

M359-1 2.0KW/2.5KVA UPS for Shipboard Application

Milpower Source M359-1 is a ruggedized, high performance On-Line UPS designed for Naval Shipboard and tough industrial applications.

The main features of the M359-1 are:

- Full Compliance with MIL-STD-1399 (Section 300B), Type I Power (115VAC/60Hz).
- Internal Input Isolation Transformer.
- A front panel loaded, Plug-in Battery Pack.
- 10 minutes Holdup-time at 1.5KW.
- Real sine-wave 115VAC/60Hz output, synthesized from a crystal oscillator.
- Very low Input Current Harmonic content (MIL-STD-1399 compliant).
- Better than 98% Input Power Factor.
- Very low input-to-chassis capacitance (MIL-STD-1399 compliant).
- Full galvanic isolation between Input, Chassis GND and Output.
- 1000V / 50 μ s spike capability (MIL-STD-1399 compliant).
- Complies with MIL-STD-461F.
- Complies with MIL-S-901D (Grade A, Class I &2) and MIL-STD-167-1 (Type I).
- Remote Panel ON/OFF capability.
- By-pass mode, via internal Power Conditioner, Isolation Transformer and Relays.
- MS Power Connectors.
- RS-232 or Ethernet SNMP Control and Monitor.
- J-STD-001B and IPC-610A Class-3 Workmanship.
- Conformal Coating of PWBs per MIL-I-46058C and IPC-CC-830.

