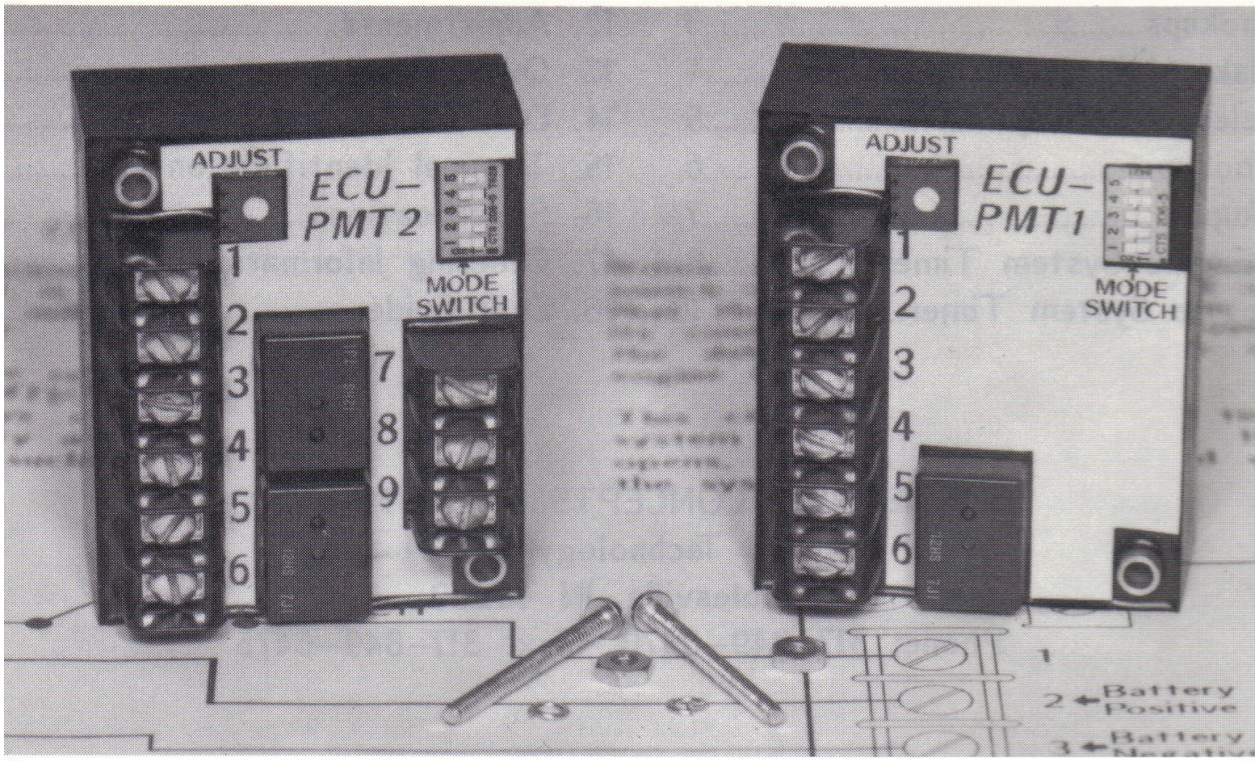
PMTN Manual

This is a reprint of the original pmt2 pmt1 which was replaced by the PMTN it will help you in your use of the PMTN until we have updated this manual. We are trying to supply you with all available current information as of today. The pdf is somewhat readable. Please call us if you have trouble reading it. We will update this manual as soon as possible



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INTRODUCTION

The PMTN is an advanced electronic delay timer featuring digital accuracy and 12 or 24 volt input operation, −40C to +85C operating environment and the capability to handle severe electrical system noise. Plus these additional features:

- Form C Relay Output(s) – 10A
- 4 Time Ranges
- Seconds to 30 Minutes
- Quick Adjust for Long Times
- No Stand–by Power for Delay On Release Modes

This timer is specifically designed for engine system use and can replace up to 12 types of engine timers:

1) Cool Down Timer
2) Warm Up Timer
3) Rack Timer
4) Full Throttle Timer
5) Delay On Make Timer
6) Delay On Release Timer
7) Delay On Start Timer
8) Crank Cycle Timer
9) Flasher Timer
10) Shut Down Solenoid Timer
11) One Shot Timer
12) Cranking Limiter Timer

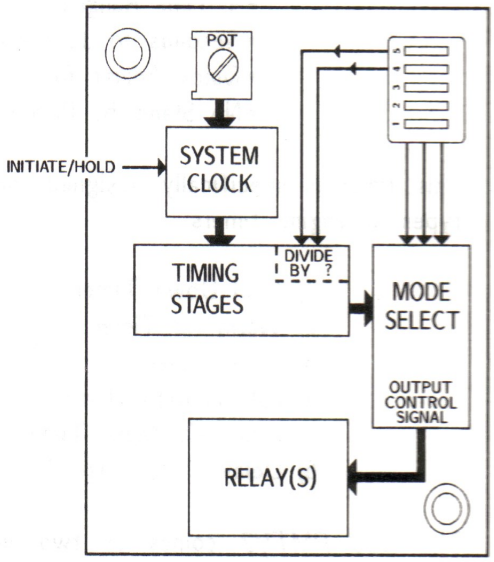
OPERATING BLOCK DIAGRAM

This is a general explanation of how the *ECU–PMT1/2* operates. Please refer to the block diagram.

