

Operator Manual

Auto Start Generator Controller Mechanical Diesel or Gaseous Engines



Part Number: GM100 14 (102-2003)
Version 1.0

Basic Controller Operation

1) Manual Start

- a. Place selector switch in the RUN position.
- b. Controller will begin start sequence.
 - Preheat (if programmed).
 - Crank and fuel systems are energized.
 - Control will crank disconnect automatically once the engine has been started.

2) Manual Stop

- a. Place selector switch in the OFF position.
 - Power to fuel solenoid will be turned off.

3) Automatic Operation

- a. Place selector switch in the AUTO position.
- b. Close the "REMOTE START" circuit to ground for engine start.
 - Preheat (if programmed).
 - Crank and Fuel energized.
 - Control will crank disconnect automatically once the engine has been started.
- c. Open the "REMOTE START" circuit to stop the engine.

1. Introduction

The GM100 is a microprocessor-based controller for industrial engines. It is based on the Controls, Inc. 1100-000 series controller platform.

- The product is housed in an 14"W x 10"H x 10"D metal enclosure.
- The controller is designed to accept generic wiring harnesses using circuit board mounted Molex connectors.
- Color-coded engine and AC wiring harnesses are available from Controls, Inc. for simple installations.
- The backlit digital display is 1"H x 4"W with two rows of 16 characters. Character height is approximately ½". Operating temperature is -20C to +70C. Extreme temperature ranges available.
- Operating voltage is 12 or 24 VDC.
- AC Voltages can range from single or three phase systems up to 600 VAC. Controller automatically senses.
- Current transformers can be used up to 2000:5 amps.
- Engine pre alarm and alarm parameters are monitored with corresponding amber or red LED illuminations above the digital display.
- Optional Remote Annunciation or Remote Relay modules available for expansion.

