PRACTICAL DEVICES
CORPORATION

XM3
Headphone Amplifier

User's Manual

Practical DEVICES

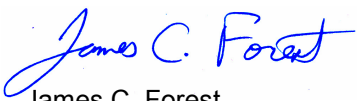
PRACTICAL DEVICES CORPORATION

Thank you, and congratulations on your purchase of the XM3 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 XM3 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 C. Forest
President & CEO
Practical Devices Corporation

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XM3 Block Diagram

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).

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.

Blue LED
Indicates power is on

Input
Connect to MP3 player or other audio source.

Output
Connect to Headphones

Main Volume

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

Power Connector
2.5mm mono audio power jack.
DC polarity is not important.

With battery charger jumper:
12 volts DC ± 5%, or
9 volts AC RMS ± 5%

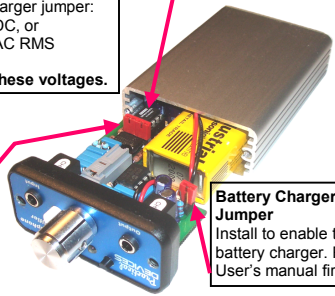
Without batter charger jumper:
6 to 20 volts DC, or
5 to 16 volts AC RMS

Do not exceed these voltages.

Gold-Plated Amp Chip Socket
Allows for future amp chip upgrades and modifications for those who like to experiment.

Crossfeed Adjuster
Turn this potentiometer (with a small Phillips or flat screwdriver) 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.



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

Battery Charger Jumper
Install to enable the battery charger. Read User's manual first!

Connecting Your XM3

1. Connect a suitable source to the input jack, as pictured. Sources may be MP3 or CD players, or 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:

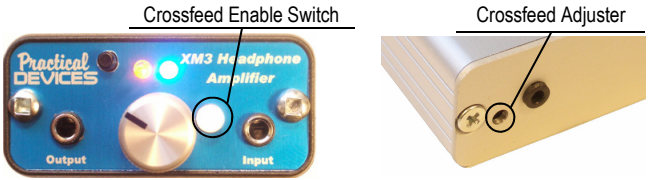
1 press:	Turn unit on. The XM3 turns off automatically after **one** hour.
3 presses:	Turn unit on for **three** hours.
6 presses:	Turn unit on for **six** hours.
7 presses:	Turn unit on. The XM3 will not turn itself off.
Press and hold:	Turn unit off.

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 XM3'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:

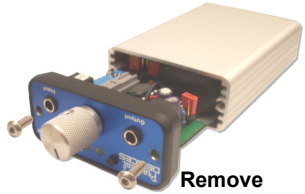
- All the way clockwise to produce a mono signal;
- All the way counter-clockwise to produce a near-stereo image.

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 alot 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:

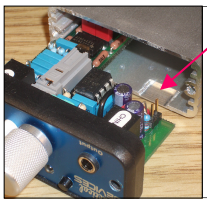
1. Turn the unit off, and remove the external power adapter if connected.
2. Remove the rear panel using a Phillips screwdriver. Remove the battery.
3. Remove the two screws on the front panel (use the included 5/64" allen key). Note: you do **NOT** need to remove the volume knob!
4. Pull on the black plastic front bezel, and the unit will slide apart from the case.



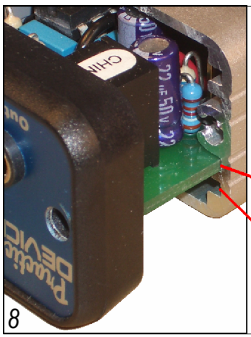
Remove two screws, and Pull!

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.



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

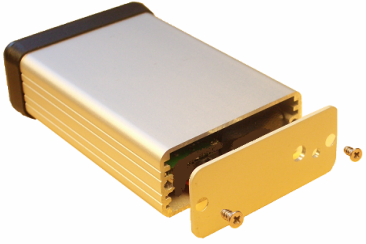


Circuit Board slides into THIS slot

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



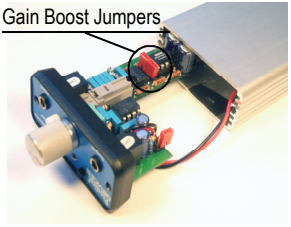
It is usually easier to replace the battery by removing the **rear** panel, instead of the front.