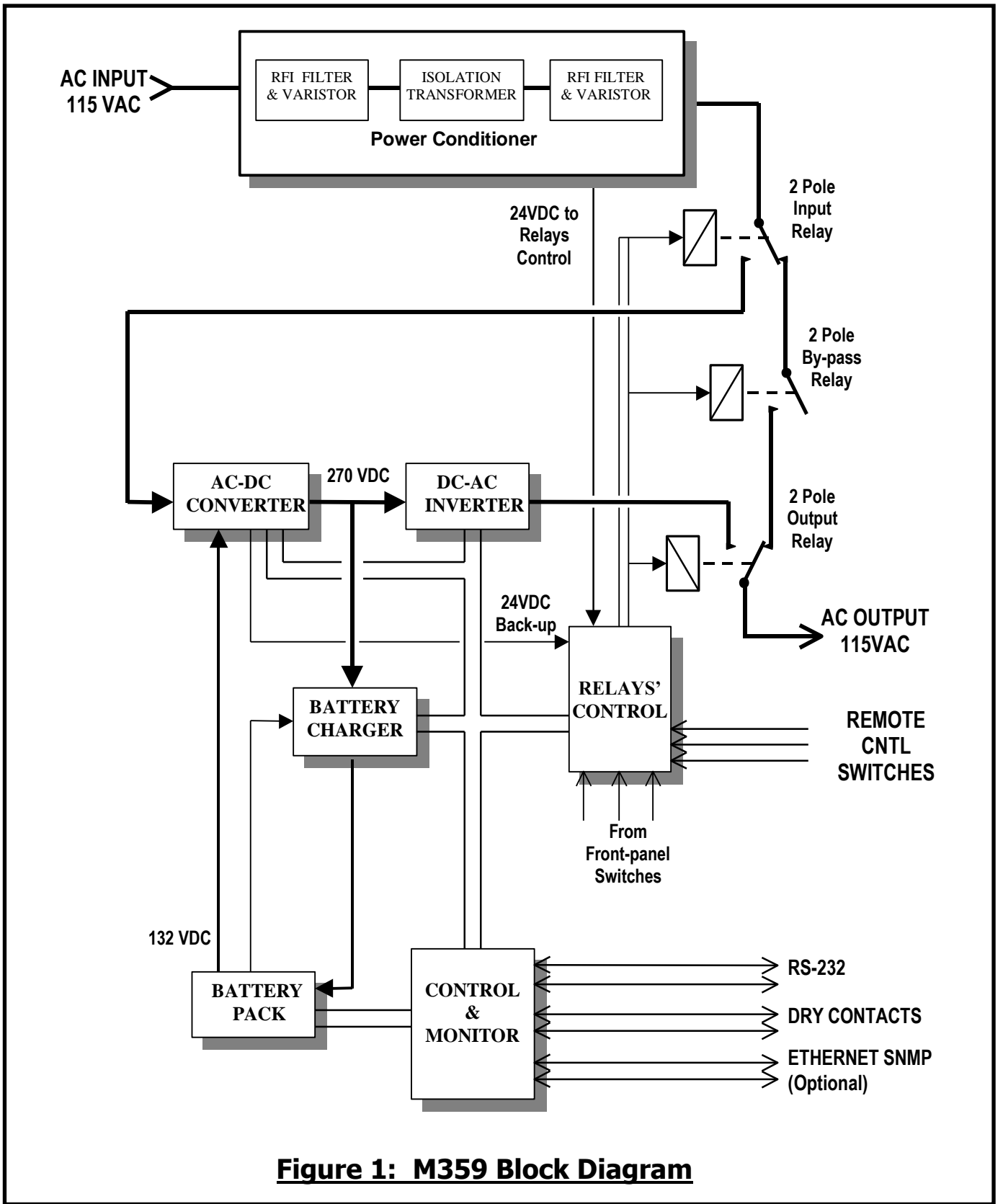


Figure 1: M359 Block Diagram

Specification

INPUT	<i>Voltage Range</i>	0 - 155VAC In Accordance with MIL-STD-1399 (Navy)
	<i>Switchover Voltage</i>	<102VAC, below this voltage the M359 may switch to Battery power. (Note: MIL-STD-1399 worst-case min. steady state voltage is 107VAC.)
	<i>Frequency</i>	48-64 Hz
	<i>Power Factor</i>	> 98%
	<i>Spikes</i>	200 joules clamping device I.A.W. MIL-STD-1399 (Navy)
	<i>Isolation</i>	Input is galvanically isolated from output and chassis (> 1 M Ω 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.
	<i>Current waveform</i>	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)
	<i>Line impedance</i>	Up to 5 ohms between 100 to 200kHz (I.A.W. MIL-STD-1399)
OUTPUT	<i>Voltage</i>	115Vac \pm 3%, grounded Neutral (Note 1).
	<i>Power Rating</i>	2.0KW (2.5KVA) Continues, up to ambient temperature of +40°C. Derate linearly to 1.5KW at +52°C (ambient), (Note 2).
	<i>Frequency</i>	60Hz \pm 0.2% (digitally synthesized from a crystal oscillator)
	<i>Waveform</i>	Sinusoidal , THD of 2% (linear load), 6% (non-linear)
BATTERY	<i>Type</i>	Front Panel Loaded, Hot-swap Plug-in, encapsulated, sealed, maintenance-free, lead-acid, Battery Pack.
	<i>Capacity</i>	2KW for at least 5 minutes. 1.5KW for at least 10 minutes.
	<i>Charger</i>	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).
	<i>Protection</i>	Battery is protected from over-discharge and thermal runaway by internal protection circuit.
	<i>Monitor</i>	The Battery charge level and internal impedance are monitored by the UPS micro-controller.
EMC	<i>RFI</i>	MIL-STD-461E Requirements: RE101, RE102, CE101, CE102, CS101, CS116 (AC Input) and RS103.
	<i>ESD</i>	All I/O lines are protected from ESD.

ENVIRONMENT	<p>Temperature</p> <p>Humidity</p> <p>Altitude</p> <p>Orientation</p> <p>Mechanical Shock</p> <p>Vibration</p>	<p>Non operating: -40 to +72°C (Note 3) Operating: 0 to + 52°C (Note 2)</p> <p>Up to 95%, non-condensing.</p> <p>Operating: Up to 10,000 feet. Non-operating: (Air transport) 40,000 feet.</p> <p>May be installed at any orientation.</p> <p>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.</p> <p>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)</p>
INDICATIONS & CONTROLS	<p>Visual Indications (Front panel)</p> <p>Test Mode</p> <p>Audible Alarm</p> <p>Power Switches</p> <p>Remote Control</p>	<p>10-segment tri-color Bar Graph for load level display. 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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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).</p>

INTERFACE	Discrete interface	<p>Four dry contacts indicating the following conditions: "UPS ON" (Output OK) "Battery Voltage Low" "Input Power Loss" (Battery Operation) "Fault Detect"</p> <p>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.</p>
	Serial Interface	<p>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, 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).</p> <p>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).</p>
	Ethernet SNMP Port	<p>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).</p>
SCREENING		Each unit is subjected to a Power Burn-in of 24 hours. Additional ESS 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. Add 8 pounds for M359-1-2) 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 (not recommended, may result in a safety hazard).
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.

How to Order

Order P/N: **M359-1 -0 -0 -0 -0**

Basic Part Number

Special Options

- 0 None (STD.)
- 1 Input Current Limited to 20Amp (MPS Doc: **M359-1-1-X_SP**)
- 2 Includes -1 above (20Amp Input Limit) and CRES top and bottom covers (instead of Al covers)

Communication Port

- 0 (STD.) RS-232 and Dry-contacts
- 1 Ethernet SNMP (v1, v2), instead of RS-232
- 2 Modified RS-232 CMD Set and Pin 3 of J5 functionality. (MPS Doc: **M359-1-X-2_SP**)
- 3 Ethernet SNMP (v3), instead of RS-232

Optional Special Hardware

- 0 (STD.) None
- 1 With Mating Power Connectors set:
MS3108R20-19S (Qty 1, 90°, AC Input Conn.)
MS3108R20-19P (Qty 1, 90°, AC Output Conn.)
M85049/41-12A (Qty 2, Conn. Cable Clamps)
MS3420-12 (Qty 2, Telescoping Bushings for the Clamps)

Optional Slides & Load Bearing Pins

- 0 (STD.) None
- 1 Slides: Actron P/N A5736-0111-003/4 or equivalent.
Pins: Jonathan P/N 1005-406 or equivalent (mate with the UPS back panel's bushings)
- 2 Pins only (same Pins as -1). No slides.
- 3 Slides only (same Slides as -1). No pins.
- 4 Drawer's Slides only: Actron P/N S5736-0111-021/022
No pins.