GENERATOR START CONTROL MODULE - MINI (2 Wire to 3 Wire) GSCM-MINI-D

FEATURES & APPLICATIONS

- **Inexpensive 2 wire to 3 wire start controller for electric start 3 wire DIESEL & Gas generators.**
- **Optimized for use with Outback Invertors.**
- **Supports three types of 3 wire generator control (momentary, maintained, ignition).**
- **Fixed Crank time, Over and Under Hz shutdown, and optional battery charging thresholds.**
- **Maximum Auto-start Run Time Limit (6 hours)**
- **Remote Run and Fault indication included.**
- **Totally sealed for harsh environment operation**

DESCRIPTION

The GSCM-mini-D is a micro-processor based generator start-stop module, designed to auto start-stop high speed gas and diesel generators needing a 3 wire connection from a 2 wire 12 volt manual start command. It automatically disconnects the starter when a minimum generator AC Hz. output is measured, it can monitor the generator's output, shutting it down if either an over or under Hz condition is detected. LEDs are flashed to indicate the cause of the shutdown. Manually resetting the GSCM-mini-d (by removing the power), removes the lockout and allows the generator to restart if called to do so. The GSCM-mini-D is powered by 12VDC from the generator battery, and can monitor the battery voltage and start the generator to charge it's own battery. All Thresholds are fixed. The GSCM-mini-D is a limited function controller, part of the GSCM family. If adjustability is required use the GSCM full function Generator Start Control Module.

THREE MODES OF RELAY OPERATION

The GSCM-mini-D's two relay contacts can be configured for three types of three wire start/stop hook-up configurations; momentary, maintained and Ignition for Honda®, Onan®, Yamaha®, and other brands of generators. This is accomplished with an optional jumper on terminal 6.

Momentary Start Contact Option #1, terminal 6, has No Connection. The GSCM-mini-D defaults to a momentary crank operation for those generators that use two momentary push button switches to start and stop the generator. K2 energizes for 10 seconds for diesel glow plug operation then, K1 cranks the Starter. On shutdown, K2 momentarily grounds the magneto. See Section 1 for operation description.

Maintained Start Contact Option #2, terminal 6, is grounded. The GSCM-mini-D changes to a maintained start operation for generators that use a maintained closed contact to start (K1). The generator is stopped by opening K1 and closing K2 contact, momentarily grounding the magneto. See Section 2 for operation description.

Ignition Key Switch Start Contact Option #3, terminal 6, is connected to B+ (12VDC). The GSCM-mini-D simulates an automobile ignition switch, K2 closes, maintains a closed ignition contact for the generator to run and K1 closes momentarily to crank the starter motor. and de-energizes when the start signal is removed. The K1 relay operates in a momentary crank configuration. See section 3 for operation description.

LED INDICATION DESCRIPTION

The GSCM-mini-D has six indication LEDs. The **Start LED,** blinks every 5 seconds to indicate ready for a start signal, blinks every 2.5 sec. to indicate running in Auto Start mode, 'On' continuously indicates running in Manual Start mode.
The **Generator Hz LED,** blinks to indicate over/under Hz Fault and Start Failure do to Maximum crank attempted. A slow blink indicates an under Hz condition, a fast blink indicates an over Hz condition. 'On' continuously indicates AC present in a non run condition. A double blink indicates a start failure condition. The **Run LED**, 'On' continuously indicates a valid Run signal from the generator. The **Fault LED**,'On' indicates a Fault condition has occurred and GSCM is in lockout and must be reset. The **K1 and K2 LEDs** indicate the relay status.

