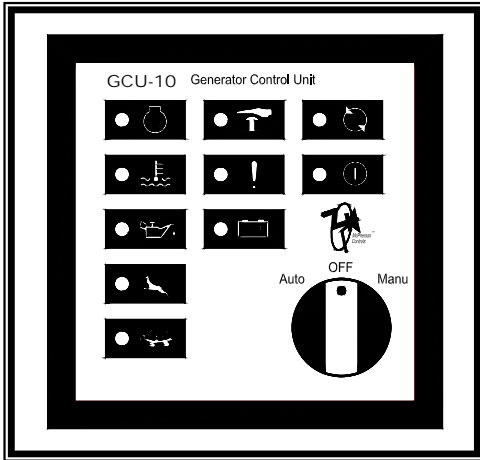


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OPERATION

The Model GCU-10 is an Automatic Generator Control Module, designed to meet the demands of the generator industry. The module starts and stops the generator, and at the same time indicating the operation status and fault conditions of the genset. If it senses a fault it will automatically shut down the engine and indicates the engine failure by means of eight LED's. The technician can program the module according to different generator requirements, as a result complying with different conditions and protections.



1. FRONT PANEL LAYOUT

1.1 FRONT PANEL LAYOUT






Operation of the GCU-10 is by a three position waterproof switch, indicating AUTO, OFF, and MANUAL.

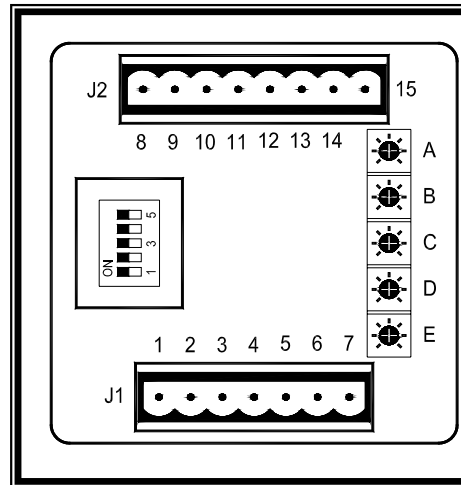
Two LED's indicate POWER ON and ENGINE RUNNING and the other eight LED's indicate the operational status and fault conditions of the genset. Each LED indicates; engine start failure, high water temperature, and low oil pressure, in addition to overspeed, underspeed, emergency stop, and low battery voltage. One extra LED (Exclamation Point) and its corresponding input is a user-defined shutdown (For example; Low Fuel, low water, breaker Open, etc.) all LED's have corresponding picture-graph that are universally recognized.

1.2 LAYOUT & CONFIGURATION

In the back, the GCU-10 we have a seven-pin (J1) and an eight-pin (J2) terminal block and five adjustment pots in addition to 5 DIP switches for genset configuration.

TIMER CONFIGURATION

-  A-- Pre-Heat Timer
Adjustable from 2 to 30sec
-  B--Starter Cranking Timer
Adjustable from 2 to 15 sec
-  C--Energize to STOP Timer (DIP SW 3 OFF)
Adjustable from 2 to 15 sec
-  D--Engine Idle (Electronic Governor Idle Control)
Adjustable from 0 to 300sec. Set to 0 for no idle
-  E--Engine Cooldown (STOP DELAY)
Adjustable from 0 to 300sec. Set to 0 if no Cooldown is needed



DIP SWITCH CONFIGURATION

SW 1 - Nominal Frequency
ON - 50Hz
OFF - 60Hz

SW 2 - Battery Voltage
ON - 12 Volt
OFF - 24 Volt

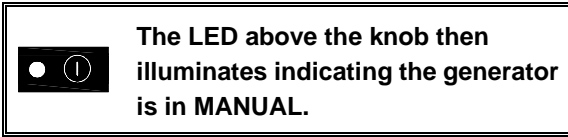
SW 3 - FUEL
ON - Energize to Start
OFF - Energize to Stop Timer

SW 4 - LOP Switch Contact
ON - Close On Fault (NO)
OFF - Open on Fault (NC)

SW 5 - Crank Disconnect on Oil Pressure
ON - Disabled
OFF - Enable

2. OPERATION IN MANUAL & AUTO

To initiate a start sequence moves the front control knob to MANUAL.



