

## FUNCTION

- Compatible with most DC Alternators.
- PWM control of field coil.
- Output current limit control.
- Overcurrent and Overtemperature annunciation.
- High/Low engine speed control based on load demand.
- Remote panel control option.
- Lowers genset EMI and improves voltage regulation.  
High temp shut down.

Polar Power's Model 710 genset regulator is designed to regulate alternator output voltage and current on DC gensets and Auxiliary Power Units (APUs). The alternator design can consist of the following technologies: brushless, rotating or stationary field, or slip rings.

The Model 710 uses all solid state circuitry with no electromechanical relays. The circuit is protected against surge and overvoltage conditions.

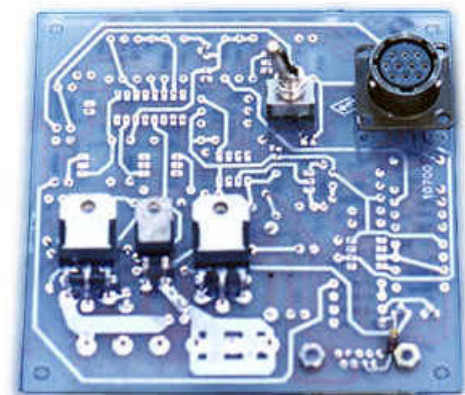
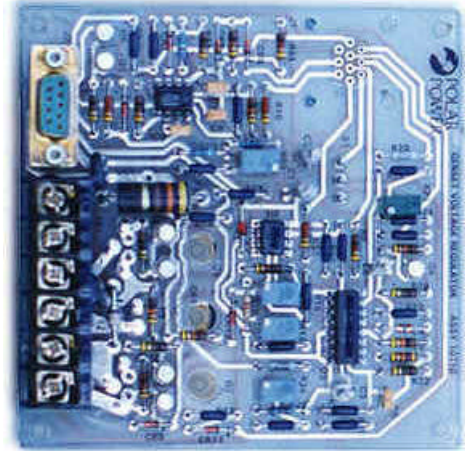
The Model 710 was designed for military applications requiring simple and reliable operation. EMI attenuation, high altitude electromagnetic pulse (HAEMP), and secondary lightning surge resistance were engineered into the Model 710 performance.

The Model 710 is assembled and packaged to meet the requirements of original equipment manufacturers.

## BUILT-IN FEATURES

**Automatic Load Dump (overvoltage clamp)** When a load is suddenly removed from the genset the voltage may rise suddenly. The load dump feature automatically clamps the voltage rise by adding a resistive load to the alternator output. The voltage set point at which the load dump is triggered is adjustable and the load itself can be adjusted by changing its resistance. The resistor load and solid state switch (MOSFET or IGBT) are external to the Model 710 printed circuit board, and are purchased as a separate option.

**Adjustable Current Limiting Output By** automatically reducing the current to alternators field coil, the output current of the generator can be limited. During a current limiting condition (similar to all power supplies) the output voltage will automatically drop. The Model 710 regulator senses the alternator output current through an external shunt, or hall effect type current sensor.





# DC Voltage Regulator

The advantage of current limited output instead of using a circuit breaker (with or without a shunt trip) for current control in installations which incorporate a battery in parallel with the load is the ability to provide continuous power output without overheating the alternator or engine, and without disrupting the power output. A battery with a damaged cell or in a low state of charge will cause the breaker to trip; the current limit feature of the Model 710 will continue to supply power.

**Overload Warning Alarm** This alarm signal can be set either before or after the alternator reaches the current limit set point. This adjustable set point is independent of the current limit set point. The standard signal output is designed to drive a LED light on a remote panel; with minor interface other types of devices can be controlled with this signal such as a secondary generator, shunt trip breaker, relays, etc.

**Over temperature Protection** Overtemperature Protection The voltage regulator has a temperature sensing circuit which will automatically reduce the current to the field coil should the alternator overheat. This will help protect the genset should cooling to the alternator fail or if a short develops inside the alternator. During over temperature condition the operator is signaled via a LED light. The advantage of this feature is to provide continued power (diminished level) under an adverse condition.

