

**V_Net Relay Module Installation Instructions:
Part Number: 230-VM-RELAY**

WARNING!!!!!!!!!!

**IMPORTANT INFORMATION: READ BEFORE
INSTALLATION!**

The relay outputs of the 230-VM-RELAY module may turn on when not expected if the module is improperly programmed and/or other components of your data logger fail or are inadvertently disconnected. For instance, a water temperature sensor is disconnected.

If you are using the relay module to control a device that can damage the vehicle or cause bodily injury to persons near the vehicle you must take precautions to insure damage or injury is prevented. This includes but is not limited to the following.

- 1) Be sure the relay module is programmed properly before connecting the controlled device to the module. Whenever possible verify operation of the module by substituting an indicator lamp for the device to be controlled to verify operation prior to connecting the actual controlled device.
- 2) Install warning signs or decals near any devices that can automatically turn on during operation.
- 3) Disconnect power to the V_Net System any time individuals are working near the controlled devices.
- 4) Install and use manual shutoffs on all relay controlled devices to allow for safe working conditions near the controlled devices. For instance provide a separate on/off power switch in-line with the supply power to an electrically controlled fan. Be sure the switch is in the off position before performing maintenance operations near the fan unit.
- 5) Be sure all members of your crew are aware of the automatically controlled devices and know the safety procedures for working on or near these devices.

**DISCONNECT THE VEHICLES BATTERY
DURING INSTALLATION!!!!!!!!!!**

V_Net Relay Module

Part Number: 230-VM-RELAY

Relay Module Configuration Setup:

Module Type: IO_RELAY

Serial Number: _____

Channel Name: Relay #1 **Function:** _____

Input Channel 1: _____ Input Channel #2: _____

Low Set Point _____ Low Set Point _____

High Set Point _____ High Set Point _____

Hysteresis _____ Hysteresis _____

Channel Conditions valid when
channel value falls:

 _____ Inside set point window
 _____ Outside set point window

Channel Conditions valid when
channel value falls:

 _____ Inside set point window
 _____ Outside set point window

Channel Combination Logic:

 _____ Relay #1 on when both channels meet setpoint conditions
 _____ Relay #1 on when either channel meets setpoint conditions

Relay #1 On Delay = _____ seconds
Relay #1 Off Delay = _____ seconds
Relay #1 Type = _____ Latching _____ Non-Latching

Channel Name: Relay #2 **Function:** _____

Input Channel 1: _____ Input Channel #2: _____

Low Set Point _____ Low Set Point _____

High Set Point _____ High Set Point _____

Hysteresis _____ Hysteresis _____

Channel Conditions valid when
channel value falls:

 _____ Inside set point window
 _____ Outside set point window

Channel Conditions valid when
channel value falls:

 _____ Inside set point window
 _____ Outside set point window

Channel Combination Logic:

 _____ Relay #2 on when both channels meet setpoint conditions
 _____ Relay #2 on when either channel meets setpoint conditions

Relay #2 On Delay = _____ seconds
Relay #2 Off Delay = _____ seconds
Relay #2 Type = _____ Latching _____ Non-Latching

Module Description:

The 230-VM-RELAY module is configured either as a single or a dual relay output module, depending on your application. The module is used to control onboard equipment such as electric water pumps via the V_Net data bus on your RacePak data logger system. The relay module monitors information such as water temperature being transmitted over the data bus and when the value of the monitored information meets the pre-programmed conditions set by the user, the relay output is turned on activating the external device. As the relay module obtains the information it needs directly from the V_Net data bus additional sensors are required only when these sensors are not present in your current data logger system.

The relay module provides a extremely flexible set of programmable parameters to allow the user to setup the module to meet his/her specific needs. The relay module included with this information sheet has been factory configured as detailed on the previous page.

IT IS EXTREMELY IMPORTANT THAT YOU REVIEW THE FACTORY CONFIGURATION OF THIS MODULE TO INSURE THE CONFIGURATION IS COMPATIBLE WITH YOUR SPECIFIC USAGE PRIOR TO CONNECTING POWER TO THE CONTROL RELAY IN YOUR SYSTEM. IN ADDITION, YOU SHOULD UPDATE THE PC CONFIGURATION OF YOUR SYSTEM (AS DETAILED BELOW) AND VERIFY THE MODULES CONFIGURATION MATCHES THE FACTORY CONFIGURATION AS DESCRIBED ON THE PREVIOUS PAGE.

IF YOU ARE USING THE RELAY MODULE TO CONTROL ANY DEVICE THAT CAN CAUSE DAMAGE TO YOUR VEHICLE OR INJURY TO INDIVIDUALS NEAR YOUR VEHICLE YOU MUST PROVIDE A MANUAL DISCONNECT AND APPROPRIATE WARNINGS TO INSURE SAFE WORKING CONDITIONS. (READ FRONT COVER OF THESE INSTRUCTIONS)

The 230-VM-RELAY module consists of a blue V_NET connector and control module and either one or two relay modules as shown below.



