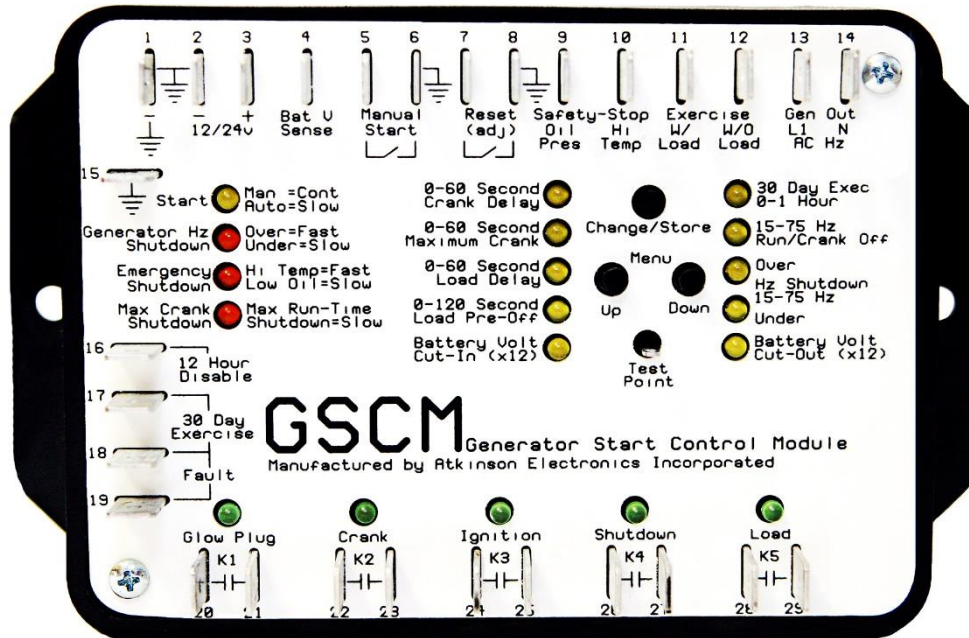


Generator Start Control Module

Part# GSCM Rev C.

Code Version: 5.13



ATKINSON ELECTRONICS, INC.

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Not Included But.....
48 Volt inverter systems
Require isolation relay
A0365

Code Version Update Changes

GSCM Rev. C set up adjustments is now accomplished with three push buttons: Change/ store, menu up and menu down.

GSCM Rev C-4.5HC has all adjustments hard coded with set up mode disabled.

GSCM Rev C-5.13HC added a stop command after each starting attempt to ensure generator is not already running before trying to start a second or third time.

Features & Applications

- Automatic starting, load transfer and shutdown for gas and diesel generators.
- Off grid generators
- Automatic adjustable voltage set points for generator battery charging applications, 0-60VDC.
- Works with 12, 24 or 48V battery systems.
- Provides fault shutdown for low oil pressure, high temperature and under-speed or over-speed conditions.
- All sequences have adjustable time periods.
- 30 day exercise with or without load, battery equalize function available.
- Relay driver for emergency shutdown and 30 day exercise remote indication.
- 12 hour maximum runtime (with override) for automatic starting applications.
- Totally sealed for harsh environment operation.

Fully customize your needs for start/stop generator operations.

Description

The GSCM is a micro-processor based generator starting controller. It receives either automatic or manual start commands to start a generator, disconnect the starter when a minimum generator frequency output is measured and monitors the generator operation, shutting it down if one of several fault conditions are detected.

LEDs are flashed to indicate the cause of the shutdown. Manually resetting, the GSCM removes the lockout and allows the generator to restart if called.



Operation

The GSCM is powered by 12 to 24VDC from a battery bank and will start generators for 12 to 48V systems. For 48V systems the GSCM must be powered by a 24V or less tap on the 48V battery bank. Adjustment for the timing controls is done during the set-up period using three push button switches on the front of the GSCM unit. The up and down buttons allows the user to move back and forth through the different timing parameters, and change the value when in change mode.

The change/ store buttons allows the user to change and then store the new setting. LEDs indicate which setting is being addressed and the stored value can be read on the test points. For example: a crank delay voltage setting of 2.5V is 50% of the 0 to 60 second timing range or 30 seconds (*See Adjustment Chart*). Timing values are stored in the memory regardless of power removal until changed.

The GSCM comes factory pre-set:

- Crank delay is set at 5 seconds
- Maximum crank is set at 15 seconds
- Load transfer delay is set at 60 seconds
- Load pre-off delay is set at 90 seconds
- Battery cut-in voltage is set at 11.5V
- Battery cut-out voltage is set at 13.5V
- Run/crank disconnect is set at 30Hz
- Under and over speed shutdown is set at 0
- 30 day exercise runtime is set at 0 (de-activated)

The GSCM provides a 30 day exercise function which can be synchronized with a photo voltaic input to only start each 30 day period at the beginning of the solar charge day. A user supplied DC relay can be energized during the 30 day generator exercise to override a battery charger and allow the battery bank to equalize by charging the batteries above the normal charger cutoff point during the exercise period.

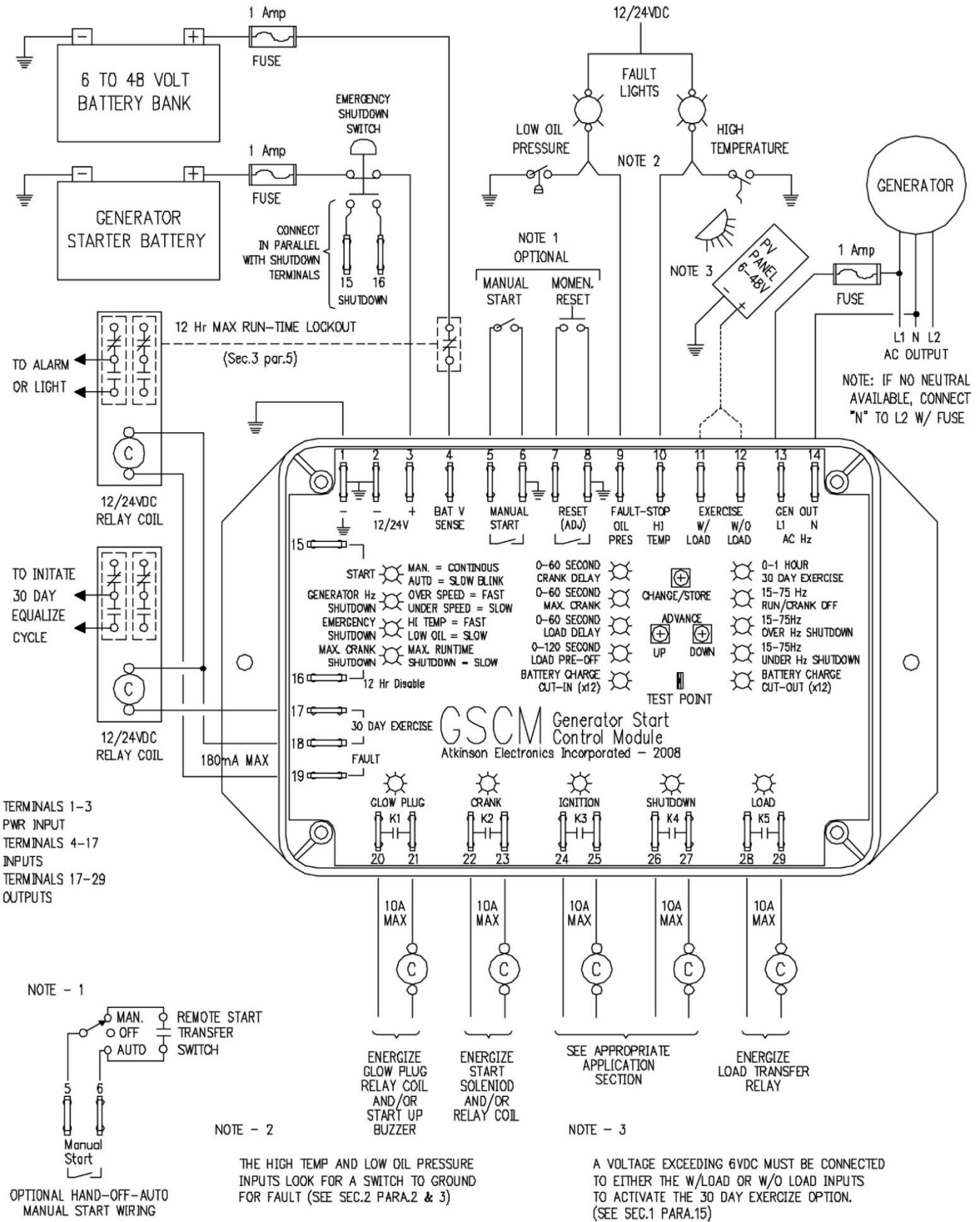
*Also, it will start and control
gas, propane &
diesel driven pumps*