OPERATIONAL THRESHOLDS

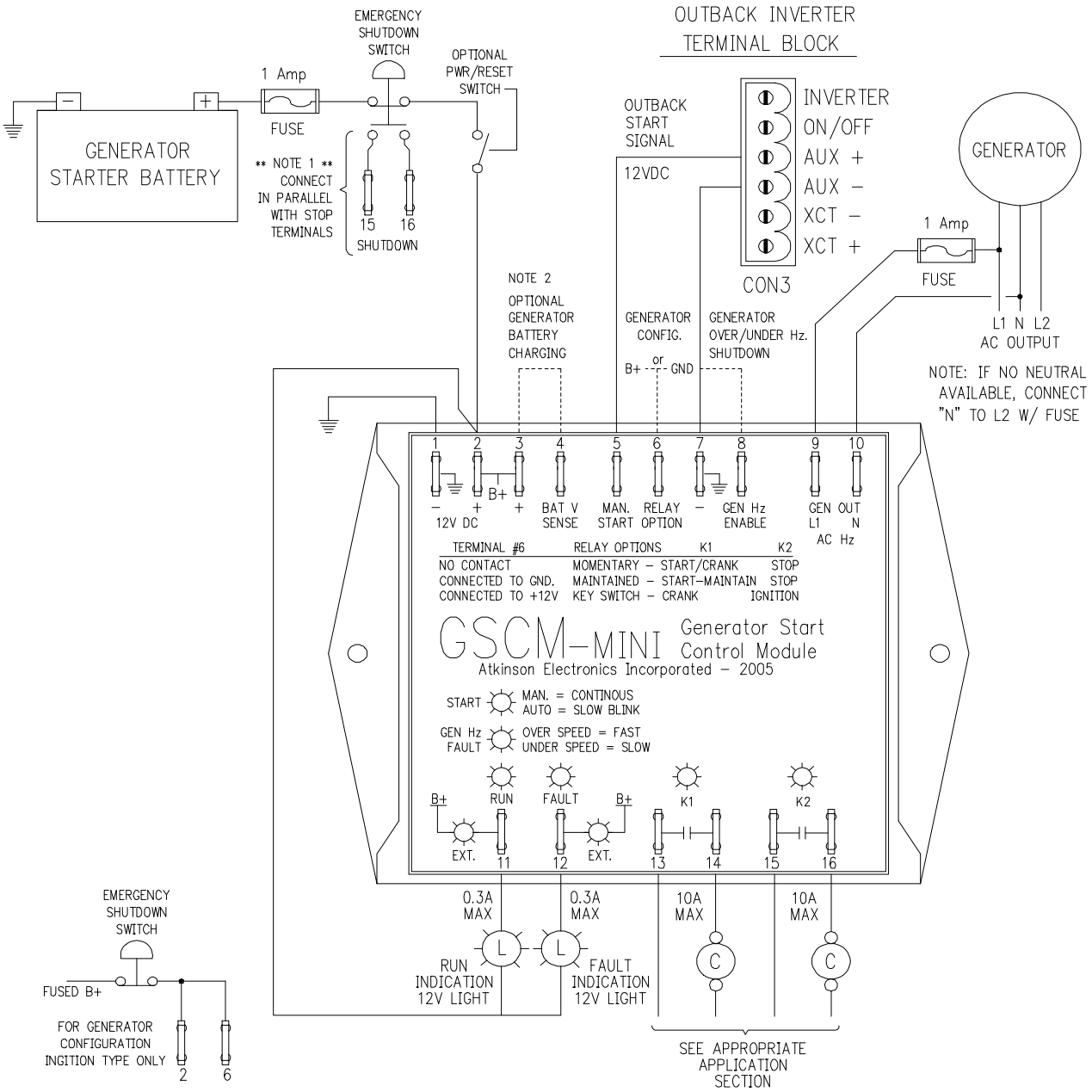
The GSCM-mini-D has fixed operational thresholds. Those are: Crank delay, Maximum Crank time, Crank Hz. Disconnect, Under Speed Shutdown, Over Speed Shutdown, Max auto start run time, and auto detects the Battery voltage to determine the auto start and auto stop threshold values for 12V, 24V, and 48V battery systems. If adjustability is required then use the GSCM full function control module.

Crank delay:	5 seconds		
Maximum Crank:	20 seconds		
Crank Disconnect:	45Hz		
Under Speed Shutdown:	55Hz		
Over Speed Shutdown:	65Hz		
Max Auto Start Run time:	6Hours		
Auto Start/Stop Thresholds:	Start	Stop	
12V system	11.5V	13.8V	Standard
24V system	23.0V	27.6V	Call for option
48V system	46.0V	55.2V	Call for option

Relay Configuration: (TERMINAL 6)
Open input = Momentary Crank
Grounded input = Maintained Crank
B+ (12VDC) input = Ignition & Crank

Fault Detection:
Start Failure, (3 attempts)
Over Hz condition (10 seconds)
Under Hz condition (10 seconds)
Max Run time Auto restart within 30m
Generator stops due to its own fault condition

GSCM-mini-D WIRING DIAGRAM AND CONTROLLER CONFIGURATION



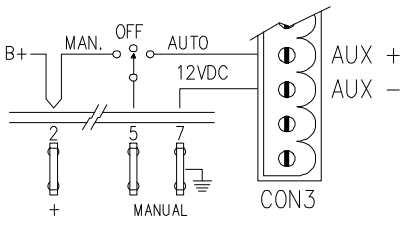
NOTE 1

IF THE GENERATOR THREE (3) WIRE START/STOP CONNECTION REQUIRES AN IGNITION (MAINTAINED CONTACT CLOSER TO RUN) AND A CRANK CONTACT TO START THE GENERATOR, THE EMERGENCY SHUTDOWN SWITCH ONLY NEEDS A SINGLE CONTACT TO DISCONNECT THE POWER FROM THE GSSM. REMOVING POWER CAUSES THE STOP/IGN RELAY TO DE-ENERGIZE SHUTTING DOWN THE GENERATOR.

NOTE 2

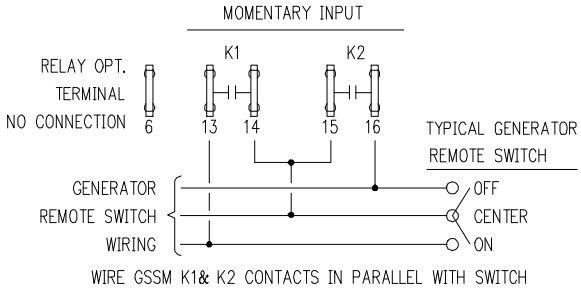
THE BATTERY VOLTAGE SENSE INPUT IS USED TO PROVIDE AN AUTO START FOR THE GENERATOR TO CHARGE IT'S OWN CRANK BATTERY. THE OUTBACK INVERTER ALREADY MONITORS IT'S OWN BATTERY BANK AND PROVIDES A START SIGNAL TO THE GSSM TO START THE GENERATOR TO CHARGE 12V, 24, OR 48V BATTERY BANKS.