PART NUMBER BREAKDOWN



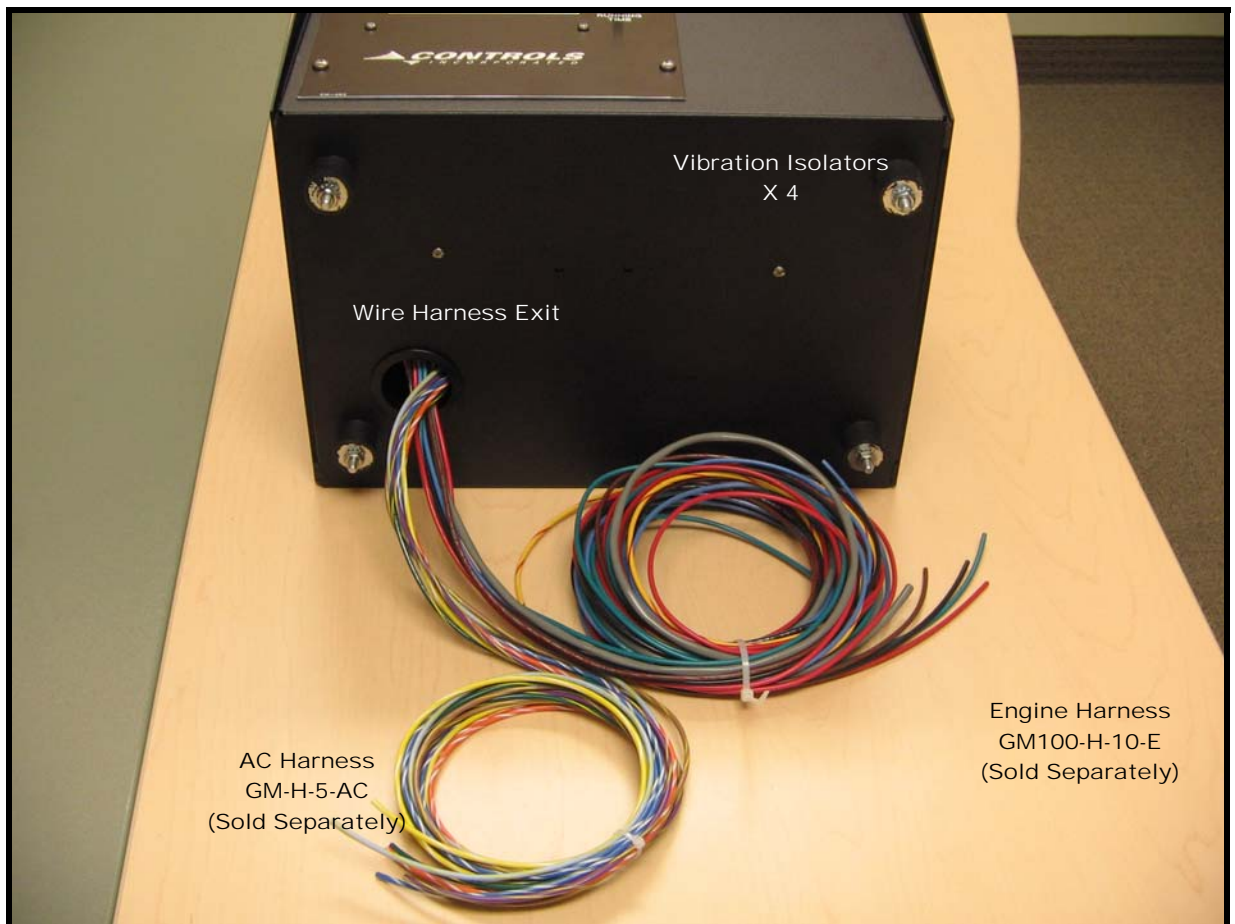
2. Interface

- LCD Display – The backlit digital display is 1”H x 4”W with two rows of 16 characters. Character height is approximately ½”.
- Eight full-time display parameter are:
 - Water Temp (Degrees F)
 - Oil Pressure (PSI)
 - AC Current
 - Frequency (Hertz)
 - Batter Volts
 - Fuel Level
 - AC Voltage
 - Phase
- Panel Operation Toggle Switch – Auto / Off / Run
- Running Time / Scroll Lock Toggle Switch
- Amber (Pre Alarm) LED and Red (Alarm) LED located above the digital display.



3. Enclosure

- The product is housed in an 14"W x 10"H x 10"D metal enclosure and supplied with four vibration isolators to mount the unit to a horizontal surface.
- Removing the eight sheet metal screws holding the wrapping lid in place can access the inside of the enclosure.
- Wiring harness exits out a guarded hole in the bottom of the enclosure.