Specifications

SIZE:	5.5"L x 3.3"W x 1.5"H
WEIGHT:	20 Ounces
MOUNTING:	2 Screws through tabs
POWER:	12V to 30VDC Quiescent current < 10mA Relay current < 25mA each @ 12V
CONNECTIONS:	Qty. (29) 1/4" Spade terminals
ON-OFF INPUTS:	Grounded input = on condition Open input = off condition
MANUAL INPUTS:	Grounded input = on condition 12-24V Outback signal = Start Open = off
VOLTAGE INPUTS:	0-60VDC
FREQUENCY INPUTS:	120-300 VAC 0-100Hz
ADJUSTMENTS:	Qty. (1) single turn potentiometer (0-5VDC=adjustment range)
	Crank Delay 0 to 60 seconds
	Maximum Crank 0 to 60 seconds
	Load Transfer Delay 0 to 60 seconds
	Load Pre-Off 0 to 120 seconds
	Battery Charge
	Cut-In Voltage 0 to 60VDC
	Cut-Out Voltage 0 to 60VDC
	Under Speed Shutdown 15 to 75 Hz
	Over Speed Shutdown 15 to 75 Hz
	Run/Crank disconnect 15 to 75 Hz
	30 Day Exercise Runtime 0 to 1 hour
OUTPUT RATINGS:	Qty. (5) 10Amp 28VDC Relay Contacts Qty. (2) Open Collector NPN Transistors
FAULT DETECTION:	5 conditions that lock out generator
MAX. RUNTIME:	12 hours in automatic start
AMBIENT TEMP:	-30 to 70°C



GSCM Wiring Diagram



GSCM Starting Sequence

The GSCM indicates that it is ready to receive a start signal by blinking the start LED once every 5 seconds. The GSCM is started by shorting terminal 5 to ground (terminal 6) for manual start mode. The module may also start in automatic mode based on a battery voltage, See AUTOMATIC STARTING FOR BATTERY CHARGING section, or a 30 day exercise cycle. The start LED is lit continuously to indicate that a manual start signal has been applied. The various adjustment LEDs blink during their respective generator controller time delay periods. If the GSCM detects an AC frequency input greater than zero (the generator is already running) it will not execute a start sequence, but will light the Hz LED continuously. The generator starting sequence is as follows:

1. The start LED blinks once every 5 seconds to indicate that the GSCM is in ready mode. When a manual start signal is received, the start LED lights constantly. After a 5 second delay, K4 (shutdown) relay closes to ensure the generator is not running before beginning the cranking sequence. After 7 seconds the K1 (glow plug) relay closes to energize the glow plug(s). The K1 relay remains closed until either the generator starts or the max crank time is reached.
2. An adjustable 5 to 60 second crank delay period starts when the K1 (glow plug) relay is energized.
3. After the crank delay period, K2 (crank) relay closes to cranks the starter, and K3 (ignition) relay closes to energize the ignition. The K2 relay remains closed until either the generator starts or the maximum cranking time period (0 to 60 seconds) is reached.
4. If the generator fails to start after cranking, K1, K2 and K3 relays open for a resting period equal to twice the maximum cranking time adjustment, the maximum crank LED blinks during this period. Halfway through the resting period K4 (shutdown) relay energizes for 7 seconds to ensure the generator did not start before beginning the cranking sequence routine again. If the generator starts and shuts down after each starting attempt, operator needs to check the AC feedback signal to make sure it is present when the generator starts and is running.
5. If the generator fails to start after 4 cranking attempts, K1, K2 and K3 relays open, K4 (shutdown) relay closes for 5 seconds and then opens to ensure the generator is not running, then the maximum crank shutdown LED lights and the GSCM enters the maximum crank lockout condition. This lockout condition remains until the GSCM is reset by momentarily shorting the reset terminals 7 and 8 together, after which the start LED blinks for 60 seconds and then enters ready mode. Powering down the GSCM for 5 seconds and powering it back up will also clear the maximum crank lockout condition, with the GSCM returning to ready mode.
6. When the generator starts, K2 (crank) relay immediately opens, stopping the cranking, K1 (glow plug) relay remains energized for an additional 5 seconds and then opens, de-energizing the glow plugs or removing a low oil pressure lockout during the starting routine. The K3 (ignition) relay remains closed during the run operation. A valid run condition is determined by the generator's AC output frequency exceeding the 30Hz run/crank disconnect setting (adjustable between 15 and 75Hz).
7. If the generator starts but shuts down after a few seconds due to a fuel problem, etc., the start sequence will revert to ready mode after a 60 second delay period in which the start LED blinks rapidly. The GSCM will then try to start the generator again in manual mode or after a 5 minute delay period in auto-stat mode. When the run condition is detected, the GSCM enters a load transfer delay period, before energizing the K5 (load) relay, the load delay LED blinks during the delay.
8. After the load transfer delay period, K5 (load) relay energizes to transfer the electrical load to the generator.
9. The generator continues to run until one of the following occurs: the manual start signal is no longer received, the auto battery charge voltage is reached, the 30 day exercise cycle time out or either an oil pressure or high temperature fault condition occurs.
10. During normal shutdown, K5 (load) relay opens and the GSCM enters the pre-off (cool down) time period, indicated by the load pre-off LED blinking.
11. When the pre-off period expires, K3 (ignition) relay opens, ½ second later the K4 (shutdown) closes, to shut down the generator by grounding the ignition, etc. It remains closed for 5 seconds after the AC Hz signal from the generator goes to zero, ensuring the generator has shutdown.
12. If the manual start signal is removed or switch is turned off before K5 (load) relay energizes, K3 (ignition) relay opens, then K4 (shutdown) relay energized shutting down the generator. The GSCM then enters a 60 second delay period before returning to ready mode.
13. If the load pre-off time delay is set to 0V, then the K5 (load) and K3 (ignition) relays de-energize simultaneously for shutdown followed by K4 (shutdown) relay energizing to ensure the generator shuts down.
14. The generator remains off until another start signal is received.



15. The GSCM will start a 30day exercise period of up to 1 hour run time, if the exercise time is set above 0 minutes (above 0V @ the test point, when in setup mode) and a reset has been applied for 30 seconds. If a DC voltage greater than 6V is connected to either terminal 11 or 12 the GSCM will exercise the generator with load or without load (energizing K5 load relay). If a voltage is not connected to either terminal, the GSCM will default to starting and running the exercise period with the K5 load relay energized. The 30 day exercise LED blinks once every minute if the exercise function is activated. The LED lights continuously and the open collector transistor switch (terminal 17) will pull in a user supplied 12 or 24VDC relay depending on supply voltage (coil current not to exceed 180 milliamps) whenever the generator is running in exercise mode. The 30 day exercise LED changes to a fast blink 60 seconds before the GSCM starts the generator in exercise mode.
16. If the DC voltage connected to either terminals 11 or 12 is supplied by a solar panel, the 30 day exercise will start in the morning when the solar panel's voltage exceeds the 6VDC threshold voltage after the 30 day exercise cycle period has been reached. Otherwise the start cycle will be 30 days, +/- several hours after the module was powered up and the reset applied for 30 seconds to activate the 30 day exercise routine. Not having a solar panel connected to terminal 11 or 12 may allow the generator to start in the middle of the night, disturbing yours or your neighbors sleep.
17. Battery equalization can be accomplished by using a relay on the 30 day exercise terminal 17 to switch a separate charge set to equalize mode, raising the battery voltage to equalization levels while the generator is running during its exercise period, (set exercise time to maximum of 60 minutes). A battery charger with an equalization operation is required for this application.

