GENSET CONTROL MODULE—LEVEL 2

C122C

Features:

- 5-alarm light outputs with lamp-test and alarm silence provisions.
- 2 pre-alarm inputs.
- User selectable starting modes: full cycle-cranking, or single-cycle crank limiter.
- User adjustable time delays for engine start and engine stop (cool down).
- Loss of speed signal protection for crank motor circuit.
- Special logic to re-establish cranking following a false start.
- Special logic permits restarting of hot engine.
- Additional relay contact to control speed governor.

General Description:

The Genset Control Module is a microprocessor based control system which provides complete automatic control of standby generator set engines. Fuel solenoid and/or ignition control, cranking control, governor control and audible alarm control are via heavy duty industrial type relay contacts. Engine temperature and oil pressure monitoring are obtained from engine mounted sensor contacts. Adjustable overspeed shutdown and crank termination control are provided internally via a frequency monitoring input terminal. This input signal may be obtained from any frequency source related to engine speed: distributor ignition pulses, magnetic pick-up, A.C. tachometer generator, alternator tachometer terminal, etc. One spare input and one spare output are available for special customer program requirements. Unless otherwise specified, this spare is shipped programmed as a 5th shutdown and alarm light output.

C122C Specifications

Input Voltage: Model C122C: 12VDC nominal, 16VDC max; transient and reverse polarity protected. (Typical: Pickup at 10VDC, Dropout at 6VDC.)

Supply Current: 0.4A maximum plus alarm light burden.

Relay Load Contacts: FS, AR, & GR: 10A at 32VDC, resistive, (or 277VAC.)
CS: 20A at 32VDC, (cranking motor solenoid.)

Alarm Light Load: 150mA maximum each output (incandescent inrush is permitted.)

Shutdown Contact Inputs: 3 (See operating instructions for start-up override times.)

Approach Contact Inputs: 2 (See operating instructions for start-up override times.)

Frequency Input: 80V RMS max. (See note 1.)
Overspeed trip point is adjustable from;
C122C: 250 to 800Hz. (Ignition / Alternator Pick-up)
C122C1: 2380 to 6800Hz. (Magnetic Pick-up)

Crank Disconnect Frequency: Internally fixed at 30% of the overspeed setting.

Crank Control: Single-cycle crank limiter: continuous 48 sec. crank period (non-adjustable.)
Cycle-cranking: 5 cycles of 12 sec. crank and 12 sec. rest (non-adjustable.)

Time Delays: Delay on start from remote signal: 0-36 seconds (adjustable.)
Delay on shutdown from remote signal: 0-12 minutes (adjustable.)

Shielding: Internal EMI shielding provided.

Ambient Temperature: -25° F to +140° F

Finish: PC Board: Protected with moisture/fungus proof varnish.
Chassis: Zinc plated / yellow dichromate.

Terminal Blocks: Industrial screw terminal barrier blocks.

