

# M1-ATX

## 6-24V Intelligent Automotive ATX Power Supply

### Installation Guide

Version 1.0c  
P/N M1-ATX-01

#### Before you start...

Please take a moment and read this manual before you install the M1-ATX in your vehicle. Often times, rushing into installing the unit can result in serious damage to your M1-ATX board, computer and probably your car's electrical system.

The M1-ATX board has several wires that need to be installed in various places. When installing, **always double check the polarity** of your wires with a voltmeter.

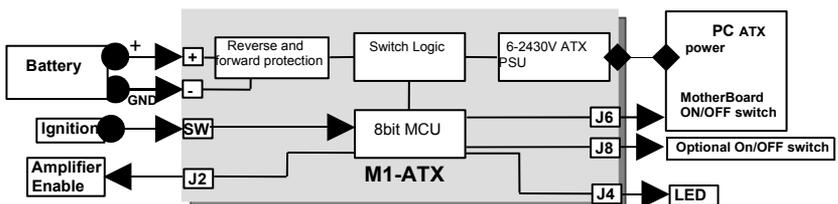
NEVER use the cigarette plug as a power source, often times the contacts are not capable of delivering high current to your PC.

#### 1.0 Introduction

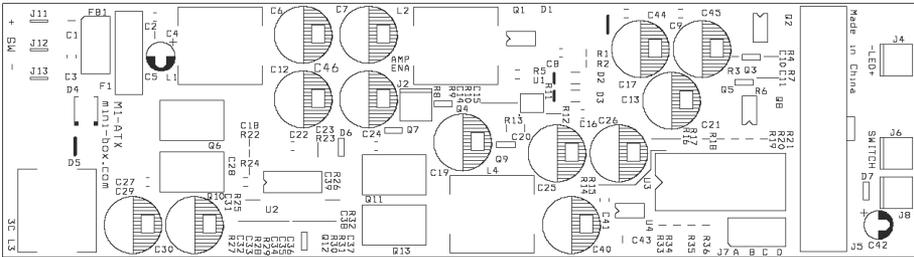
Thank you for purchasing the M1-ATX power sequencer / vehicle ATX power supply.

The M1-ATX was designed to work with a wide variety of main boards such as the VIA mini-ITX motherboards as well as low power Pentium-M or Celeron I, II and III systems. Please note that powering full power P4 or AMD systems is not recommended due to 12V rail power limitations.

#### 1.1 M1-ATX Logic Diagram



## 1.2 M1-ATX Connection diagram



**M1-ATX, top view**

### **Power Input Connectors**

- J11** Battery + (un-switched battery, positive)
- J12** Ignition (switched battery, positive. Can test by connecting it to Battery +)
- J13** Battery - (negative)

### **Controls and Settings**

- J2** Controls amplifier via remote ON/OFF. Left pin is RMT, Right pin is GND
- J6** To motherboard ON/OFF switch
- J7** User jumper settings (A,B,C,D)
- J8** To external ON/OFF switch (optional, J8 is in parallel with J6)

### **Power Output Connectors**

- J3** Optional HDD power (not shown in this picture)
- J5** ATX power connector (to motherboard)
- J4** To LED (optional)

A B C D **MODE OFFDELAY / HARDOFF**

- 0 = (traditional PSU mode)
- 1 = 5sec / 45sec
- 2 = 5sec / 2hour (suggested)
- 3 = 5sec / never
- 4 = 30sec / 2hour
- 5 = 30sec / never
- 6 = 30min / never, (taxi mode)
- 7 = 3hour / never, (taxi mode)

**NOTE:** "when HARDOFF is set to "never", the M1-ATX will automatically shut down when battery voltage is below 11V for more than 1 minute in order to prevent 'deep discharge' situations.

## 1.2 Power challenges in a Vehicle PC

**The 5V Standby Problem:** One of most difficult tasks of operating a PC in a vehicle is power consumption while the computer is OFF. Even if your computer is totally OFF, it

will still consume about 100mA on the 5V rail. All power supplies have 5VSB (5V standby) mode so that they can issue at least a PSON signal. When the computer is in the suspend mode, it will consume even more power, because the RAM needs to be powered at all times. The power consumption in the suspend mode is few watts.

*No matter how big your battery is, it will eventually drain your battery in a matter of days.*

The M1-ATX is addressing these issues by cutting off the 5Vsb rail after a pre-defined amount of time (see jumper chart). When 5Vsb is always active (HARDOFF=Never), M1-ATX watches the battery level. When battery level drops below 11V for more than one minute, M1-ATX will shut down and re-activate only when the input voltage is > 11V.

**Engine Cranks, under-voltage and over-voltage situations.** Another very difficult task is maintaining stable 3.3, 5, 12 and -12V power to your PC. While car batteries are rated at 12V, they actually can provide voltages in between 7V (during engine cranks) or as high as hundreds of volts (load dump conditions). Most of the times, your battery will stay at 13.5V (while car is running) or 12V (when car is off), but extra precautions need to take place in order to prevent under and over-voltage situations. M1-ATX can operate as low as 5.7V and as high as 26V while providing strict regulation on all rails with input voltage clamping and reverse protection.