First, the pre-heat timer begins by energizing terminal 4. Do not use terminal 4 if the pre-heat function is not used

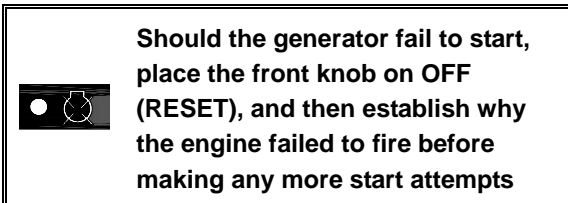
After pre-heat ends, the module de-energizes terminal 4 and begins engine-starting energizing terminal 11, together with Fuel Solenoid terminal 10, and Engine Idle terminal 14 & 15.

After a 1 sec. delay, the starter motor engages, and the engine cranks for the length of the cranking cycle.

When the engine starts, the starter motor disengages and locks out by the GCU sensing the output coming from the generator. Alternatively, the oil pressure switch can serve as an additional backup crank disconnect,

The ENGINE RUNNING LED will constantly flash throughout the idle period indicating the GCU is in IDLE.

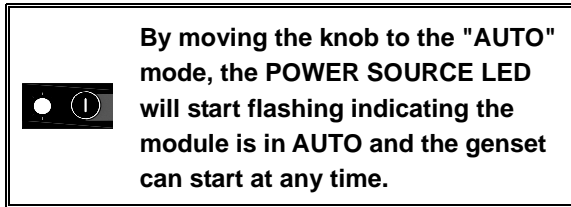
If the engine does not start the first time, the module will try to start two more times.



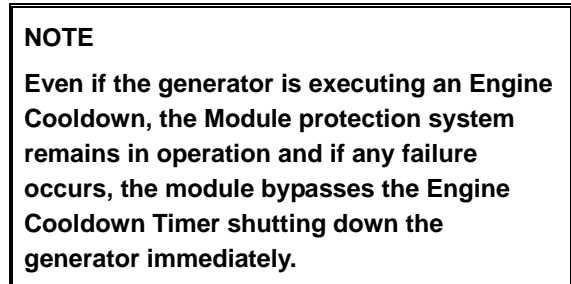
After the generator starts, the module allows Oil Pressure, High Water Temp, underspeed, and the Auxiliary fault input to stabilize for 20 sec. before triggering any faults. Once the engine is running full fault protection is on.

By moving the knob to OFF, the genset STOP after normal engine cooldown. In addition, the ENGINE RUNNING LED flashes throughout the cooldown period showing that the generator is in COOLDOWN.

2.2 Automatic (Remote Start) Operation



In the "AUTO" position, the module monitors input terminal 9 for a "REMOTE START" signal. Should a "REMOTE START" signal be detected a start sequence similar to previous manual start sequence is initiated automatically.



SYSTEM WARNINGS AND FAILURE-PROTECTION SETTINGS

Engine Fail To Start Reattempt

Engine tries 3 times to start

Engine High Water Temperature Protection

Shutdown activated after 3 seconds

Temperature Switch Type "Normally Open"

Engine Low Oil Pressure Protection

Shutdown activated after 3 seconds

Set Oil Pressure Switch Type

Normal Open or

Normal Close

Engine Overspeed Protection

Shutdown activated after 3 seconds

If set for 50Hz operation, Overspeed is activated at 55 Hz

If set for 60Hz operation, Overspeed is activated at 66 Hz

Engine Underspeed Protection

Shutdown activated after 5 seconds

If set for 50Hz operation, Underspeed is activated at 45 Hz

If set for 60Hz operation, Underspeed is activated at 54 Hz

Emergency Shutdown

Shutdown activated by Normal Open Contacts

Spare / User Define Shutdown

Activated after 5 seconds delay
Using Normal Open Contacts







Low Battery Voltage Warning

Activated after 5 seconds delay
For 12VDC operation set at 10 V
For 24VDC operation set at 20 V

