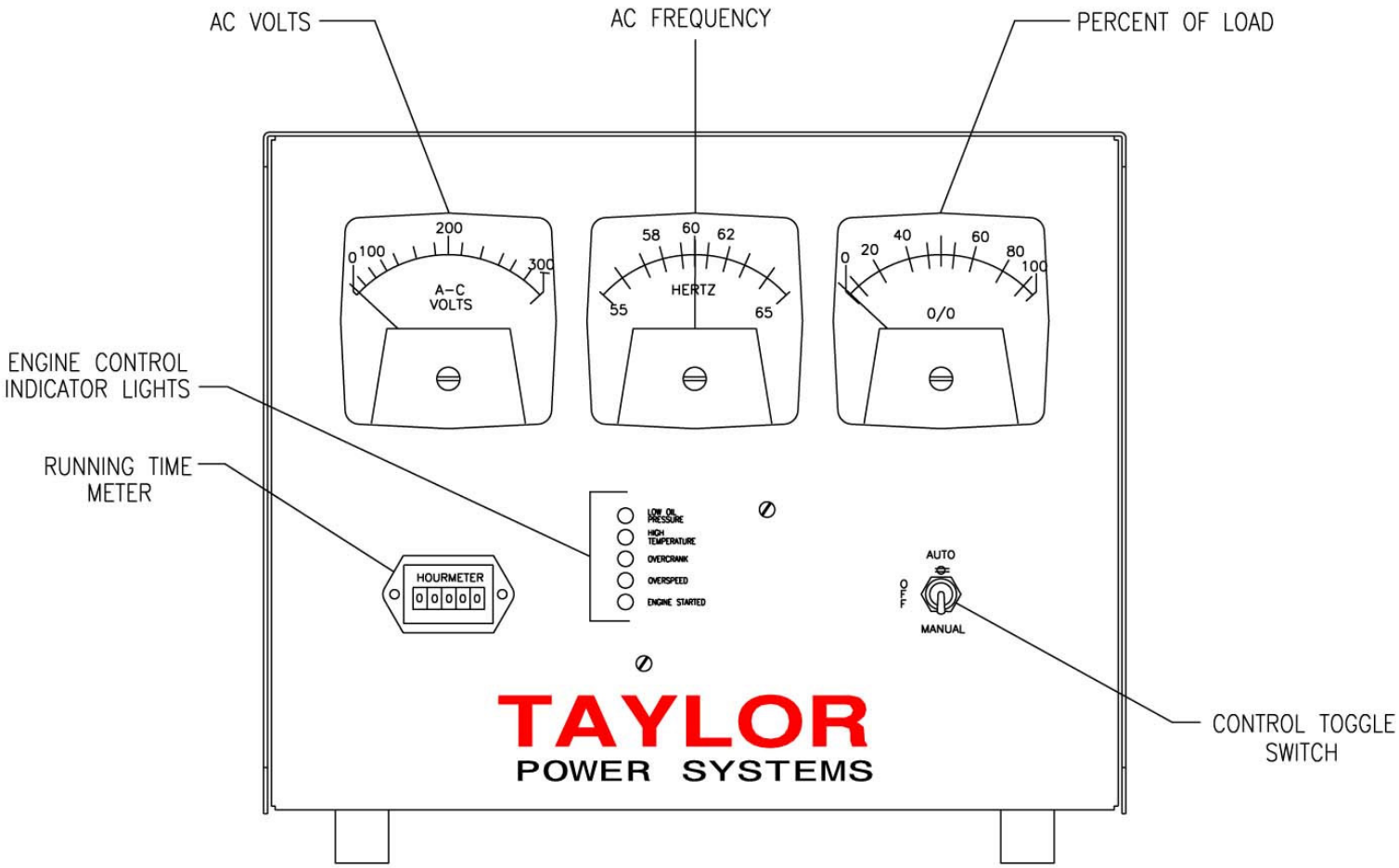
TAYLOR
POWER SYSTEMS

ANALOG CONTROL PANEL
OPERATORS MANUAL



1. **AC VOLTS**: Displays generator output in voltage.
2. **AC FREQUENCY**: Displays the speed of the generator set in Hertz.
3. **Percent of Load**: Displays percentage of load on the generator.
4. **Control Toggle Switch**: Switches generator from off to manual position or auto position.
5. **Running Time Meter**: Displays the number of hours the generator set has run.
6. **Engine Control Indicator Lights**: Indicates specific shutdowns of the generator set.

AUTOMATIC ENGINE CONTROL FOR DIESEL/GAS ENGINES (CAN BUS)

The ECU®-CAN engine control provides complete automation and safety monitoring of a gas or diesel engine. The ECU®-CAN controls the starter and fuel thus completely taking the operator out of the picture. A built in speed switch controls both starter disengagement and overspeed protection. Speed and shutdown information are derived from the CAN BUS SPEED.

ECU®-CAN

ONE VERSION FOR 12 AND 24 VDC

APPLICATIONS: Generator Control Panels, Automatic Engine Systems

FEATURES:

- Loss of Speed Data or CAN Signal detection during both cranking and running
- Overspeed verify without engine damage
- Built in speed switch using CAN data
- HWT and LOP faults via CAN bus
- Low oil pressure and high water temp override during cranking
- Wide temperature range -40C to +85C
- Epoxy encapsulated module for excellent field reliability
- LEDS with auto/manual lamp test
- All preset at factory no field adjustments

ECU®-CAN A COMPLETE AUTOMATIC ENGINE CONTROL

The ECU-CAN covers just about all the essential engine control functions that are asked for in most specifications. Glow plug delay is achieved via an internal lookup table in conjunction with Fuel temperature.

The ECU-CAN automatically cranks, starts and monitors an engine for Overcrank, Overspeed, High Water Temperature and Low Oil Pressure. All adjustments are factory set. A built in speed switch uses a CAN speed signal to monitor engine speed for crank disconnect and overspeed. The bypass timer/logic assures Low Oil Pressure and High Water Temp override during the crank period and an additional adjustable period after crank disconnect. The ECU-CAN expands to as many faults as required by using the Engine Alarm Input/ Output. The ECU-CAN monitors the CAN signal for problems during both cranking and running. If a problem is detected the engine will shutdown and the Overcrank and Overspeed LED's will both turn on.

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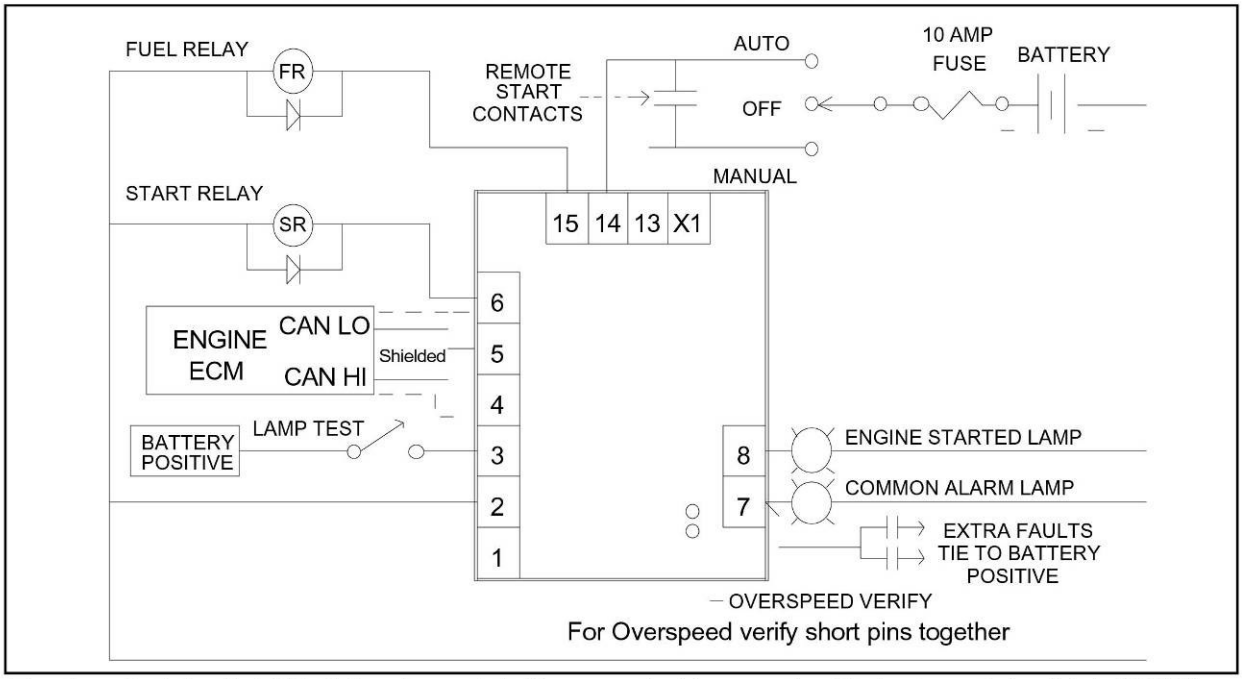
ENGINEERING CONCEPTS UNLIMITED, INC.
P.O. BOX 250 - 8950 TECHNOLOGY DRIVE - FISHERS, IN 46038
Voice: 317-849-8470 Fax: 317-849-6475 E-Mail: sales@ecu-engine-controls.com

