



**PRACTICAL DEVICES
CORPORATION**

XM4

Headphone Amplifier



User's Manual

**Practical
DEVICES**



PRACTICAL DEVICES CORPORATION

Thank you, and congratulations on your purchase of the XM4 Portable Headphone Amplifier!

We've worked very hard to provide you with what may be one of the most advanced, feature packed, and best sounding headphone amplifiers on the market today. The XM4 is designed to be durable, flexible, easy to use, practical, and above all, sound great. Each unit is carefully manufactured, and then rigorously tested for performance, durability, and sound quality.

If you have any questions that are not answered by this manual, please feel free to send us an email. Enjoy the amp!

Yours truly,

James Forest
President & CEO

**PLEASE
READ!**

A Word About Protecting Your Hearing: The most valuable piece of audio equipment you own are your ears. Smart people protect their hearing. When using the XM4, or any headphones, [get in the habit of removing the headphones from your ears](#) whenever you:

- Turn the XM4 on;
- Connect or disconnect any cables,
- Do ANYTHING that may cause a sudden burst of loud sound.

Your only have one set of ears, and you can't replace them. **Never** listen at excessive volume. **Always** listen to music at reasonable volume, and most importantly, **use good common sense.**

Table of Contents

XM4 Block Diagram	4
Connecting Your XM4	5
Power Button Functions	6
Crossfeed Controls	7
Disassembling the Unit	8
Replacing the Battery	9
Gain Boost Jumpers	10
Lithium Battery Charger	11
External Power Supply	12
Testing the Battery	13
Frequently-Asked Questions	14
Troubleshooting	15
Warranty and Guarantee	17
Technical Specifications	18

XM4 Block Diagram

Power Button

Press button:

- 1 time = Turn on power for 1 hour
- 3 times = Turn on power for 3 hours
- 6 times = Turn on power for 6 hours
- 7 times = Turn on power forever

- 2 times = Toggle flashlight mode
- 5 times = Toggle dimming of blue LED

Press and HOLD to turn unit off.

Press once to display battery voltage. For example, if battery is at 8.5 volts, the amber LED will flash 8, then 5 times.

Amber LED

Flashes battery voltage when Power Button is pressed.

Flashes a one-flash warning when the battery is low (below 6.5 volts). Flashes a two-flash warning when the battery is very low (below 5.2 volts).

Blue LED

Indicates power is on

Output

Connect to Headphones

Bass +6dB

Main Volume

Input

Connect to MP3 player or other audio source.

Crossfeed Enable Switch

IN position: Crossfeed enabled.
OUT position: Crossfeed disabled.

Power Connector

"Barrel" connector with 1.3mm center pin. Center pin must be **positive**.



Used to power and recharge the XM4.

Gold-Plated Amp Chip Socket

Allows for future amp chip upgrades and modifications for those who like to experiment.

Crossfeed Adjuster

Turn this potentiometer to adjust the amount of Crossfeed, from near-stereo to 100% mono.

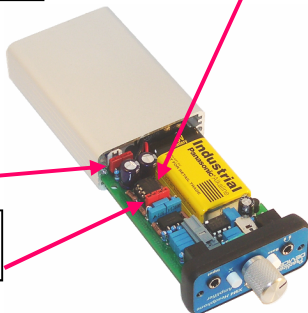
This only has an effect when the Crossfeed Enable Switch is in the IN position.

Battery Charger Jumpers

Change these only if you want to use a NiMH battery. See Users Manual Pages 12 and 13

Gain Boost Jumpers

Jumpers installed: = +10db extra boost
Jumpers not installed: = +0db extra boost



Connecting Your XM4

1. Connect a suitable source to the input jack, as pictured. Sources may be MP3 or CD players, iPods, or any line-level devices.
2. Connect your headphones to the output jack.



Your headphones can have an impedance of 24 to 600 ohms.

Power Button Functions



The power button functions are activated by pressing repeatedly within a three second window:

1 press: Turn unit on. The XM4 turns off automatically after **one** hour.

3 presses: Turn unit on for **three** hours.

6 presses: Turn unit on for **six** hours.

7 presses: Turn unit on. The XM4 will not turn itself off.

Press and hold: Turn unit off.



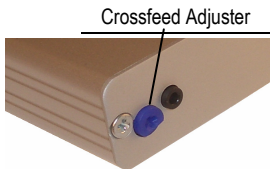
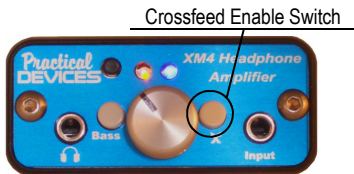
The unit will respond to button presses by flashing the blue LED once for each hour it will stay on.