In every mode except Delay On Release (DOR) and the Rack mode, once power is applied to the unit the system clock begins operating. The speed of the clock is adjusted via the pot. The timing block utilizes the system clock and the *divide by* switches (SW4 and SW5) to calculate the delay time. These two *divide by* switches determine the number of delay elements involved in the timing process. Basically, the more delay elements involved, the longer the delay time at the same system clock speed. It is because of these delay elements that the *ECU–PMT1/2* can be quickly set for long delay times.

Once the desired time has elapsed, a signal is sent to the mode select block. This block uses this signal in conjunction with the mode settings of the mode switch to feed the appropriate control signal to the relay(s).

The initiate/hold signal is only used in the Delay On Release and Rack modes. When the initiate/hold signal is applied, the output relay(s) energize and the system clock is stopped. Upon the removal of the signal, the system clock starts and the delay period begins. After the appropriate delay has expired the relay(s) de–energize. If at any time during the delay process the initiate/hold signal is re–applied, the timing stages are reset and the system clock stopped. The entire time delay will begin again when the signal is removed.



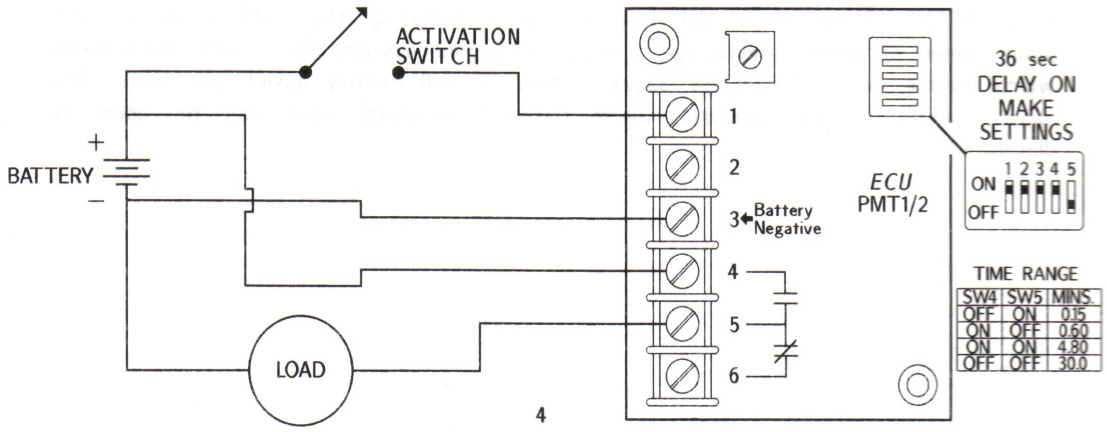
SAMPLE ELECTRICAL HOOKUPS

The following twelve pages demonstrate the various operating modes of the *ECU–PMT1/2*. These pages will help you when installing the *PMT1/2* as a stand alone timer or when interfacing it with an engine system. For those applications which involve an *ECU–57/87/88* pages 8 thru 15 will greatly assist you since they show specific hookup diagrams (with terminal numbers) that can be used as illustrated.

HOOKUP FOR DELAY ON MAKE

In automation systems a frequent delay task is delay on make. The course of events are, (1) Apply power to *PMT1/2*, (2) after a delay period, (3) transfer the relay contacts. To reset the timer, power must be removed from the input terminals.

Below is an example showing a simple usage of the *PMT1/2*. Upon application of power to terminal 1 via the activation switch the timer goes through a delay cycle. After the appropriate delay has passed the "FORM C" contacts will transfer and voltage applied to terminal 4 will pass to terminal 5 thus operating the load. The system will reset upon the removal of voltage from terminal 1.