Start-Up Safety-On Period

The 20 sec. Safety-On timer activates only after engine idle ends; in this mode, the module ignores all engine alarms delaying any shutdown until Safety-On times out, except for Emergency Stop and Overspeed

3.5 ICON REFERENCE TABLE

ICON	DESCRIPTION	EXECUTION
	Power Source Indication	Generator standby in Auto LED Flashing
	Generator Operating Normally	LED always ON When Running Normally
	Engine Start Failure	Shutdown
	High Water Temperature	Shutdown
	Low Engine Oil Pressure	Shutdown
	Overspeed	Shutdown
	Underspeed	Shutdown
	Emergency Shutdown Activated	Shutdown
	Spare Shutdown	Shutdown
	Low Battery Voltage Warning	Warning Only

3. SYSTEM INSTALLATION

Install the Model GCU-10 Module on the front panel by using the two installation clips provided. When installed in a panel with too much vibration use appropriate anti-vibration isolators.

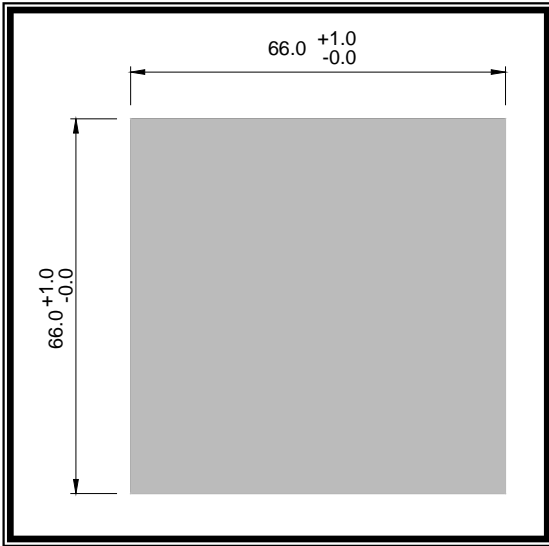
4.1 SPECIFICATIONS

DC Supply	9.0 to 36 V
Alternator Input Range	5 ~ 300VAC
Alternator Input Frequency	50/60 Hz
Fuel Solenoid Signal Output	5 Amp @ 12/24VDC
Start Signal Output	5 Amp @ 12/24VDC
Warm up Signal Output	5 Amp @ 12/24VDC
Alarm Signal Output	5 Amp @ 12/24VDC
Idle Control Conductor Capacity	5 Amp @ 12/24VDC
Operating Temperature	-20 °C to +70 °C
Relative Humidity	90% or Below
Power Consumption	Under 3VA
Weight	100 gram