Additional power button functions:

2 presses: Toggle flashlight mode.

5 presses: Toggle LED dimming.

CrossFeed Controls



The XM4's Crossfeed circuit simulates the sound stage of loudspeakers, through your headphones.

- Press the Switch IN to activate Crossfeed.
- Leave the button OUT for full stereo operation, bypassing the Crossfeed circuit entirely.

Use a small screwdriver (Philips or Straightblade) to adjust the Crossfeed Potentiometer:

- All the way clockwise to produce a mono signal;
- All the way counter-clockwise to produce a near-stereo image.



Why would you want Crossfeed? Most music is mixed to be listened to on loudspeakers. The studio technicians mixing the recording assume there will be a lot of crosstalk, since with speakers the listener's left ear clearly hears the right speaker's output, and vice versa. Thus, most music is mixed with a very wide stereo soundstage.

With headphones, however, the left ear only hears the left channel, and the right ear only hears the right channel, with nearly zero crosstalk. This can, for many recordings, cause the soundstage to appear to be "in the center of your head". Further, some recordings (early Beatles recordings are infamous for this) have each instrument and vocal track panned 100% to either left or right, which can almost immediately cause listener fatigue. Crossfeed corrects this by bleeding some of the left channel into the right, and vice-versa.

Disassembling the Unit

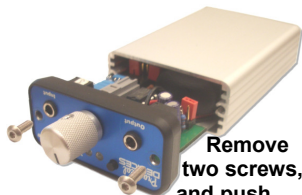
If you need to change the Gain Boost Jumpers or Battery Charger Jumper, you will need to disassemble the unit.

Here's how:

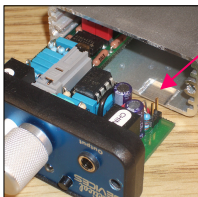
1. Turn the unit off, and remove the external power adapter if connected.
2. Remove the rear panel using a Phillips screwdriver. Remove the battery.
3. Remove the two screws on the front panel (use the included 5/64" allen key). Note: you do **NOT** need to remove the volume knob!
4. From the rear, push the circuitboard out the **front** of the case.

To re-assemble the unit:

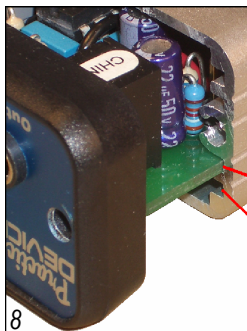
1. Slide the unit back together (make sure the circuit board slides **smoothly** on the case's guide rails)
2. Re-install the two screws. Do not overtighten.
3. Re-install the battery and rear panel.



Remove two screws, and push circuitboard from rear.



Note: there is a notch in the case. Make sure the case is oriented so the notch lines up with the **pushbutton**, as shown.



Circuit Board slides into THIS slot

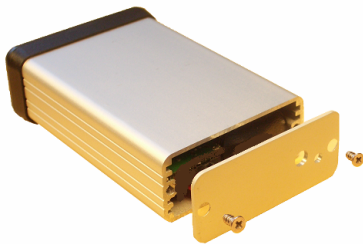
NOT this slot

Help! I think I stripped the screws when I tightened them!

No, you didn't. You can gently pinch the case's screw receptacles with a pair of pliers, as shown, to tighten things up.



Replacing the Battery



Replace the battery by removing the **rear** panel, using a Philips screwdriver.

- Connect the battery clip to the new battery
- Insert the battery clip-first into the XM4
- The battery should not protrude out of the rear of the unit (if it does protrude, you won't be able to completely screw down the rear panel. Check that the battery cable hasn't prevented the battery from being pushed in completely).



If the battery cable has become entangled, you may need to disassemble the unit as shown on page 8.

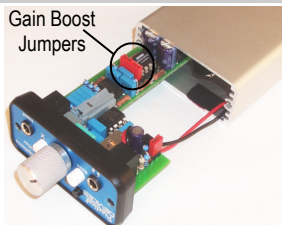
Gain Boost Jumpers

With the volume knob at full, your XM4 will deliver +13dB of gain. Additionally, you can install the Gain Boost jumpers, which will give you an extra +10dB of gain, for a total of +23dB.