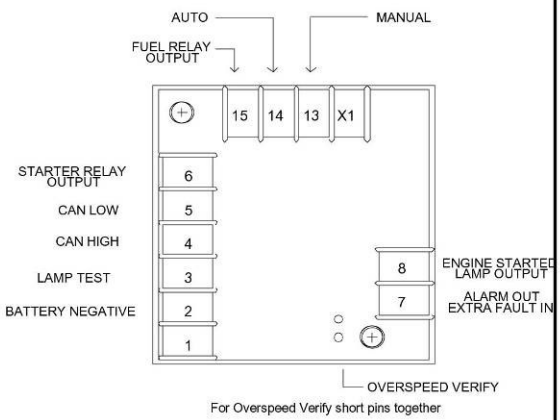
SAMPLE *ECU*®-CAN APPLICATION:
AUTOMATIC ENGINE CONTROL OF DIESEL/GAS ENGINE



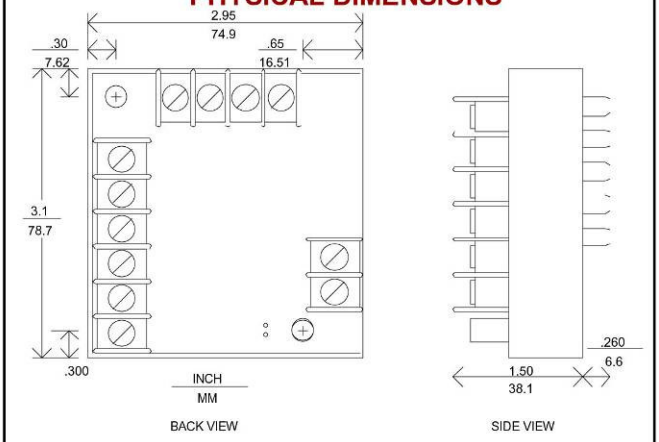
The above illustrates the ECU-CAN engine control with an energized to run engine. Placing the control switch in MANUAL or closure of the Remote Start Contacts while in AUTO initiates the Crank mode. The Fuel and Starter Relays are energized causing the engine to begin cranking. If the engine does not start in the allotted time the Overcrank Fault occurs, and the Fuel and Starter Relays are turned off. If during cranking the internal speed switch detects a speed equal to or above the Crank Disconnect Pre-Set the Starter Relay turns off, the LOP/HWT delay timer is initiated. After this delay period if the LOP or HWT switch closes the engine will shutdown immediately. If the internal speed switch detects a speed equal to or above the Overspeed Setting the engine is shutdown immediately. To stop the engine or to clear a fault condition place the control switch in the Off position. Based on an internal wait table and the fuel temperature from the CAN data the unit delays for the glow plug time period before start. If the CAN or Speed signal from the Engine ECM is lost during cranking or running the engine will shut down and the Overcrank & Overspeed LED's will both turn on.

SPECIFICATIONS: VOLTAGE RANGE - 9 TO 28 VOLTS
STARTER AND FUEL OUTPUT - 5 AMPS MAX
LAMP OUTPUTS (TOTAL) - 1 AMP MAX

ECU®-CAN TERMINAL OUT



PHYSICAL DIMENSIONS



ORDERING INFORMATION:
ORDER BY SPECIFYING: *ECU*® -CAN

AUTOMATIC ENGINE CONTROL FOR DIESEL/GAS ENGINES

The ECU-9988N engine control provides complete automation and safety monitoring of a gas or diesel engine. The ECU-9988N controls the starter and fuel thus completely taking the operator out of the picture. A built in speed switch controls both starter disengagement and overspeed protection.

ECU®-9988N

ONE VERSION FOR 12 AND 24 VDC

APPLICATIONS: Generator Control Panels, Automatic Engine Systems

FEATURES:

- Loss of Magnetic Pickup detection during both cranking and running
- Single or Multi-crank modes are field adjustable
- Built in speed switch
- Grounded or positive HWT/LOP inputs
- Low oil pressure and high water temp override during cranking
- Wide temperature range -40C to +85C
- Epoxy encapsulated module for excellent field reliability
- LEDS with auto/manual lamp test
- 1 AMP Relays for annunciator outputs

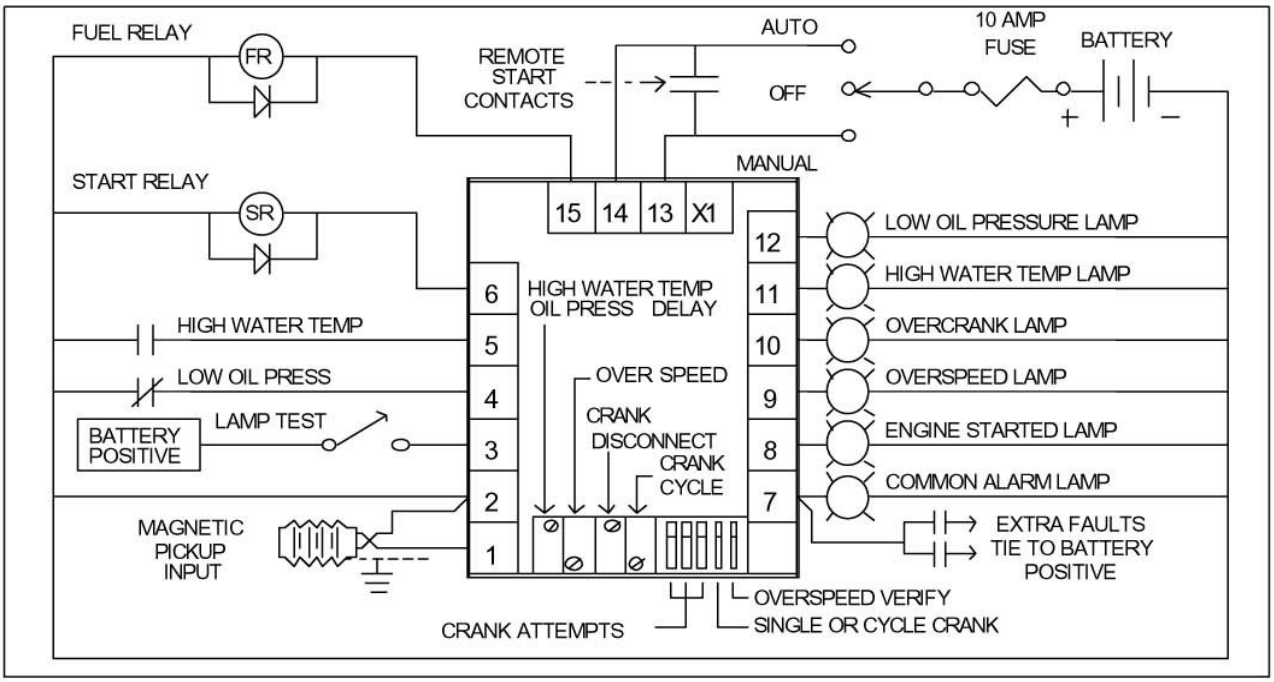
ECU®-9988N A COMPLETE AUTOMATIC ENGINE CONTROL

The ECU-9988N covers just about all the essential engine control functions that are asked for in most specifications.

The ECU-9988N automatically cranks, starts and monitors an engine for Overcrank, Overspeed, High Water Temperature and Low Oil Pressure. Any crank timing sequence is accomplished by using the multiple or single crank modes in conjunction with the timer adjustments. A built in speed switch uses a magnetic pickup to monitor engine speed for crank disconnect and overspeed. The bypass timer/logic assures Low Oil Pressure and High Water Temp override during the crank period and an additional adjustable period after crank disconnect. The ECU-9988N expands to as many faults as required by using the Engine Alarm Input/Output. The ECU-9988N monitors the Magnetic Pickup signal for problems during both cranking and running.If a problem is detected the engine will shutdown and the Overcrank and Overspeed LED's will both turn on.

P.O. BOX 250 - 8950 TECHNOLOGY DRIVE - FISHERS, IN 46038
Voice 317-849-8470 Fax 317-849-6475 www.ecu-engine-controls.com

SAMPLE *ECU*®-9988N APPLICATION:

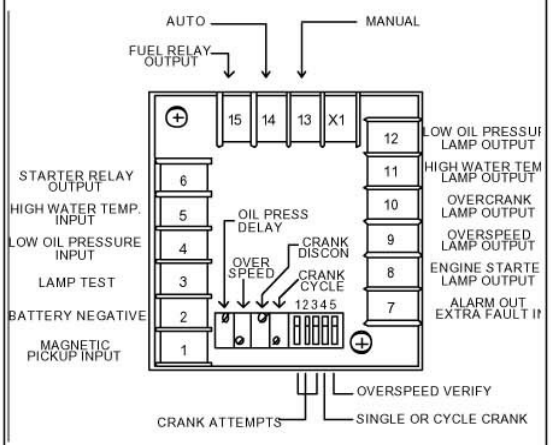


The above illustrates the ECU-9988N engine control with an energized to run engine. Placing the control switch in MANUAL or closure of the Remote Start Contacts while in AUTO initiates the Crank mode. The Fuel and Starter Relays are energized causing the engine to begin cranking. If the engine does not start in the allotted time, as determined by the Crank Cycle Adjust and Dip Switch setting, the Overcrank Fault occurs, and the Fuel and Starter Relays are turned off. If during cranking the internal speed switch detects a speed equal to or above the Crank Disconnect Adjustment Setting the Starter Relay turns off, the LOP/HWT delay timer is initiated. After this delay period if the LOP or HWT switch closes the engine will shutdown immediately. If the internal speed switch detects a speed equal to or above the Overspeed Adjustment Setting the engine is shutdown immediately. To stop the engine or to clear a fault condition place the control switch in the Off position.