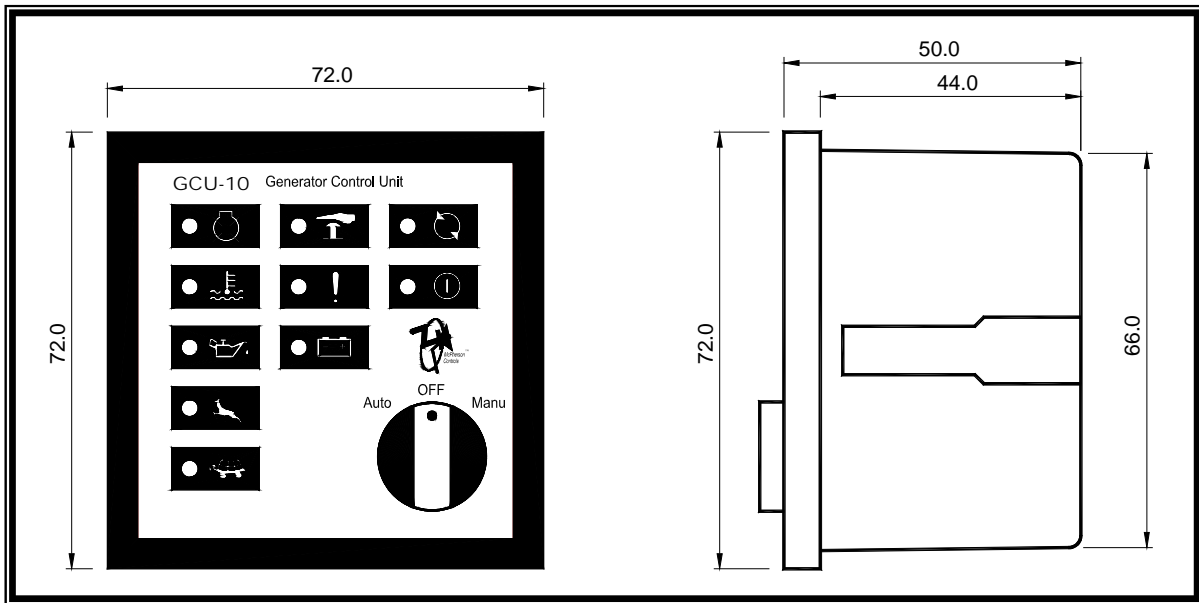
4.2 WORKING ENVIRONMENT

The module works over a wide temperature range from -20 to +70° C however, make allowances for temperature rise within the control panel enclosure. Do not mount close to any heat sources without adequately ventilated; also, the humidity inside the control panel should not exceed 90%.

