

TITLE DC CONTROL DRAWING

## GENERATION 1, 2, & 3 AUTO START



### INTRODUCTION:

The GENERATION 1, 2, & 3 AUTO START series is one of the smallest and most cost-effective Automatic Engine Controls in today's market. This design assures long life flexibility and many powerful features.

The GENERATION 1, 2, & 3 AUTO START automatically cranks, starts and monitors an engine for Overcrank, Overspeed, High Water Temperature, and Low Oil Pressure. The GENERATION 1, 2, & 3 AUTO START expands to as many faults as required by using the Engine Alarm Input/Output.

Any crank timing sequence is accomplished by using the multiple or single crank modes in conjunction with the timer adjustments.

The low oil pressure timer/logic assures Low Oil Pressure Override during the crank period and an additional period after crank termination to achieve oil pressure before shutdown actually occurs. In addition, the low oil pressure timer acts as a bubble timer such that temporary disruptions in oil pressure will not cause false shutdown.

It should be noted that the Low Oil Pressure Timer interval does not begin until the engine has achieved Crank Disconnection speed.

### INTRODUCTION TO GENERATION 1, 2, & 3 AUTO START:

The GENERATION 1, 2, & 3 AUTO START is a solid-state module with three main features. These are:

- 1) The GENERATION 1, 2, & 3 AUTO START performs cranking of the engine. This cranking could either be composed of a single crank or many crank-rest-crank cycles. The duration of the crank cycle is totally adjustable by the user.
- 2) The GENERATION 1, 2, & 3 AUTO START uses a magnetic pickup to monitor engine speed for crank disconnect and overspeed.

3) The GENERATION 1, 2, & 3 AUTO START continuously monitors its inputs until a fault is detected. This fault could either be one of four interval faults (Low Oil Pressure, High Water Temperature, Overcrank, or Overspeed) or an external fault. Anyone of these will cause the module to shutdown the engine and ignore any further input. These faults will be annunciated by connecting external lamps to the output.

## STANDBY CONDITION

In the Standby mode the Engine Control Switch is in the Auto position as the module monitors the Remote Start Contacts. All that is required for cranking to begin is the closure of the Remote Start Contacts shown connected across terminals 13 and 14.

## ENGINE CRANK CYCLE

When the Engine Control Switch is in the Auto position and the Remote Start Contacts are closed, the module will begin in the Crank mode. In this mode the Fuel Relay and Starter Relay connected to terminals 15 and 6, respectively, are energized. This action turns the engine over for cranking.

The Crank mode will continue for the duration of the settings of the Crank Cycle Adjust and the Dip Switch, unless Overcrank occurs first.

During the Engine Crank Cycle the Low Oil Pressure Switch is ignored.

## ENGINE REST CYCLE

This Rest mode is a pause in the cranking sequence and only applies if Dip Switch 4 is on the module is in the Off position. As you can see the primary difference between the Engine Crank Cycle and the Engine Rest Cycle is the fact that the Starter Relay has been turned off by the module.

The Engine Rest mode will continue for the duration determined by the setting of the Crank Cycle Adjust on the module, unless Overcrank occurs first.

The Low Oil Pressure Switch is ignored during the Engine Rest Cycle.

## CRANK DISCONNECT

Once the engine reaches a speed determined by the Crank Disconnect Adjustment on the module, crank disconnect will occur.

Engine speed information is sent to the module by way of the Magnetic Pick-Up. Once engine speed is sufficient for crank disconnect to occur, the Starter Relay at terminal 6 will be denergized. This will latch the Engine Started condition, which means the starter will not re-engage until the module is reset, even if the engine rpm drops below the crank disconnect point.

Also a signal appears at terminal 8 that will if connected, illuminate the Engine Started indicator.

The GENERATION 1, 2, & 3 AUTO START will have the Engine Started LED illuminated when Crank Disconnect occurs.

## OVERCRANK FAULT

If the engine does not start in the allotted time, as determined by the Crank Cycle Adjust and the Dip Switch on the module, an Overcrank Fault occurs.