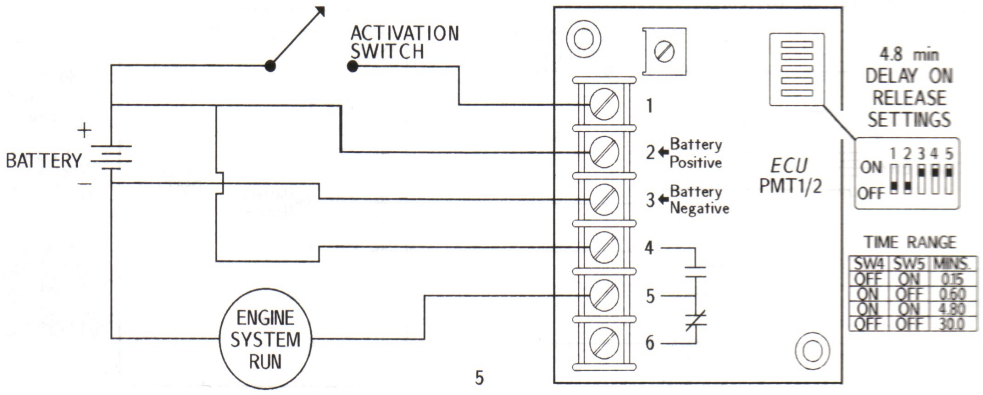
HOOKUP FOR DELAY ON RELEASE

The delay on release function is used in many applications. Its primary goal is to be initiated thus turning on the load. A delay will go into effect after the activation switch is opened.

After the delay has expired the relay(s) will de–energize. One advantage of the *ECU–PMT1/2* over other timers is the fact that the timer draws no power in the off mode. This adds to its reliability and assures no battery drainage on standby systems such as irrigation pumps and compressors.

Notice that in the circuit below when the activation switch closes the run relay will operate due to the fact that the *ECU–PMT1/2* locks in and supplies power via its contacts. Even if the activation switch should open, the delay time of the timer must expire before the engine would shut off.

This circuit shows how the timer "buffers" the engine system against false starts. If the activation switch opens, the timer will run and when it expires will shut the system down.

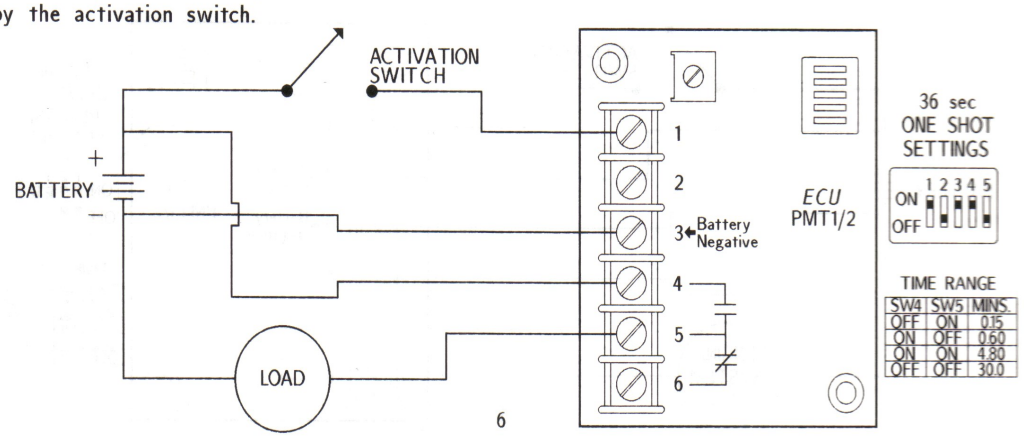


HOOKUP FOR ONE SHOT TIMER

The interval, or one shot timer as it is sometimes called, allows for an event to be initiated, operated and then de–energized. This could be used for many functions such as timed engine cranking, pre–lube oil pumps, shut down solenoids and many more.

The example below shows a one shot timer's main function. The load is to be energized for an adjustable time period after initiation by the activation switch.

The moment power is applied to terminal 1 the relay will operate thus causing power to be connected from terminal 4 to terminal 5. This will cause the load to turn on. After an adjustable time period has elapsed the load will be de–energized. The system will reset upon the removal of voltage from terminal 1.

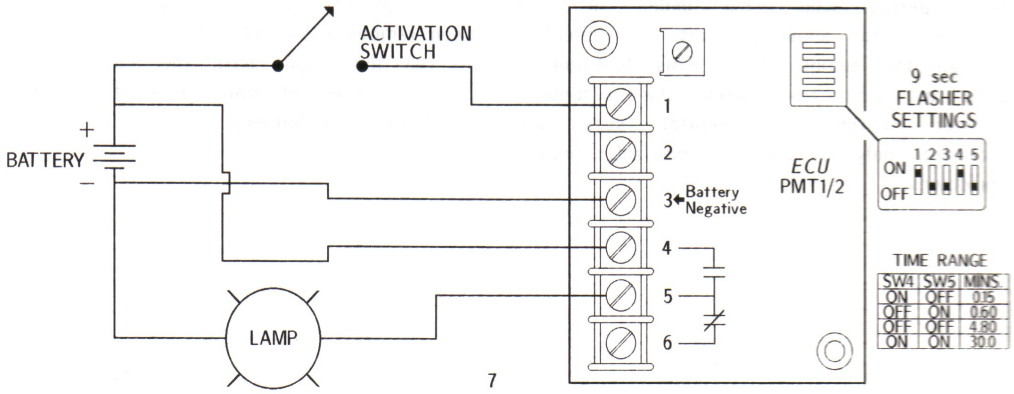


GENERAL HOOKUP FOR FLASHER

The *ECU–PMT1/2* incorporates an adjustable circuit with a 50% duty cycle coupled to a "FORM C" relay(s). The timer can be adjusted to either operate in an on–off–on sequence or an off–on–off sequence as long as power is applied to the input.