4.3 PANEL CUT-OUT (mm)



4.4 UNIT DIMENSIONS (MEASUREMENT (mm))



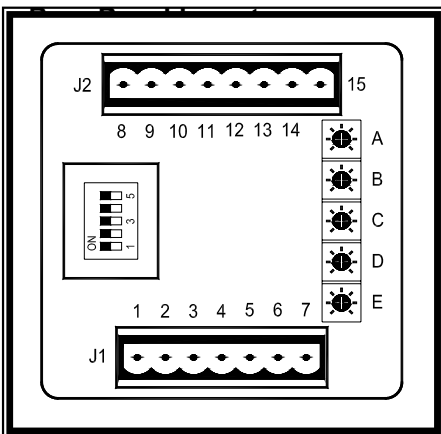
4.5 CONNECTION DETAILS

Seven pin din rail terminal J1

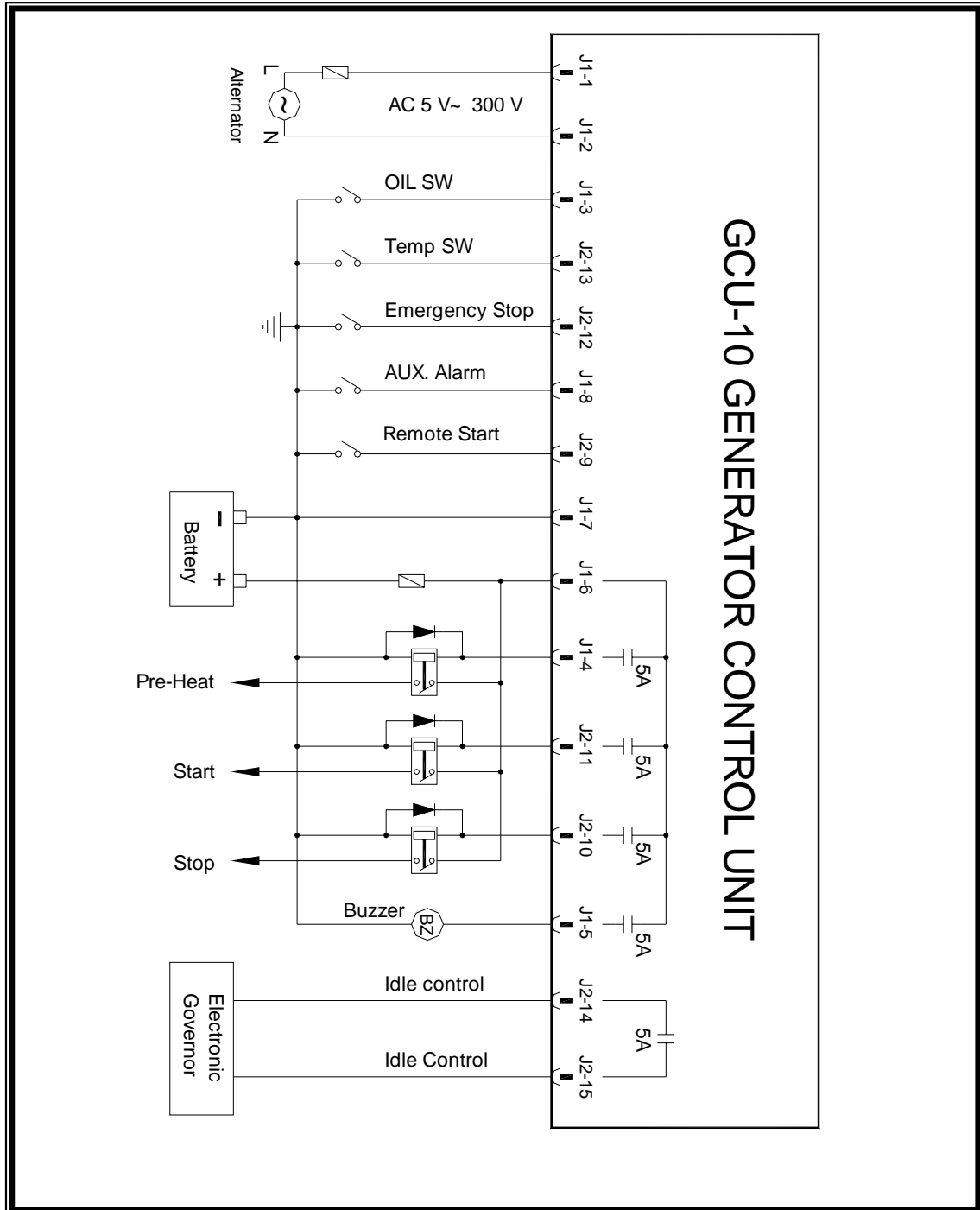
PIN No.	DESCRIPTION	NOTES
1	Generator Sensing Input	Connect to Generator Output
2	Generator Sensing Input	Same as Above (Indicate Generator Running and Also Used For Crank Disconnect)
3	Oil Pressure Switch Input	Negative Switched Oil Pressure Sender Input Can Also be Used for Crank Disconnect
4	Pre-heat Signal Output	Hook UP to Engine Pre-heat Max 5 Amps @ Battery Voltage
5	Failure / Warning Signal Output	Use For External Buzzer/Remote Annunciator Max 5 Amp @ Battery Voltage
6	DC Plant Supply Input (+V)	Battery Positive
7	DC Plant Supply Input (-V)	Battery Negative

Eight pin din rail terminal J2

PIN No.	DESCRIPTION	NOTES
8	Auxiliary Input	Negative Switches Input
9	Remote Start Input	Hook Up to ATS Switch Remote Start Connections
10	Fuel Solenoid Signal Output	Control Fuel Solenoid - Governor ON etc. Max 5 Amp @ Battery Voltage
11	Start Signal Output	To Starter Motor Solenoid Output Max 5 Amps @ Battery Voltage
12	Emergency Stop Input	Negative Switched Emergency Stop Button Input Terminal 12 to B-
13	Coolant Temperature switch Input	Negative Switched Water Temp Sender Input Terminal 13 to B-
14	Idle Signal Output	Connect to Governor (Speed Control) Idle control Dry contacts 5 Amp rated
15	Idle Signal Output	Same as Above (Used to Control a 2 Speed Governor With Idle Control)