GSCM Shutdown Conditions

The GSCM detects several fault conditions (detection not enabled until the generator has been running for 15 seconds) and will immediately shutdown the generator, locking it out until a reset signal is received (shorting pins 7 and 8 momentarily). The open collector transistor terminal 18 will energize a user supplied DC relay (not exceeding 180 milliamp coil current) whenever a fault shutdown occurs and will de-energize the relay when the fault is reset. The shutdown conditions are as follows:

1. Failure to start with 4 cranking attempts. See GSCM STARTING SEQUENCE section: 4-5. The max crank/ max runtime fault LED blinks rapidly.
2. Low oil pressure condition is detected 15 seconds after run condition is verified in the load delay period. Terminal 9 is connected to ground by the oil pressure sensor. The emergency shutdown LED blinks slowly.
3. High temperature condition is detected 25 seconds after K5 (load transfer) relay is energized. Terminal 10 is connected to ground by temperature sensor. The emergency shutdown LED blinks fast.
4. High frequency (over speed) condition (must be activated in setup mode). The generators AC frequency is monitored, 25 seconds after K5 (load transfer) relay is energized, on terminals 13 and 14. If the frequency exceeds the 15 to 75 Hz adjustment for 10 seconds, the GSCM shuts down the generator and the frequency shutdown LED blinks rapidly. The over Hz LED blinks during the 10 seconds it over frequency. The factory default setting is 0 de-activated.
5. Low frequency (under speed) condition (must be activated in setup mode). The generators AC frequency is monitored, 25 seconds after K5 (load transfer) relay is energized, on terminals 13 and 14. If the frequency drops below the 15 to 75 Hz adjustment for 10 seconds, the GSCM shuts down the generator and the frequency shutdown LED blinks slowly. The under Hz LED blinks during the 10 seconds it over frequency. The factory default setting is 0 de-activated.
6. Maximum runtime of 12 hours is exceeded See AUTOMATIC STARTING FOR BATTERY CHARGING: 5. The max crank/ max runtime fault LED blinks slowly.
7. Loss of AC feedback signal while in run mode (K5 load relay energized). The GSCM begins monitoring the generator's AC voltage 25 seconds after K5 (load transfer) relay is energized, on terminals 13 and 14. If the AC voltage is lost for more than 60 seconds will cause the GSCM to go through its shutdown sequence. The generator Hz LED will blink three times, rest, blink three times to indicate the fault condition. Possible causes: generator ran out of fuel, load tripped the generators circuit breaker(s), broken or intermittent connection between the generator's AC connection points and the GSCM's terminals 13 and 14.



Automatic Starting for Battery Charging or from Pressure Switch, Etc.

The GSCM monitors a battery voltage of 0 to 60VDC on battery voltage sense terminal 4. This mode is disabled if the voltage on terminal 4 is less than 6V, (no connection) or both the cut-in or cut-out voltage adjustment has been set to 5V.

1. The start LED blinks once every 5 seconds to indicate that the GSCM is in ready mode. When the battery voltage connected to the battery sense input, terminal 4, drops below the battery voltage cut-in adjustment value, the battery cut-in LED begins blinking once a second. The battery voltage must remain below the cut-in adjustment value for 5 continuous minutes to activate an auto start. If the battery voltage rises above the cut-in adjustment value during the 5 minute period it clears the timer and starts over. Temporary battery voltage fluctuations such as instantaneous inverter loads will not cause the GSCM to start the generator.
2. Once the battery cut-in timer has reached 5 minutes, it sets the automatic start, indicated by the start LED blinks once every 2.5 seconds. The GSCM then enters its start routine with the K4 (shutdown) relay energizes to ensure the generator is not running before beginning the cranking sequence. After 7 seconds the K4 relay de-energizes and the GSCM begins its cranking routine. See *GSCM STARTING SEQUENCE* section 1-8.
3. The GSCM shuts down the generator whenever the battery voltage exceed the cut-out adjustment value for 10 minutes. See *GSCM STARTING SEQUENCE* section: 9-14. The battery cut-out LED blinks during this 10 minute period. The GSCM will exit the 10 minute period and shutdown the generator if the battery voltage exceeds the cut-out value by +1VDC (for 12V systems, +2 for 24V system, higher voltages are proportional). The generator remains off until started again by the battery voltage dropping below the battery cut-in adjustment value.
4. If the user wishes to disable the 5 minute start delay and 10 minute shutdown delay timers for a battery charging application. See *GSCM INITIALIZATION AND ADJUSTMENT* section 6-7.
5. If the generator has been running for 12 continuous hours in automatic battery charge mode without the battery voltage reaching the cut-out adjustment value, the GSCM will shut down the generator and indicate a maximum runtime fault by slowly blinking the max crank/ max runtime LED. See *GSCM SHUTDOWN CONDITIONS* section: 6. This runtime fault is only active in the automatic starting mode.
6. The GSCM will clear the max runtime fault if the reset terminals 7 & 8 are momentarily shorted, a manual start signal is applied to terminals 5 & 6, or a period of 12 hours passes from the time the max runtime fault occurred.
7. The user can force the GSCM to remain locked out beyond the 12 hours shutdown period by interrupting the battery voltage applied to terminal 4 with a normally closed contact DC relay connected to terminal 18 and Battery +. This relay will energize during any fault condition requiring a manual reset to clear the fault. (See the wiring diagram on page 2).
8. Connecting the 12 hour shutdown terminals 15 and 16 together with a jumper wire will allow the generator to continue to run indefinitely in automatic battery charge mode if the battery voltage does not reach the battery cut-out adjustment value. If the user wishes to only override the current cycle, such as needing more than the 12 hours to initially charge a large battery bank, the momentarily connecting the 12 hour shutdown terminals 15 & 16 together while the generator is running will allow it to exceed the 12 hour limit on its current cycle, but will reinstate the 12 hour limit for all future charge cycles.
9. There is no maximum runtime shutdown after 12 hours if the manual start input (terminal 5 & 6) is used to start the generator.
10. If the user wishes to have the 12 hour max runtime feature present when starting the generator from a separate pressure switch, level switch, thermostat or inverter start contact, etc. to prevent the generator from running indefinitely, all one needs to do is; run the battery voltage through previously mentioned device contacts and connect it to the battery sense input (terminal 4) and adjusting both the battery cut-in and cut-out values to 5VDC (while in set-up adjustment mode). The GSCM will start the generator in automatic start mode and it will run until either the input voltage signal is disconnected by the contact opening, the 12 hour max run time limit is reached (as described in paragraphs 5-8) or a fault occurs. Any DC voltage greater than 6VDC and less than 60VDC may be used for this mode with the battery cut-in and cut-out values set to maximum. Terminal 4 switched input applications automatically disables the 5 minute and 10 minute start and shutdown delay timers.