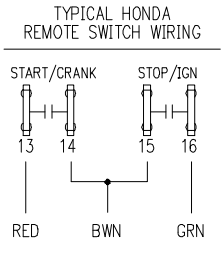
OPTIONAL REMOTE MAN−OFF−AUTO SWITCH

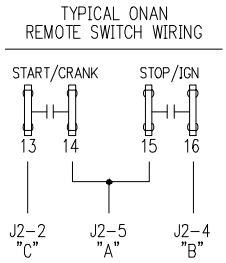


See Page 5 Section 4

OPTION #1 MOMENTARY START CONTACT - TYPICAL GENERATOR W/ STARTER CONTROL BOX

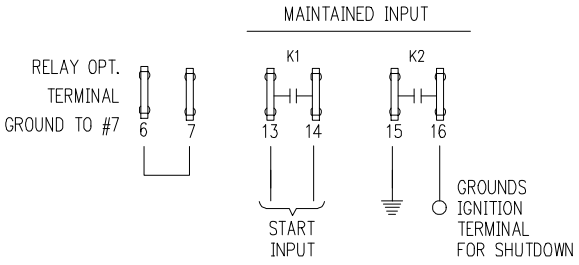


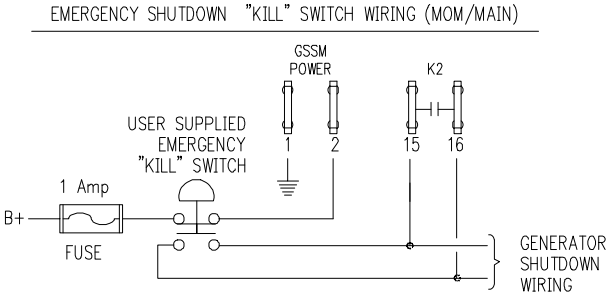




The GSCM-mini-D option #1 provides the same momentary glow plug operation for those 3 wire diesel applications where the key switch or off button is pressed for 10 seconds energizing the glow plugs, then the start button is pressed starting the generator. The GSCM-mini-D energizes K2 for 10 seconds to heat the glow plugs, then energizes K1 relay, providing a signal to the start/crank input and removes it when the generator has reached 45Hz, or half speed. The K2 relay also provides a momentary "stop" signal until the generator AC Hz has dropped to zero. For operational sequence details see Page 4, Section - 1

OPTION #2 MAINTAINED START CONTACT TYPICAL GENERATOR W/ STARTER CONTROL BOX

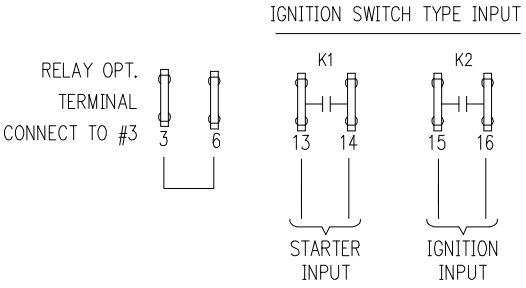


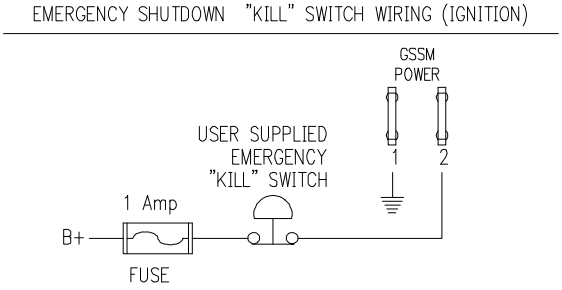


The K1 relay provides a continuous run signal for generators requiring a "maintained" start signal. The K2 relay provides a momentary "stop" signal until the generator AC Hz has dropped to zero. For GSCM-mini-D operational sequence details see Page 4, Section - 2

A double pole "kill switch" wired and installed by the user, stops the generator instantly in emergency situations such as a fuel spill. One switch pole (N.C.) kills power to the GSCM-mini-D opening all relays. The other switch pole (N.O.) shorts out the magneto for an instant stop.

OPTION #3 IGNITION KEY SWITCH TYPE START CONTACT TYPICAL GENERATOR W/ STARTER CONTROL





The K1 relay is used to switch the starter input that is looking for a momentary signal and opens it when the AC line output has reached 45Hz. The K2 relay provides a continuous run signal for generators requiring a "maintained" ignition signal. When the GSCM-mini-D no longer receives a run command, K2 relay opens telling the generator to shutdown. For GSCM-mini-D operational sequence details see Page 5, Section - 3

A single pole "kill switch" wired and installed by the user, stops the generator instantly in emergency situations such as a fuel spill. One switch pole (N.C.) kills power to the GSCM-mini-D opening all relays shutting down the ignition switch type generators.