In this fault signals at terminal 6 and 15 denergize the Starter and Fuel relays. Also, signals are sent to terminals 7 and 10 which, if connected, causes the external annunciation of Engine Alarm and Overcrank.

The Overcrank LED will be illuminated for the GENERATION 1, 2, & 3 AUTO START modules.

The Overcrank condition will remain until the Engine Control switch is placed in the Off position.

The Low Oil Pressure and High Water Temperature switches are ignored in the Overcrank Condition.

## OVERSPEED FAULT

If during engine operation, a dangerous increase in speed occurs, the engine will shut down under an Overspeed Fault condition.

The Magnetic Pick-Up transmits engine speed information to the module. In the event an Overspeed Condition occurs, the engine will shut down and the following will occur:

(1) The Fuel Relay connected to terminal 15 will be denergized.

(2) Signals are sent to terminals 7, 8, and 9, which, if connected, causes the external indicators Overspeed and Engine Alarm to be activated while turning off the Engine Started indicator.

Also, the GENERATION 1, 2, & 3 AUTO START will have the appropriate signals in (2) sent to the corresponding LEDS.

The Overspeed Fault must be cleared by placing the Engine Control Switch in the Off position.

The Low Oil Pressure and High Water Temperature faults are ignored during the Overspeed condition.

## HIGHWATER TEMPERATURE FAULT

After the engine has started, the jacket water can approach a High Water Temperature condition requiring the engine to shut down.

In the High Water Temperature Fault mode the High Water Temperature Switch closes and applied voltage to terminal 5 which causes the following to occur:

- (1) The Fuel Relay connected to terminal 15 is deactivated.
- (2) Signals are sent to terminals 7, 8, and 11, which, if connected, causes the external annunciation of Engine Alarm and High Water Temperature while turning off the Engine Started indicator.

The GENERATION 1, 2, & 3 AUTO START is the appropriate signals in (2) are sent to the corresponding LEDs.

The High Water Temperature Fault condition must be reset by cooling of the jacket water temperature and placing the Engine Control Switch in the Off position.

#### LOW OIL PRESSURE FAULT

After the Engine has started, the Low Oil Pressure Timer is armed. In the event the Low Oil Pressure Switch closes, a voltage is applied to terminal 4 which is the input to the Low Oil Pressure Timer. If the voltage is applied for a time period longer than the setting of the Low Oil Pressure Timer Adjustment on the module, the Engine is shut down in the following way:

- (1) A signal is sent to terminal 15 which deactivates the Fuel Relay.
- (2) Signals are sent to terminals 7, 8 and 12, which, if connected, causes the external indicators Engine Alarm and Low Oil Pressure to illuminate while turning off the Engine Started Indicator.

Also, for the GENERATION 1, 2, & 3 AUTO START the appropriate signals in (2) are sent to the corresponding LEDS.

The Engine Control Switch must be placed in the Off position to reset this fault.

## NORMAL SHUTDOWN

### NORMAL SHUTDOWN FROM AUTOMATIC MODE

If the requirement for power is not needed any more while in the automatic mode, the Remote Start Contacts would open thus breaking all voltage to the system. The engine would shutdown since all the relays would be deactivated. The system is now once again in the ready state and no manual reset is required.

### NORMAL SHUTDOWN FROM LOCAL OR AUTOMATIC

If the Engine Control Switch is in the manual or auto mode, the engine may be shutdown from the engine control panel by placing the Engine Control Switch in the Off position. This action breaks all voltage to the system. Notice the above action would override the Remote Start Contacts.

## ADJUSTMENTS

### GENERAL

- (1) Crank cycle time is increased by turning cycle adjust clockwise.
- (2) Turn overspeed clockwise to increase trip speed to a higher rpm.
- (3) Turn crank disconnect clockwise to increase trip speed to a higher rpm.
- (4) Oil pressure time is increased by turning adjustment clockwise.

(5) The four adjustments pots are 25 turn and can not be damaged by turning too many times.