GSCM Initialization and Adjustment

1. Powering up the GSCM with a jumper placed on reset terminals 7 and 8 will cause it to enter the adjustment mode. When the crank delay LED is lit the GSCM will accept timing modifications to any of the factory settings. *See diagram in GSCM ADJUSTMENT CHART, which describes each adjustment LED and the setting that it refers to.* Connect your digital volt meter between the test point and ground (terminal 15) to read the settings.
2. In the adjustment mode, the GSCM first lights the crank delay LED and outputs the current setting value to the test point where it can be read with the digital volt meter.
3. Pressing the advanced up or down buttons allows the user to scroll through the ten settings, reading the value with the meter.
4. To change a stored setting, scroll to the desired setting indicated by the LED. Press the change/ store button once. The LED will then begin to blink indicating the unit is ready to accept a new value. The test point voltage now can be changed by pressing either the up button to increase the value or the down button to decrease the value. *See chart in GSCM ADJUSTMENT CHART.*
5. To store the new value, press the change/ store button once again, and the new value is then stored to the memory. If you do not want to modify the value, but have pressed the change/ store button by accident, pressing the change/ store button will restore the displayed value and take you out of change mode.
6. To disable the 5 minute start delay timer used in battery charging applications, jumper between terminals 15 and 16 (override 12 hour shutdown) while adjusting the cut-in voltage set point. Remove jumper after the new cut-in adjustment has been stored *See AUTOMATIC STARTING FOR BATTERY CHARGING section: 1-3.*
7. To disable the 10 minute stop delay timer, jumper between terminals 15 and 16 while adjusting the cut-out voltage set point. Remove jumper after the new cut-out adjustment has been stored. *See AUTOMATIC STARTING FOR BATTERY CHARGING section: 1-3.*
8. To disable the over/ under Hz fault shutdown, advance to the low Hz position, press the change/ store button, (led blinks) and set the test point voltage to 0VDC, store setting, advance to high Hz position and set to zero volts, both must be set.
9. To re-enable the 5 and 10 minute time delays, the GSCM must enter adjustment mode as in paragraph 1 of this section and then the cut-in and cut-out adjustment re-entered and stored without the jumper between terminals 15 and 16. Restoring the GSCM factory default values as described in GSCM Reset Conditions: 6 will restore the time delays.
10. Switched signal using the battery voltage sensing input such as application 5 and application 6 requires that the cut-in and cut-out adjustments to be set to +5V @ test point while in setup mode.
11. After scrolling through all the settings to verify that any changes made have been stored, removing the reset jumper on reset terminals 7 and 8 will cause the GSCM to enter the ready mode and the start LED blinks once each 5 seconds to indicate that the GSCM is ready to receive a manual or auto start signal. *See GSCM STARTING SEQUENCE section.*
12. During the ready mode, applying a reset of 30 seconds by shorting the reset terminals will start the 30 day exercise period if it has been selected by adjusting the exercise time above a zero volt signal. Short term GSCM module power interruptions will not change this 30 day exercise cycle start time.
13. The three push buttons are ignored except in the adjustment mode described above.

GSCM Reset Conditions

1. Shorting the reset terminals momentarily when the GSCM is starting, but not yet running, causes the generator start sequence to terminate and a 60 second delay period (with the start LED blinking rapidly) it must pass before the generator can start again.
2. Shorting the reset terminals during this delay period terminates the period and puts the GSCM into ready mode waiting for a new start command signal.
3. Shorting the reset terminals momentarily while the generator is running terminates the run command and the GSCM causes the generator to go through a normal shutdown sequence.
4. Shorting the reset terminals momentarily while the generator is locked out in a fault condition terminates the shutdown and enters a 60 second delay period (with the start LED blinking rapidly) before the generator can start again.
5. Resetting the GSCM for 30 seconds while in the ready mode is required to start the 30 day exercise period after which the 30 day LED blinks if it has been selected by adjusting the exercise time above a zero volt signal.



6. Resetting the GSCM for 60 seconds by shorting terminals 7 and 8 while in the ready mode forces the GSCM back to the original factory default settings, as it came out of the box. The adjustment LEDs blink once in sequence to indicate a return to default settings.
7. An alternate set of test adjustments may be selected by performing step 5 above and holding down the change/ store button just before releasing the 60 second reset. The change/ store button is then released after the reset jumper is removed, three of the ten adjustment LEDs blink. The test parameters are:
 - Maximum crank = 7 seconds - load delay = 20 seconds - pre-cool off delay = 10 seconds
 - Battery cut-in delay = 1 minute - battery cut-out delay = 2 minutes- 12 hour run time = 1 hour
 To exit the test parameters operation the user must perform step 5 above to return to factory defaults.

LED Description and What They Mean

OPERATION LEDs:

Start:	Continuous = manual start signal received One blink every 5 seconds = ready to receive a command Slow blink = auto start mode operation Fast blink = 60 second delay after reset, before ready mode
Generator Hz Shutdown:	Fast blink = over speed; slow blink = under speed Continuous = start function disabled, AC Hz detected Three slow blinks = run fault, loss of AC feedback signal after load relay has energized
Emergency Shutdown:	Fast blink = high temperature; slow blink = low oil pressure
Max. Crank Shutdown:	Fast blink = max. 4 crank attempts exceeded; slow blink = 12 hour max. runtime exceeded

ADJUSTMENT & TIMING LEDs:

On continuous = selected for adjustment

0-60 Second Crank Delay:	Blinking = entered crank delay period while glow plug relay K1 energized
0-60 Second Maximum Crank:	Blinking = rest period after unsuccessful cranking attempt
0-60 Second Load Delay:	Blinking = generator running, delay period before load transfer
0-120 Second Load Pre-Off:	Blinking = load disconnected, cool down period before shutdown
Battery Charge Cut-In (x12):	Blinking = battery voltage lower than cut-in point, during 5 minute delay
Battery Charge Cut-Out (x12):	Blinking = battery voltage greater than cut-out point, during 10 minute delay
15-75Hz Under Hz Shutdown:	Blinking = generator Hz (under speed) less than trip point, during 10 second delay
15-75Hz Over Hz Shutdown:	Blinking = generator Hz (over speed) greater than trip point, during 10 second delay
15-75Hz Run/Crank Off:	Continuous = adjustment selection; no blinking condition
0-1 Hour 30 Day Exercise:	One blink every minute = 30 day exercise option activated; Fast blink = 60 second warning before 30 day exercise generator starting

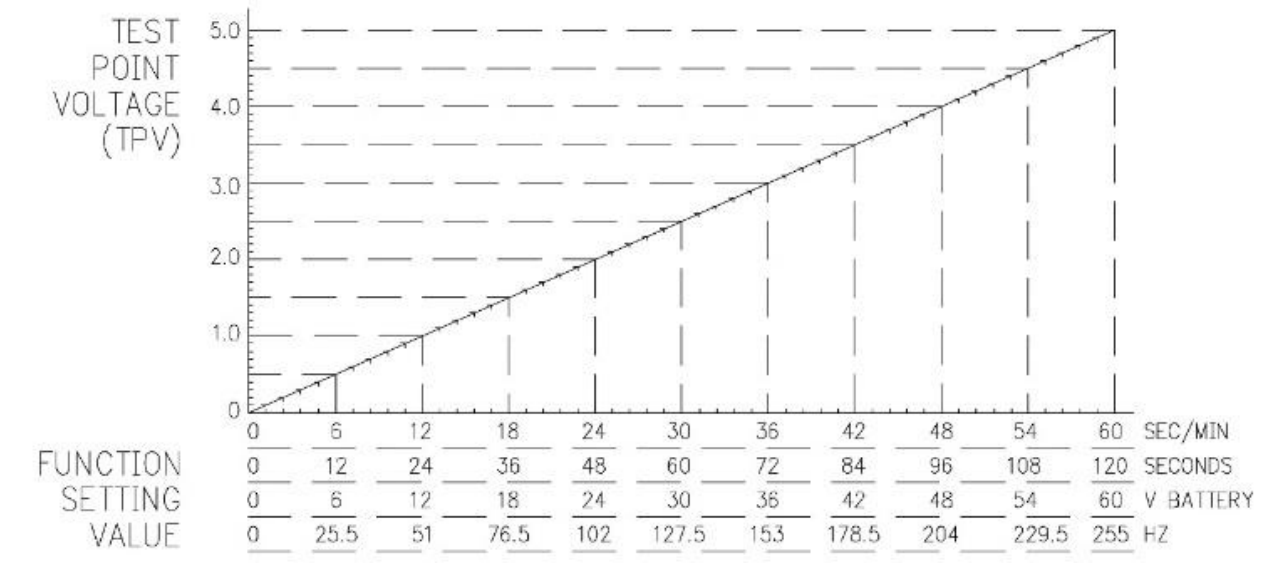
Generator Emergency Shutdown with GSCM

The GSCM Generator Start Controller is **NOT AN EMERGENCY SHUTDOWN DEVICE!!** Shorting the reset terminals 7 and 8 terminates the current GSCM cycle. See *GSCM RESET CONDITIONS* section. If the manual start signal is removed the generator will go through a normal shutdown which may include running for up to two minutes in a load removed cool-down cycle. Also shorting reset terminals 7 and 8 will shut down the generator in a normal sequence including the cool-down cycle. If the generator has started but is in the load delay period, applying a reset to terminals 7 and 8 will shut down the generator immediately.