GSCM-mini-D MOMENTARY STARTING SEQUENCE (Relay Option #1) SECTION - 1

The GSCM-mini-D indicates that it is ready to receive a start signal by blinking the start LED once every 5 seconds. The CONFIGURATION terminal 6 has NO connection, configuring the GSCM-mini-D for momentary start sequence. The start signal is created by closing a switch connected between the manual start terminal 5 to B+ terminal 3 **or** connecting the Aux + and Aux - terminals from an Outback Inverter to terminal 5 (start) and terminal 7(ground). The module may also start in automatic mode based on a battery voltage (see Section-6 for Automatic start for battery charging). If the GSCM-mini-D detects an AC signal from the generator before a start command is given (ie: the generator is already running) it will turn ON the Generator Hz LED, and not execute a start sequence until the AC Hz. signal has been rectified. The generator starting sequence is as follows.

1. The start LED blinks once every 5 seconds to indicate that the GSCM-mini-D is in a "Ready" mode. When a manual signal is received, the start LED lights continuously. After a 2 second delay, K2 relay closes for 10 seconds, causing the 3 wire diesel generator glow plug(s) to heat. K2 relay then opens and K1 relay closes to crank the starter, and remains closed until either the generator starts or the maximum cranking time period (20 seconds) is reached.
2. If the generator fails to start during the 20 seconds cranking period, K1 relay opens for a resting period of 40 seconds. At the end of the resting period K2 relay then closes for 10 seconds, heating the glow plug(s), after the ten second glow period K2 opens and K1 relay then closes, again cranking the starter until the maximum cranking time is reached or the generator starts.
3. If the generator fails to start after 3 cranking attempts with the associated resting periods, the K2 relay then closes for 5 seconds to ensure the generator is not running, the Gen Hz LED does a double blink, the Fault LED turns ON and the GSCM-mini-D enters the Max. Crank Lockout Fault condition. This lockout condition remains until the GSCM-mini-D is reset by removing power from terminal 2, waiting 5 seconds and then reconnecting power (see GSCM-mini-D wiring diagram, previous page). This clears the lockout condition, and the GSCM-mini-D enters "Ready" mode with the Start LED blinking Every 5 seconds.
4. When the generator starts, K1 relay immediately opens, stopping the cranking. A valid run condition is determined by one of two conditions: the generators AC output frequency exceeds the crank disconnect setting of 45Hz (terminals 9 & 10) or by a 12v run status signal provided by the generator connected to terminal 8. The GSCM-mini-D indicates that it has received either signal by turning on the Run LED.
5. If the generator starts but shuts down after a few seconds due to a fuel problem, etc. the start sequence will revert to the "Ready" mode after a 60 second delay. During this delay the start LED will blink rapidly. The GSCM-mini-D will then try to start the generator again in manual mode or after a 5 minute delay period in auto-start mode.
6. When a run condition is detected, the GSCM-mini-D turns ON the Run LED and transistor output (remote run lamp terminal) and after a 60 second generator stabilization period begins monitoring the AC Hz signal for over/under Hz condition, if enabled.
7. If the generator starts but shuts down after the 60 seconds stabilization period, due to a fuel problem, low oil pressure, broken AC Hz or 12v run status wire, the GSCM-mini-D blinks the Gen Hz LED for an Under Hz condition , after 60 seconds the Run LED turns Off, K2 relay energizes for 5 seconds, and Fault LED turns On and the Gen Hz LED blinks four times every two seconds. The GSCM-mini-D enters a Fault shutdown lockout condition and must be powered down to reset the fault lockout.
8. If no Faults occur, the generator will continue to run until one of the following occurs: the manual start signal is no longer received, the auto battery charge voltage or Max Auto Run time has been reached while running in Auto Charge Mode, an Over or Under Hz condition occurs (If Gen. Hz. Shutdown is enabled) or the generator runs out of gas.
9. During shutdown, K2 relay closes to ensure shutdown of the generator by grounding out the ignition, etc. It remains closed until the AC Hz signal from the generator has gone to zero for 5 seconds ensuring that the generator has shutdown.
10. The generator remains off until another start signal is received.

GSCM-mini-D MAINTAINED STARTING SEQUENCE (Relay Option #2) SECTION - 2

The CONFIGURATION terminal 6 has been connected to ground (terminal 7), configuring the GSCM-mini-D for maintained start sequence. The GSCM-mini-D is then powered by connecting B+ (12.0 VDC) to terminal 2. The Start LED turns on for 5 seconds while the GSCM-mini-D initializes with option #2 maintained starting sequence then begins blinking the start LED once every 5 seconds . The generator starting sequence is as follows.

1. The start LED blinks once every 5 seconds to indicate that the GSCM-mini-D is in a "Ready" mode. When a manual start signal is received, the start LED lights continuously. After a 2 second delay, K1 relay closes to start the generator. The K1 relay remains closed until either the start signal is removed or the maximum cranking time of 1 minute is reached.
2. If the generator fails to start after a single 1 minute start period, GSCM-mini-D runs thru its Shutdown Routine, the Fault LED turns ON and the GSCM-mini-D enters the Max. Crank lockout condition and the Gen Hz LED does a double blink. This lockout condition remains until the GSCM-mini-D is reset by removing power from terminal 2 (see GSCM-mini-D wiring diagram), waiting 5 seconds and reconnecting power. This clears the lockout condition, and returns to "Ready" mode.
3. When the generator starts, K1 relay remains energized. A valid run condition is determined by the generator AC output frequency exceeding the crank disconnect setting of 45Hz and is indicated by the Run LED being turned ON.