4.6 STANDARD WIRING DIAGRAM



4. TROUBLE SHOOTING

SYMPTOM	PLEASE CHECK	REMEDY
In "MANUAL MODE", the Power Source LED does not illuminate and generator fails to start.	<ul style="list-style-type: none"> • Check Battery Volts on cranking (Not below 6V) • Check DC supply Voltage • Check DC supply fuse • None of the above 	<ul style="list-style-type: none"> • Change Battery • Check and confirm voltage and wiring • Change fuse • Change Control Unit
In "MANUAL MODE" Power Source LED illuminates and Starter Motor fails to operate.	<ul style="list-style-type: none"> • Check Battery Volts on cranking (Not below 6V) • Check oil pressure switch type • Check GCU-10 Start signal output • Check Starting motor • Check wiring to see if it is open circuit 	<ul style="list-style-type: none"> • Change Battery • Correct Oil pressure Switch type to correct setting • Change Control Unit • Change Starting motor • Correct the fault point
In "MANUAL MODE" Power Source LED illuminates and Starter Motor fails to crank.	<ul style="list-style-type: none"> • Check fuel • Check wiring of fuel solenoid • Check Governor and wiring 	<ul style="list-style-type: none"> • Add fuel • Correct Engine Stop Mode setting • Change Governor
In "MANUAL MODE" Starter Motor cranks but engine fails to start	<ul style="list-style-type: none"> • Check Battery Volts on cranking (Not below 6V) • Check Starting circuit and wiring • Check oil pressure Switch 	<ul style="list-style-type: none"> • Change Battery • Change Wiring • Change appropriate oil pressure switch or cancel the Oil Pressure Detection Engine Start option
Starting motor does not disengage after generator starts	<ul style="list-style-type: none"> • Check AC Input Voltage (5~300VAC) • Check wiring to see if it is open circuit • Check oil pressure switch • Check Starter motor 	<ul style="list-style-type: none"> • Change Automatic Voltage Regulator (AVR) • Correct the fault point • Change appropriate oil pressure switch • Change Starting Motor
Emergency STOP LED ON. Engine not operating And does not start	<ul style="list-style-type: none"> • Check emergency stop terminal and wiring • Check wiring to see if it is short circuit 	<ul style="list-style-type: none"> • Select emergency stop to normal open input • Correct the wiring
Low oil pressure LED always ON while engine is running	<ul style="list-style-type: none"> • Check engine oil pressure • Check oil pressure switch • Check wiring to see if it is open circuit 	<ul style="list-style-type: none"> • Add engine oil / lubricant • Change oil pressure switch • Correct the fault point
High water Temp LED always ON while engine is running	<ul style="list-style-type: none"> • Check engine temperature • Check water temperature switch • Check wiring for short circuit 	<ul style="list-style-type: none"> • Change water temperature switch • Correct the fault point

SYMPTOM	PLEASE CHECK	REMEDY
In "Auto Mode" the generator does not start with a remote start signal	<ul style="list-style-type: none"> • Check Engine Pre-heat countdown Setting to see if preset time (2 ~ 30 sec) has been reached • Check remote start signal input • Check GCU-10 start signal output 	<ul style="list-style-type: none"> • Correct the fault point • Change Control Unit
Pre-heat does not work	<ul style="list-style-type: none"> • Check wiring to see if it is open circuit • Check Engine Pre-heat Countdown Setting • Check GCU-10 Pre-heat signal output 	<ul style="list-style-type: none"> • Correct the fault point • Reset settings • Change Control Unit
Engine does not STOP in OFF	<ul style="list-style-type: none"> • Check Engine Cooling Countdown time setting (excessive time delayed) • Check Engine Stop Countdown time setting (inadequate time delayed) • Check Engine Stop Mode setting • Check GCU-10 Engine Shutdown output signal • Check Fuel Solenoid 	<ul style="list-style-type: none"> • Reset Engine Cooling Countdown time • Reset Engine Stop Countdown time • Reset Engine Stop Mode Change Control Unit • Change Fuel Solenoid