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 module will force the relays to open. This will shut down generators that require a maintained run signal from K3 (ignition) relay. However this also prevents the K4 (shutdown) relay from closing to shut down those generators requiring a momentary stop signal. Using a double pole kill switch and wiring the second pole in parallel with the K4 (shutdown) relay terminals will force the generator to stop in an emergency situation such as a fuel spill.



ADJUSTMENT CHART



Adjustment Formulas

0 - 60 Second/min/Vbat
 0 - 120 (Sec)
 15 - 75 Hz

TPV = (Desired Value ÷ 60) x 5
 TPV = (Desired Sec ÷ 120) x 5
 TPV = {(Desired Hz - 15) ÷ 60} x 5

Example: 11.5V Bat = 0.96V (TPV)
 55Hz = 3.33V (TPV)
 65Hz = 4.17V (TPV)

- 0-60 SECOND CRANK DELAY
- 0-60 SECOND MAX. CRANK
- 0-60 SECOND LOAD DELAY
- 0-120 SECOND LOAD PRE-OFF
- BATTERY VOLTAGE CUT-IN (x12)

- CHANGE/STORE
- ADVANCE
- DOWN
- UP
- TEST POINT

- 30 DAY EXEC. 0-1 HOUR
- 15-75 Hz RUN/CRANK OFF
- 15-75Hz OVER Hz SHUTDOWN
- 15-75Hz UNDER Hz SHUTDOWN
- BATTERY VOLTAGE CUT-OUT (X12)

Factory Default Adjustments

- Crank Delay @ 5s - TPV = 0.42V
- Maximum Crank @ 15s - TPV = 1.25V
- Load Transfer Delay @ 60s - TPV = 5V
- Load Pre-Off Delay @ 90s - TPV = 3.75V
- Battery Cut-In Volt @ 11.5V - TPV = 0.96V
- Battery Cut-Out Volt @ 13.5V - TPV = 1.13V
- Under Speed Shutdown @ deactivated - TPV = 0
- Over Speed Shutdown @ deactivated - TPV = 0
- Run/Crank Disconnect @ 30Hz - TPV = 1.25V
- 30 Day Exercise Runtime @ deactivated - TPV = 0

Adjustment

- 0 - 60 Second Crank Delay
- Maximum crank time
- Load transfer delay
- Load pre-off delay
- Battery charge cut-in
- Battery charge cut-out
- Under speed shutdown
- Over speed shutdown
- Run/crank disconnect
- 30 day exercise runtime

0 Volts

- 5 second minimum
- Will not energize starter
- Ignition and load relays energize together
- Ignition and load relays de-energize together
- Ignores automatic battery charge function
- Ignores automatic battery charge function
- Ignores under speed shutdown condition**
- Ignores over speed shutdown condition**
- Uses 15Hz to disconnect starter
- Deactivates 30 day exercise

5 Volts

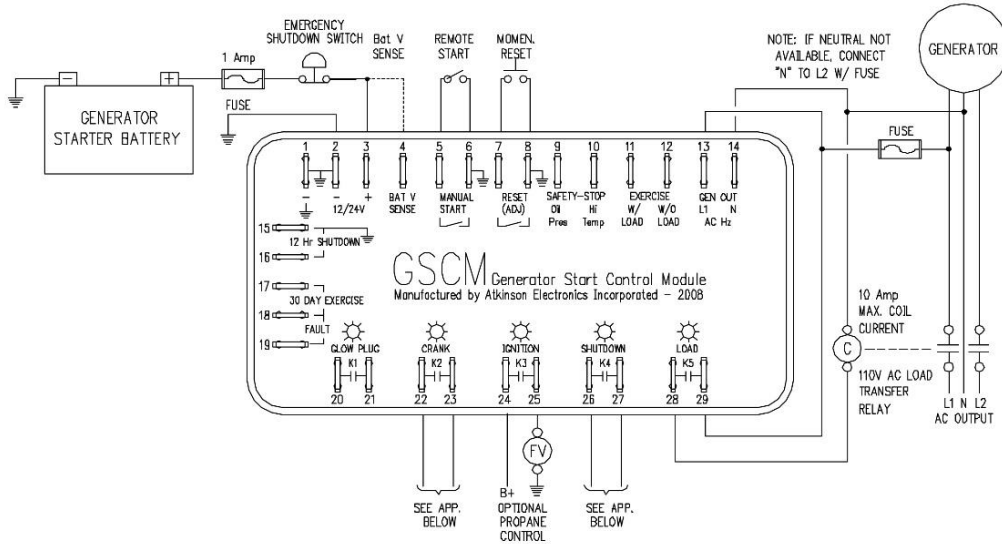
- 60 seconds
- 60 seconds
- 60 seconds
- 120 seconds
- Switched auto start*
- Switched auto start*
- 75Hz under speed shutdown
- 75Hz over speed shutdown
- Over 60 Hz starter won't disconnect
- 1 hour 30 day run time

* Both battery cut-in and cut-out must be at maximum for switched auto start.

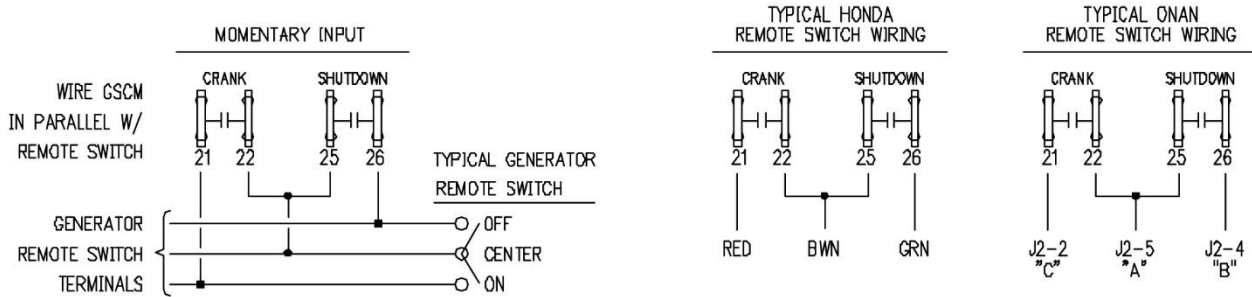
** Both Over Hz and Under Hz must be set at zero to disable the Over or Under Hz Shutdown.