GSCM-mini-D MAINTAINED STARTING SEQUENCE continued *SECTION - 2*

4. If the generator starts but shuts down after a few seconds due to a fuel problem, etc. The GSCM-mini-D goes thru it's Shutdown Routine then re-enters "Ready" mode after a 60 second delay. During this delay the start LED will blink rapidly. The GSCM-mini-D will then try to start the generator again in manual mode or after a 5 minute delay period in auto-start mode.
5. When a run condition is detected, the GSCM-mini-D turns ON the Run LED and open collector transistor output (remote run lamp) and after a 60 second generator stabilization period begins monitoring the AC Hz signal for over/under Hz condition.
6. If the generator starts but shuts down after the 60 seconds stabilization period, due to a fuel problem, low oil pressure, broken AC Hz or 12v run status wire, the GSCM-mini-D blinks the Gen Hz LED for an Under Hz condition , after 60 seconds the Run LED turns Off, K2 relay energizes for 5 seconds, and Fault LED turns On and the Gen Hz LED blinks four times every two seconds. The GSCM-mini-D enters a Fault shutdown lockout condition and must be powered down to reset the fault lockout.
7. If no Faults occur, the generator continues running until one of the following occurs: the manual start signal is no longer received, the auto battery charge voltage or Max Run time has been reached while running in Auto Charge Mode, an Over or Under Hz condition occurs (If Gen. Hz. Shutdown is enabled) or the generator runs out of gas.
8. Shutdown Routine, K1 de-energizes, then ½ second later K2 relay energizes , remains closed until the AC Hz signal from the generator goes to zero for 5 seconds ensuring generator shutdown.
9. The generator remains off until another start signal is received.

GSCM-mini-D IGNITION/CRANK STARTING SEQUENCE (Relay Option #3) *SECTION - 3*

The CONFIGURATION terminal 6 has been connected to B+ (terminal 3), configuring the GSCM-mini-D for ignition/crank start sequence. The GSCM-mini-D is then powered by connecting B+ (+12 VDC) to terminal 2. The Start LED turns on for 5 seconds while the GSCM-mini-D initializes with option #3 ignition/crank starting sequence then begins blinking the start LED once every 5 seconds . The generator starting sequence is as follows.

1. The start LED blinks once every 5 seconds to indicate that the GSCM-mini-d is in a "Ready" mode. When a manual signal is received, the start LED lights continuously. After a 2 second delay, K2 relay energizes and remains energized until the start signal is either removed or the generator fails to start after 3 attempts. K1 relay closes to crank the starter. The K1 relay remains closed until either the generator starts or the maximum cranking time period (20 seconds) is reached.
2. If the generator fails to start after the 20 seconds cranking period, K1 relay opens for a resting period of 40 seconds. The K1 relay then closes again cranking the starter until the maximum cranking time is reached or the generator starts.
3. If the generator fails to start after 3 cranking attempts with the associated resting periods then K2 relay de-energizes and enters its shutdown routine, then the Gen Hz LED does a double blink, the Fault LED turns ON and the GSCM-mini-D enters the Max. Crank lockout condition. This lockout condition remains until the GSCM-mini-D is reset by removing power from terminal 2 (see GSCM-mini-D wiring diagram) and reconnecting power. The GSCM-mini-D will then clear the lockout condition, and enter "Ready" mode with the Start LED blinking Every 5 seconds.
4. When the generator starts, K1 relay immediately opens, stopping the cranking. A valid run condition is determined by the generator AC output frequency exceeding the crank disconnect setting of 45Hz.
5. If the generator starts but shuts down after a few seconds due to a fuel problem, etc. the start sequence will revert to the "Ready" mode after a 60 second delay. During this delay the start LED will blink rapidly. The GSCM-mini-D will then try to start the generator again in manual mode or after a 10 minute delay period in auto-start mode.
6. When a run condition is detected, the GSCM-mini-D turns ON the Run LED and open collector transistor output (remote run lamp) and after a 60 second generator stabilization period begins monitoring the AC Hz signal for over/under Hz condition.
7. If the generator starts but shuts down after the 60 seconds stabilization period, due to a fuel problem, low oil pressure, broken AC Hz or 12v run status wire, the GSCM-mini-D blinks the Gen Hz LED for an Under Hz condition , after 60 seconds the Run LED turns Off, K2 relay energizes for 5 seconds, and Fault LED turns On and the Gen Hz LED blinks four times every two seconds. The GSCM-mini-D enters a Fault shutdown lockout condition and must be powered down to reset the fault lockout.
8. The generator continues running until one of the following occurs: the manual start signal is no longer received, the auto battery charge voltage or Max Run time has been reached while running in Auto Charge Mode, an Over or Under Hz condition occurs (If Gen. Hz. Shutdown is enabled) or the generator runs out of gas.
9. When the manual start signal is removed, K2 relay de-energizes opening the ignition circuit shutting down the generator. The GSCM-mini-D then monitors the Generator AC Hz input to watch for a zero Hz condition before returning to "Ready" mode. If the AC signal remains the GSCM-mini-d's Gen. HZ LED turns on indicating AC Hz. Signal still present and will not return to Ready mode until the AC signal goes to zero. Once it goes to zero the GSCM-mini-D returns to "Ready' mode.