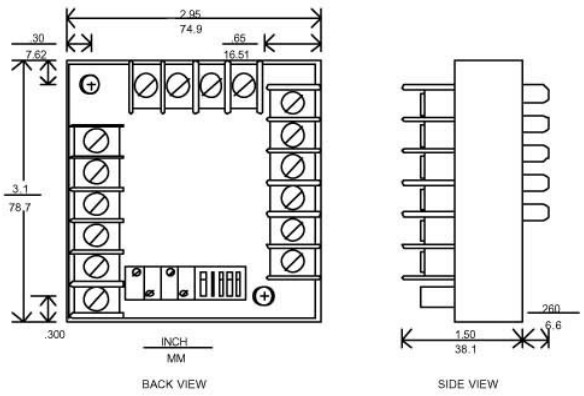
If the signal from the magnetic pickup is lost during cranking or running the engine will shut down and the Overcrank & Overspeed LED's will both turn on.

SPECIFICATIONS: VOLTAGE RANGE - 9 TO 28 VOLTS
MAGNETIC PICKUP - 250-8500 HERTZ
STARTER AND FUEL OUTPUT - 5 AMPS MAX
LAMP OUTPUTS (TOTAL) - 1 AMP MAX

ECU®-9988N TERMINAL OUT



PHYSICAL DIMENSIONS



Mounting holes will accept No. 8 or No. 6 screws.
All dimensions in inches.

ORDERING INFORMATION:
ORDER BY SPECIFYING: *ECU*®-9988N

***ECU*® IS A REGISTERED TRADEMARK OF**
ENGINEERING CONCEPTS UNLIMITED, INC.

Adjusting an ***ECU®*** engine control with pots

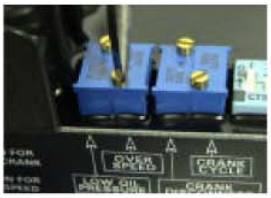
Adjusting Crank Disconnect

This adjusts when the starter disengages upon start

Turn the Crank Disconnect adjustment 30 turns counter clockwise. Then turn it about 3 turns clock wise. Try to start the engine. It should crank and stop quickly. If your engine control has an engine started LED it will be lit. Now try turning the crank disconnect adjustment 1 turn clockwise and try restarting the engine. Keep turning the adjustment clockwise and attempting to start until the engine starts reliably. If the Overcrank and Overspeed LEDS light at the same time on your unit see the trouble shooting guide for more help.

Adjusting Overspeed

This adjusts overspeed safety trip



Be sure you have adjusted the crank disconnect first. Turn the Overspeed adjustment 30 turns clockwise. Flip Switch 5 to the on position. Start the engine. It should crank and start. If your engine control has an engine started LED it will be lit. Now start turning the overspeed adjustment counterclockwise until the engine control shuts down the engine in an overspeed fault. Turn Sw 5 off. If the Overcrank and Overspeed LEDS light at the same time on your unit see the trouble shooting guide for more help.

Adjusting Fault Delay

This adjusts how long engine can run in fault mode

Turn the Fault Delay adjustment 30 turns counter clockwise. This will allow for about 1 second of fault delay. Fault delay is begun after the engine has started. The purpose of the delay is to allow time for oil pressure to build adequately before the oil pressure monitor starts checking the oil pressure sender. High water temperature is also ignored during the fault delay time to allow engine coolant to circulate in the engine.

Adjusting Crank Time

This adjusts starter on time

Turn the Crank Disconnect adjustment 30 turns counter clockwise. Then turn it about 3 turns clock wise. This will allow about 1 second or so of actual engine cranking (starting motor on) time. Each turn up adds about 1 second to the crank time. Adjusting the crank time automatically sets the rest time to the same value.

Engineering Concepts Unlimited Inc. 317-849-8470
8959 Technology Drive, Fishers, IN 46038 USA

Adjusting an *ECU*® engine control with DIP switch

SW1	SW2	SW3	CYCLES
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

Adjusting Crank Cycles

Using a pen or small screwdriver and the table on the side of the engine control flip the switches in the pattern to adjust to your desired amount of cycles. Cycles is the amount of times the engine will turn on the starter to attempt engine cranking.

Adjusting Single or Multiple cranks

Using a pen or small screwdriver adjust switch 4 on for one single crank. This action causes all the multi cranks to add together to create one large crank. In affect it disables the rest cycles.

SW 4	Action
ON	Single Crank
OFF	Multiple Cranks

Using the overspeed verify switch

After engine starts and engine is at speed turn this switch on and if properly set the engine will shutdown in overspeed fault. Be sure switch 5 is turned off for proper normal operation.

SW 5	Action
ON	Makes control think engine is going approximately 13% faster than it really is
OFF	True engine speed

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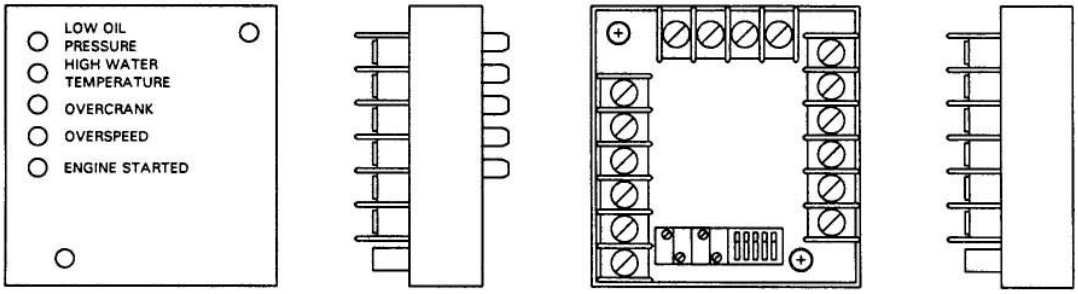
ECU-®57N / ECU-®88L / ECU-®88N INSTRUCTION MANUAL

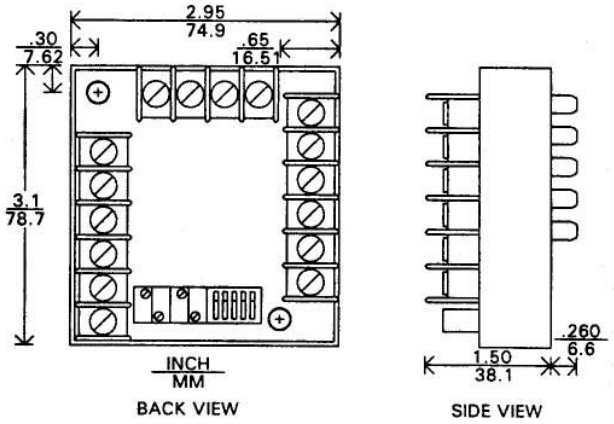


These units are the most advanced, rugged and compact engine control modules we have ever built. They are simple to use but this manual will assist both engineer and mechanic alike in the installation and operation of these controls. The following pages have in order: wiring and operation, expansion, adjustment, specifications, physical drawing, drilling guide and warranty information.

SPECIFICATIONS

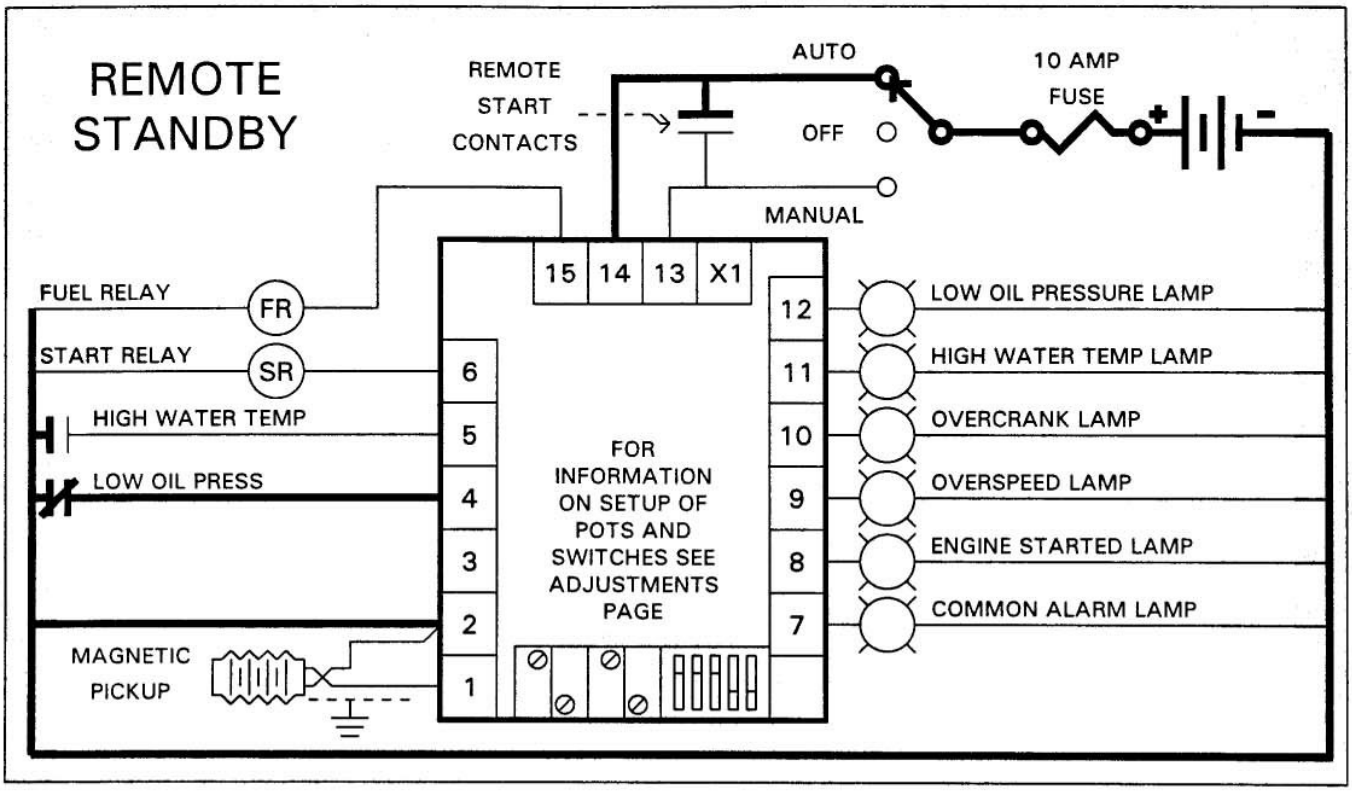
Temperature Range	-40 TO +85 C
Voltage Range	9 to 28 VDC
Vibration	10 G 's
Standby Current	0 Amps
Operating Current	200 mA
Maximum life cycles	50,000
Starter and Fuel Output	5 Amps
Signal outputs (total)	1 Amp
Speed input voltage range	2 to 15 Volts
Input Impedance	5 kohms
Weight	12 oz.
Crank Cycle Time Single	2 sec to 15 min
Crank Cycle Time Multi	2 to 60 sec
Crank attempts	1 to 8
Low oil pressure delay	1 to 60 sec
Crank disconnect trip	250 Hz to 8500 Hz
Overspeed trip	250 Hz to 8500 Hz
Verify mode	87% of set point