## SINGLE CRANK MODE

There are two ways to achieve single crank. The first way is to set SW4 of the dip switch to the “on” position. Now the combination of the Crank Cycle Timer and SW1, SW2, SW3 of the dip switch will determine the duration of the single crank. For example, to achieve a single crank of 30 seconds, one could place the three switches (SW1-SW3) in a setting to give 2 cycles and adjust the Crank Cycle Timer for 10 seconds.

Another way to achieve single crank is to place SW4, along with SW1, SW2, and SW3, in the “off” position. The duration of this single crank will only be between 4 and 25 seconds, depending on the setting of the Crank Cycle Timer.

## MULTIPLE CRANK MODE

For a multiple crank mode, SW4 of the dip switch must be in the “off” position. To choose the number of crank-rest cycles, use the Dip Switch Chart on the next page to determine the appropriate settings for the first three switches. Next using the Crank Cycle Adjust, choose the crank period. Note, the rest period automatically is set for the same durations as the crank period. For example, suppose you wanted the unit to perform an 8 cycle multiple crank with a crank and rest period of 15 seconds each. This could be obtained by setting SW1, SW2, and SW3 to the “on” position and adjusting the crank cycle to 15 seconds.



## SPECIFICATION

Input Voltage Range:

12 Volt Unit – 9 to 15 Volts

24 Volt Unit – 50,000 Volts

Life Expectancy:

50,000 cycles

Operating Temperature Range:

-40C to +85C

Overspeed Trip:

Adjustable

Vibration Tolerance:

10 G's

Crank Disconnect Trips:

Adjustable

Magnetic Pick-up:

2 to 15 Volts

Lamp Output Signal Protection:

Automatic electronic protection

Speed Input Range:

High 1000 to 8500 hertz

Crank Rest Crank Timer:

Adjustable from 4 seconds to  
25 seconds

Signal Output Range:

300 milliamps maximum  
output loaded

Cranking Attempts:

1 to 8 switch selectable

Maximum Signal:

Starter Relay and Fuel Relay -  
5 amps

Crank Mode:

Single or multiple, switch  
selectable

Reverse Power Protection:

Yes

Oil Pressure Timer:

Adjustable from 1 second to  
25 seconds; only operates after  
crank disconnect occurs.