GSCM-mini-D WITH A MANUAL/OFF/AUTO SWITCH OPTIONS *SECTION - 4*

The Manual start signal is created by connecting terminal 5 (man. Start) to terminal 3 (B+12VDC) through a Power/Reset Switch (see GSCM-mini-D wiring diagram). It may also be generated by an Outback Inverter using the AUX+/- connections on the remote terminal block. The Outback provides a switched +12VDC signal for the GSCM-mini-D's manual start input. An optional Manual-Off-Auto switch can be installed to provide user flexibility for manual starts, resets, turning the unit off, or Auto starting from Inverter.
(see GSCM-mini-D's wiring diagram, lower right hand corner).

GSCM-mini-D FAULT SHUTDOWN CONDITIONS *SECTION - 5*

The GSCM-mini-D detects Five (5) fault shutdown conditions, they are as follows:

1. Failure to start with 3 cranking attempts (see Section-1:3, 2:2, & 3:3). The Gen. Hz Shutdown LED does a double blink and Fault LED On continuously.
2. High frequency (over Hz.) condition. The generator AC frequency is monitored on terminals 9 and 10. If the Gen. Hz. enable terminal #8 is grounded and the generator output frequency exceeds the 65 Hz fixed threshold for 10 seconds, the generator shuts down and the Generator Hz shutdown LED blinks rapidly. The "Generator Hz" LED blinks during this 10 second period.
3. Low frequency (under Hz.) condition. If the Gen. Hz. enable terminal #8 is grounded and the generator output frequency remains below the 55 Hz fixed threshold for 10 seconds, the generator shuts down and the Generator Hz shutdown fault LED blinks slowly. The "Generator Hz" LED blinks during this 10 second period.
4. Auto Start within 30 minutes of Max Run Time shutdown (see Section-6:4). The Gen. Hz Shutdown LED does a triple blink and Fault LED On continuously.
5. The GSCM-mini-D is in run mode, and the generator shuts down on a fault condition (low oil pressure, Hi temperature, or out of fuel) or the AC Hz signal fuse or wire opens or the 12v run status wire opens, the GSCM-mini-D goes thru it's shutdown routine and enters a fault condition, turning on the red Fault LED and blinking the Gen Hz LED four times every two seconds.

The over/under Hz. detection not enabled until the generator has been running for 60 seconds and will shutdown the generator after 10 continuous seconds of Hz. fault condition, locking it out until a power down reset and power back up. The Fault open collector transistor output (terminal 12) will energize a user supplied remote lamp or DC relay (not exceeding 300 milliamp coil current) whenever a fault shutdown occurs and will de-energize the relay when the fault is reset.

AUTOMATIC STARTING FOR BATTERY CHARGING *SECTION - 6*

The GSCM-mini-D can monitor either the generator battery voltage or a battery bank voltage and Automatically start/stop the generator based on battery voltage. This is accomplished by connecting the battery voltage to the battery sense input (terminal 4). The GSCM-mini-D monitors a battery voltage range of 0 to 60V DC and automatically determines the start and stop set point based on battery voltage (12, 24, or 48VDC). Below 16VDC - uses 12V thresholds, between 16 to 32V -uses 24V thresholds, above 32V - uses 48V thresholds. This mode is disabled if the voltage on terminal 4 is less than 6V, (no connection).

1. The GSCM-mini-D monitors the battery sense input and when the battery voltage drops below the start threshold the Start LED begins blinking (every second). When the battery voltage has remained below the start threshold for 5 continuous minutes the Auto start sequence begins. If the battery voltage rises above the start threshold during the 5 minute period the 5 minute timing cycle starts over. (Temporary battery voltage fluctuations such as instantaneous inverter loads will not start the GSCM.) The start LED blinks every 3 seconds while the GSCM-mini-D is running the generator in auto-start mode.
2. The GSCM-mini-D starts the generator as described in sections 1: momentary start, 2: maintained start, or 3: ignition start.
3. The GSCM-mini-D shuts down the generator (as described in Sections 1, 2, or 3) whenever the battery voltage exceeds the stop threshold for 10 minutes. The Start LED blinks (every second) during this 10 minute period. The GSCM-mini-d will exit the 10 minute period and shutdown the generator if the battery voltage exceeds the stop point by +1.0V (for a 12V system, 2V for 24V system). The generator remains off until the battery voltage drops below the start threshold voltage.
4. The GSCM-mini-D will shutdown the generator when it has run in auto-start battery charging mode for 6 hours and has not charge the battery above the shutdown threshold. The GSCM-mini-D then returns to ready mode looking for a start command. If the battery voltage drops below the Auto start threshold within 30 minutes of a max Run Time shut down the GSCM-mini-D will enter a Max run time fault condition and lock out the start sequence and requires a power down reset. The Gen Hz LED will blink 3 quick blinks every 5 seconds and the fault LED is on continuously.
5. If the user wishes to manual-start the generator from a separate pressure switch, level switch, thermostat or inverter start contact, etc., the battery voltage is fed through the switch (pressure switch etc.) contact to Manual start terminal 5. Closing the contact will cause the GSCM-mini-D to start the generator. Some invertors provide a switch 12VDC signal to start the generator. This switched voltage can be connected directly to the manual start terminal 5 and ground terminal 7. (See GSCM-mini-D wiring diagram).