The diagram below shows the basic use for the flasher circuit. When voltage is applied to terminal 1, the contacts will connect voltage from terminal 4 to terminal 5 thus lighting the lamp. After an adjustable time, the relay(s) will turn off. This action will repeat until the voltage is removed from terminal 1.

Notice that the configuration below will give the on–off–on sequence. To obtain the off–on–off sequence, set switch 2 on the Mode switch to the ON position.



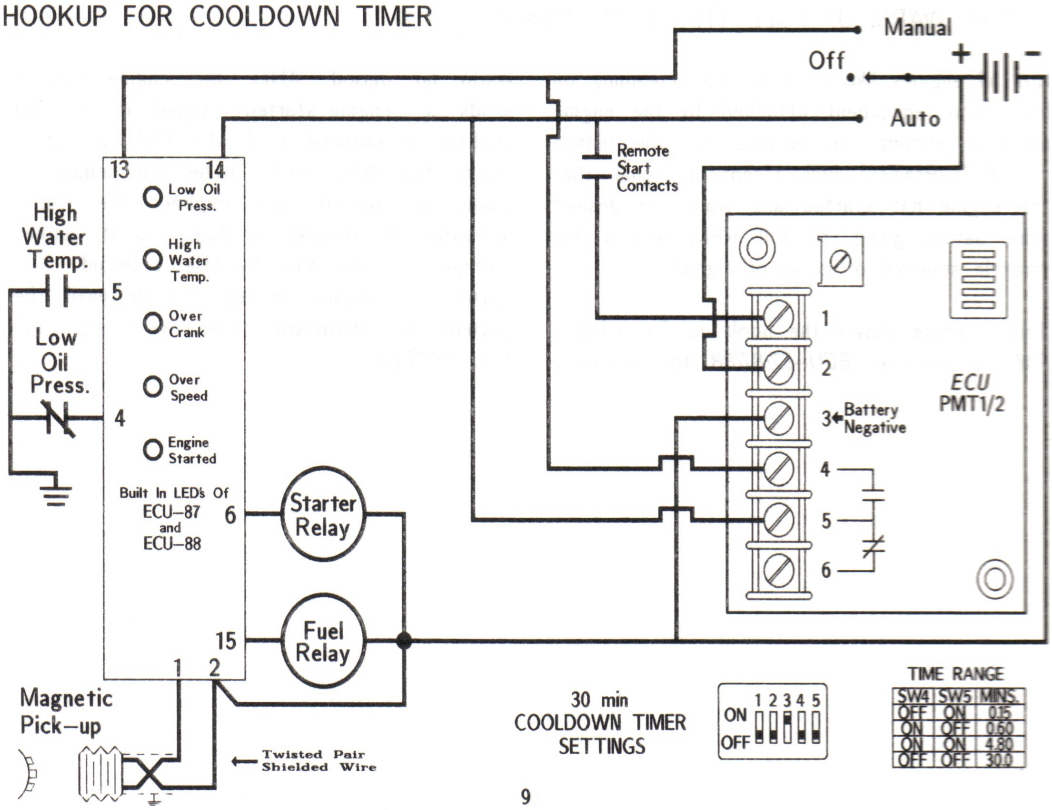
COOLDOWN TIMER FOR ENGINE SYSTEMS

Engines often are run for hours (and sometimes days) under full load conditions. In automatic engine systems when the power requirement is relaxed the engine is sometimes shutdown from full load. This causes the engine to heat soak and can cause premature wear due to oil breakdown and warpage of engine parts.

By adding an *ECU–PMT1/2* an adjustable delay period will occur under no load conditions to allow coolant to circulate through the engine block. This function is done in conjunction with the automatic transfer switch in generator sets and cooldown only occurs on non–fault related shutdowns.

The opposite page shows a *ECU–PMT1/2* connected between the remote start contacts and the *ECU–57/87/88* engine control. While in the auto mode if the remote start contacts close, voltage will be applied to terminal 1 of the timer and cause the relay to operate thus causing the engine control to start the engine via 4 and 5. As long as the remote start contacts remain closed the engine will continue to run. When the remote start contacts open (signifying the load has been removed) the *ECU–PMT1/2* will continue to run the engine until the adjustable time period is over, at which time it disconnects itself from the battery.

