Milpower Source

M359-1-**1**-X

Special Option Description

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1. Scope

This document supplements the M359Users Manual (Milpower Source Doc: M359_UM) by describing the items affected by the "**Input Current Limited (20Amp)**" Special Option P/N M359-1-**1**-X. The third Dash # (-X) depends upon the selected Communication Option.

2. Special Option Description

2.1. Part Number and Marking

M359-1 Units that include special option(s) are identified by the second and third dash numbers (see the "How To Order" Section at the end of this document). This **"Limited Input Current (20Amp)**" Special Option is identified by the second "-1" dash number.
The applicable Part Number: "**M359-1-1**-X" appears on a label attached to the top left corner of the front panel. (The third dash number depends upon the type of Communication Port installed in the Unit).

2.2. Intended Usage

The Standard M359-1, when heavily loaded, or during low input voltage transient (or "brown-out") may consume up to 30Amp from the AC Input. This Special Option was designed to support systems that have a limited input power source and therefore can not support the full power capability of the Standard M359-1.

The M359-1-1 is intended for systems that are fed from an AC Source that can not support the 30Amp maximum consumption of the standard M359-1-0, but can provide at least 20Amp(rms). The M359-1-1 will operate properly only if the long-term, average loading on the UPS Output is 1,650 Watt (real power) or less. (The VA capability is not affected and remains 2.2KVA). The M359-1-1 will support loads up to 2KW but if the load exceeds 1.65KW for too long (more than 5 minutes) or too often (more than 5% of the time) it may deplete the internal Battery.

2.3. General Description

The M359-1-1 actively limits the AC current into its Input to 20+/1Amp (rms). The limiting is accomplished by an Electronic Input Current Limiting Circuit. When the Input current approaches the limit of 20Amp (due to low Input voltage and/or heavy load) the M359-1-1 will reduce the Battery charging current, thus directing all the available Input power to the Load. If the input current is still attempting to rise, the internal Battery will kick-in and provide the power that the AC input can not provide. **Regardless of the load and Input voltage, the M359-1-1 will not allow the input current to exceed its 20Amp limit**.

In addition, a Load Monitoring circuit monitors the load on the M359 Output. When the load is too high (above 1,700W) and can not be supported by the limited AC Input, the Load Monitor circuit will switch-in the internal Battery that will provide the additional power required to support the load. When the load drops below 1600W, the Load Monitor circuit will disconnect the Battery.

3. Specification

Items affected by the Special Option appear in Black Fonts.

INPUT	***Voltage Range***	0 - 155VAC In Accordance with MIL-STD-1399 (Navy)
	Input Current	**The M359-1-1 actively limits the input current (Note 4) to below 20 +/-1Amp (rms).**
	Switchover Voltage (at 1600W Load)	**Below 105VAC (max) the M359-1-1 may start using Battery power. At 107VAC (max) the M359 will switch back to AC Input. (Note: MIL-STD-1399 worst-case minimum steady state voltage is 107VAC.)**
	Frequency	48-64 Hz
	Power Factor	> 97%
	Spikes	200 joules clamping device I.A.W. MIL-STD-1399 (Navy)
	Isolation	Input is galvanically isolated from output and chassis (> 1 MΩ at 600VDC). Total capacitance between input and chassis is less than 0.02uf per line. Leakage current is less than 2ma. (130dB Input Isolation Transformer.) Both input wires may be "hot" I.A.W. MIL-STD-1399.
	Current waveform	Sinusoidal with harmonic content of less than 2.5% for harmonics between 2fo to 32fo and less than 100%/N for harmonics between N=32 and 20kHz. (I.A.W. MIL-STD-1399)
	Line impedance	Up to 5 ohms between 100 to 200kHz (I.A.W. MIL-STD-1399)
OUTPUT	***Voltage***	115Vac ±3%, grounded Neutral (Note 1).
	Power Rating	**1.65KW continuous, 2.0KW for up to 5 minutes. Above 1.7KW, the M359-1-1 may use the internal battery (Note 4).**
	Frequency	60Hz ± 0.2% (digitally synthesized from a crystal oscillator)
	Waveform	Sinusoidal , THD of 2% (linear load), 6% (non-linear)
BATTERY	***Type***	Front Panel Loaded, Hot-swap Plug-in, encapsulated, sealed, maintenance-free, lead-acid, Battery Pack.
	Capacity	2KW for at least 5 minutes. 1.5KW for at least 10 minutes.
	Charger	Low ripple, regulated voltage, float-charger, with current limiting and temperature compensation. Fully charges the battery within 6 hours (following 5-min. discharge at 2.0 kW). **(Note 5)**
	Protection	Battery is protected from over-discharge and thermal runaway by internal protection circuit. (Note 3)
	Monitor	The Battery charge level and internal impedance are monitored by the UPS μ-controller.