Bouchette Electronics, Inc.
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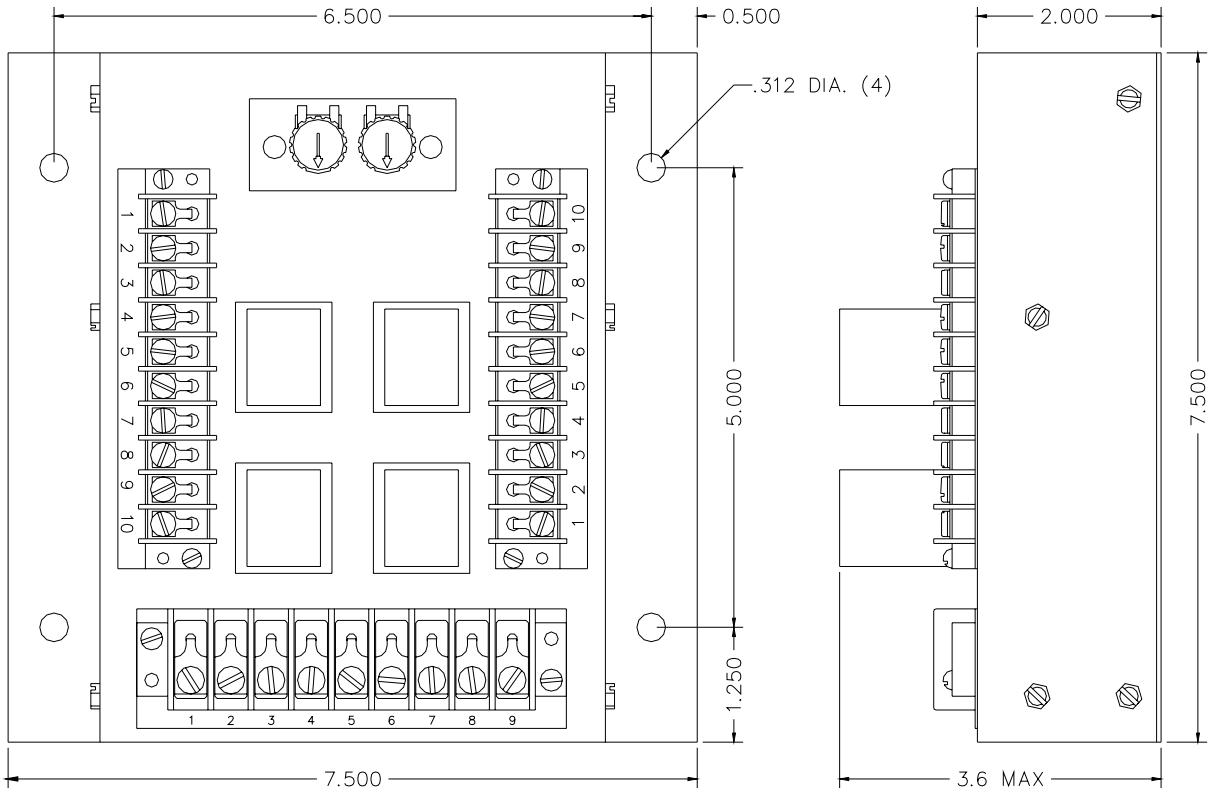
(715) 823-7770 (715) 823-7771 Fax *www.bouchette.com*

C122C Dimensions



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GENSET CONTROL MODULE — LEVEL 2
C122C

Control Switch Inputs

The following operator panel controls are wired into the microprocessor through the front-mounted terminal blocks:

1. Run/Stop/Auto Switch

a. "Run" position causes the engine to start and run immediately.

b. "Auto" position allows the unit to be controlled via any remote single-pole dry-type contact (transfer switch, remote start switch, etc.). Contact closure causes the unit to start and run, while contact opening causes the unit to shut down. *Also see Start/Stop Time Delays for time delay options.*

c. "Stop" position de-energizes the engine control for immediate shutdown.

2. Lamp Test Push-Button

Energizes all alarm lights simultaneously. This feature is disabled with the Run/Stop/Auto selector switch in the "Stop" position, and has no other effect on unit operation.

3. Alarm Silence Push-Button

De-energizes the alarm relay at any time. Any subsequent faults will re-energize the alarm relay.

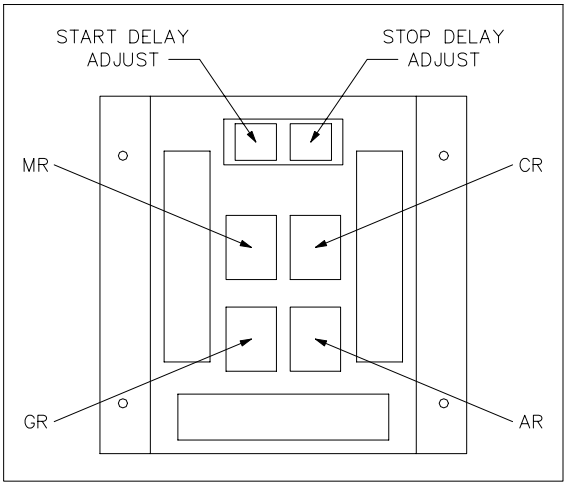


Figure 1 C122C Genset Control Module

Relay Functions

1. Master Control Relay (FS).

Provides contact (20-amp. maximum) for operation of the fuel solenoid, etc.

2. Cranking Control Relay (CS).

Provides contact (10-amp. maximum) for engine cranking functions.