HOOKUP FOR COOLDOWN TIMER

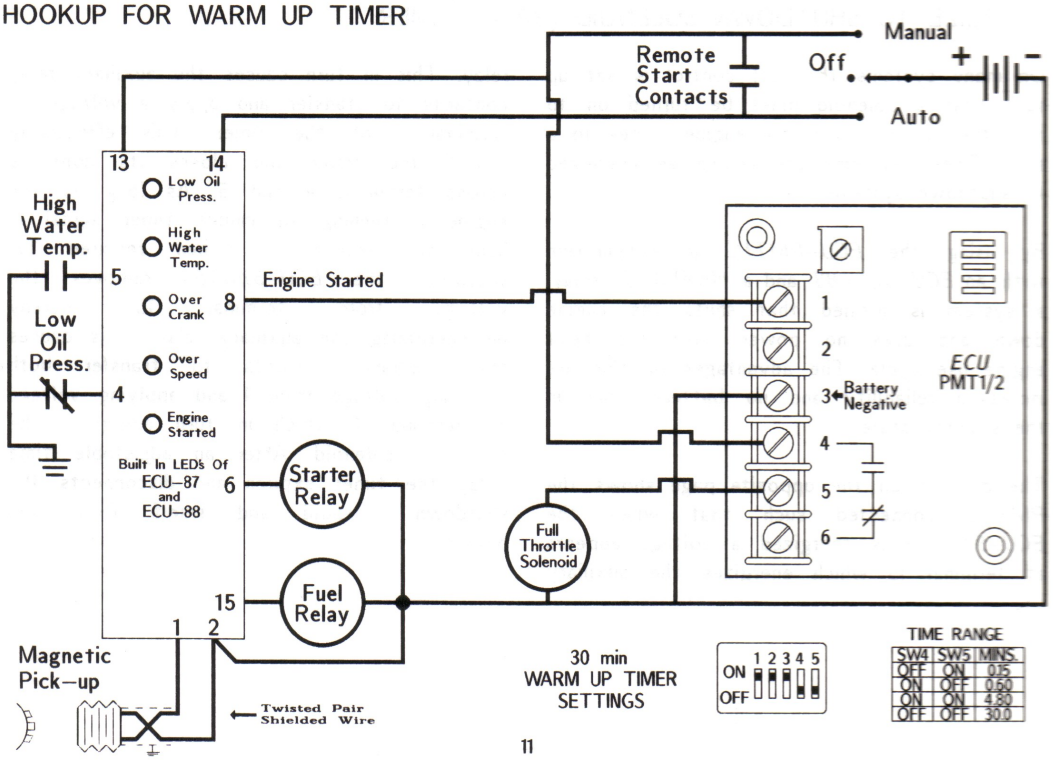


ENGINE WARM UP FULL THROTTLE TIMER

Not all engines like to come up screaming on line. Some equipment attached to the engine needs a "priming" period also. For this reason the *ECU–PMT1/2* will accept a signal that the engine has started and wait the desired time before going to full RPM (via a full throttle solenoid or governor signal).

This example shows the hook up for using a *PMT1/2* with an *ECU–57/87/88* to achieve a warm up period. After the engine control sends a engine started signal it is also applied to terminal 1 of the *PMT1/2*, which starts the delay cycle. After the adjustable warm up period has expired the timer activates its relay(s), in doing so it applies voltage to the full throttle solenoid. The system will remain at full throttle until the system is shutdown, thus resetting the *ECU–PMT1/2*.

HOOKUP FOR WARM UP TIMER



30 min
WARM UP TIMER
SETTINGS

TIME RANGE

SW4	SW5	MINS.
OFF	ON	0.15
ON	OFF	0.50
ON	ON	4.80
OFF	OFF	30.0

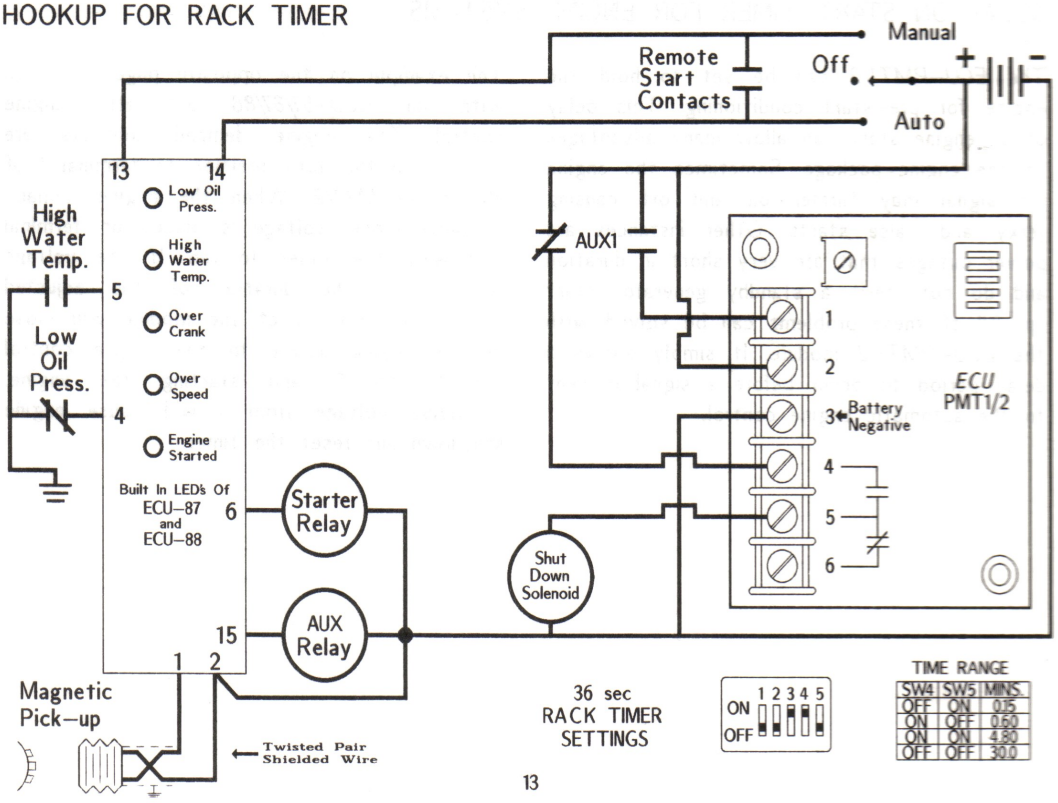
ENERGIZE TO SHUTDOWN SOLENOID (RACK) TIMER