PHYSICAL DRAWING

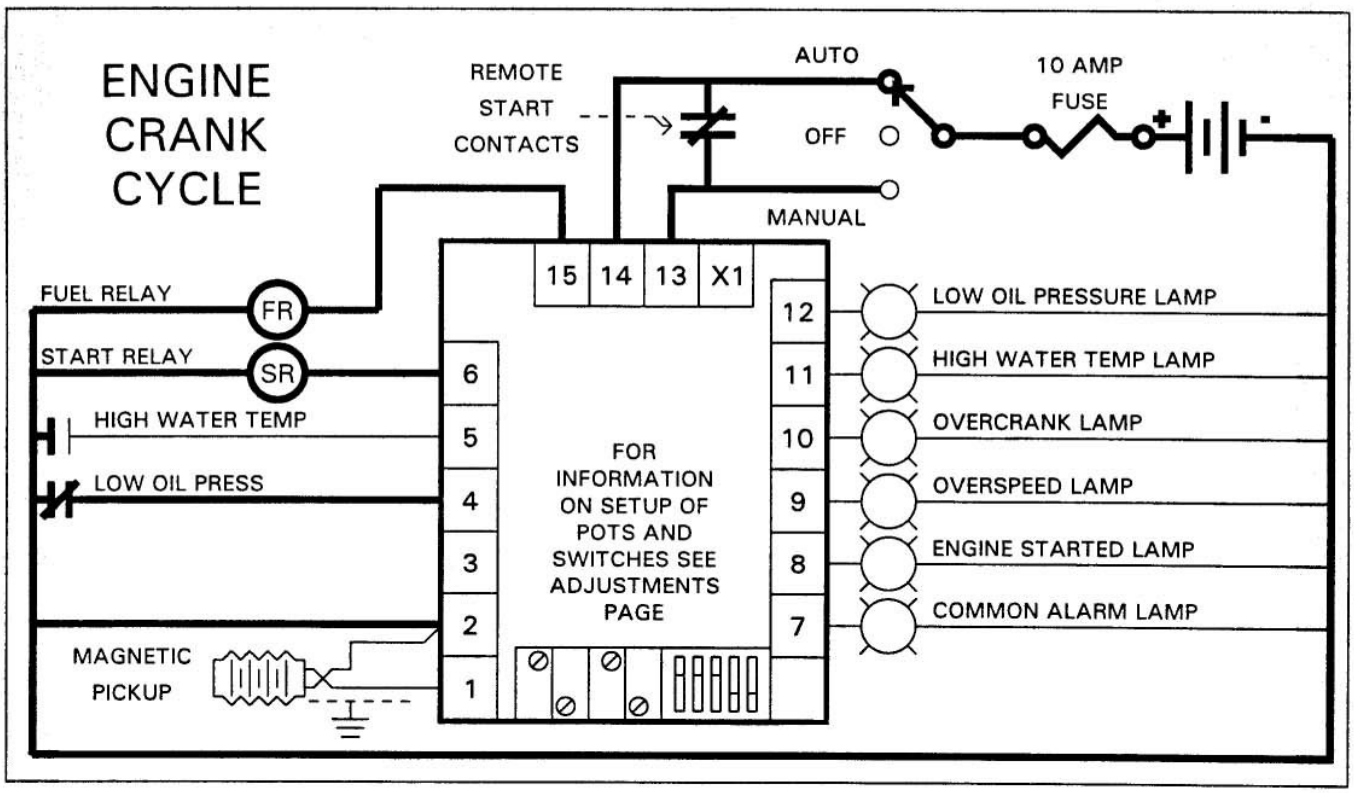


Mounting holes will accept No. 8 or No. 6 screws.

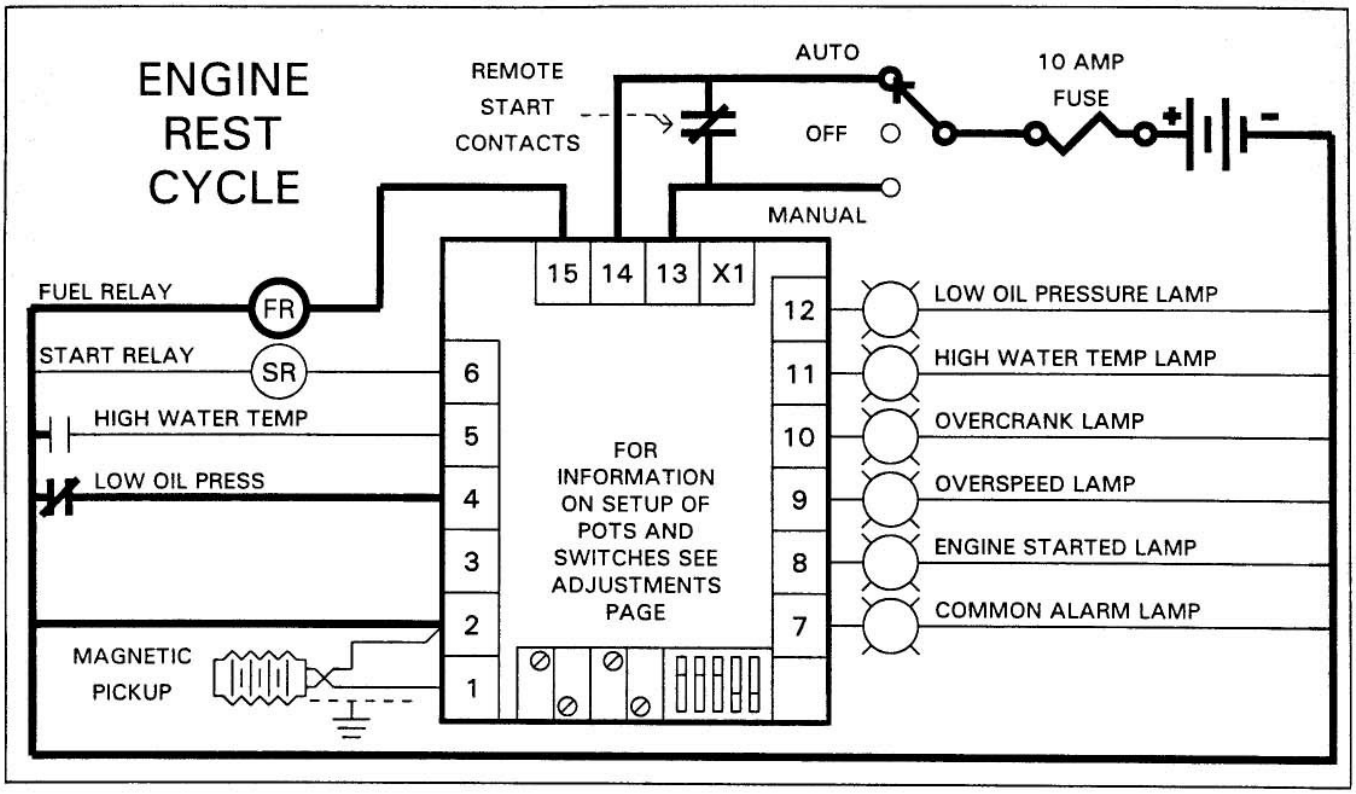
All specifications are subject to change without notice.