3. Alarm Relay (AR).

Provides contact (10-amp. maximum) for remote alarm indication, bell, etc. The alarm relay is energized for all engine fault conditions.

4. Governor Relay (GR).

Provides contact (10-amp. maximum) for energizing the electronic governor thru a normally closed contact. When this contact opens, the electronic governor operates the engine at "idle" speed. Idle speed occurs during the cool-off period, and by default occurs for the first 12-seconds after engine start-up. The start-up idle can be omitted by cutting the "Governor Idle Jumper" shown in Figure 3. (*Also see section Start/Stop Time Delays.*)

Safety Inputs

1. Low Oil Pressure (LOP) Shutdown.
Monitoring of oil pressure begins 12-seconds after the unit starts and remains in effect until the unit is shut down *(except as noted in section Microprocessor Program Notes.)* Except as noted, closure of this contact while engine is running results in engine fault shutdown and alarm with light indication. The LOP signal is derived from an oil pressure sensor switch mounted on the engine.

2. High Water Temperature (HWT) Shutdown.
The engine coolant temperature sensor monitoring begins immediately with the start signal. However, if the water temperature is excessive prior to start, (i.e., heat soak after shutdown), the unit is permitted to start and the high temperature condition is permitted to exist for up to 90-seconds after the unit is running, before an engine fault shutdown and alarm with light indication occurs. If the high temperature condition is corrected within that time period, the microprocessor circuit reverts to normal monitoring. Except as noted, closure of this contact while engine is running results in engine fault shutdown and alarm with light indication. The HWT signal is derived from a temperature sensor switch mounted on the engine.

3. Spare Shutdown (Optional)
Monitoring of the spare input begins 12-seconds after the unit starts and remains in effect until the until is shut down. Closure of this contact while running results in engine fault shutdown and alarm with light indication. If used, this input is derived from a sensor switch external to the control module.

4. Overspeed (OS) Shutdown / Adjustment.
Overspeed shutdown protection is provided by a frequency sensing network within the control module. The trip point of the frequency network is screwdriver adjustable via a rheostat accessible through the top of the control module as shown. Clockwise rotation increases the trip frequency and thereby, raises the shutdown speed. Exceeding this speed will result in engine fault shutdown and alarm with light indication.

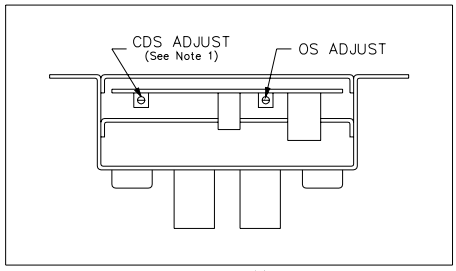


Figure 2 Genset Control Module Adjustments

5. Approach Alarms (Pre-Alarms)
The control module also accepts one additional input for both LOP & HWT. Closure of either of these contacts while engine is running results in alarm with respective light indication, without shutting the unit down. This permits detection of an impending shutdown and is intended to warn that a shutdown may occur. Each alarm light will self-extinguish as its approach fault is corrected. The alarm relay will automatically de-energize if all alarm lights are extinguished. *Also see section Alarm Silence Push-Button.* If used, these inputs are connected to the engine mounted sensor switches similar to those used for the shutdown feature.

Note 1: CDS Adjust (Cranks Disconnect Speed Adjustment)
Early model controls used this separate adjustment for setting the crank disconnect speed. This adjustment worked in the same fashions OS Adjust. New models internally calculate the crank disconnect speed as a percentage of the overspeed. *Also see section Cranking Control: Crank Disconnect.*

Cranking Control

1. Overcrank (OC) Protection.

Two different cranking cycles are programmed into the control modules microprocessor:

a. Single-Cycle Cranking Feature.

This feature provides a single, non-adjustable, crank period of 48-seconds. Failure of the engine to start within that time results in an "overcrank" engine fault shutdown and alarm with light indication.

b. Cycle Cranking Feature.

The control module may be field-converted to the "cycle cranking" feature by cutting the jumper wire located through the access hole nearest the middle of the back of the control as shown. This feature provides a series of five cranking cycles; each containing a 12-second crank period with a 12-second rest period. Failure of the engine to start by the end of the fifth crank period results in an "overcrank" engine fault shutdown and alarm with light indication.