4. Engine Start & Stop

4.1 The controller is manual and auto start capable.

4.1.1 Manual Operation

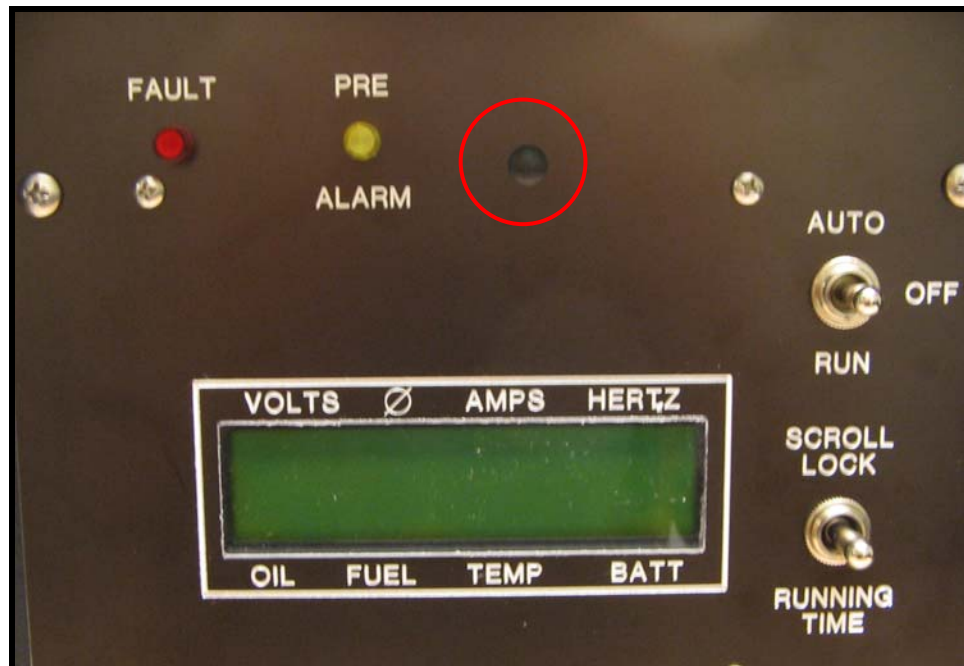
- 4.1.1.1 Turn the panel selector switch to RUN.
- 4.1.1.2 A message of “Starting Engine” will appear on the display.
- 4.1.1.3 The controller will engage the starter and fuel systems.
- 4.1.1.4 The controller automatically crank disconnects when the unit detects 450 RPM from the engine’s speed sensor or 100+ VAC from the generator output.
- 4.1.1.5 To stop the engine, move the toggle switch back to the OFF position.
- 4.1.1.6 Once the engine has started the controller will begin monitoring and displaying the engine and generator parameters.
- 4.1.1.7 If a fault occurs while the engine is running, the control panel will open the run circuit to the engine’s fuel system.
- 4.1.1.8 To clear a fault, the panel selector switch must be cycled to the OFF position.