**Automatic Engine Speed Control** Automatic Engine Speed Control Polar Power's voltage regulator can drive a one-step solenoid actuating the engines throttle in response to the current demand placed on the genset. This two-speed throttle control will save considerable fuel and extend engine life. During low current demand, the engine can operate at low speed and still supply the required regulated voltage. When the current demand reaches an adjustable set point, the engine solenoid is energized, increasing engine speed. There is a manual override which forces the generator to stay in the high speed operation.

**Precision Output Voltage Regulation** The

Model 710 incorporates a pulse-width-modulated, DC to DC, linear regulator to provide a proportional voltage output to the field coil. The circuit is fast and responsive to load fluctuations on the genset output. A separate input is provided for voltage sense in order to reduce the effects of voltage drop and load noise across the power transmission line.

**Enable Switch** The Model 710 can be switched on and off remotely. When connected to a thermostat, mounted on the engine for example, the genset output can be automatically and efficiently brought on line after the engine has warmed up. The feature also prevents battery drain into the field coil during the off state.

**Remote Console Capability** There is a provision on board which allows connection to a remote display or system controller via on-board connector J1:

1. Voltage adjust
2. Regulator on/off (enable)
3. Engine speed override (forces the solenoid to stay energized)
4. Over current warning
5. Over temperature warning

## OPTIONS

The Model 710 can be custom configured to meet each application requirement. The Model 710 is available in all voltages from 12 to 48 Vdc, and field coil currents up to 20 amps.

## DIMENSIONS

Board only, 4.5" X 4.5" X 1" inches  
(114.3 X 114.3 X 25.4mm)



# DC Voltage Regulator

### CALIBRATION

Calibration will require an experienced electro/mechanical technician with the proper equipment.

1. Setting the load dump (overvoltage clamp) will require the operator to do the following:
  - a. Select the voltage clamping point.
  - b. Determine the minimum resistive load required to clamp the voltage. An insufficient load will fail to clamp the voltage and too large a load will cause the circuit to oscillate.
  - c. Since the transients are fast, an oscilloscope is required to observed events and calibrate.
  - d. Potentiometer (Pot) R-34 is adjusted clockwise to increase the voltage set point.
2. Output current limit, Pot R-12, is adjusted clockwise to increase the current limit.
3. Over current alarm, Pot R-15 is independent of R-12. Turn clockwise to increase the alarm set point.
4. Pot R-50 is adjusted clockwise to increase the current (limit) before the regulator switches the engine to a higher speed. To prevent the engine from oscillating between low and high speed there is a current differential between switch to high and switch to low.
5. Pot R-25 is used to adjust the output voltage.
6. Switch S1 (if installed on the circuit board) is used to switch the voltage adjustment between the remote panel pot and pot R-25.

### CONNECTIONS

Remote Panel Connector J1, MIL-C-26482, 10 pin. Pin assignments are based on whether the connector is mounted from the component side or the circuit side of the circuit board. The following pin assignments are correct when the connector is mounted on the circuit side:

	Pin
Voltage adjust pot	A
Voltage adjust wiper	B
Voltage adjust pot	K
Enable switch	E
Speed override	H
Common for enable and speed override	G
Overtemperature LED cathode	F
Overtemperature LED anode	D
Overcurrent LED cathode	J
Overcurrent LED anode	C

### Sensor Input Connector, Sub D, 9 Pin.

	Pin
Current shunt, output side	1
Current shunt, alternator side	2
Load dump transistor, gate	3
Temperature sensor (no polarity)	4
Load dump transistor, Kelvin	5
Temperature sensor (no polarity)	6
Second load dump transistor, gate	7
Positive voltage sense	8
Spare	9

### Terminal Block, 6 Circuit

	Terminal
Positive input	1
Positive output to field coil	2
Positive output to speed solenoid	3
Negative output to field coil	4
Negative output to speed solenoid	5
Negative input	6