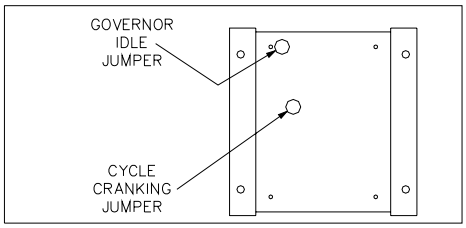


Figure 3. Genset Control Module Backside

2. Cranking Disconnect

The cranking termination speed is obtained from the frequency network within the control module. The microprocessor automatically sets the cranking termination speed at 30% of the selected overspeed trip value.

3. Loss of Frequency Signal

The microprocessor will detect an absence of frequency signal while cranking. After the first 12-seconds of cranking, the "overcrank" light begins a staggered flashing pattern to indicate there is no frequency signal input.

If the cycle cranking feature (*1.b above*) was selected; the microprocessor automatically converts to the single-cycle cranking feature (*1.a above*). This conversion prevents the starter motor from re-engaging during the second crank cycle in the event the engine is already running. *Also see section Microprocessor Program Notes.*

Start/Stop Time Delays

The control module provides screwdriver adjustable time delays for starting and/or stopping the unit. If used, the start delay will delay the start-up of the engine for 0-36 seconds after the Remote Run contact is closed. The stop delay will delay the shutdown of the engine for 0-12 minutes after the Remote Run contact is opened. These timing features can be made active only in the "Auto" switch position, and still permits instantaneous manual starting in the "Run" switch position. Placing the selector switch in the "Stop" position provides instantaneous shutdown of the engine under all conditions. The start delay is intended to prevent unnecessary start-ups from momentary remote run signals, and the stop delay is intended to provide a cool-off running period for the engine after load removal. Each timing function has a red light located on the control module face to indicate when in use. Clockwise rotation increases time delay.