To replace the battery:

1. Disconnect any external power adapter, if connected.
2. Remove the two screws holding the rear panel.
3. Unclip and discard the old battery
4. **Hold down the power button for 10 seconds (Important!).** This discharges the circuit.
5. Connect the new battery. As you connect the battery, the amber LED will flash briefly. If it does **not** flash, return to step 3.
6. The unit should be ready. If it is not, return to step 3.
7. Re-assemble the unit

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

Gain Boost Jumpers



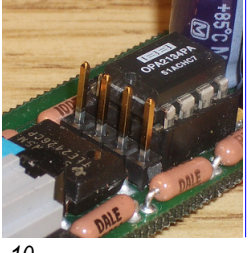
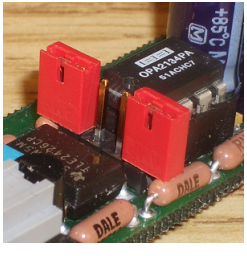
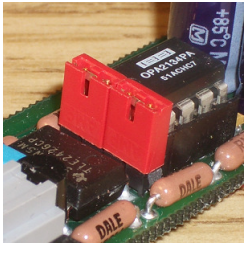
With the volume knob at full, your XM3 will deliver +13dB of gain. Additionally, you can install the Gain Boost jumpers, which will give you an extra +10dB of gain, for a total of +23dB.

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**
		

External Power Adapters

Use the power connector to connect an external power adapter that has a **2.5mm mono audio-style jack**. When **not** using the battery charger feature (ie. Battery Charger Jumper is **removed)**, the external power supply can be:

- 6 to 20 Volts DC (polarity is not important), or,
- 6 to 18 volts AC

IMPORTANT: Do not exceed the above voltages, or damage to the XM3 may result. Such damage is not covered under warranty.

Note that the ground of your external power supply will **not** be at the same potential as the XM3's metal case.

Hint! If you use an Alkaline battery (with the Battery Charger Jumper **removed**, of course), and an external power adapter greater than 10 volts, power will come from the adapter (saving battery life). When you are at home and plugged in, the XM3 will operate from external power. When you mobilize, unplug the adapter and you benefit from the long life of the Alkaline.

The milliamp rating (mA) of the power adapter does not matter; any rating can be used with the XM3.

A suitable 12VDC regulated power adapter is RadioShack PN#273-1773 (make sure you ask for Adaptaplug “E” 2.5mm connector PN#273-1708, which is included with the adapter).

Testing the Battery

The XM3 also acts as a battery tester.

When the XM3 is initially 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 once.

The XM3 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.

Charging the Battery

Your XM3 shipped from the factory with an Industrial Alkaline 9v battery. Alternatively, a rechargeable battery can be used instead of the alkaline, and you can use the XM3's integrated battery trickle charger to recharge it. 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.

When using the battery charger, the external power adapter **must** conform to the following:

- Regulated 12V DC ± 5%, or,
- 9V RMS AC ±5%

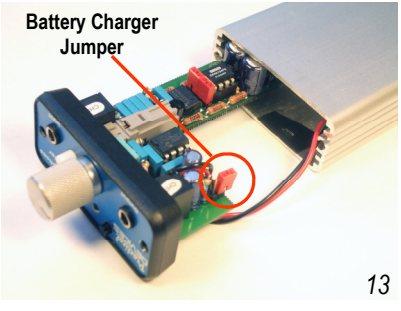
Use of an external power adapter which is higher than the voltages shown above may cause battery overcharging, damage to the battery and/or the XM3, battery electrolyte leakage, or possibly even battery explosion. If in doubt, measure your power adapter with a voltmeter, or enquire at your local electronics store.

IF you are using non-rechargeable (Alkaline, carbon, or zinc battery), then remove the Battery Charger Jumper!

IF you are using an external power adapter which is not 12VDC or 9V RMS AC, then remove the Battery Charger Jumper!

A completely-flat battery will typically take about 15 hours to recharge fully.

Install the charge jumper when you want to use the battery charger function.
Remove the jumper otherwise (your XM3 shipped from the factory with the jumper **removed**).



Frequently-Asked Questions

Can I use a line-level input to the XM3, such as from a CD player or VCR?

Yes, the XM3 will accept a line-level input.

Can I use the XM3 to drive speakers?

Usually, no. The XM3 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

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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:	- 9-volt alkaline, NiMH, NiCd battery, or, - 8.4-volt NiMH or NiCD battery, and/or, - External Power Supply
External Power Supply:	2.5mm mono audio connector power jack. If using built-in battery charger: 12VDC ± 5% or 9V AC RMS ± 5% If not using battery charger: 6-20VDC or 6-18VAC In all cases, polarity is not important
Battery Charge Time (using built-in charger, typical):	15 Hours
Battery Life (alkaline, typical):	50 hours active, 2.5 years standby
Maximum Gain:	+23.1 dB (Gain Boost jumpers in) +12.7 dB (Gain Boost jumpers out)
Frequency Response (20-20,000Hz, typical):	+0.8dB, -0.3dB
-3dB Point (typical):	21 kHz at top end; 9 Hz at low end
Total Harmonic Distortion (typical)	0.002%
Intermodulation Distortion (typical)	0.0039%
Signal to Noise ratio (20-20,000Hz, typical):	97dB

Dynamic Range (20-20,000Hz, typical):	97dB
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)	±100mV
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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