4.1.2 Automatic Operation

- 4.1.2.1 Set the panel selector switch to AUTO.
- 4.1.2.2 A message of “Unit in Auto” will appear on the display.
- 4.1.2.3 Closing the remote start circuit to ground will initiate an engine start sequence.
- 4.1.2.4 The controller has a cycle crank routine programmed for 5 crank attempts of 10 seconds each.
- 4.1.2.5 Opening the circuit will initiate an engine shutdown.
- 4.1.2.6 Note: Ground must be common to the engine battery negative for reliable remote start signals.

5. Engine Speed (Frequency) Calibration

- 5.1 Panel must be calibrated to engine flywheel for proper frequency display.
- 5.2 Controller default is 180 pulses per revolution (180 fly wheel teeth)
- 5.3 Start engine by placing the toggle switch in the RUN position.
- 5.4 Move the Running Time toggle to the Scroll Lock position.
- 5.5 Adjust engine speed to 1800 RPM. Verify with a hand held tachometer.
- 5.6 Locate the hole in the front panel above the LCD. Using the wooden dowel supplied, press the pcb mounted button behind the faceplate for 1 second and release.
- 5.7 Upon release, the Hertz will display 60.0. The control is now calibrated to the engine flywheel.

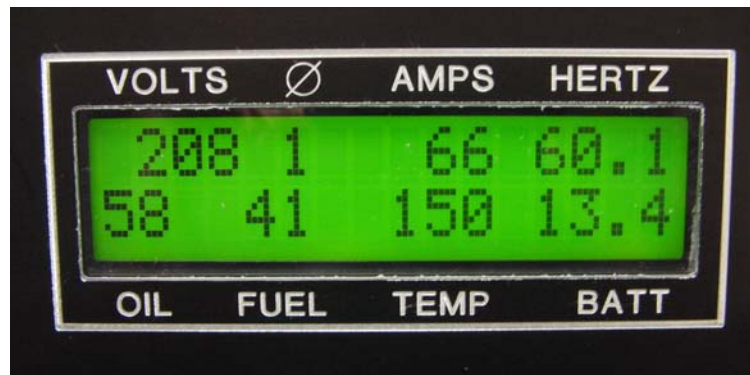


6. Engine Pre Alarms & Alarms

The controller monitors engine oil pressure, engine temperature and engine speed directly using sensors. If measured parameters become out of tolerance, the controller will begin to prealarm the specific condition. If the parameter exceeds the fault values, the controller will open the run signal causing the engine to shutdown.