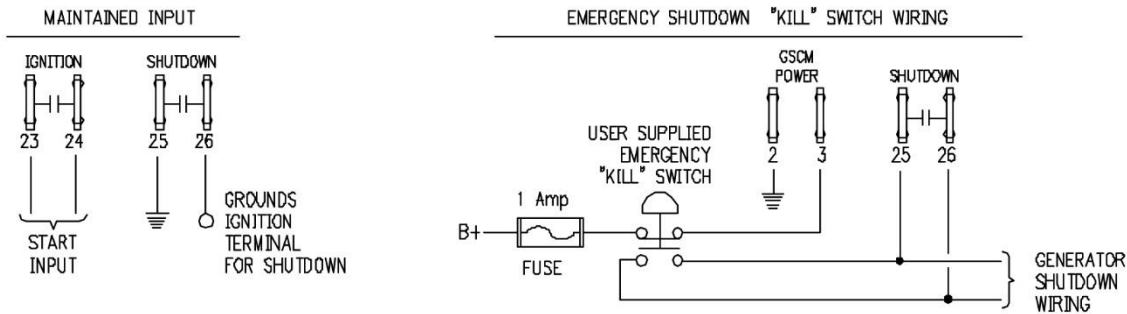
Electric Start High Speed Gas/ Propane Generator with Starter Control Box



This application matches most high speed or portable generator sets that have an electric starter and some type of starter control. These generators should have the ignition switch left in the on position. The start commands usually come through the GSCM connected to the remote start terminals. The remote start may be either momentary or maintained.



The K2 (crank) relay is used to switch the start input which is looking for a momentary signal. The K2 (crank) relay opens when the generator has reached 30Hz, or half speed. If this setting doesn't allow the start input to remain engaged long enough for the generator to stay on-line, adjust the run disconnect setting to 55Hz. See *GSCM INITIALIZATION AND ADJUSTMENT for changing adjustments*. The K4 (shutdown) relay provides a momentary stop signal until the generator AC Hz has dropped to zero.

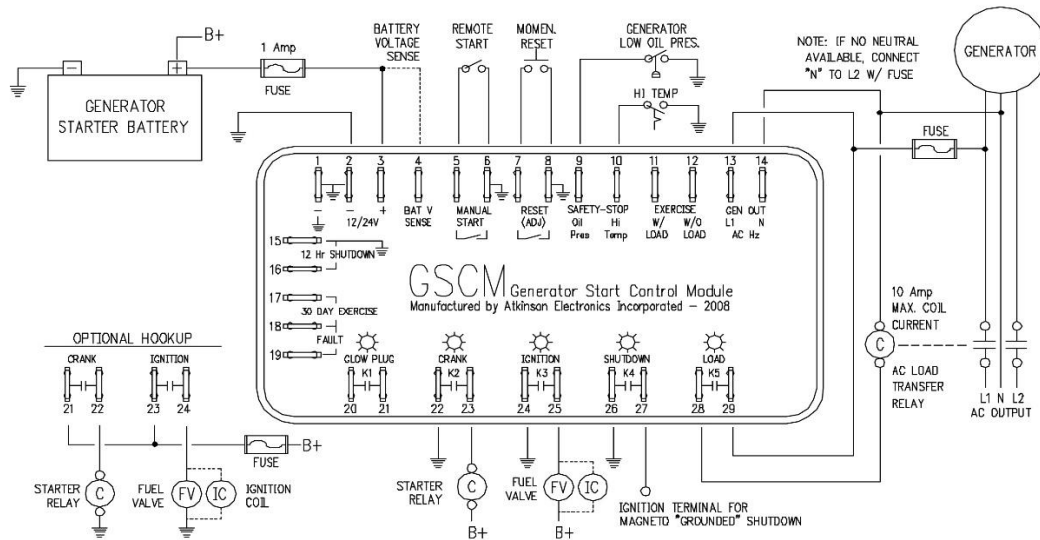


The K3 (ignition) relay provides a continuous run signal for generators requiring a maintained start signal. The K4 (shutdown) relay provides a momentary stop signal until the generator AC Hz has dropped to zero.

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 opening all relays. The other switch pole (N.O.) shorts out the magneto for an instant stop.

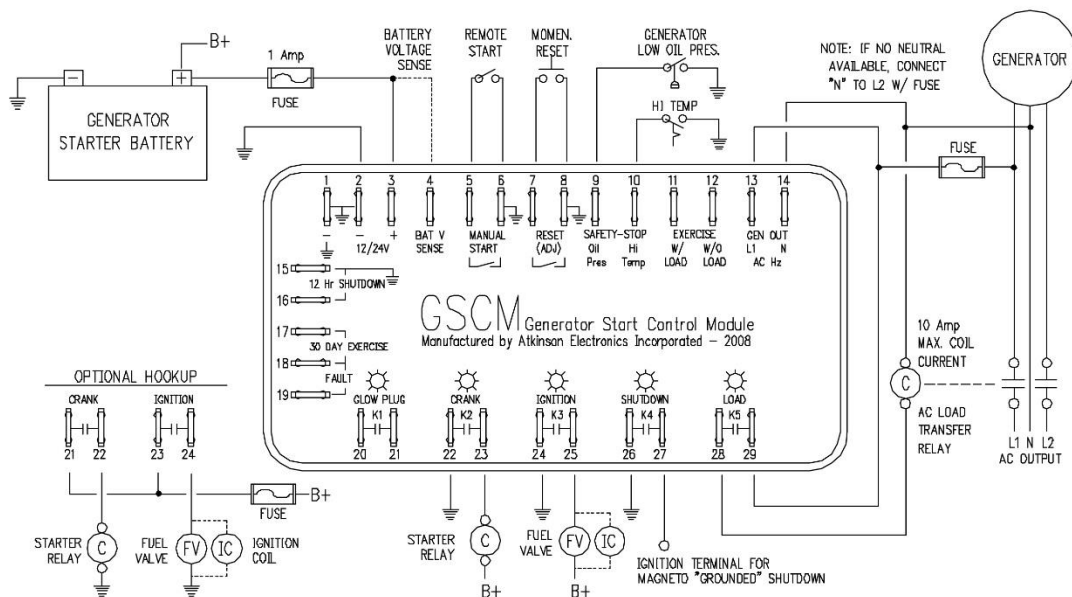


Electric Start High Speed Gas/ Propane Generator without Starter Control Box



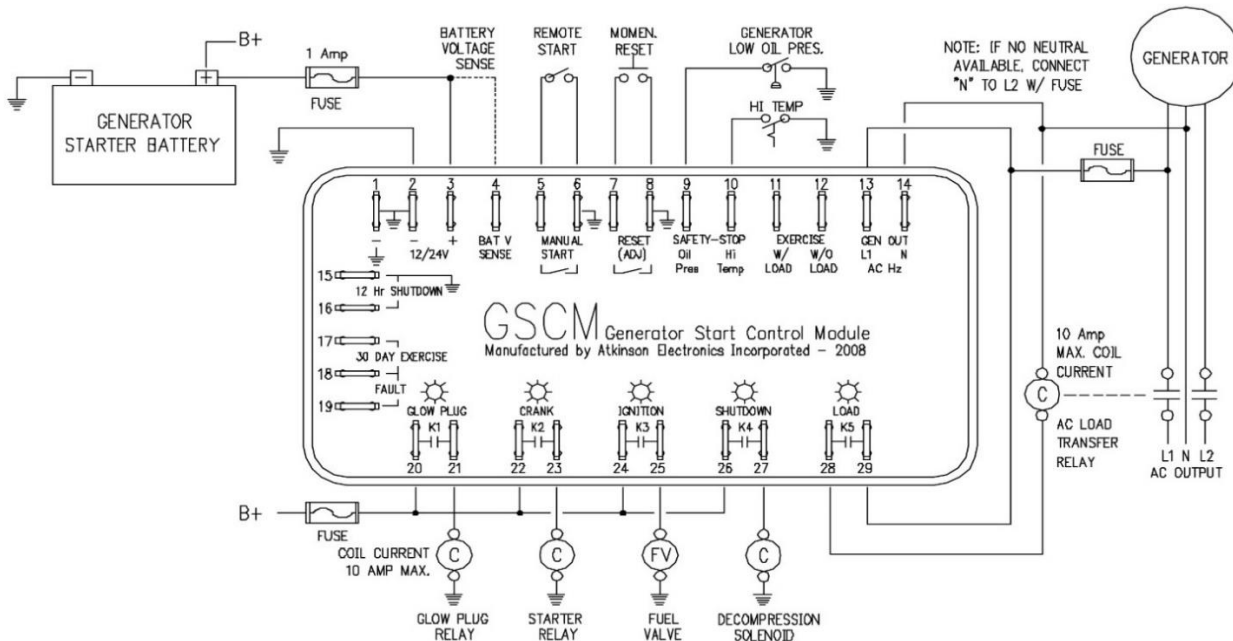
This application matches high speed generators that do not include starter control boxes. Propane generators may be the type that ground the ignition to shut down or have an automotive type coil ignition. The wiring configurations are shown for both automotive and magneto type with or without fuel valves. High speed (3600 RPM) generators may need the crank disconnect hertz adjustment set to 20Hz or less to avoid over driving the starter.