On many systems the fuel control is set up such that a solenoid must be turned on to hold the fuel off until the engine comes to a stop. These systems are known as energized to shutdown systems.

By using the *ECU–PMT1/2* in conjunction with an *ECU–57/87/88* and a "FORM C" relay, a system is formed that shuts the engine down and uses no power until the next engine use cycle. The advantages of this are increased reliability and no battery drain in the standby state.

The diagram on the opposite page shows the *PMT1/2* connected such that when the *ECU–57/87/88* is energized a voltage appears at terminal 15 which energizes the auxiliary relay. This in turn causes the auxiliary relay contacts to transfer and apply a voltage to terminal 1 of the timer. This effectively "arms" the timer and closes its contacts across terminals 4 and 5. As long as the engine is running an inhibit timer signal is held at terminal 1. When required for shutdown the *ECU–57/87/88* removes the voltage from terminal 15 thereby de–energizing the auxiliary relay. This causes the auxiliary contacts to transfer both removing voltage from 1 and applying voltage to terminal 4 which in turn energizes the shutdown solenoid. After an adjustable time delay the timer expires and disconnects the shutdown solenoid and itself from the battery.

HOOKUP FOR RACK TIMER



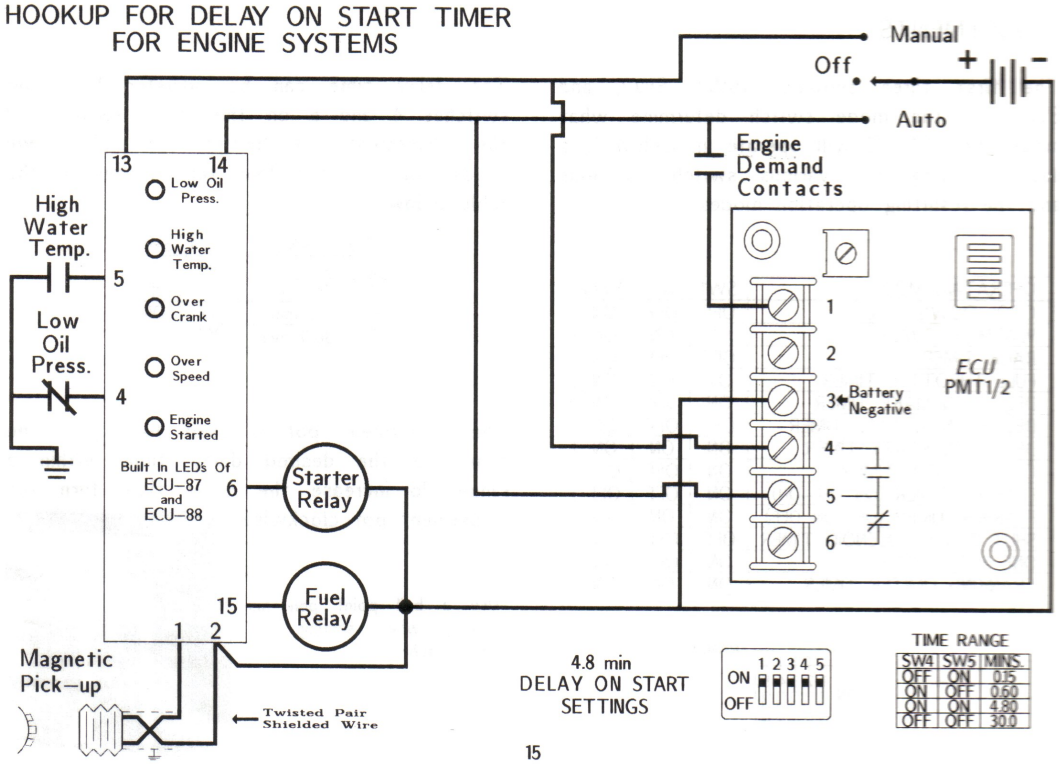
SW4	SW5	MINS
OFF	ON	0.15
ON	OFF	0.60
ON	ON	4.80
OFF	OFF	30.0