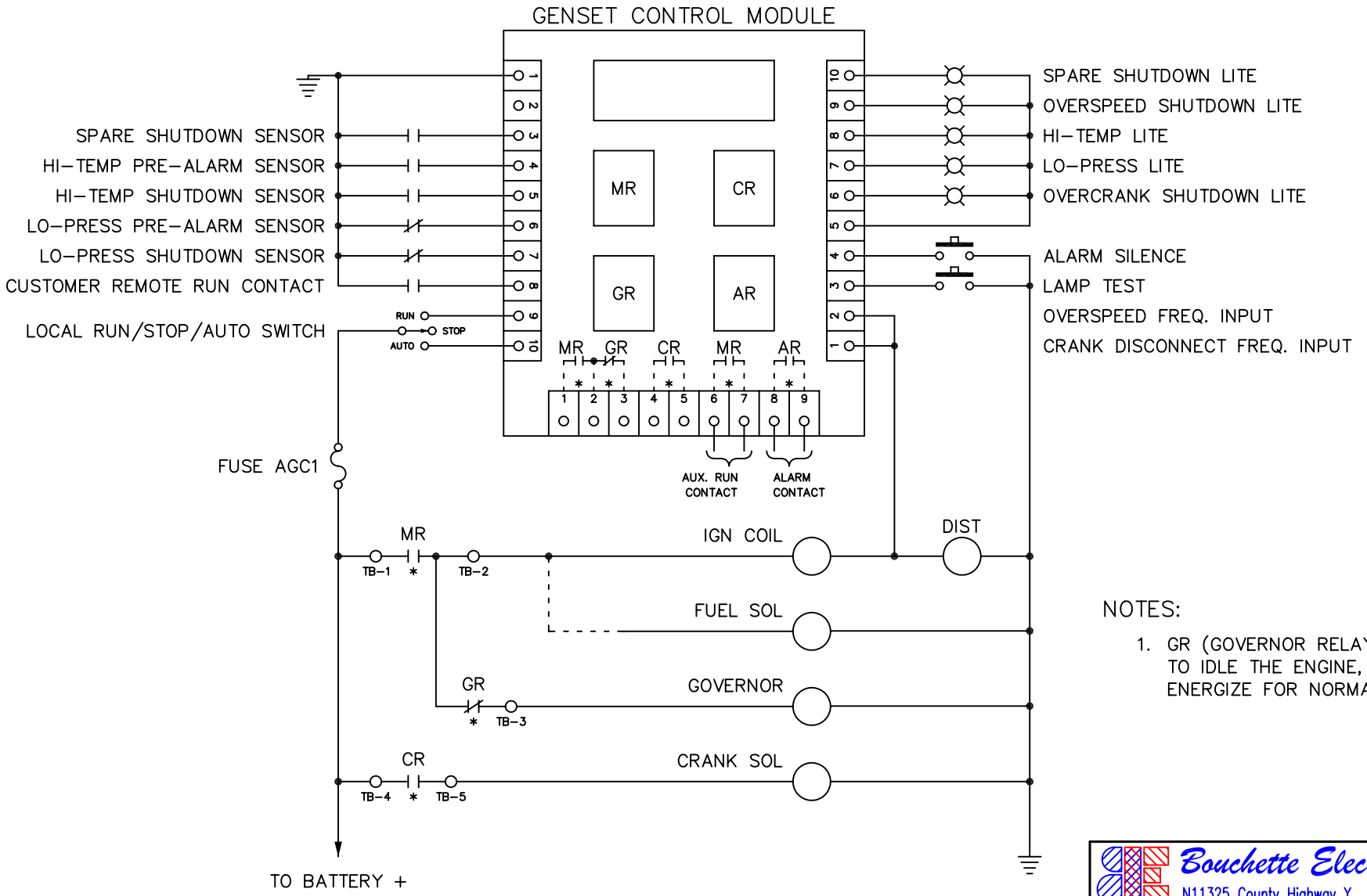
Microprocessor Program Notes

Internal protection against loss of frequency input signal is programmed in after the unit has started normally. In the event the frequency goes to zero (engine runs out of fuel, frequency signal source fails, etc.), the LOP shutdown circuit is bypassed and a 12-second wait period is initiated. If the frequency returns within this time period, LOP monitoring resumes and operation continues normally. If frequency has not returned at the end of this time period, the engine oil pressure status is observed to determine whether the engine is actually running or stopped. If the engine has stopped, the cranking cycle will begin in an effort to re-start the engine. If the engine has not stopped (loss of input signal, etc.), the unit will display an "overcrank" indication and alarm, and will continue to run **WITHOUT OVERSPEED PROTECTION** until stopped in a normal manner. Re-starting at a later time is prevented until the overcrank indication has been reset.

Warning: "Overcrank" indication can mean a loss of frequency input signal during the previous run period. Attempting to restart the engine without any frequency input signal can destroy the starter motor, which can cause serious personal injury. The frequency signal source is a key component in this system and must be checked out thoroughly whenever an "overcrank" shutdown occurs.

Resetting A Fault Shutdown

A shutdown with alarm, due to any fault condition, will prevent any subsequent operation of the generator set. The Run/Stop/Auto selector switch on the operator control panel must be momentarily placed in the "Stop" position to reset these functions.



NOTES:

1. GR (GOVERNOR RELAY) IS ENERGIZED TO IDLE THE ENGINE, AND DE–ENERGIZE FOR NORMAL ENGINE SPEED.

* RELAYS AR, GR, MR, & CR ARE INSIDE THE GENSET CONTROL.