GENERATOR EMERGENCY SHUTDOWN WITH THE GSCM-mini-D — *SECTION - 7*

The GSCM-mini-D Generator Start Stop module is **NOT AN EMERGENCY SHUTDOWN DEVICE!!** If the manual start signal is removed the generator will go through a normal shutdown which may take up to 15 seconds to completely shutdown the generator.

A RECOMMENDED EMERGENCY SHUTDOWN SOLUTION is to install a separate "Kill" switch and label it as such. The recommended wiring is shown on page-2 of these instructions and also in Application 1. Disconnecting the power to the GSCM-mini-D module will force the relays to open. This will shutdown generators that require a maintained run signal from K1 relay. However this also prevents the K2 relay from closing to shutdown those generators requiring a momentary stop signal. Using a double pole "Kill" switch and wiring the second pole in parallel with the K2 relay terminals will force the generator to stop in an emergency situation such as a fuel spill. (see note 1 on wiring diagram, page 2, for Ignition/crank emergency shutdown option).

LED DESCRIPTION (WHAT THEY MEAN) — *SECTION - 8*

1. **Start:** one blink every 5 seconds = Ready mode, looking for a start signal;
   one blink every 2.5 seconds = auto start mode operation;
   one blink every other second= auto start/stop period,
   continuous = manual start signal received;
   fast blink = 60 second delay after start signal removed before generator started;
2. **Generator Hz Shutdown:** fast blink = over speed condition;
   slow blink = under speed condition;
   double blink = Maximum Crank attempts reached, Failed to Start;
   triple blink = Auto start attempted with-in 30 minutes of a Max run time (6 hour) shutdown;
   Four blinks every 2 seconds = Ac Hz or 12v run status signal lost during run mode;
   continuous = start function disabled, AC Hz detected while in ready mode;
3. **Run:** continuous = GSCM has a valid run signal from generator;
4. **Fault:** continuous = GSCM is in a fault condition and requires a reset;
5. **K1 & K2:** continuous = Status of K1 and K2 Relays "ON"

SPECIFICATIONS — *SECTION - 9*

SIZE & WEIGHT: 5.13" L x 2.853" W x 1.35" H, 20oz.

MOUNTING: 2 screws through tabs

POWER: 12VDC Battery (9.5 to 15VDC)
Quiescent current < 10mA
Relay current < 25mA ea.

MANUAL INPUT: B+ (12VDC) input = on condition
Open input = off condition

BATTERY INPUT: 0-60V DC

AUTO START/ STOP THRESHOLD:

	Start	Stop
12V System	11.5V,	13.8V
24V System	23.0V,	27.6V
48V System	46.0V,	55.2V

RELAY CONFIG.: (Terminal 6) Open input = Momentary Crank
Grounded input = Maintained Crank
B+ (12VDC) input = Ignition & Crank

Gen. Hz Enable: (Terminal 8) Open input = Gen. Hz shutdown not active
Grounded input = Gen. Hz shutdown active
12VDC input = Generator run Status input, Over/Under Hz shutdown not active

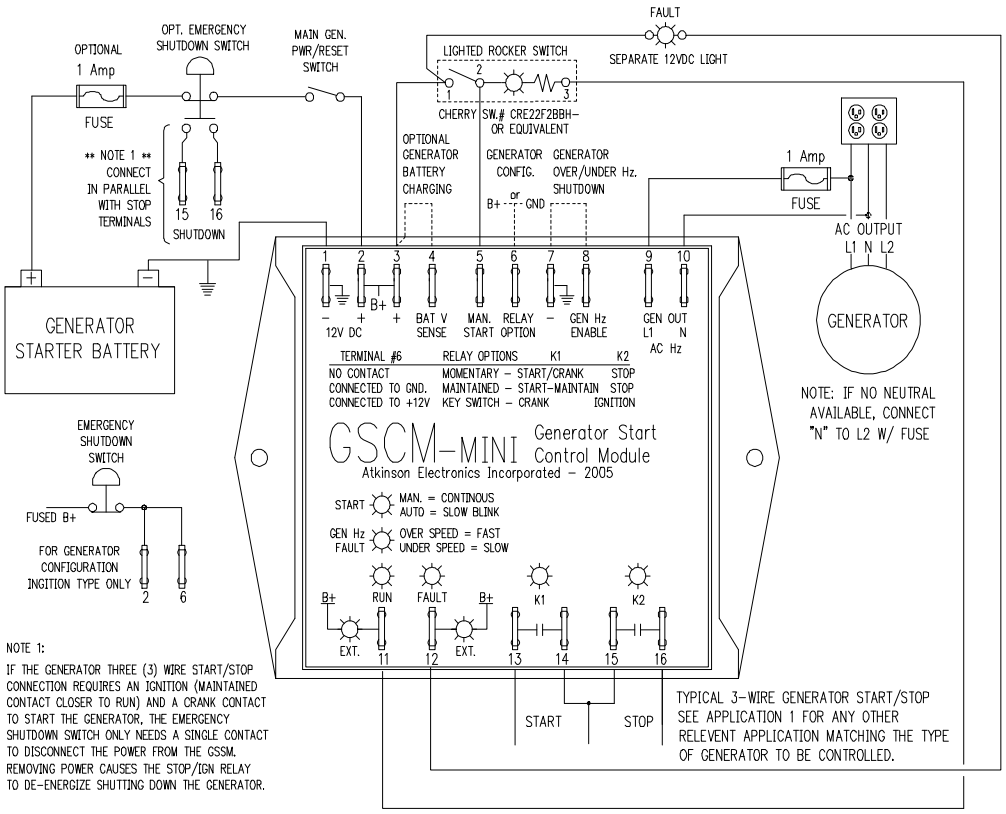
FREQUENCY INPUT: (Terminals 9 & 10) 24VAC, 120VAC & 240VAC 0-100 Hz

