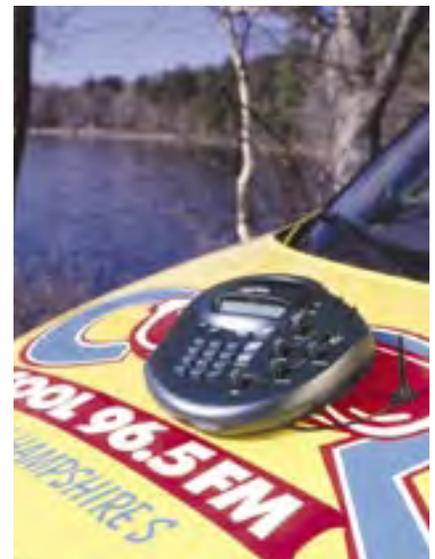
## Built for the real world

Comrex has addressed all the details to make use and maintenance of your codec hassle-free.

- Compatible with all Comrex POTS codec models. (A corresponding unit is required at the other end of the phone line.)
- Field-proven, rugged design for years of trouble-free use.
- Software updates are accomplished easily using the Matrix Portable's multipurpose data port and files downloaded from Comrex website or obtained via e-mail. All software updates are free.
- Switching power supply works everywhere.
- Optional rechargeable battery for up to seven hours of primary or backup operation.
- Store and forward mode—Ability to record and store 10 minutes of full-fidelity audio to send in nonreal time.

## Audio mixing and other features

- Two-channel microphone mixer:
  - An XLR mic input and XLR mic/line input can be mixed, along with an auxiliary, unbalanced line input to create the send program.
  - Headphone output provides an adjustable mix of send and receive audio for the local talent.
  - An XLR output provides an adjustable mix of send and receive audio to feed a local device, such as a public address system.
- Built-in peak limiter.
- Front-panel LED status indicators:
  - Ring/carrier detection LED flashes when an incoming call is ringing and is steadily on when the internal modem is connected with a compatible codec on the far end.
  - Ready indicator illuminates when decoder locks with compatible far-end codec.
- Accessory slot accepts expansion modules for maximum flexibility.
- Two contact closures for remote control:
  - One latching, enabled upon the decoder synching with far-end codec.
  - One momentary, activated by a button press on the far-end codec.
- A "Send CC" button on the Matrix Portable triggers a contact closure on the far-end Comrex codec.



# Matrix Portable Add-ons

## Matrix Portable GSM Module

Matrix Portable's core purpose is to provide the best-quality remotes over POTS. Unlike most devices in its class, Matrix Portable has a flexible design, with an accessory slot for function expansion and our most advanced coding, to provide easy and economical migration to new communication technologies.

Wireless audio transmission with enhanced quality from anywhere has been our customers' most sought-after capability. Advances in GSM and an intensive design effort on the part of Comrex have resulted in an outstanding means to accomplish wireless remotes—the fully integrated Matrix GSM Module for the Matrix Portable. It requires GSM circuit-switched data service, the longtime global standard that is spreading rapidly throughout North America.

With the GSM Wireless Module, you can now achieve broadcast-quality audio from anywhere without being tied to a phone line. What's the next great communications technology for broadcast remotes? We can't be certain, but our plan is to have the Matrix Portable support it!



## Features and benefits

- The finest audio quality available over wireless telephone services.
- No external phone is necessary, because the phone is actually embedded into the module. Simply insert a GSM SIM card to activate the phone.
- Accepts SIM cards from GSM providers.
- Improved transmission and reception:
  - Kit includes a three-inch external magnet-mount antenna.
  - Can safely transmit more power (up to 2 watts) than traditional mobile phones, since the phone is neither handheld nor limited by radiation concerns.
- Modules are available in an 850/1900 MHz version for North American use as well as 900/1800 MHz for use in the rest of the world.
- LED indicator of connection status between the Matrix Portable GSM Module and the GSM Network.