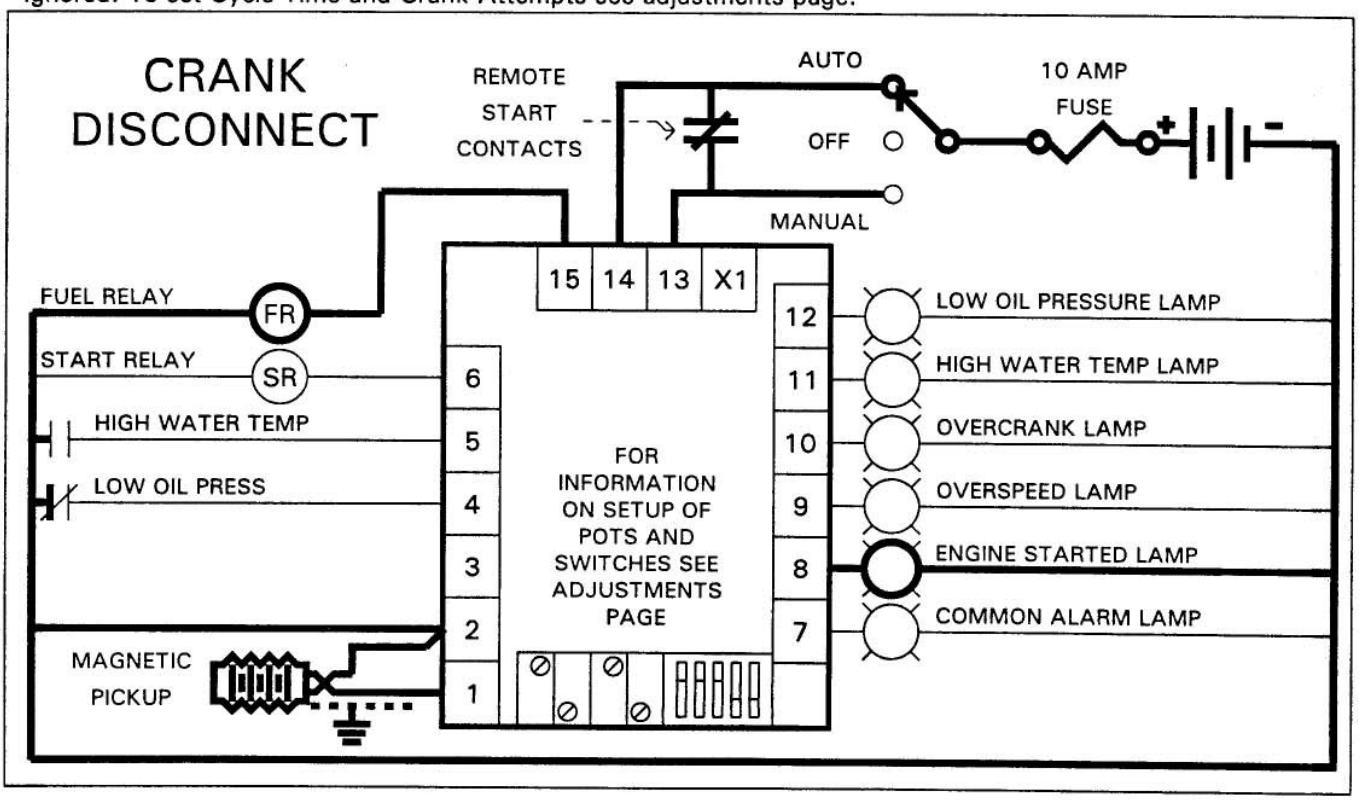
In the Standby mode the Engine Control Switch is in the Auto position as the module monitors the Remote Start Contacts. All that is required for cranking to begin is the closure of the Remote Start Contacts shown connected across terminals 13 and 14.



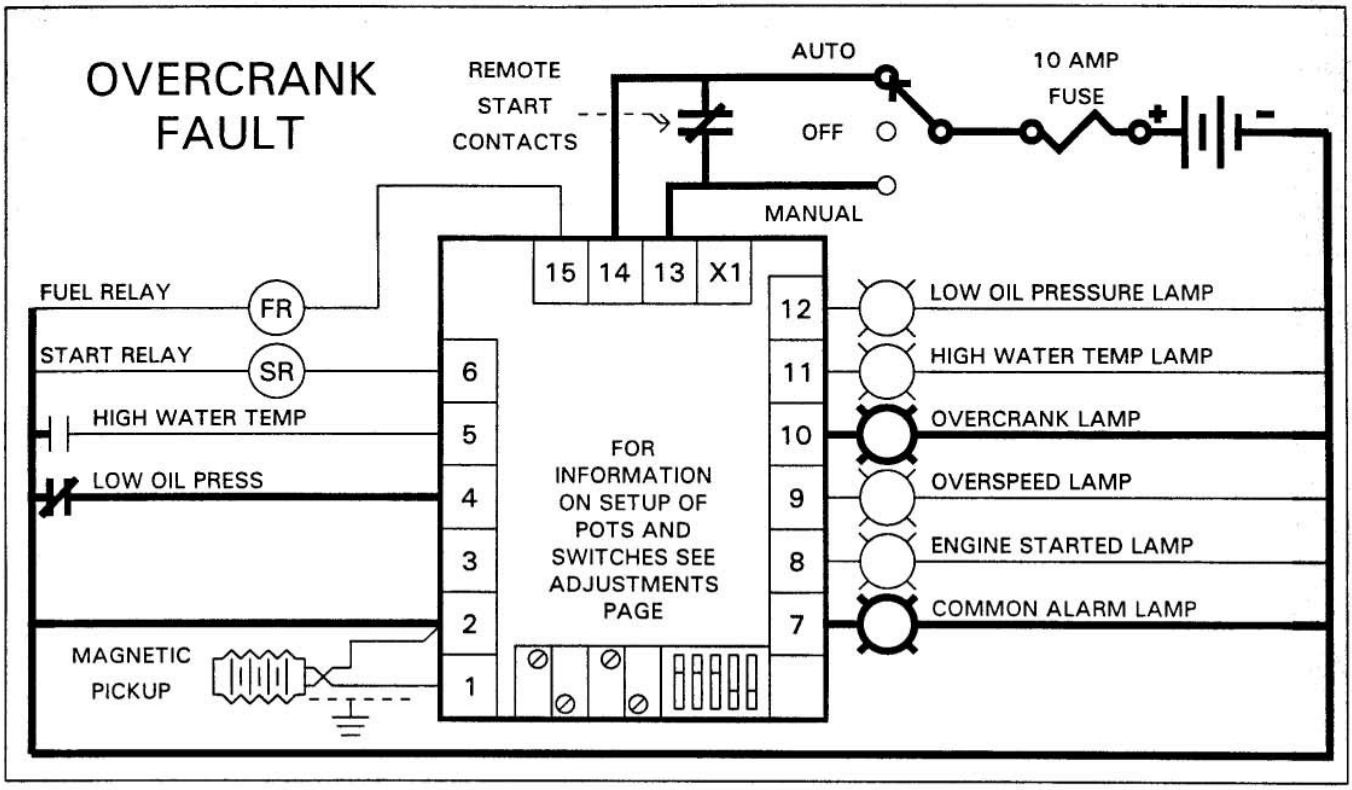
Closure of the Remote Start Contacts while in AUTO initiates the Crank mode.The Fuel Relay and Starter Relay are energized causing the engine to begin cranking. The Crank mode will continue for the duration of the settings of the Crank Cycle Adjust and the Dip Switch, unless Overcrank occurs first. During the Engine Crank Cycle the Low Oil Pressure Switch is ignored. To set Cycle Time and Crank Attempts see adjustments page.



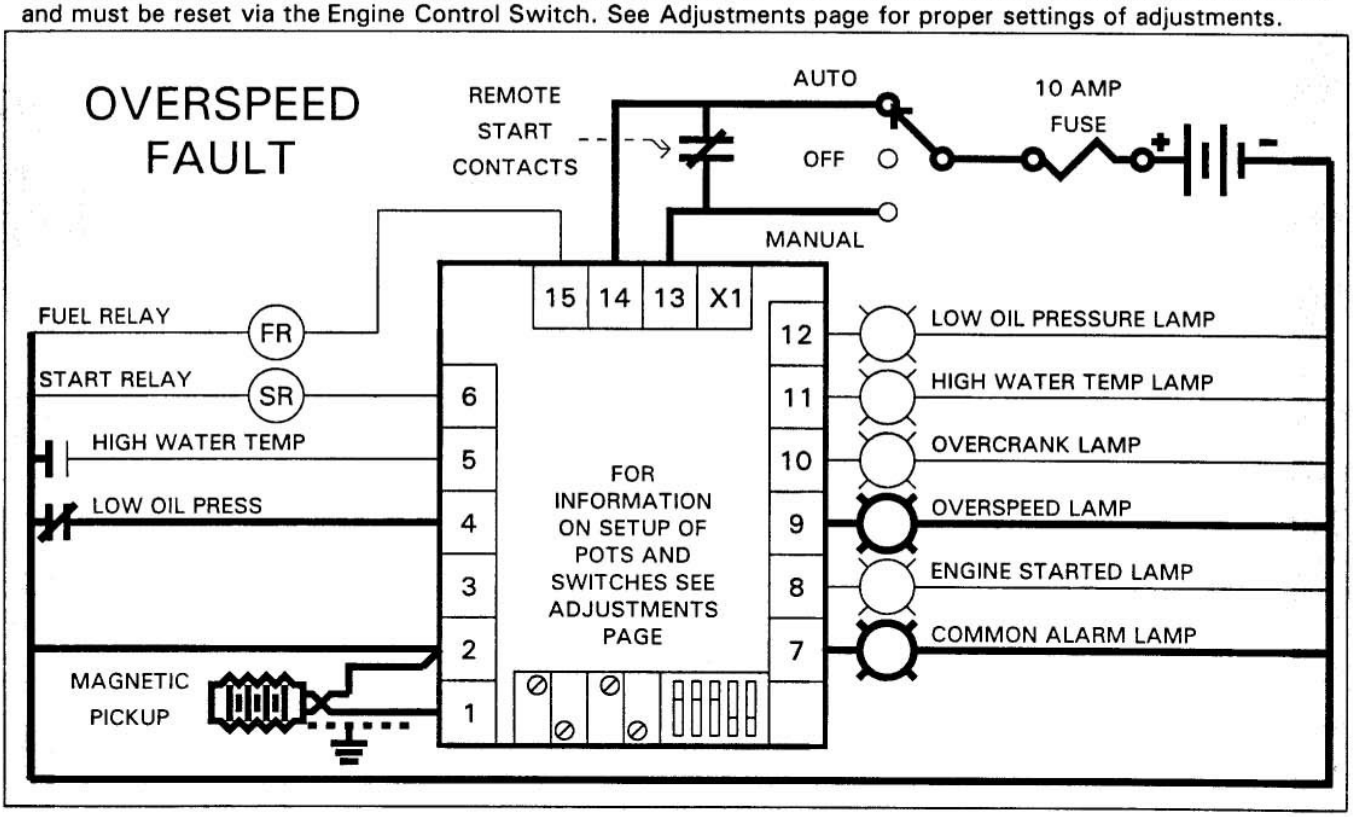
The REST cycle is a pause in the cranking sequence and only applies if Dip Switch 4 on the module is in the Off position. In this mode Fuel is still applied to the engine but the Starter Relay signal is turned off. The cycle continues for the duration of the Cycle time Adjustment Setting. The Low Oil Pressure fault signal input is ignored. To set Cycle Time and Crank Attempts see adjustments page.



