Inverter Operation Test

Note: Call Magnum Energy (425-353-8833) for any issue and to receive an RMA (Return Material Authorization) before replacing the inverter.

Note: Completion of this troubleshooting document (pages 1 -3) is not authorization to cover/pay warranty or labor costs. Warranty/labor coverage is decided after the unit is returned to Magnum Energy and the failure is evaluated.

Start

(I-1.0) Inverter Function:

Ensure Shore Power is not connected and Generator is off. Press **ON/OFF INVERTER** button on remote and display shows:

- "Inverting" (**INV** LED is on)
- "Searching" (**INV** LED is blinking)
- FAULT condition, red **FAULT** LED is on.
- Display and LED's on remote are off.
- "OFF" Unit will not turn on.

"Searching" → Disable the search feature and ensure remote display shows "Inverting".

FAULT condition → Go to page 3 to Record fault (I-1.1), and find/resolve fault condition.

Display and LED's on remote are off. / "OFF" Unit will not turn on. → Go to section **I-2.0** to resolve display

"Inverting" / Disable the search feature and ensure remote display shows "Inverting". → Turn on Inverter loads in vehicle* (i.e. Microwave, TV, etc) and ensure they are running.

- Inverter loads running → Inverter operation working normally, perform Charger Operation Test (page 2).
- Inverter loads NOT running → Ensure the output breakers **on inverter** (CB1 & CB2) if available, are NOT tripped.

Ensure the output breakers **on inverter** (CB1 & CB2) if available, are NOT tripped. → Use a **True RMS** voltmeter to measure and record the AC output voltage on the inverter's terminal block or wires (I-1.2). Is the voltage between 114 – 126 VAC?

- **YES** → Inverter operation is working normally, but inverter voltage is not getting to loads. Problem is in vehicle*, not inverter
- **NO** → Refer to warranty procedure to repair/ replace inverter

*vehicle = Boat, Recreational Vehicle (RV) or truck.

(I-2.0) Remote display and LED's are off, or inverter will not turn on from remote:

Go to inverter and locate the RJ11 ports (STACK, NETWORK, REMOTE, BTS). Are all the phone cables/connected into the correct port (i.e. remote in REMOTE port)?

- **NO** → Correct the phones cables and restart Inverter Function Test **(I-1.0)**
- **YES** → Remove **all** phone cables connected to the inverters RJ11 ports → Press the ON/OFF button at the inverter, is the green LED on the inverter Blinking or ON?
  - **NO** → Measure and record the DC voltage **at the inverter DC terminals** (I-2.1). Is voltage within DC limits for operation for this inverter?
    - **NO** → Correct DC voltage and restart Inverter Function Test **(I-1.0)**
    - **YES** → Refer to warranty procedure to repair/ replace inverter.
  - **YES** → Reconnect the remote cable into the REMOTE port. Does display now work and allow the inverter to be turned on or off?
    - **NO** → Remove the remote cable from the REMOTE port and reconnect in NETWORK port. Does display now work?
      - **YES** → Damaged REMOTE Port. **Non-warranty failure**, refer to warranty procedure to repair/replace the inverter's control board (TCB).
      - **NO** → Remove the remote display from inside vehicle* and connect another 4-conductor telephone cable from the REMOTE port on the inverter to the remote display. Does the display now work?
        - **YES** → Damaged cable. **Non-warranty failure**, replace cable
        - **NO** → Refer to warranty procedure to repair/replace remote. If the remote display still does not work, refer to warranty procedure to repair/replace the inverter's control board (TCB)
    - **YES** → Inspect the phone cables and devices disconnected from the other RJ11 ports (STACK, NETWORK, or BTS) and verify they operate correctly

Charger Operation Test

(C-1.0) Charger Function:

Note: Ensure the inverter function operates correctly (see Inverter Operation Test) before performing the Charger Operation Test.

Start

Press **ON/OFF INVERTER** button on remote to turn Inverter function off (**INV** LED is OFF).
Plug in Shore Power (or turn on the generator) and read and record the remote display text (C-1.1):

"Inverting"	Charge condition:			Fault condition (red **FAULT** LED is on).
	"Charging"	"Bulk", "Float", "Absorption"	"Equalizing"	

- "Inverting" → Go to **C-2.0** to resolve display.
- "Charging" → Wait until charger transitions to a charge mode (~30 secs)
- "Bulk", "Float", "Absorption" → Press/hold **ON/OFF CHARGER** button (~ 15 secs) until display says "Float Charging".
- Fault condition → Go to page 3: Record fault (C-1.6), and resolve fault condition.

Do the inverter loads in vehicle* (i.e. Microwave, TV, etc) continue to run?

- **NO** → No AC transfer, refer to warranty procedure to repair/replace inverter
- **YES** → What is the charge stage on the remote?
  - **"Float" or "Absorption"** → Record the charge voltage (C-1.2) on the remote display.
  - **"Bulk"** → Is the charge rate >5 amps as shown on the remote display?
    - **YES** → Wait until the display says "Absorption" or "Float".
    - **NO** → What is the **CHG** LED doing?
      - **Blinking Green** → If the **CHG** LED is blinking, one of the following conditions is occurring and needs to be corrected before max charge occurs:
        1. Charger Back-off - the temperature inside the inverter is getting hot which automatically reduces the charge rate to try and maintain temperature.
        Remedy: Look at the XFMR (Transformer) and FET temperature under the TECH menu. The XFMR temp needs to be <113C and FETS <80C; if not, allow the inverter to cool down and restart Charger Function Test (C-1.0).
        2. Low AC Input Voltage - the input AC voltage is below 90 VAC which automatically reduces/disables charging to stabilize incoming AC voltage.
        Remedy: a. correct the AC source, b. use a different AC source, or c. check all AC input connections to inverter's AC input.
      - **Solid Green** → Are the **Shore Max** (≥30A) and **Max Charge Rate** (≥80%) settings correct?
        - **NO** → Increase these settings to allow ample charging and restart Charger Function test **(C-1.0)**
        - **YES** → Record voltage and current shown on remote display (C-1.5), and refer to warranty procedure to repair/replace inverter.