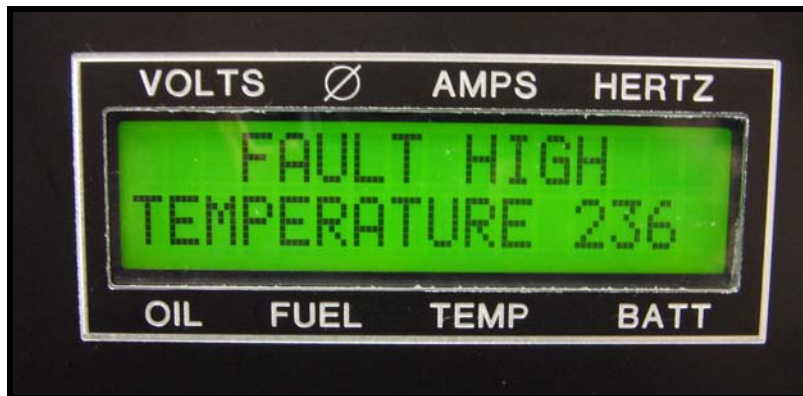
6.1 Engine Pre Alarms

- 6.1.1 In the case of an engine pre alarm, the yellow LED will illuminate.
- 6.1.2 The engine will continue to run.
- 6.1.3 If the out of tolerance value is one of the full time display items, the number will flash every second on the display. (Defaults shown below)
 - Low Fuel Level < 20%



6.2 Engine Faults

- 6.2.1 In the case of an engine alarm, the red LED will illuminate.
- 6.2.2 The controller will open the run circuit causing the engine to stop.
- 6.2.3 A fault message will be displayed indicating which parameter caused the controller to stop the engine. (Defaults shown below)
- Low Oil Pressure > 15 PSI for 5 Seconds
 - High Engine Temp < 225 F for 5 Seconds
 - Low Fuel Level < 1% for 5 Seconds
 - Over Speed < 67.0 for 1 Second
 - Over Crank
- 6.2.4 The control panel will keep this message displayed until a manual reset done by placing the Auto / Off / Run toggle switch back in the OFF position.
- 6.2.5 A fault will also be cleared if a power cycle occurs.



7. Auxiliary Input / Output Connections

7.1 Aux Inputs

7.1.1 **Fuel Level** - An analog fuel level sender input is located on the terminal strip inside the controller. Plug 1 Pin 12 (Light Blue Wire)

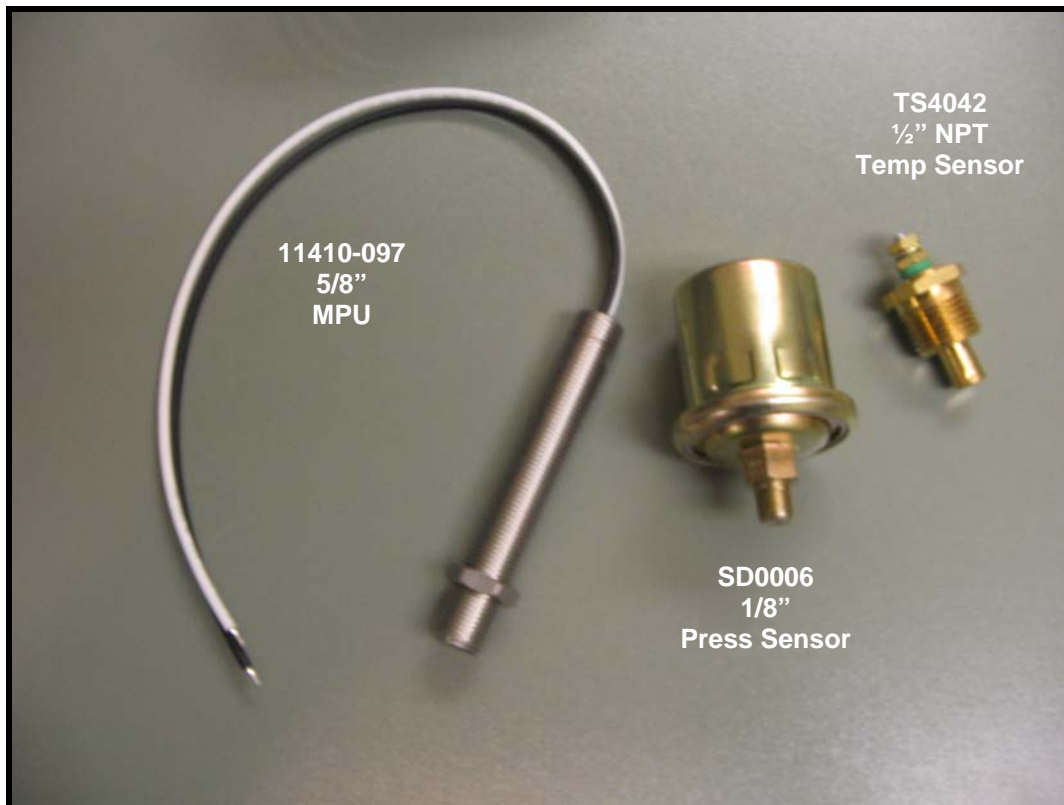
7.1.1.1 When a Stewart Warner sender type (240 – 33 ohm) is connected, fuel level will be displayed in percentage on the LCD.