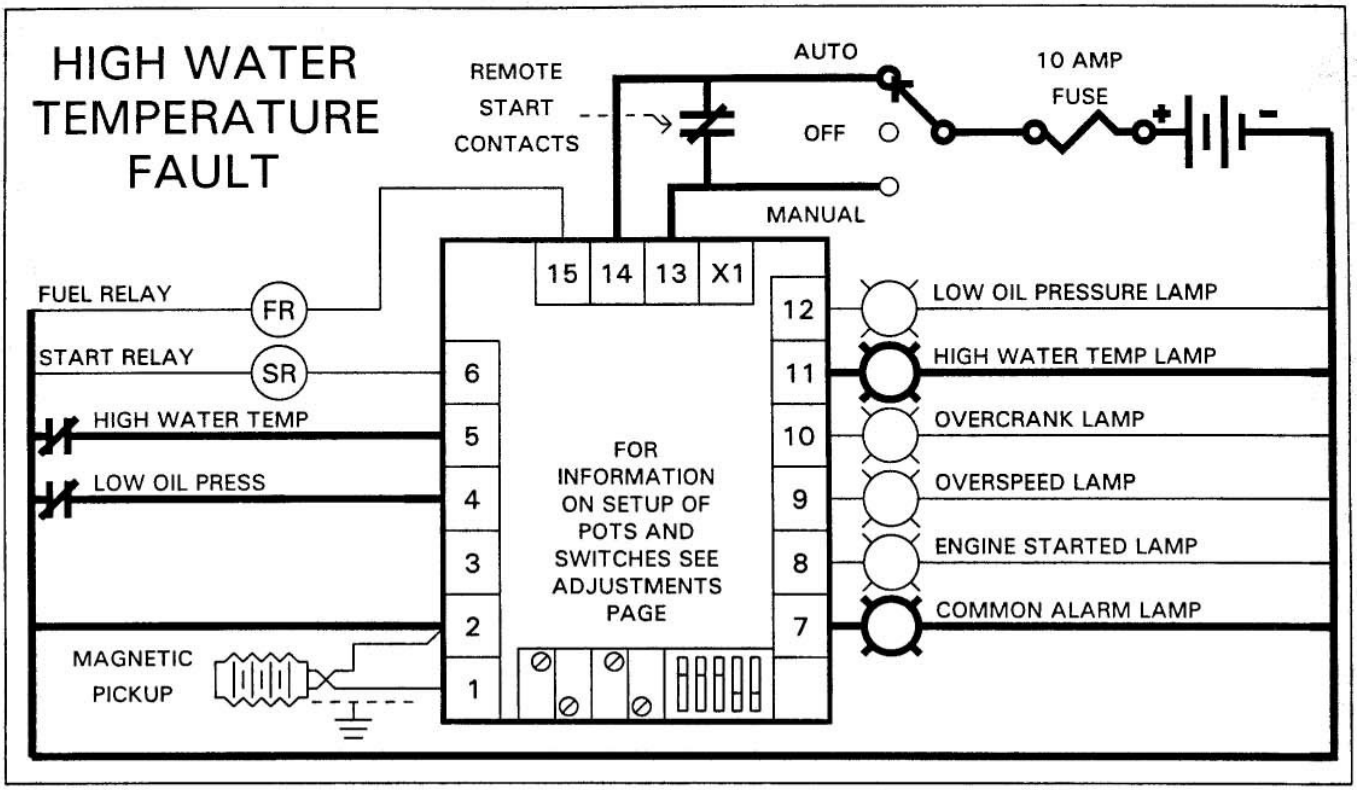
If the internal speed switch detects a speed equal or above the Crank Disconnect Adjustment Setting the starter relay signal turns off, the Low Oil Pressure delay timer is initiated and the appropriate signals indicate as shown. The LED versions indicate via an LED also. This is a latched condition and must be reset by placing the Engine Control Switch in the Off position. The internal speed switch uses the Magnetic Pickup for speed detection.



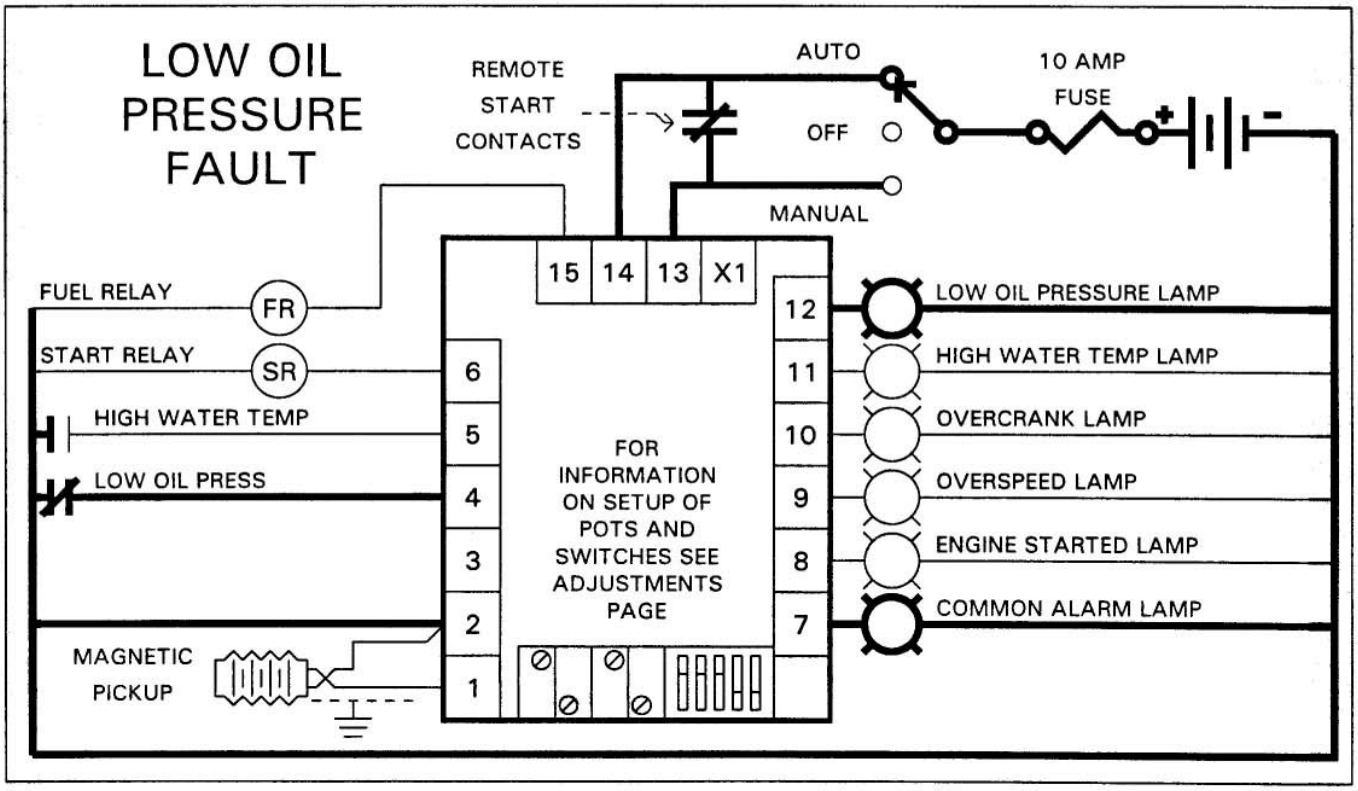
If the engine does not start in the allotted time, as determined by the Crank Cycle Adjust and the Dip Switch settings, the Overcrank Fault occurs. The Fuel and Start relays are turned off and the appropriate signals indicate as shown. The LED versions indicate via an LED also. The Overcrank condition is a latched condition and must be reset via the Engine Control Switch. See Adjustments page for proper settings of adjustments.