In order to get the best possible noise floor, you should **not** install the Gain Boost jumpers unless: a) the volume of your headphones is too quiet, and, b) you have already tried turning up the volume of your



Usually, the Gain Boost jumpers are only needed when using headphones which have an impedance **greater** than around 150



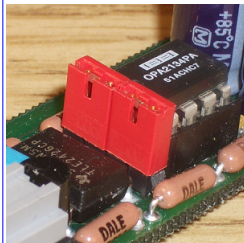
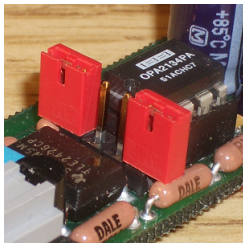
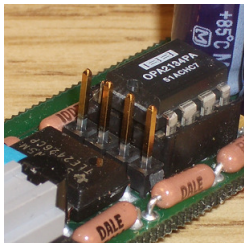
To install or remove the Gain Boost jumpers:

1. Disassemble the unit (see page 8)
2. To install the jumpers, place a jumper of each pair of riser pins. (Hint: if you are removing the jumpers, place each jumper over **one pin only**, so you don't lose them).
3. Re-assemble the unit.

Jumpers are removed.
Gain boost is **disabled**.

Jumpers are removed, but
are placed over a **single**
pin so they don't get lost.
Gain boost is **disabled**.

Jumpers are installed.
Gain boost is **+10dB**



Lithium Battery Charger

Lithium Battery FastCharge™ System

If your XM4 came equipped with the optional Lithium rechargeable system, just plug the charger into the powerjack on the rear of the XM4.

- The battery will fully charge within two hours. When charging is finished, the LED on the charger will turn from red to green.
- The battery will charge even if the XM4 is turned on.
- You can leave the charger connected indefinitely.
- You can expect up to 40 hours of use per charge.
- Your Charger is a "World" charger—it will work with AC Mains voltages from 105 to 240 VAC, at 50 or 60Hz. If you are using the charger outside of North America, you may need a plug adapter (available from your local electronics store).




External Power Supply

(**Note:** If your XM4 came equipped with the Lithium rechargeable system, then this page does **not** apply to you.)

External Power Supply

If your XM4 did NOT come with the Lithium system, then it shipped from the factory with an Industrial Alkaline 9v battery. You can use an external power supply to save battery life while you are at home. The external power supply must be:

- 6 to 15V DC (if you want to use the supply to recharge a NiMH or NiCd battery, then the supply **must** be **Regulated 12V DC \pm 5%**)
- Have a barrel-type connector, with a 1.3mm center pin.
The center pin must be positive polarity: 
- The milliamp (mA) rating on the supply does not matter; any mA rating can be used.
- A suitable power supply is RadioShack PN#273-1773 (make sure you ask for Adaptaplug "H" PN#273-1711, which is included with the adapter).

NiMH or NiCd Rechargeable Battery

A rechargeable NiMH or NiCd battery can be used instead of the alkaline, and you can use the XM4's integrated battery trickle charger to recharge it. RadioShack #23-529 battery will work, or any of the following types of rechargeable batteries can be used:

- Nickel Metal-Hydride (NiMH), 8.4v or 9v
- Nickel-Cadmium (NiCad), 8.4v or 9v



Using a 7.2v battery is not recommended, as overcharging may result if the external power is applied for too long.

To use the trickle charger and a NiMH or NiCd battery:

- 1) Obtain an external power supply described above
- 2) Install the NiMH or NiCd battery in the XM4
- 3) Set the Charge Jumpers in the XM4 as shown on bottom-center of Page 13.

- Charging a NiMH or NiCd battery will take approximately 15 hours
- Battery life depends on the "mAh" rating of your battery. For example, a "250mAh" battery can be expected to last approximately 25 hours.

Use of an external power supply which is higher than the voltages shown above may cause battery overcharging, damage to the battery and/or the XM4, battery electrolyte leakage, or possibly even battery explosion. If in doubt, measure your power adapter with a voltmeter, or enquire at your local electronics store.

Barrel-type plug:
XM4 uses:
"1.3mm
center
pin"



Testing the Battery

The XM4 also acts as a battery tester.

When the XM4 is turned on, the amber LED will display the battery voltage by flashing. For example, if the voltage is 8.5 volts, the LED will flash 8 times, then 5 times.

To see the battery voltage if the unit is already on, press the power button



The XM4 will warn you if the power falls below certain thresholds:

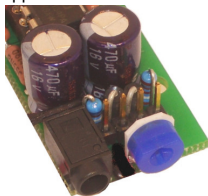
- At around 6.5 volts, the amber LED will begin to flash.
- Below around 5.2 volts, the amber LED will double-flash, indicating the battery is very low.