## Custom road cases

### Small Road Case

This high-impact, ridged plastic case with sturdy fasteners is rugged enough for the cargo hold of an airplane, yet small enough for most overhead compartments. Provided with custom foam insert for Matrix Portable and many other Comrex products. Inside dimensions: 18" W x 13" D x 8" H (45.7 cm x 33 cm x 20 cm); weight 12 lbs (5.4 kg)



### Large Road Case

Retractable handle, recessed wheels and larger size accommodate your codec as well as headphones, microphones, cables, etc. High-impact, ridged plastic with custom foam insert compartments designed to accommodate your Matrix. Inside dimensions: 24" W x 17.5" D x 12" H (60.9 cm x 44.5 cm x 30.5 cm); weight 27 lbs–12.25 kg

## Matrix Portable ISDN Module

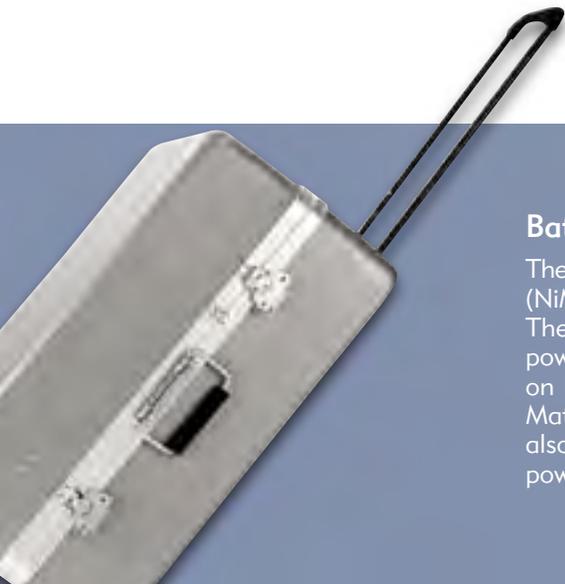
The Comrex Matrix Portable ISDN Module converts your Matrix to a full-featured ISDN codec.

- Three algorithms are offered in the Matrix ISDN Module to transport mono audio, including G.722 for widest compatibility, Turbo G.722 for very low delay 15 kHz operation and MPEG Audio Layer III for compatibility and full fidelity at lower bit rates.
- Includes ability to deliver MPEG Audio Layer III in one direction with a G.722 return for reduced delay on Layer III feeds.
- Worldwide ISDN interfaces are present in the module, including an international terminal adapter with both "U" and "S/T" interfaces available.
- Compatible with Comrex's Matrix Rack (with Matrix ISDN Module), Comrex's Nexus Rack and ISDN codecs from most manufacturers.
- Up to 10 line configurations may be stored in nonvolatile memory.
- Very easy to program through the intuitive Matrix Portable front panel interface.
- An ancillary data channel provides 1200 baud, bidirectional data on the same ISDN channel used for the coded audio with little impact on audio quality. Allowing devices on both sides of the remote to communicate with each other, ancillary data are available in both MPEG Audio Layer III and G.722 modes, but are limited to the G.722 direction when operating in split mode.



## Matrix TelCell Module

The Matrix TelCell module provides a simple coupler/hybrid connection to phone lines and mobile phones. Standard landline or wireless call quality is enhanced somewhat by the use of professional microphones, rather than the telephone set, for the audio feed. Audio bandwidth is 300 Hz–3 kHz. The TelCell Module allows Matrix Portable to be used as a field mixer, connecting to studios without codecs or in cases where phone lines cannot support codec transmissions. The Matrix TelCell Module also adds the ability to send and receive audio through the hands-free port of many mobile phones.



## Battery Kit

The battery kit includes a Nickel Metal Hydride (NiMH) battery, a charger and a mounting bracket. The battery may be used as a primary source of power to run Matrix Portable for up to 7 hours on POTS or ISDN; up to 4 hours when using the Matrix Portable GSM Module. The battery kit can also be used as an optional backup should AC power be interrupted during a broadcast.



# Matrix Portable Operation



## Pairing Matrix Portable with Studio Codecs

Matrix Portable requires a compatible codec on the studio side of the phone connection. The chart below illustrates the various combinations available for each of the codec modules.

Matrix Portable mode	Paired device requirements
POTS Codec	<ul style="list-style-type: none"> <li>• Comrex Matrix Rack</li> <li>• All other Comrex POTS codec, including another Matrix Portable, BlueBox, Vector and HotLine</li> </ul>
GSM Codec	<ul style="list-style-type: none"> <li>• Comrex Matrix Rack</li> <li>• Another Comrex Matrix Portable</li> <li>• Comrex BlueBox</li> </ul>
ISDN using MPEG Audio Layer III and/or G.722	<ul style="list-style-type: none"> <li>• Comrex Matrix Rack with Matrix ISDN Module</li> <li>• Another Comrex Matrix Portable with Matrix Portable ISDN Module</li> <li>• Any ISDN codec that supports G.722 or MPEG Audio Layer III</li> </ul>
ISDN using Comrex Turbo G.722	<ul style="list-style-type: none"> <li>• Comrex Matrix Rack with Matrix ISDN Module</li> <li>• Another Comrex Matrix Portable with Matrix Portable ISDN Module</li> <li>• Comrex Nexus Rack</li> <li>• Comrex Nexus Portable</li> <li>• Comrex DXR.1</li> </ul>
Standard telephone call using TelCell (no audio coding)	<ul style="list-style-type: none"> <li>• POTS telephone couple or hybrid</li> </ul>