EMC	***RFI***	MIL-STD-461E Requirements: RE101, RE102, CE101, CE102, CS101, CS116 (AC Input) and RS103.
	ESD	All I/O lines are protected from ESD.
ENVIRONMENT	***Temperature***	Non operating: -40 to +72°C (Note 3) Operating: 0 to + 52°C (Note 2)
	Humidity	Up to 95%, non-condensing.
	Altitude	Operating: Up to 10,000 feet. Non-operating: (Air transport) 40,000 feet.
	Orientation	May be installed at any orientation.
	Mechanical Shock	When packed, withstands the free fall drop and edgewise drop IAW Methods 5007.1 and 5008.1 of Federal Test Method standard 101C. When operating, withstands the high-impact shipboard shock IAW MIL-S-901D, Grade A, Class I and II.
	Vibration	Type I vibration IAW MIL-STD-167-1. Random vibration IAW MIL-STD-810D, Cat. 9, Proc. I (test condition I-3.2.11, Fig. 514.3-34)
INDICATIONS & CONTROLS	***Visual Indications (Front panel)***	10-segment tri-color Bar Graph for load level display. **(Note 6)** 10-segment Bar Graph for battery charge level display. "Output OK", "Output Fail" and "Standby" status lamps. "Input OK" and "Input Fail" status lamps. "On Batt " status lamp. "Batt Passed" and "Batt Failed" lamps for battery self-test. "Low Batt" warning lamp. "Overload Shutdown" status lamp. "Overtemp warning" and "Overtemp Shutdown" lamps.
	Test Mode	When test mode is invoked by pressing the push-button on the front panel, the UPS performs battery impedance testing without interrupting the output power (even if the battery fails) utilizing a proprietary time-sharing circuit. The test results are displayed on the panel indicators. End-to-End testing of the UPS is accomplished by cycling the INPUT UPS/BY-PASS switch on the front panel.
	Audible Alarm	The UPS will beep when it operates on battery power or during over-temperature condition. The alarm may be silenced by pressing the "Alarm Off" push-button on the front panel.
	Power Switches	The M359 has three double-pole power relays, one on the input, one on the output and a third relay that bypasses the UPS section. The front panel switches allow the user to control these three power relays.
	Remote Control	Connector J4 on the back panel, allows the controlling of the M359 by a remote 28Vdc/0.25A single pole, On/Off switch (Remote Power On/Off) and a 28Vdc/0.25A, ON-ON, single pole switch (Remote UPS/By-Pass Select).

INTERFACE	***Discrete interface***	Four dry contacts indicating the following conditions: "UPS ON" (Output OK) "Battery Voltage Low" "Input Power Loss" (Battery Operation) "Fault Detect" A "Shutdown" input (via opto-isolator) for remote shutdown of the UPS during AC input fail. When the AC input recovers the UPS will automatically turn ON.
	Serial Interface	RS-232 Serial port (EIA-RS-232). The serial port allows transmission of status and reception of User-Programmable Options, some of which are described below: **Status:** Input OK, Output OK, On Battery, Low Battery, Over-Temperature Warning, Battery Test Passed/Failed, Load Level **(Note 6)**, Charge Level, status of all User Programmable Options and failure diagnostic. **Commands:** UPS Shutdown, UPS Standby, Initiate Battery Test, Enable/Disable Periodic Battery Test, Enable/Disable Battle Mode, Enable/Disable Aural Alarm, Set Input power Limit (see Note 2), Protection Reset (resets all latching protection circuits), System Reset (forces all User Programmable Options into their default state and resets all latching protection circuits). For the complete set of the available Status messages and Commands, refer to the M120BA-1A Software Interface Manual. (Available at http://www.milpower.com).
	Ethernet SNMP Port	Optional, RJ-45, CAT-5 SNMP Port with Server/ Client Monitor Software. Allows monitoring of the UPS (using MIBs). Supports user defined event-triggered shutdown. Supports different shutdown timing for each Client in the net. Supports delay UPS shutdown (after the Server has been shutdown).
SCREENING		Environmental stress screening (including: thermal cycles, vibration and power burn-in) is available upon request.
ACOUSTIC NOISE		Less than 48dBA.
FUNGUS		Does not support fungus growth, in accordance with the guidelines of MIL-STD-454, Requirement 4.
WEIGHT and SIZE		140 Pounds. (88 Pounds without the Battery Pack) 19", 3-U, 22" deep, Rack mount or Hard mount.

Notes

1. The Neutral Grounding Link is accessible to the user and may be removed to obtain a floating output.
2. The long-term maximum loading of the UPS Output is limited by the fan's cooling capacity. At ambient temperature above 40°C, the maximum steady-state output power should be derated to 1.5KW at 52°C. For short term loading (less then 5 minutes) no derating is required.
3. High temperature for prolonged duration will shorten the battery life.
4. The maximum loading that the M359-1-1 presents to the AC Source is limited, such that it shall not trip a 20Amp Slow Circuit Breaker. When the Output power is too high for the limited AC Input current, the internal Battery will provide the additional required power.
5. When the AC Input current is approaching 20Amp the charger will charge the Battery at slower rate, depending on the Load and the Input voltage level. At a Load (UPS Output) of 1.6KW, the charger will provide 100% of its rate only when the Input voltage is above 115Vac. At this loading it will provide 50% of its normal charging current at 110Vac and will stop charging the Battery at an Input voltage of 105Vac. At 1.4KW Load, the charger will provide 100% of its rating for any Input voltage above 105Vac.
6. The 100% Load indicated by the LED BAR display (and by the serial port) corresponds to 1.6KW.