Low Speed Gas/ Propane Generator with Safeties



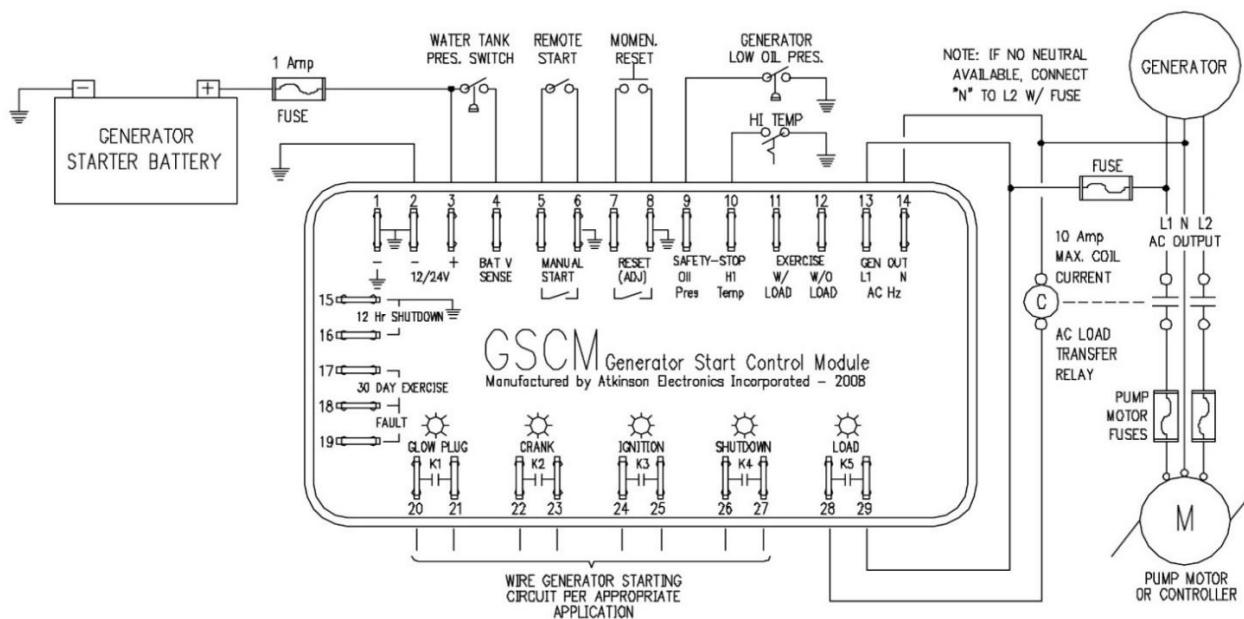
The low speed gas/ propane generators also wire the same as in application 2. However, the installer should determine ignition type and oil and high temperature safety shutdown wiring. The GSCM is looking for oil and high temperature safety switches that short to ground on a low oil pressure or high temperature condition.





The diesel generator is started by the GSCM in either automatic or manual mode. A field installed relay that will handle the glow plug current is needed if not already installed on the engine. A fuel control solenoid is connected to the K3 (ignition) relay terminals. decompression solenoid furnished with the generator must be wired to K4 (shutdown) relay to energize on shutdown.

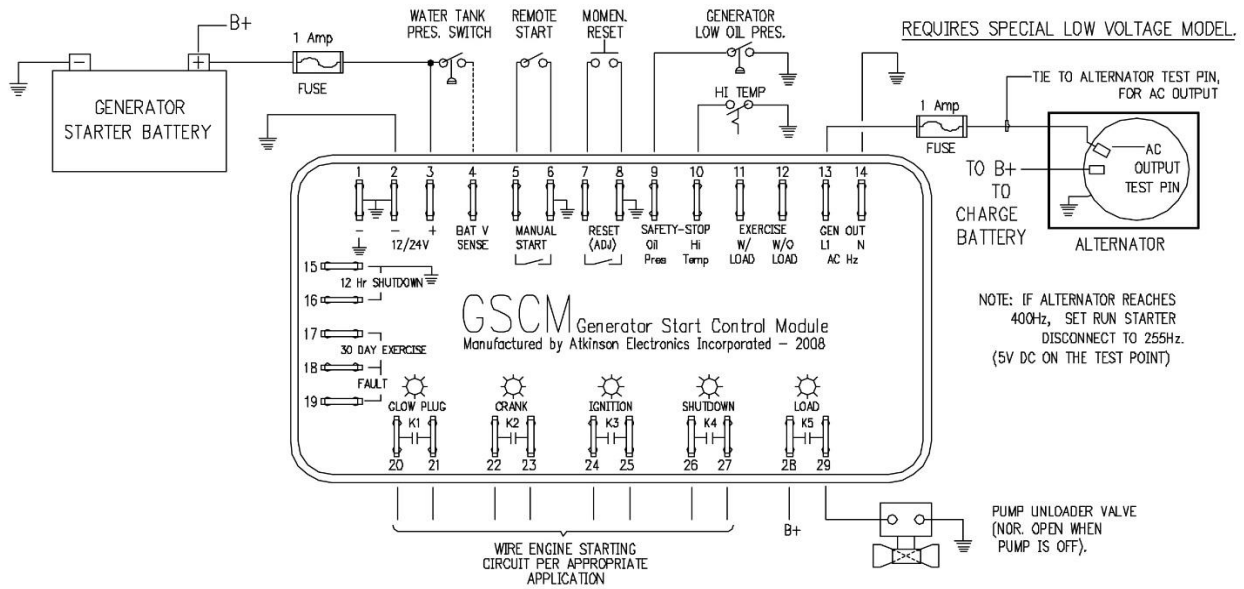
Automatic Generator Powered AC Pump



In this application the GSCM is connected to a pressure or level switch into the battery sense terminals. To make the appropriate cut-in and cut-out adjustments. See *AUTOMATIC STARTING FOR BATTERY CHARGING* section: 9. The cut-in and cut-out adjustments must be set at the maximum for the switched input auto start mode to operate. See *AUTOMATIC STARTING FOR BATTERY CHARGING* section: 9 & 4:9. The K5 (load) relay energizes the pump contactor.