Charge Jumper Configuration

Only change the charge jumpers from their factory defaults if you want to install a NiMH or NiCd rechargeable battery. (For advanced users only!)

Alkaline Battery Configuration:

Both jumpers are removed. Use this configuration if you are using an Alkaline battery. This is the Factory default for XM4's shipped with an alkaline battery.



Trickle Charger

Configuration. For NiMH and NiCd rechargeable batteries. Install the outer **one** jumper, as shown:



Lithium Battery Fastcharge.

Both jumpers are installed. This is the Factory default for XM4's shipped with the Lithium option.



Frequently-Asked Questions

Can I use a line-level input to the XM4, such as from a CD/DVD player or VCR?

Yes, the XM4 will accept a line-level input.

Can I use the XM4 to drive speakers?

Usually, no. The XM4 was designed as a *headphone* amp, and will usually not do a good job of driving speakers, even small ones (most speakers have impedances of around eight ohms). What you are looking for is a *power* amplifier, not a *headphone* amplifier

For more FAQs, see our website:

<http://www.practicaldevices.com/faq.htm>

Troubleshooting

Here are some common problems, and their solutions:

Amp does not turn on or respond to pushing the power button:

- Disconnect the battery, **hold down the power button for 10 seconds**, then reconnect the battery.

Headphone volume is too quiet, even with the volume knob at full:

- Increase volume of source (MP3 player). If it is still too quiet, then install the Gain Boost jumpers (see page 10)

Output is in one ear only; the other channel is dead:

- Check that all cables are **completely** plugged in all the way
- Check that your cable is a **stereo** cable, not a **mono** cable.

Notes

Warranty and Guarantee



PRACTICAL DEVICES CORPORATION


Practical Devices stands behind its products with a full no-risk warranty and money-back satisfaction guarantee.

Practical Devices offers a 30-day money-back guarantee on all of our products. If, for any reason whatsoever, you are unsatisfied with your purchase, you may return it for your money back, including your original shipping cost. (The fine print: Unit must be returned within **30 days** of sale; Unit must be returned in the same undamaged, good working order as it was received; Practical Devices will refund you the original cost, plus the cost of the original shipping. Customer must pay for return shipping cost).

Further, we warranty, for a period of one year, that our products are free from any defects in workmanship. Should you have any problems, we promise to make it right. (The fine print: warranty is in effect for a period of one year. Problems must be reported to sales@practicaldevices.com This warranty covers any defects in workmanship. It does not cover abuse, physical damage, or the like).

Should you need any service, please email us at
sales@practicaldevices.com

Specifications

Description:	Portable Audio Headphone Amplifier
Weight:	140 grams (4.9 oz)
Power Source:	<ul style="list-style-type: none"> - 9-volt alkaline, NiMH, NiCd battery, or, - 8.4-volt NiMH or NiCD battery, and/or, - External Power Supply. - Option Lithium Rechargeable System
External Power Supply:	1.3mm Barrel connector power jack, center pin positive.  If using built-in NiMH battery charger: 12VDC \pm 5% If not using battery charger: 6-15VDC Optional Lithium charger can also be used.
Battery Charge Time	Lithium Charge System: 2 hours Trickle charge NiMH: 15 hours
Battery Life (typical):	Alkaline: 50 hours Lithium: 40 hours
Maximum Gain:	+23.1 dB (Gain Boost jumpers in) +12.7 dB (Gain Boost jumpers out)
Frequency Response (20-20,000Hz, typical):	+0.1dB, -0.4dB
-3dB Point (typical):	21 kHz at top end; 9 Hz at low end
Total Harmonic Distortion (typical)	0.002%
Intermodulation Distortion (typical)	0.007%
Signal to Noise ratio (20-20,000Hz, typical):	100 dB

Specifications (Continued)

Dynamic Range (20-20,000Hz, typical):	100dB
Bass Boost	+6dB @ 100Hz
Crossfeed	User-adjustable from mono to stereo using potentiometer; User can bypass using pushbutton.
Auto Power-OFF	User selects between 1, 3, or 6 hour poweroff interval, or unit can be set to stay on indefinitely
Status Indicators	Two LEDS (one blue, one amber)
Integrated Voltmeter accuracy (typical)	$\pm 100\text{mV}$
Mechanicals	Anodized aluminum case; Glossy laser-anodized faceplate; Polished aluminum volume knob; FR-4 dual-layer Printed Circuit Board with 1 oz. copper
Other Features	Flashlight Mode: Turns on both LEDs to full brightness; Dimming mode: Allows user to optionally dim the blue LED.



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