

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 Amp Enable (controls amplifier via Amplifier remote ON/OFF, optional)

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)

Jumper attached=ON					Off-delay (All rails ON)	Hard-off (5VSB)
A	B	C	D	P		
OFF	OFF	OFF	OFF	P0	Standard PSU mode	
ON	OFF	OFF	OFF	P1	5s + 1min AutoLatch*	1 min
OFF	ON	OFF	OFF	P2	5s+ 1min AutoLatch*	2 hour
ON	ON	OFF	OFF	P3	5s+ 1min AutoLatch*	NEVER
OFF	OFF	ON	OFF	P4	30s + 1min AutoLatch*	2 hour
ON	OFF	ON	OFF	P5	30s + 1min AutoLatch*	NEVER
OFF	ON	ON	OFF	P6	30min	NEVER
ON	ON	ON	OFF	P7	3 hour	NEVER
OFF	OFF	OFF	ON	P8	10 min	1 hour
ON	OFF	OFF	ON	P9	15 min	2 hours
OFF	ON	OFF	ON	P10	1 hour	75min

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.

***AutoLatch** is active during the first 60s of PC operation (and only during the first 60 seconds). For example, If Ignition is turned ON and then OFF right away, M1-ATX will latch Ignition in ON position for the next 60 seconds, allowing your operating system to fully come up. This will prevent disk drive corruption or systems that remain hung in the ON position. After the first 60 seconds of system operation, the AutoLatch feature will be removed and system will shut down at as governed by the “Off-delay” setting.

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

M1-ATX User Guide Page 2 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), M1ATX 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 28V 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 "OFFDELAY", 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.

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 Specifications

Minimum Input Operating. voltage	5.7V
Maximum input Operating voltage	30V
Min startup voltage	8V
Deep-Discharge shutdown threshold	11V
Input current limit (fuse protected)	10A
Max Output Power	90 Watts
Operating temperature	-20 to +85 degrees Celsius
Storage temperature	-40 to +125 degrees Celsius
MTBF	192,000 hrs @ 55C, 96,000 hrs @65C
Efficiency (Input 7-24V)	>90% on 3.3,5,5VSB ~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"

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	100mV	1.5%

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.

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