FREQUENCY SENSING FROM DISTRIBUTOR LOW VOLTAGE TERMINAL

Bouchette Electronics, Inc.
N11325 County Highway Y Clintonville, WI 54929

TITLE			
CONNECTION DIAGRAM C122C CONTROL			
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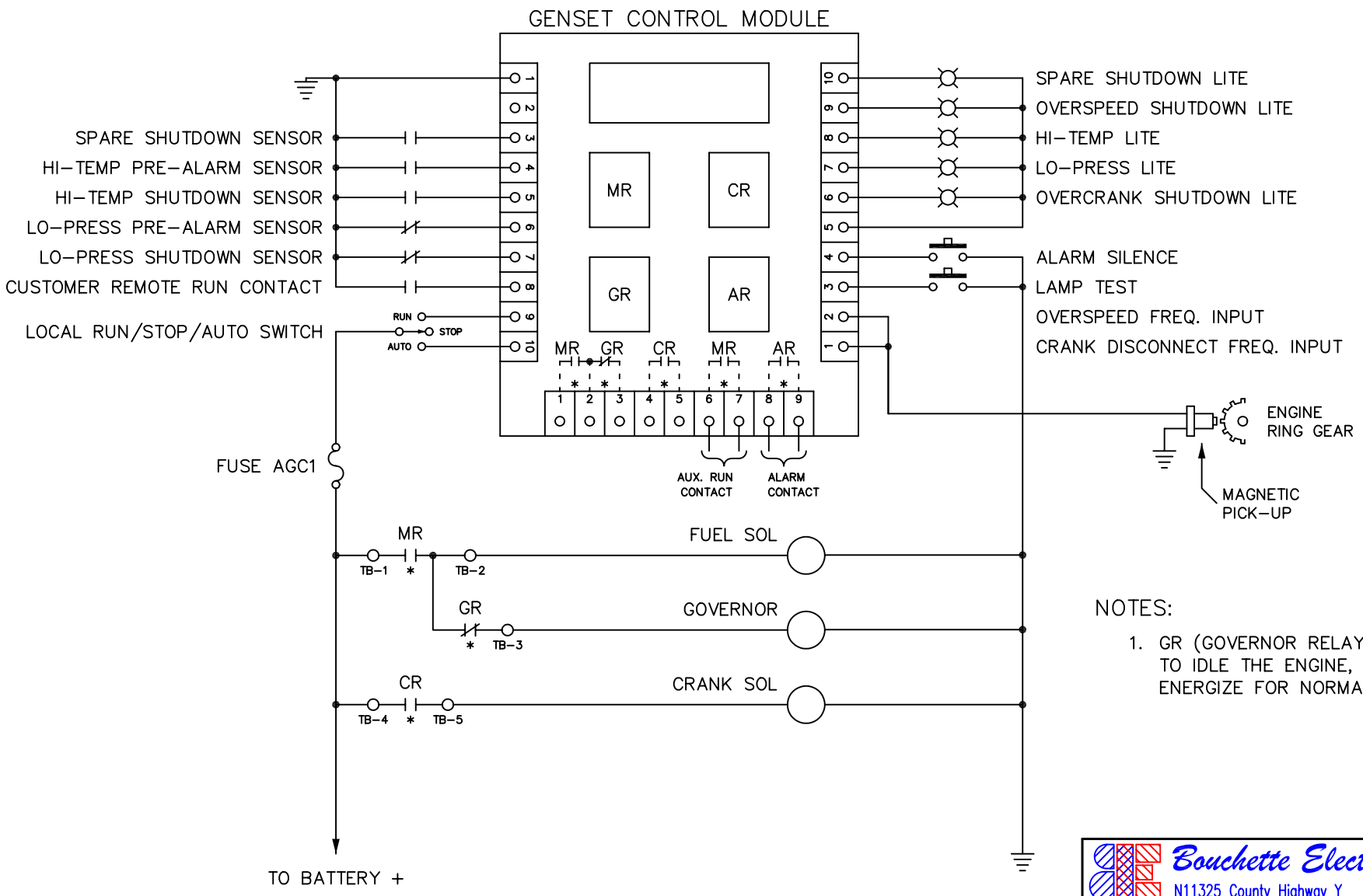
01/04/90	DSB	TJB	NONE
P/N	CAD REF	DWG NO	
		E126–3	



NOTES:

1. GR (GOVERNOR RELAY) IS ENERGIZED TO IDLE THE ENGINE, AND DE-ENERGIZE FOR NORMAL ENGINE SPEED.

* RELAYS AR, GR, MR, & CR ARE INSIDE THE GENSET CONTROL.

FREQUENCY SENSING FROM MAGNETIC PICK-UP

Bouchette Electronics, Inc.
N11325 County Highway Y Clintonville, WI 54929

TITLE			
CONNECTION DIAGRAM C122C2/C122C1 CONTROL			
DATE	DWN BY	CHK	SCALE
01/04/90	DSB	TJB	NONE
P/N	CAD REF	DWG NO	
		E126-2	