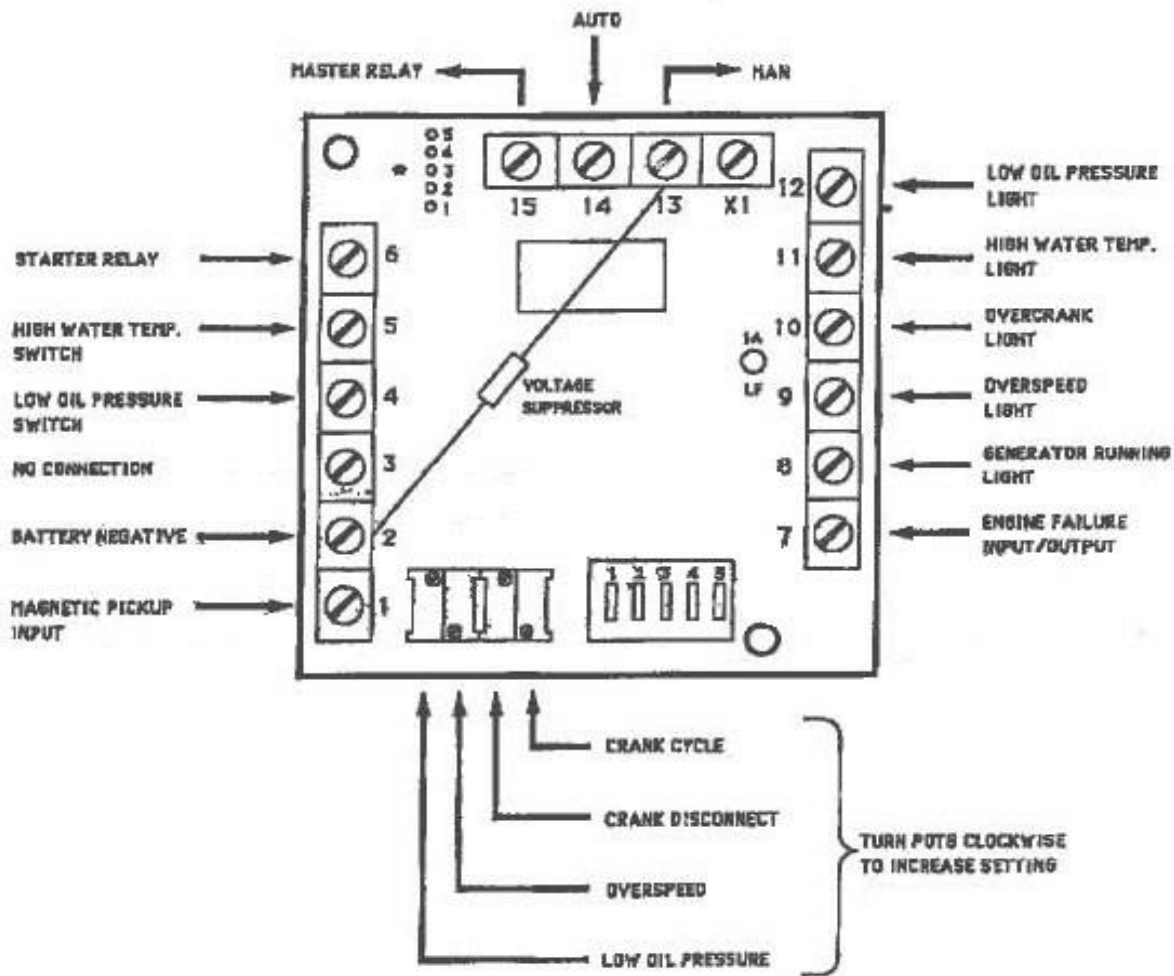
Engine Alarm:

Input-Output

**12 VOLTS SYSTEM:**  
 JUMP 4 TO 5  
 IF POSITIVE INPUT, JUMP 1 TO 2,  
 IF NEGATIVE INPUT, JUMP 2 TO 3.

\*\* FOR DIP SWITCHES POSITION  
 SEE CHART IN INSTRUCTION  
 MANUAL

**24 VOLTS SYSTEM:**  
 IF POSITIVE INPUT, JUMP 1 TO 2  
 IF NEGATIVE INPUT, JUMP 2 TO 3



DMT PN- 4900059



2404 E. HWY 184  
 MAURANDIA, MO  
 63106 USA  
 616-549-0814

REVISIONS	DESCRIPTION	BY
CHG	DATE	

TITLE	CONTROL MODULE		
TERMINAL IDENTIFICATION			
SCALE	DWN BY JP	DATE	6-7-93
SHEET OF	DWG NO.		

This is a common engine alarm output. In the event any of the four faults occur, terminal 7 will go to battery positive indicating an engine failure. If voltage is applied to terminal 7 externally, the GENERATION 1, 2, & 3 AUTO START will go into shutdown mode. This action inhibits all the internal signals, such as Low Oil Pressure and High Water Temperature.

Timed Valves:

Oil Pressure Timer set at 6 seconds

Oil Pressure shutdown set at 12 PSI.

High Water Temperature shutdown set at 215F.

SW1	SW2	SW3	CYCLE
OFF	OFF	OFF	1
OFF	ON	OFF	2
ON	OFF	OFF	3
ON	ON	OFF	4
OFF	OFF	ON	5
OFF	ON	ON	6
ON	OFF	ON	7
ON	ON	ON	8

SW4 ON = SINGLE CYCLE

SW4 OFF = MULTIPLE CYCLES

Dip Switch Settings for Cycle Crank



N2494 HWY. 184  
WAUKESHA, WISCONSIN 53186 U.S.A.