Record the battery temperature (C-1.3) on the remote display (under TECH menu). Is this temperature reading compared to the temperature around the BTS:

- **Incorrect** → Test the BTS for proper operation – cold reading when placed in cold water. If the battery temperature displayed on the remote reads incorrectly, replace BTS (Battery Temperature Sensor) and restart Charger Function Test **(C-1.0)**?
- **Correct** → While in the "Absorption" or "Float" charge mode, is the voltage on the remote display correct based on the Battery Type selected and the temperature around the batteries?
  - **YES** → Charger operation working normally.
  - **NO** → Record reason for incorrect charging (C-1.4) and refer to warranty procedure to repair/replace inverter

(C-2.0) Remote display says "Inverting":

Go to Inverter, measure and record AC voltage at the input of the inverter (C-2.1). Is the voltage between 90 and 132 VAC?

- **NO** → Correct AC voltage and restart Charger Function Test **(C-1.0).**
- **YES** → Is the 30A input breaker on inverter popped out (open)?
  - **YES** → Reset breaker and restart Charger Function Test **(C-1.0).**
  - **NO** → 1. Disconnect Shore Power and ensure the generator is off.
    2. Ensure the inverter is turned off.
    3. Remove the AC input and output wires from the inverter.
    4. Record the resistance between the AC1 Hot In to the AC Neutral In at the inverter (C-2.2). Is the resistance 350-450 Ω?
    - **YES** → No charging, refer to warranty procedure to repair/replace inverter
    - **NO** → Damaged Input PTC/transformer, due to incorrect AC input. **Non-warranty failure**, remove inverter and have repaired.

Recorded Values

Recorded Values - Inverter Operation Test

I-1.1: What is the Fault Condition shown **on the remote display**? _____

I-1.2: What is the RMS voltage measured **at the inverter's AC output**? _____

I-2.1: What is the DC voltage **at the inverter DC terminals**? _____

Recorded Values - Charger Operation Test

C-1.1: After plugging in Shore Power (or turn on the generator), what does the remote display read? _____

C-1.2: What is the "Absorb" or "Float" charge voltage shown on the remote display? _____

C-1.3: What is the Battery temperature reading shown on the remote display (under TECH menu)? _____

C-1.4: Write down the reason to repair/replace the inverter for incorrect charging: _____

_____

C-1.5: What is the DC voltage and current shown **on the remote display** (must be in "Bulk" charge mode)? _____

C-1.6: What is the Fault Condition shown **on the remote display**? _____

C-2.1: What is the AC voltage measured **directly at the inverter's input**? _____

C-2.2: What is the resistance between the **AC1 Hot In** to the **AC neutral In** directly at the inverter? _____

Install Info

Name of troubleshooting technician: _____ Date: _____

Dealership: _____Phone: _____ WO / RO #: _____

Inverter Info: Model: _____ Serial Number: _____ MFG Qtr/Year: _____

Vehicle Info: Model: _____ VIN/SN: _____MFG Year: _____

Fault Conditions

AC Overload: a load (or short) on the inverter's AC output is larger than the inverter can safely handle. Remove the excessive AC load from the inverter's AC output and perform a manual restart.

AC Backfeed (or Backfeed Fault): has detected an AC voltage source on the inverter's AC output. Remove the external AC voltage from the inverter's AC output and perform an inverter reset**.**

Overcurrent (or DC Overload): has detected a load (or short) on the inverter's AC output that is larger than the inverter can safely handle. Remove the excessive load from the inverter's AC output and perform a manual restart.

FET Overload: the internal FETs heated up very quickly beyond a safe operating condition - usually caused by a load/short on the AC output that is larger than the inverter can safely handle. After the AC load (or short) is removed, perform an inverter reset, if fault immediately returns - unit requires repair.

High AC Volts: AC voltage on the inverter's AC input is higher than normal > 151 Vac while charging. The inverter will automatically restart after the high external AC voltage is disconnected from inverter's AC input.

Low Battery: The battery voltage is less than the LBCO setting. Once battery voltage ≥ 12.5 vdc (12-volt models) or ≥ 25.0 vdc (24-volt models), the inverter will automatically restart. Plug into shore power (or turn on gen) to begin charging.

Internal Bridge (or Internal Fault -1): a fault shutdown to protect internal FET Bridge circuit. Perform an inverter reset, if fault immediately returns - unit requires repair.

Internal Charger: a fault shutdown to protect internal charger circuit. Perform an inverter reset, if fault immediately returns - unit requires repair.

Internal NTC (or Internal Fault - 2)**:** a fault shutdown to protect internal NTC circuit. Perform an inverter reset, if fault immediately returns - unit requires repair.

Internal Relay: a fault shutdown to protect internal Relay Transfer circuit. Perform an inverter reset, if fault immediately returns - unit requires repair.

Overtemp: the inverter FET's and/or transformer have exceeded a safe operating temperature, the inverter will automatically restart once the inverter has cooled down.

Unknown fault: a fault not recognized by the remote – the remote requires newer revision to determine fault.

Manual Restart: press and release power switch on inverter (or ON/OFF INVERTER button on remote).

Inverter Reset: Soft RESET = press and hold power switch on inverter >15 seconds until the inverter's green LED rapidly flashes (MS Series requires rev ≥1.1, other Series require rev. ≥3.4). Hard RESET = remove all AC/DC from unit and reconnect.