DELAY ON START TIMER FOR ENGINE SYSTEMS

The *ECU–PMT1/2* can be set to hold the engine for pre–start conditioning. This delay of an engine start can allow many advantages to the engine package. Sometimes the engine run signal may flutter on and off causing jerky and false starts. Other instances are power outages that are very short in duration and do not merit a standby generator start up. All of these problems can be solved with the *ECU–PMT1/2* module. It simply allows a delay period to occur before a signal is sent to the automatic engine control.

The example on the opposite page is shown with an *ECU–57/87/88* automatic engine control. The engine demand contacts are wired from the auto position to terminal 1 of the *ECU–PMT1/2.* When the engine demand contacts close, voltage is placed on terminal 1 causing the timer to run. If the voltage remains for the duration of the adjusted delay, the contacts of the module will close thus supplying power to the engine control via 4 and 5, and starting the engine. Removing voltage from 1 will cause engine shutdown and reset the timer.

HOOKUP FOR DELAY ON START TIMER FOR ENGINE SYSTEMS

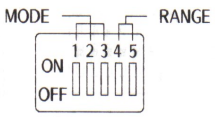


TIME RANGE		
SW4	SW5	MINS.
OFF	ON	0.15
ON	OFF	0.60
ON	ON	4.80
OFF	OFF	30.0

ADJUSTMENTS

The first three switches (SW1, SW2, and SW3) of the mode switch determine what mode the *PMT1/2* will operate in. Below is a table showing the various switch positions and the resulting operation modes:

OPERATING MODE	SW1	SW2	SW3
COOL DOWN TIMER	OFF	OFF	ON
WARM UP TIMER	ON	ON	ON
RACK TIMER	OFF	OFF	ON
FULL THROTTLE TIMER	ON	ON	ON
DELAY ON MAKE TIMER	ON	ON	ON
DELAY ON RELEASE TIMER	OFF	OFF	ON
DELAY ON START TIMER	ON	ON	ON
CRANK CYCLE TIMER	ON	OFF	OFF
FLASHER TIMER (ON–OFF–ON)	ON	OFF	OFF
FLASHER TIMER (OFF–ON–OFF)	ON	ON	OFF
SHUT DOWN SOLENOID TIMER	OFF	OFF	ON
ONE SHOT TIMER	ON	OFF	ON
CRANKING LIMITER TIMER	ON	ON	ON

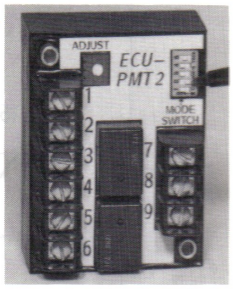


The delay time can be adjusted by using switches 4 and 5 on the mode switch and the adjustment pot. Switches 4 and 5 will choose one of the four time ranges in the table below:

TIME RANGE	SW4	SW5
0 – 9 sec.	OFF	ON
0 – 36 sec.	ON	OFF
0 – 4.8 min.	ON	ON
0 – 30.0 min.	OFF	OFF

The adjustment pot is used to adjust the timer to the desired delay time within a range. To increase the delay time turn the adjustment pot clockwise.

Use a ball point pen (as shown) when setting the DIP switch.



QUICK ADJUSTMENT FOR LONG DELAY TIMES

For long delay times there is a way to quickly adjust the *PMT1/2* to give the proper delay. First it is important to understand how the *PMT1/2* calculates its delay. The timer derives the delay time by using a multiple of the base time. The table below shows the four different settings and the associated multiples:

SETTING	RANGE	SW4	SW5	BASE MULTIPLE
A	0 – 9 sec.	OFF	ON	1
B	0 – 36 sec.	ON	OFF	4 times setting A
C	0 – 288 sec.	ON	ON	32 times setting A 8 times setting B
D	0 – 1800 sec	OFF	OFF	256 times setting A 64 times setting B 8 times setting C