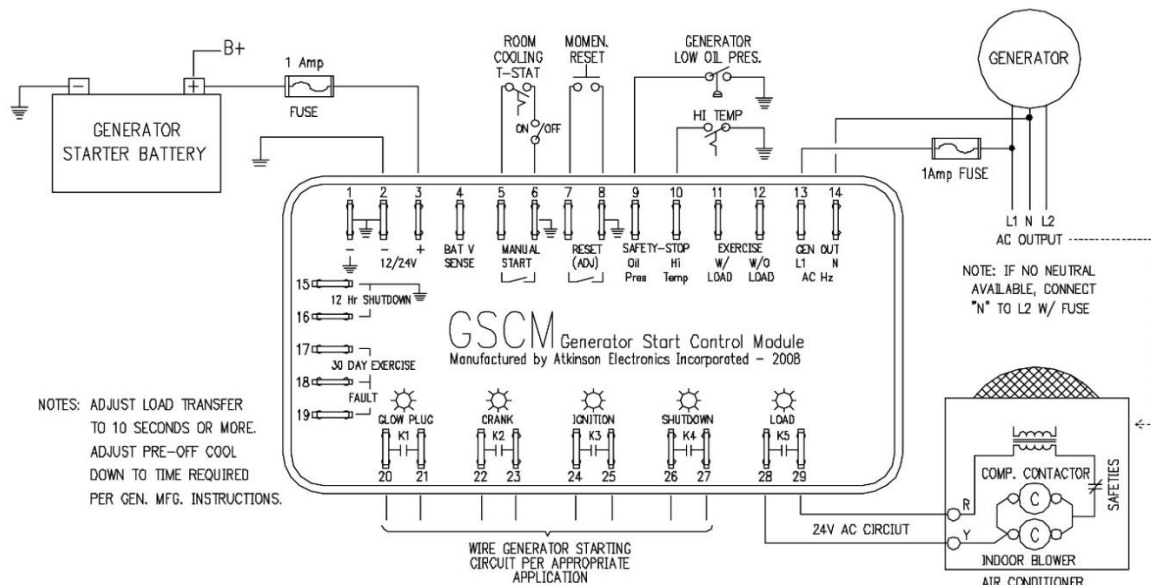


Fuel Powered Pump



A pressure or level switch starts a direct engine driven pump similar to application 5. The K5 (load transfer) relay is used to energize the pump unloader valve closing when the engine is running. The unloader valve bleeds off the pump pressure when de-energized. The standard GSCM “out of the box” looks for a minimum 100V AC frequency input signal. Order a special low voltage generator frequency input version for 12V alternator applications. GSCM, 12V ALT 255 Hz. See *AUTOMATIC STARTING FOR BATTERY CHARGING* section: 9 & 4:9.

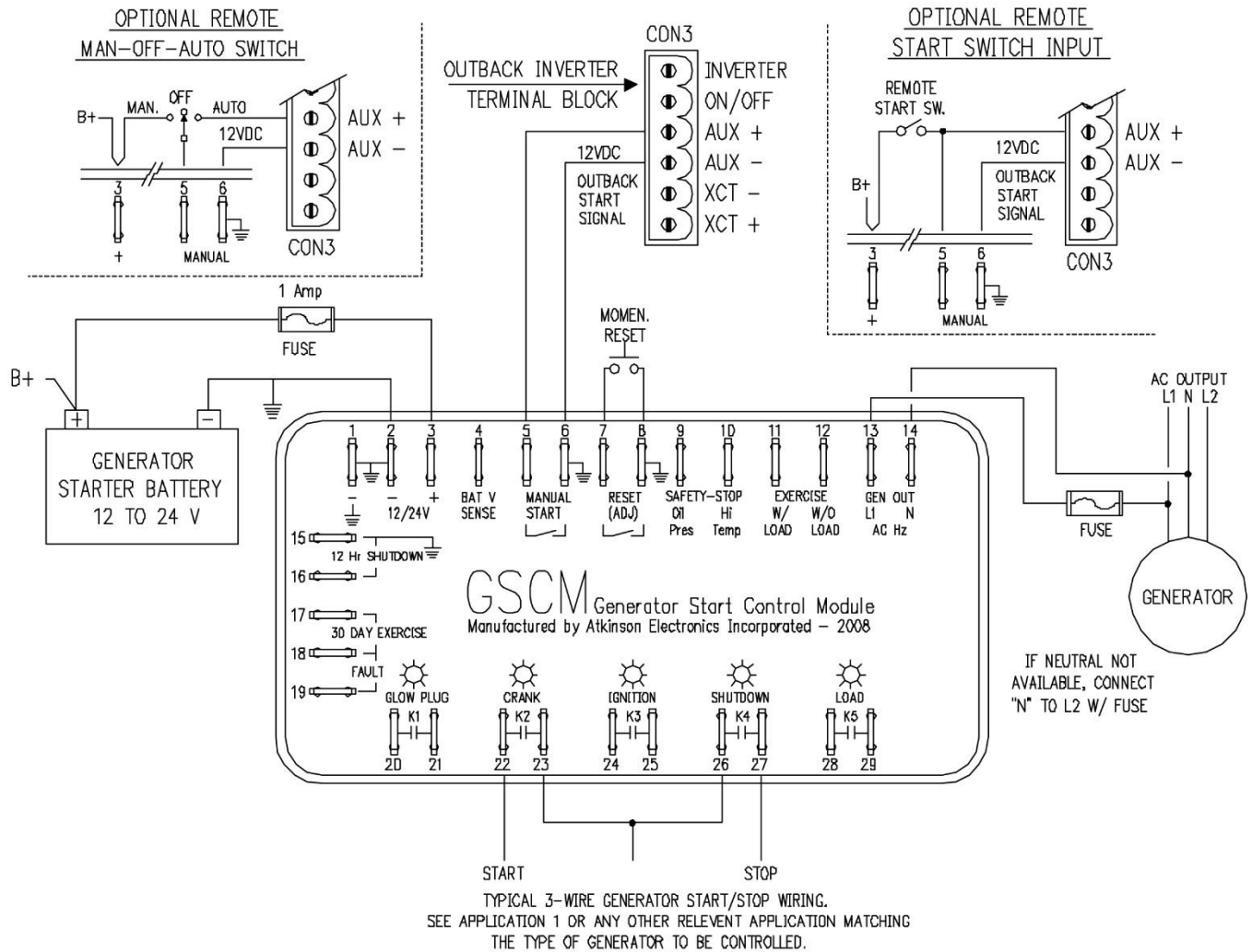
Generator Powered Air Conditioner



The room thermostat (should be line voltage slow action type to minimize short cycling) signals the generator to start. The GSCM K5 (load transfer) relay starts the air conditioner after the generator is running. When the thermostat is satisfied, it opens the start signal to the GSCM. The air conditioner is instantly turned off by the K5 (load transfer) relay, however, the generator continues to run during the cool down cycle for the period of time selected.



Outback Inverter Auto Generator Start Using GSCM



The GSCM accepts either as dry contact closer between terminal 5 and 6, or a 12VDC signal from an Outback Inverter's auxiliary output without requiring a separate 12VDC relay as shown in the Outback Auto Generator Start application. GSCMs with a date code before May 2004 will still require a 12VDC relay to interface with the Outback Inverter. A remote generator start switch or manual off auto switch may still be connected to the GSCM along with the Outback Inverter, but it needs to be connected to the GSCM power terminal as shown in the optional remote switch diagram. When not connected to the Outback Inverter, the remote start switch may be wired as in application 1 of the GSCM instructions booklet.

When the start signal is received from the Outback Inverter, the GSCM starts the generator with a 3-wire start/ stop or any other generator starting application to match the type of generator to be controlled. If the user desires, the voltage from the generator's battery may be connected to the GSCM on terminal 4 and the GSCM will start the generator automatically to charge its own battery when the voltage falls below the battery cut-in threshold voltage.

The Outback Inverter monitors the battery bank, and provides a start signal when the inverter battery bank needs to be charged. While charging the inverter passes the AC power from the generator to the inverter's loads. If loads become unbalanced or exceed the rating of generators output harmonics can occur on the generators AC output causing the GSCM to see an over Hz condition. If this occurs, it is recommended that an EMI filter be placed in the AC feedback line (GSCM terminals 13 & 14) from the generator (Qualtek Electronics #851-02/ 001). A second option is to disable the over/ under Hz shutdown monitoring and allow the Outback Inverter to monitor the AC for over/ under Hz. Condition and shutdown the generator in those conditions.



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3. An appropriate charge (25% of product list price) may be made for testing, repairs, replacement and shipping for a returned product which is not defective or found to be defective as the result of improper use, maintenance or neglect.
4. Atkinson Electronics, Inc. will not accept responsibility for any invoiced goods or services that are not covered by an Atkinson Electronics, Inc. written purchase order. Under no circumstances does Atkinson Electronics, Inc. agree to pay for labor or other related expenses associated with the troubleshooting and/ or repair of our product without prior specific written authorization.
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