# Specifications

## Matrix Portable

### Audio connections

- One XLR mic input—adjustable level
- One XLR mic/line input—adjustable level
- Auxiliary mini-jack line tape input—fixed level
- Headphone output—adjustable mix of send and receive audio
- Balanced XLR line level audio out—adjustable mix of send and receive audio

### Other connections

- Telephone line and telephone set: RJ-11 6-pin modular jacks (2)
- Contact closures: 2-conductor mini-jacks (2)
  - Ready: Latching dry contact closure when Matrix Portable encoder is synchronized to far-end Comrex decoder
  - Enter: Momentary dry contact closure activated by button push on Comrex codec
- Auxiliary data port: DB-9
- Accessory connection: 25-pin D
- Power: 5 pin mini-DIN

### Audio input levels

- Mic input: -70 to -40 dBu @ 2 K $\Omega$
- Line input: -10 to +10 dBu @ 20 K $\Omega$
- Tape input: -10 dBu (fixed) @ 10 K $\Omega$

### Audio output levels:

- Line level out: +12 dBu maximum @ 100 $\Omega$
- Headphone out: .5 watt @ 100 $\Omega$

### Audio Performance

- POTS:

*Audio performance varies with phone circuit conditions*

- Full duplex FM quality (15 kHz) audio bandwidth at connect rates of 24 kbps and above
- Full duplex audio scales from 12 kHz to 5 kHz at connect rates of 21.6 kbps to 9.6 kbps
- Selectable "Voice Mode" allows 7 kHz audio with a 300 bps ancillary data channel and extra forward error correction

- GSM:

*Audio performance varies with phone circuit conditions*

- Up to 7 kHz on bit rates as low as 9600 kbps with fewer digital artifacts

- ISDN:

- MPEG Audio Layer III—15 kHz mono over a single ISDN B channel
- G.722—7.5 kHz mono, low delay, over a single ISDN B channel
- Comrex Turbo G.722—15 kHz mono, low delay, over 2 ISDN B channels

- TelCell:

- Standard POTS response of 300 Hz–3 kHz

### Coding Delay

*Delay specified does not include transmission delay*

- POTS: 100 mS
- GSM: 120 mS (Note: GSM transmission delay may be significant)
- ISDN
  - G.722 and Turbo G.722: 6 mS
  - MPEG Audio Layer III: 310 mS
- TelCell: Matrix Portable contributes no delay

### Power and physical

- External power supply: 24 V for 120/240 VAC 60/50 Hz operation
- Size: 9.5" W x 10" D x 3.5" H (24.1 cm x 25.4 cm x 8.9 cm)
- Weight: 2.5 lbs (1.1 kg)

## Matrix Portable ISDN Module

### Connections

- ISDN line connection: RJ-45
- External DCE port: DB-9 pin connector allows bypass of the internal terminal adapter to connect to an external terminal adapter, DSU, satellite terminal, etc.

### Levels

- Ancillary data: RS-232
- DCE in/out: RS-422

### Physical

- Powered through Matrix Portable
- Size: 4.25" W x 6.5" D x 1.5" H (10.8 cm x 16.5 cm x 3.8 cm)
- Net weight: 0.68 lbs (0.31 kg)

## Matrix GSM Module

### Physical

- Powered through Matrix Portable
- Size: 4.25" W x 6.5" D x 1.5" H (10.8 cm x 16.5 cm x 3.8 cm)
- Net weight: 0.72 lbs (0.32 kg)
- Antenna
  - Height with base: 3"
  - Connector: SMA

## Matrix TelCell Module

### Connections

- Hands-Free Cell: 1/8" 3-conductor mini-jack
- Tel Line: RJ11 6-pin modular jack

### Physical

- Powered through Matrix Portable
- Size: 4.25" W x 6.5" D x 1.5" H (10.8 cm x 16.5 cm x 3.8 cm)
- Net weight: 0.52 lbs (0.23 kg)



## About Comrex

Comrex, an innovator in communications and telephony technologies for more than 40 years, provides reliable solutions to meet the demands of live broadcast. Thousands of radio and TV stations trust the quality of our products every day for news, sports and entertainment audio. The company is headquartered near Boston, Massachusetts, and Comrex products are offered and supported by a worldwide network of dealers.

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