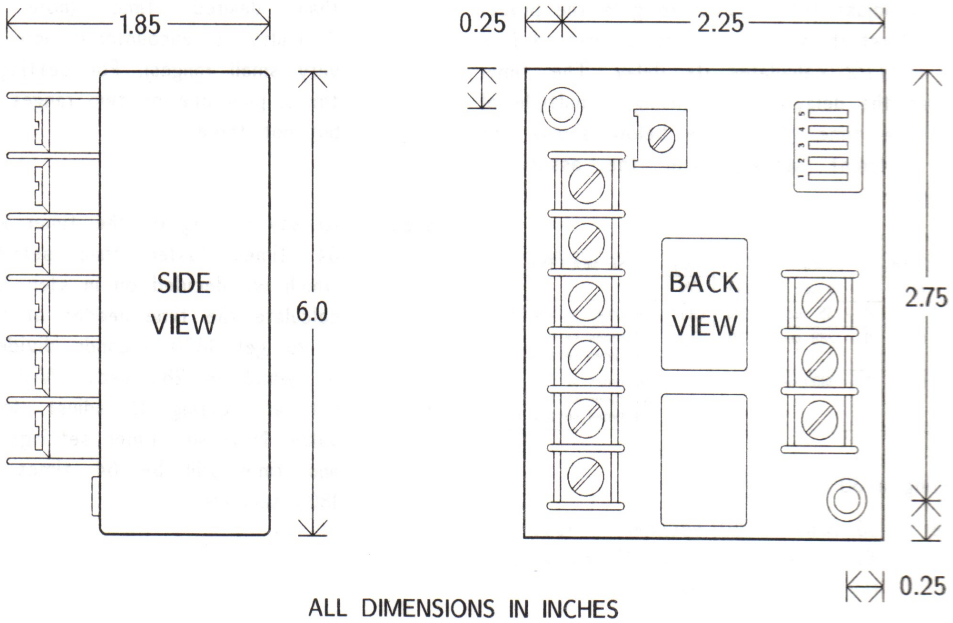
Setting a 30 minute delay:

Step 1: 30 mins X 60 sec/min = 1800 sec
This requires setting D to achieve the final time range.

Step 2: Choose a time range setting lower than desired time (note: great difficulty is encountered upon using very small ranges). For setting long times, pick one or two ranges below but not three.

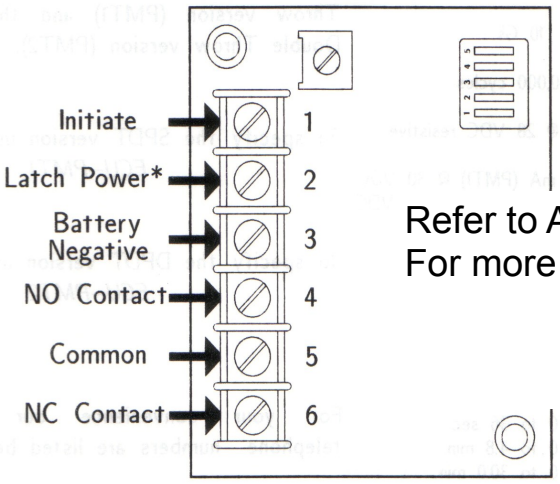
Step 3: At say setting B, the timer expires 64 times faster than setting D which we decided on in step 1. Now calculate the time needed at setting B to get 1800 seconds divided by 64 which is 28.1 secs. With timer set at setting B adjust to this value. Now set timer settings to D and time will be 64 times B or 1800 seconds.

DIMENSIONAL AND MOUNTING



ALL DIMENSIONS IN INCHES

TERMINAL IDENTIFICATION FOR ECU–PMT1/2

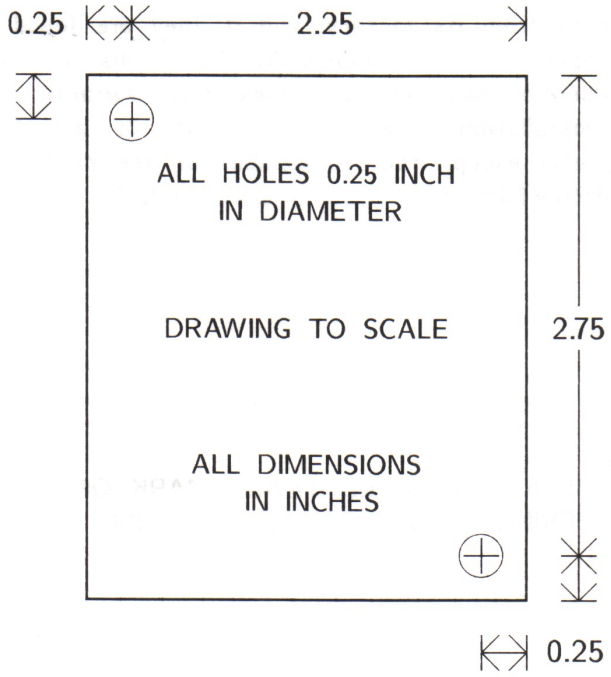


Refer to Adjustments For more information

* The Latch Power terminal is connected to battery positive only in the Delay On Release, Rack, and Cool Down modes.

For current specifications see the PMTN flyer

DRILLING TEMPLATE



YOU MAY CENTER PUNCH DIRECTLY THROUGH THIS PAPER FOR ACCURATE HOLE LOCATION

MANUFACTURER'S WARRANTY

Engineering Concepts Unlimited, Inc. warrants and guarantees that its electronic control modules 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. Noblesville, 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.