**Loud amplifier pops when PC starts.** If your PC is connected to your car amplifier, you will hear a loud pop when the computer is first started. The M1-ATX has an 'anti-thump' control that will keep your amp OFF while the PC starts. Simply connect J2 to your amplifier remote control pins to activate the 'anti-thump' feature.

## 2.0 Mode of operation

The M1-ATX performs several timing routines and takes actions as follows:  
**(NOTE:** When all config jumpers are removed, M1-ATX will be in the "dumb PSU mode", no ignition timing, no HARDOFF. M1-ATX will send a gratuitous "ON" signal to the M/B when power is applied for the first time. Do not connect J8/J6 to the M/B on/off switch if you don't want your PC to be started automatically)

- 1) Ignition=OFF. Nothing happens. M1-ATX is waiting for ignition signals.
- 2) Ignition=ON. M1-ATX waits for 3 seconds then turns on the 5Vsb rail. After another 1 second the MCU sends an "ON" signal to the motherboard via the 2 wires connected to the motherboard's ON/OFF pins. The motherboard will turn ON and your system should start booting.
- 3) Ignition=ON during driving: Nothing happens. Your computer will remain ON.
- 4) Ignition=OFF. M1-ATX waits for "OFFDELAY" in seconds (see jumper chart on Page 2) and then it turns the motherboard OFF by sending a signal to the motherboard's ON/OFF switch. Your computer should turn off gracefully (shutdown procedure). During this time, power will still be available for your PC to perform shutdown.
- 5) Ignition=OFF. 5VSB will still be provided for another "HARDOFF" seconds (see jumper chart on Page2). In the event where the shutdown process is longer than "HARDOFF", power will be shut down hard, turning off your computer's power. If ignition is turned on during this step, your computer will start again. If

"HARDOFF" is set to "NEVER", the PSU will always provide 5VSB, therefore the PC can also be used in the SLEEP mode. During the HARDOFF procedure, the battery levels will be constantly monitored to prevent deep discharge situations. When battery levels reach > 11V, the PSU will start working again.

- 6) M1-ATX will go to step 1, if ignition is turned ON again.

### 3.0 Troubleshooting

a) Motherboard is not turning ON.

Check input cables. Measure voltage on the un-switched 12V. You should get 12V when your car is turned OFF. Measure the un-switched pin (red) while turning the car ON/OFF. You should see 12V (car on) or 0V (car off). If no voltage on both switch or un-switched circuits, check your car fuse system. **NEVER** use the cigarette lighter plug, it is unreliable.

b) Motherboard is not turning ON (cont).

Check your output cables. Make sure your total system power consumption does not exceed the M1-ATX specifications.

c) Motherboard is not turning ON (cont).

Make sure that either J6 or J8 is properly connected to the ON/OFF switch of your M/B.

### 4.0 M1-ATX Characteristics

Minimum Input Operating. voltage	5.7V
Maximum input Operating voltage	26V
Min startup voltage	8V
Deep-Discharge shutdown threshold	11V
Input current limit (fuse protected)	10A
Max Output Power	90 Watts
Operating temperature	-40 to +85* degrees Celsius
Storage temperature	-55 to +125 degrees Celsius
MTBF	192,000 hrs @ 55C, 96,000 hrs @65C
Efficiency (Input 7-24V)	>90% on 3.3,5V5VSB ~80% on 12V
PCB size	160x45mm
Input connectors	Faston 0.25" terminal
Input fuse	Mini-Blade fuse, 10A
Output Connector	ATX Power 20 pin (Molex P/N 39-01-2200)
J2, J4, J8, J6	Polarized Header 2x1, 0.1"

\*Units starts failing at ~115 Celsius. Operating at temperatures above 85C / 185F will drastically reduce the MTBF. When operating at high temperatures, must reduce PSU load by 25%.

#### Maximum Power Characteristics

Output Rail	Current (Max)	Current Peak (<60 seconds)	Ripple (V p-p)	Regulation
5V	10A	15A	50mV	1.5%
3.3V	10A	15A	50mV	1.5%
5VSB	1.5A	2A	50mV	1.5%
-12V	0.15A	0.2A	150mV	10-%
12V	2A	2.5A	200mV	1.5%

<http://mini-box.com>, Cool Embedded PCs

NOTE (5V and 12V rail combined should not exceed 50Watts)

Total Max power=92Watts

When operating at 24V or extreme temperatures, de-rate to 80Watts, ventilation will be required.

#### **4.0 Support and warranty**

Standard Hardware Warranty 1Year / US, 2 Year EU

Installation support: 30days via email, [support@mini-box.com](mailto:support@mini-box.com)