7.2 Aux Outputs

7.2.1 **None**

8. Engine Sender Types

- Oil Pressure – Stewart Warner 240 – 33 ohm, 0-100 PSI (*SD0006 Including with K part numbers*)
- Engine Temperature – Stewart Warner 280-EA Type, 100-255 F (*TS4042 Including with K part numbers*)
- Engine Speed – Magnetic Pick Up, 3 VAC minimum
- Fuel Level – Stewart Warner 240 – 33 ohm, 0-100%

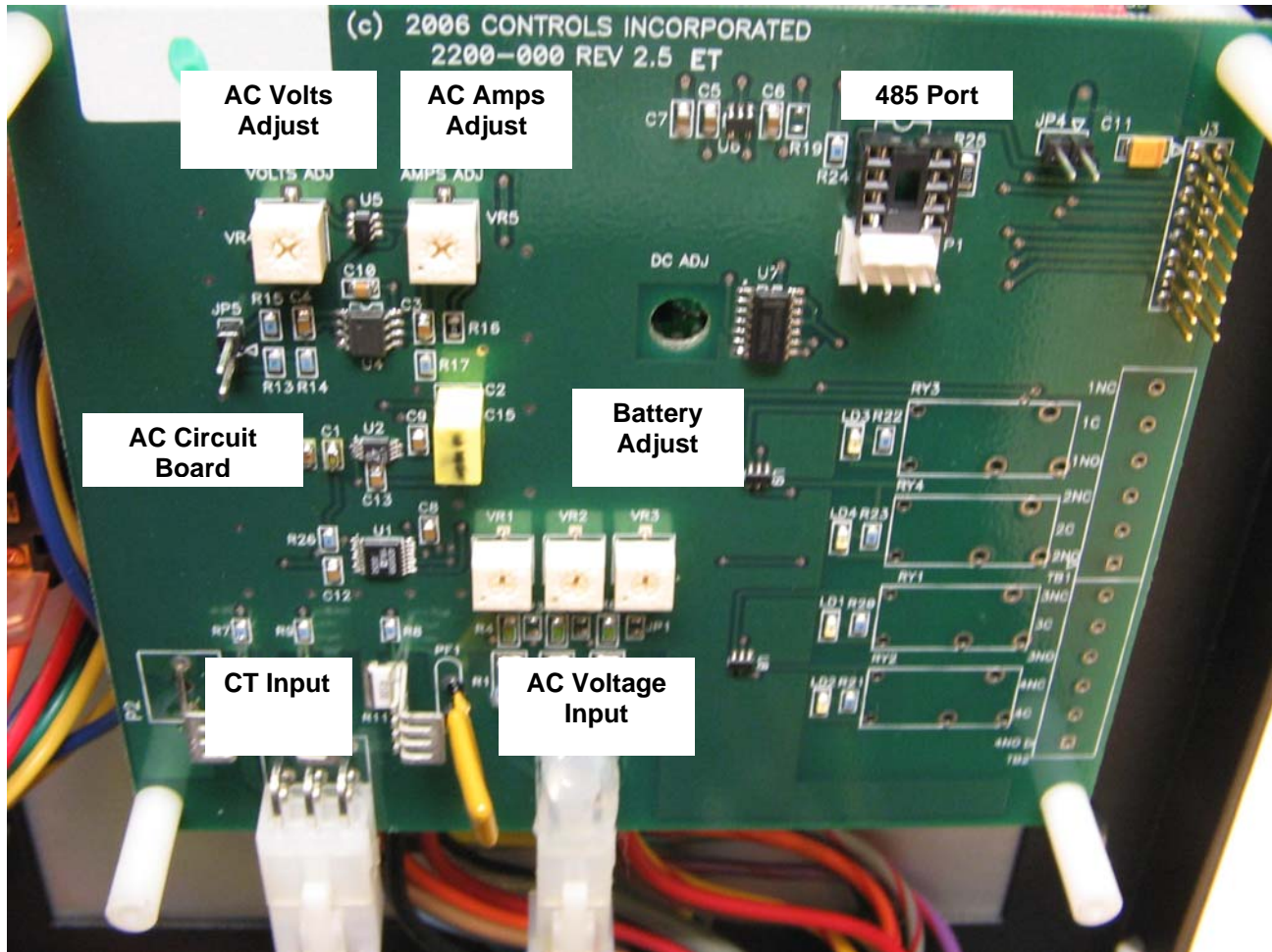


9. Generator Sensing

- AC Voltage – Directly from generator output, Up to 600 VAC
- AC Current – Current transformers, 5 Amp output (XXX: 5). Two required for single phase operation. Three required for three phase operation. *(CTs Including with K part numbers)*



10. Control AC / DC Adjustments



10.1 AC Voltage Adjustment – Using the pcb mounted calibration pots, the displayed voltage can be adjusted to match the output of the generator.

10.2 AC Amps Adjustment – Using the pcb mounted calibration pots, the displayed current can be adjusted to match the output of the generator. The adjustment is limited to the pre-programmed range of the current transformer inputs. The size of CT's to be used must be known at the time of ordering.

11. Product Warranty

CONTROLS, INC. is herein called "Seller". The person, firm or corporation to whom or which the sale is made is herein called "Buyer". Seller warrants to the Buyer that all products furnished under this order will conform to Seller's specification, drawings as described in its current catalog or quotation and will be free from defects in materials and workmanship. Seller must approve other special requirements asked for by the Buyer in its purchase order in writing. Parts replaced or repaired in the warranty period shall carry the unexpired portion of the original warranty. The foregoing is subject to the provisions that in no case will the total warranty period extend beyond twelve (12) months from date seller ships equipment from point of sale.

The Liability of Seller thereunder is limited to replacing or repairing at Seller's factory any part or parts which have been returned to the Seller and which are proved by buyer as defective or not conforming to Seller's specifications, drawings or other written descriptions, accepted by Seller, provided that such part or parts are returned by the buyer within thirty (30) days after such defect is discovered. All items returned to Seller for repair or replacement must be sent freight prepaid to its factory. Buyer must obtain Seller's Return Goods Authorization prior to returning items. The above conditions must be met if warranty is valid. Seller will not be liable for any damage done by unauthorized repair work, unauthorized misapplication in non-suitable environment.

In no event shall the Seller be liable for loss, damage, or expense directly or indirectly arising from the use of the units, or from any other cause, except as expressly stated in the warranty. Seller makes no warranties, express or implied, including any warranty as to merchantability of fitness for a particular purpose or use. Seller is not liable for and buyer waives any right or action it has or may have against seller for any consequential or special damages arising out of any breach of warranty, and for any damages buyer may claim for damage to any property or injury or death to any person arising out of its purchase or the use, operation or maintenance of the product. Seller will not be liable for any labor subcontracted or performed by buyer for preparation of warranted item for return to Seller's factory or for preparation work for field repair or replacement. The Seller will not consider invoicing of Seller for labor either performed or subcontracted by buyer as a liability. This warranty shall be exclusive of any and all other warranties express or implied and may be modified only by a writing signed by an officer of the Seller. With respect to accessories supplied by Seller, but manufactured by others, there is no warranty of any kind, express or implied, and specifically there is no warranty of merchantability or fitness, except as may be set forth in any warranty the manufactures have made to Seller and which can be passed to the Buyer.