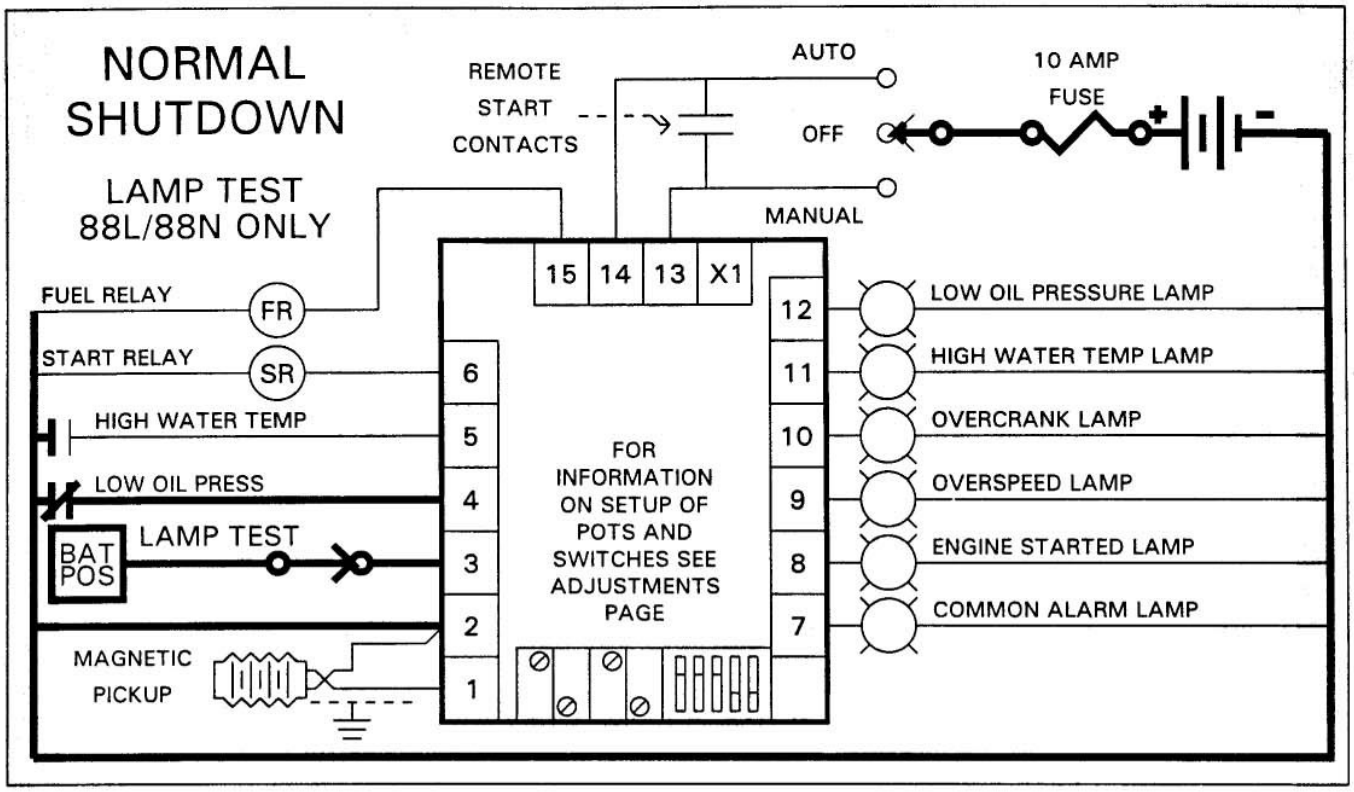
The Overspeed fault is armed at engine cranking. If the internal speed switch detects a speed equal or above the Overspeed Adjustment Setting the engine is shutdown immediately. The internal speed switch uses the Magnetic Pickup for speed detection. The Fuel Relay is turned off, the Low Oil Pressure switch is locked out and the appropriate signals indicate as shown. The LED versions indicate via an LED also. The Engine Switch must be placed in OFF for reset. See Adjustments page for speed adjustments.



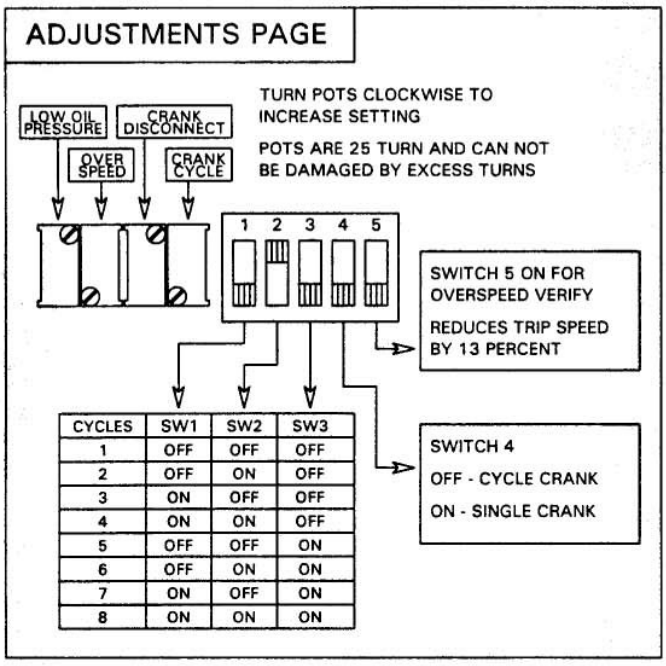
If the High Water Temperature Switch closes the engine will be shut down immediately. System indicates as shown and the LED versions indicate via an LED also. The Engine Switch must be placed in OFF and the engine allowed to cool for reset. The above circuit is grounded fault if you are using positive fault tie your fault switch common to terminal 13.



Upon crank termination the Low Oil Pressure time delay begins. After this delay period if the Low Oil Pressure switch closes the engine will shutdown immediately. The Fuel Relay is turned off and the appropriate signals indicate as shown. The LED versions indicate via an LED also. The Engine Switch must be placed in OFF for reset. The above circuit is grounded fault if you are using positive fault tie your fault switch common to terminal 13. See Adjustments page for delay time adjustments.

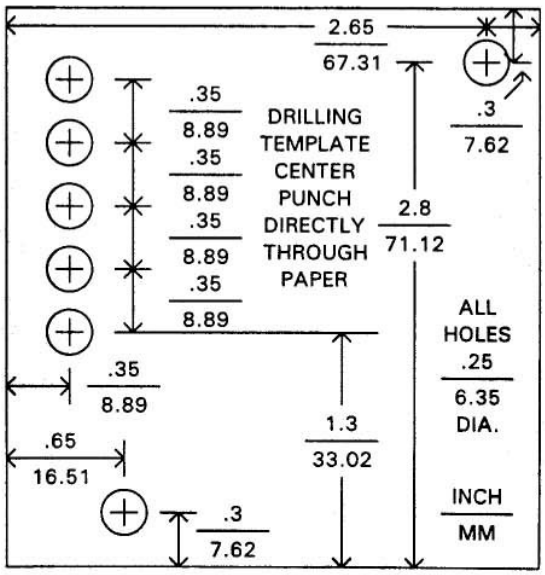


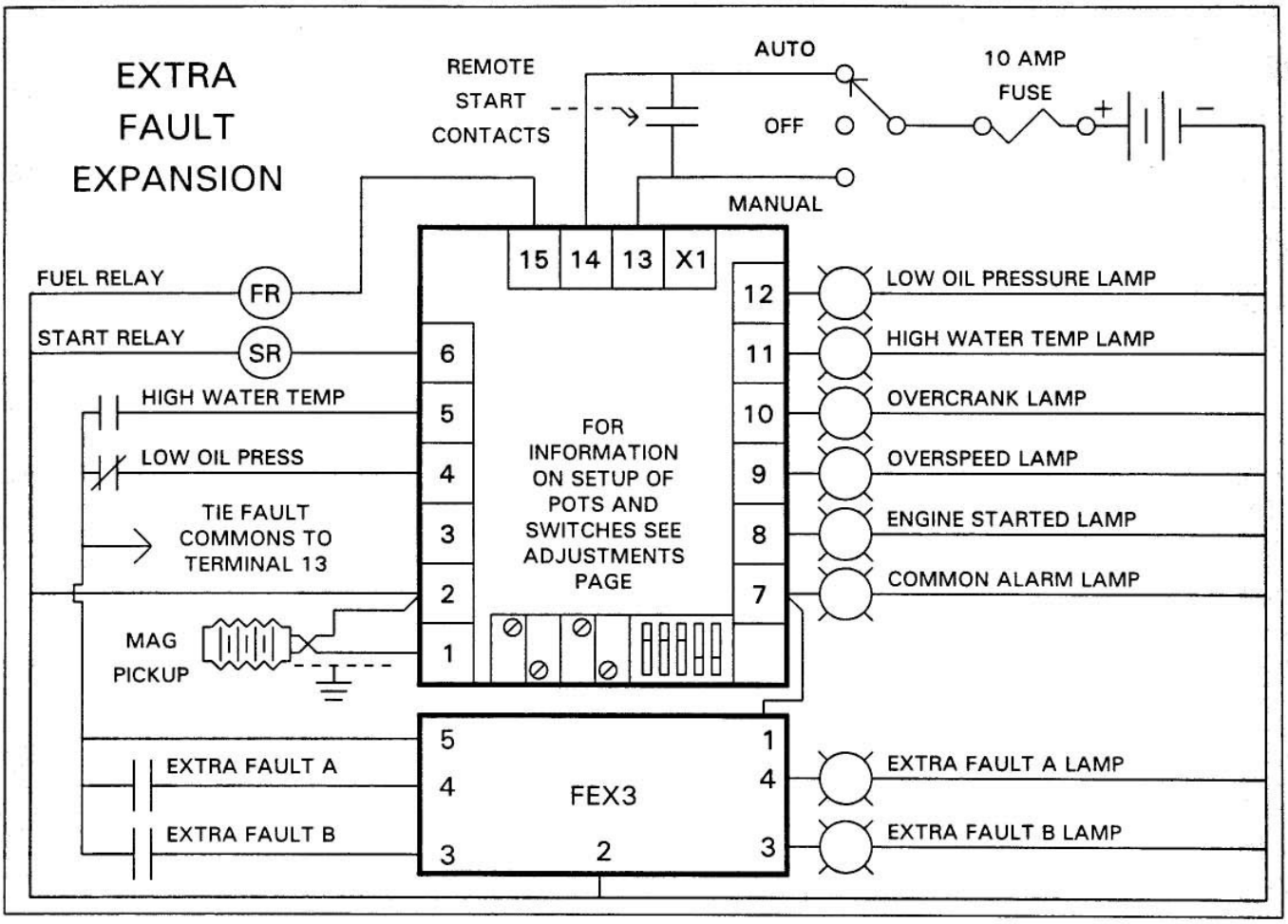
To stop engine place switch in the OFF position and engine will shut down immediately. The Fuel Relay is turned off and the unit draws no power. If the unit is an LED version lamp test may be applied as shown and all LEDS will light. Since the output system is totally independent of the signal system Lamp Test can be actuated at any time with no possibility of backfeed.