OUTPUT RATINGS: Qty. (2) 10 Amp 28V DC relay contacts, K1 has 38vdc MOV across contact
Qty. (2) Open collector NPN transistors, Max. 300mA each

FAULT DETECTION: Start Failure, (3 attempts)
Over Hz condition (10 seconds)
Under Hz condition (10 seconds)
Max Run time (6 hours)
Loss of AC Hz or 12V run status signal

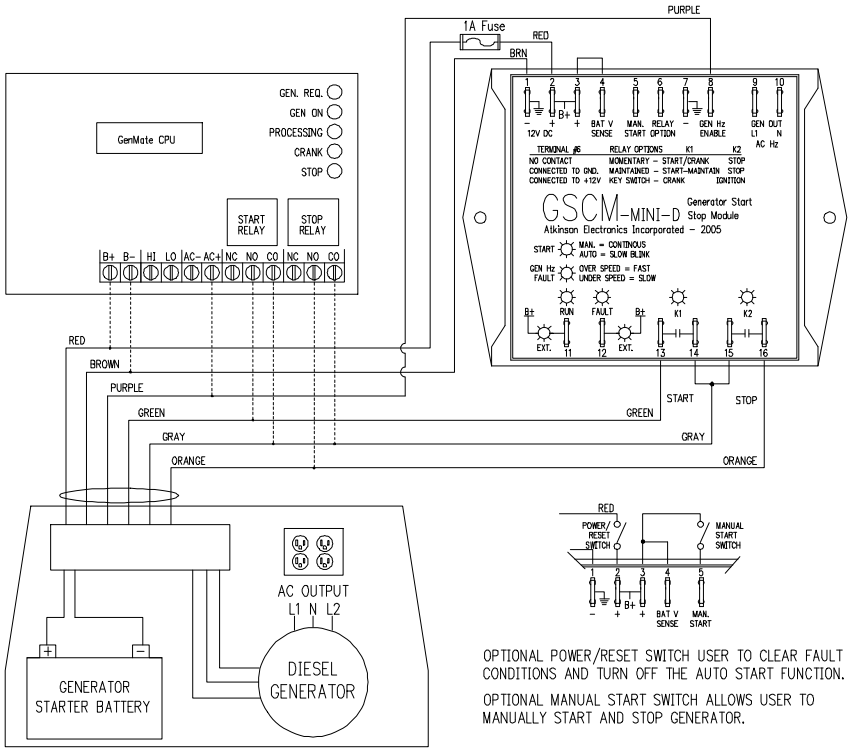
AMBIENT TEMP: -40 to 85°C

APPLICATION 2 - REMOTE RV GENERATOR START CONSOLE REPLACEMENT



The GSCM-mini-d can be used to replace a typical remote generator control console, that is mounted on the dash of a motorhome. Instead of a large console and cable, use a small 16 to 18 gauge 4 wire signal cable, an on-off switch with built in light and a separate 12vdc fault light. When the remote switch is turned on, the GSCM-mini-d starts the generator. After the generator starts and comes up to speed the "run" LED lights on the GSCM mini and lights the remote start switch light. If the generator fails to start or fails while commanded to run the "fault" LED on the GSCM- mini-d lights along with the remote fault 12vdc light. Turning off the power to the GSCM mini resets the fault condition and it is ready to receive another start command.

APPLICATION 3 - GenMate PC BOARD REPLACEMENT



The GSCM-mini-d can be used to replace a GenMate PC Board, that is mounted on the upper console of a motor coach. The GSCM-mini-D uses the same 6 wires that the GenMate used to start and stop the diesel generator based on battery voltage. When the coach battery voltage falls below 11.5vdc the GSCM-mini-D starts the generator to charge the batteries. When the batteries reach 13.8vdc the GSCM-mini-D shut down the generator. An optional manual start switch can be added to manually start the generator for other uses. A power/reset switch is recommended to reset any fault conditions and to shutdown the auto start when generator is being serviced. For 24v systems the GSCM-mini-D must be power from 12vdc and the battery sense input (terminal 4) would wire directly to the positive of the 24v battery bank.

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2. Atkinson Electronics, Inc. will correct any defects in material or workmanship which appear within two (2) years from the date of shipment by Atkinson Electronics, Inc. (or its authorized distributors) to the original Customer. Atkinson Electronics, Inc. will repair or replace, at our option, any defective products, provided that our inspection discloses that such defects developed under normal and proper use. This warranty does not extend to goods subjected to misuse, neglect, accident or improper installation, or to maintenance or repair of products which have been altered or repaired by anyone except Atkinson Electronics, Inc., unless otherwise stated in writing.

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