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

DRILLING TEMPLATE



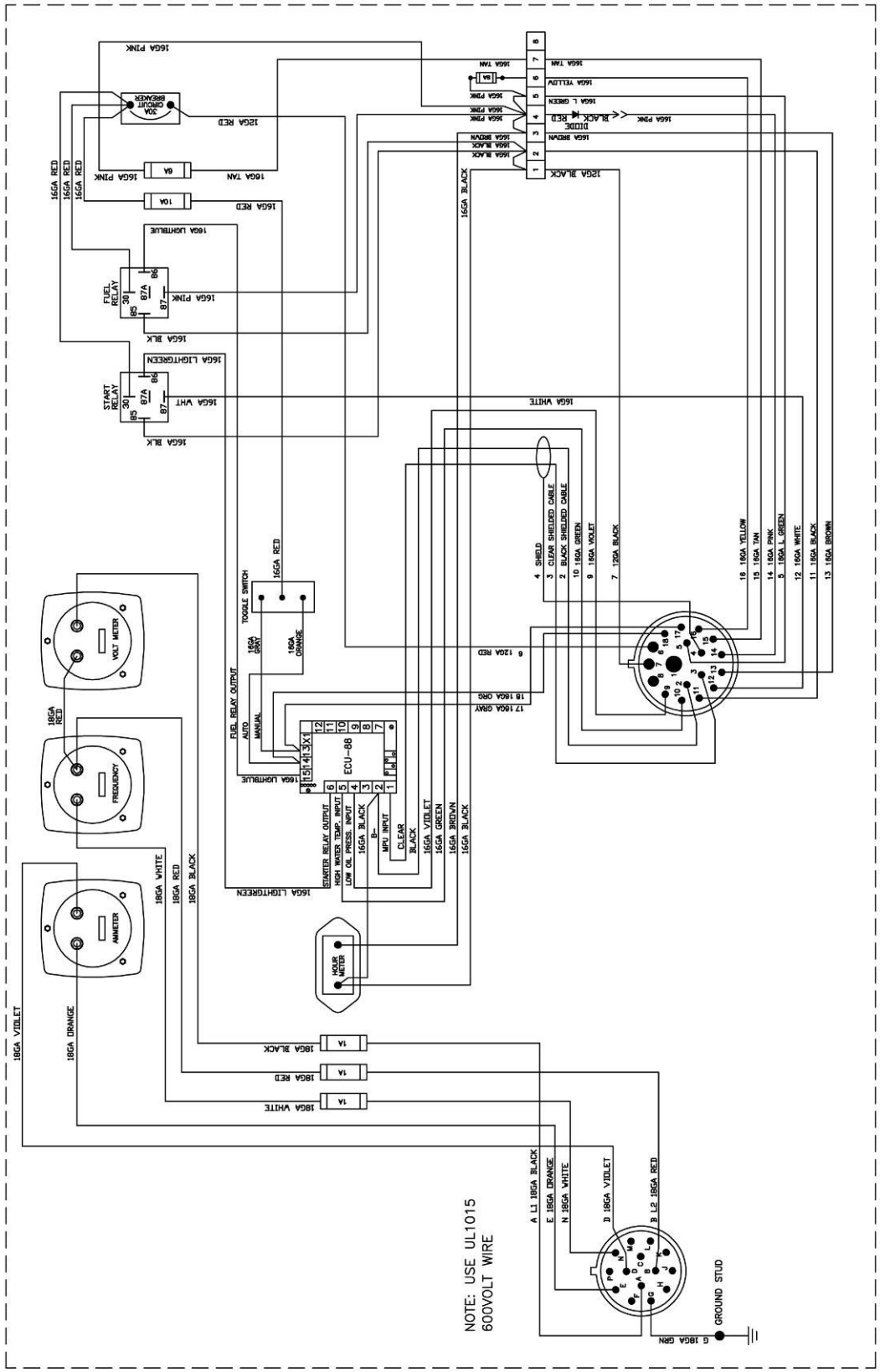


The FEX3 is shown expanding the control to 6 total engine faults. The FEX3 provides both the fault combining signal circuits and the latch circuits. Placing voltage on terminal 7 will place unit in shutdown but it will not latch. See FEX3 literature for more information.

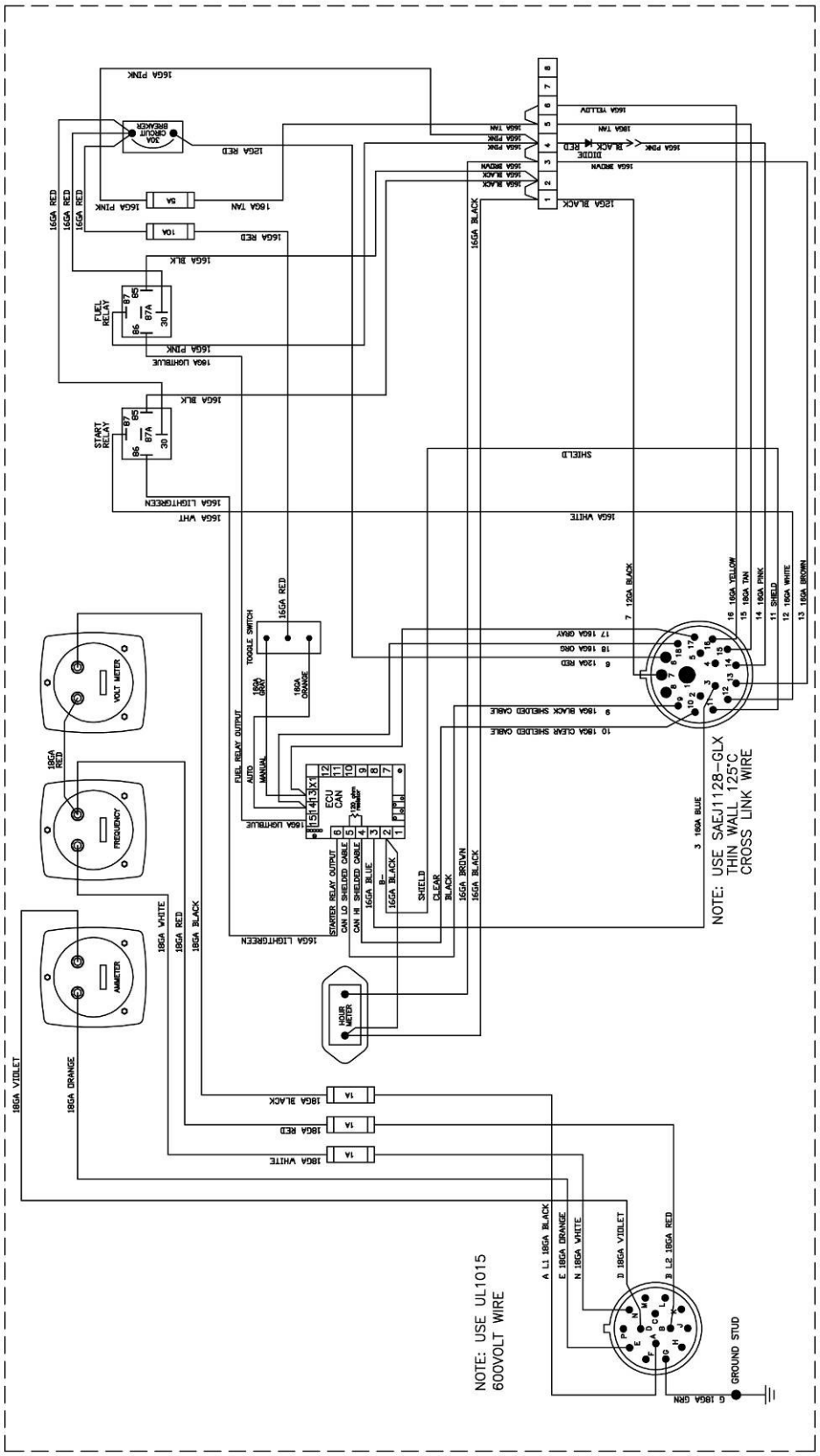
MANUFACTURER'S WARRANTY

Engineering Concepts Unlimited, Inc. warrants and guarantees that its automatic engine starting controls are free from any defects in workmanship and/or materials for one (1) year from date of shipment from its factory, and if they are found defective by the factory, they will be replaced, F.O.B. Fishers, IN. This warranty does not cover incidental and consequential damages, nor does this warranty cover defects caused by misuse, faulty installation, alteration, accident, or any labor charges, service charges, or anything else except the replacement of the product. THIS IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED.

All Specifications are subject to change without notice
We are not responsible for typographical errors



WIRING FOR NON-CAN CONTROLLED UNITS



WIRING FOR CANBUS CONTROLLED UNITS