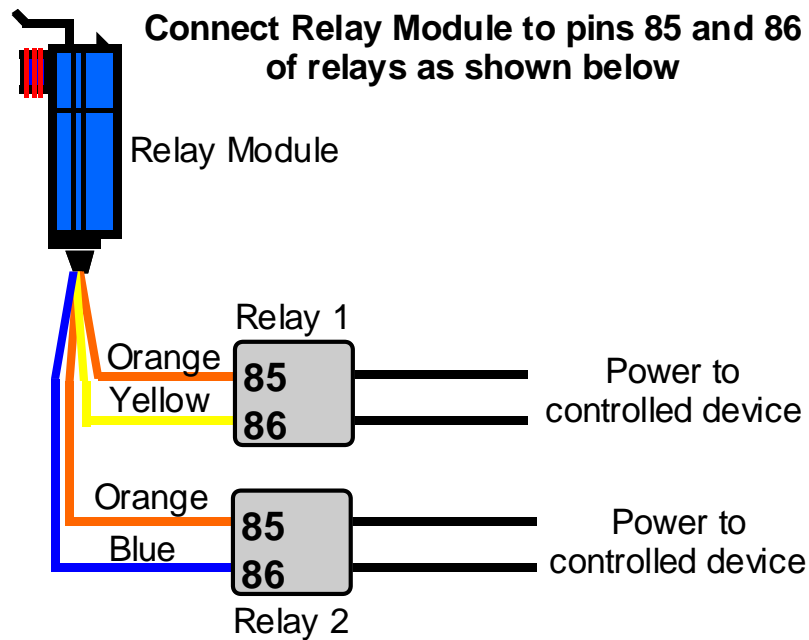
Module Installation:

The relays supplied with this module will be inserted in the electrical wiring of your vehicle in much the same manner as an on/off switch used to manually control the devices on your car. As such you will need to select a mounting location for the V_Net connector module and relays that is convenient to the wiring in the vehicle.

The V_Net connector module can be inserted at any location in the V_Net data bus cable in your vehicle. If the V_Net bus cable does not run near the desired mounting location you may want to extend the V_Net data bus by installing additional cable sections. These cables can be purchased in a variety of lengths. (Contact RacePak for assistance) Select a location where the connector module can be mounted safely. Avoid mounting near heat sources and high voltage ignition wires. The connector module must be mounted in a location where the temperature does not exceed 185 degrees or the module will be damaged.

Mount the relays on a solid member on the body of the vehicle. Avoid mounting the relays on loosely secured elements of the body as these elements can vibrate radically during operation. The vibrations can cause the relays to operate erratically.

After you have connected the module into the V_Net cable and have mounted the module and relays, connect the individual wires from the module to the relays as shown in the diagram below using the supplied connector and terminals. Secure the wires to the chassis.

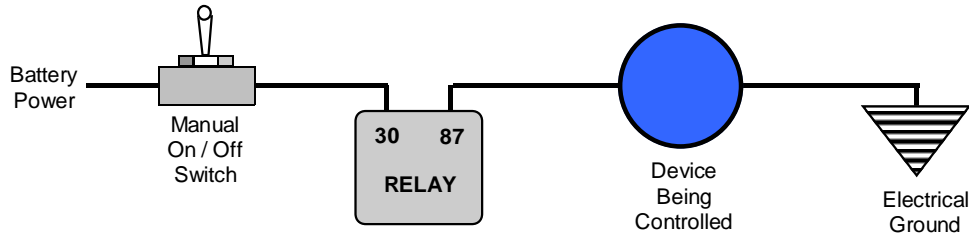


If you only use one of the relays insulate the ends of the spare wires to insure they do not come into contact with the chassis or other wires in the vehicle. Contact with the chassis or other wires may cause an electrical fire and/or cause the main V_Net System fuse to be blown.

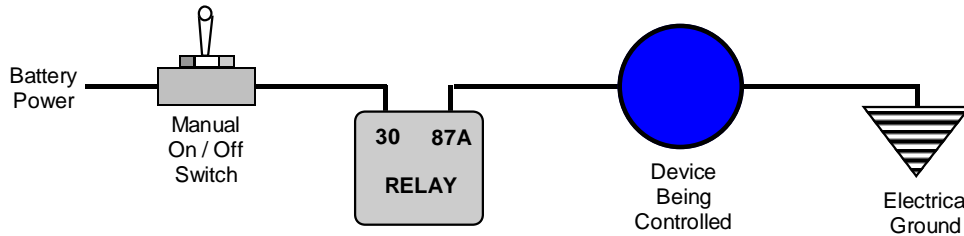
Next connect the relay contacts in series with the power to the device to be controlled using the supplied connector and terminals as shown at the top of the next page.

WARNING!!!!!!!!!!!!
BE SURE THE BATTERY IN THE VEHICLE IS DISCONNECTED
DURING THE INSTALLATION TO AVOID INADVERTANTLY
ACTIVATING THE DEVICES TO BE CONTROLLED!!!!!!!!!!!!

To use a Relay Module to turn ON an external device connect the relay as follows:



To use a Relay Module to turn OFF an external device connect the relay as follows:



After you have completed installation leave power to the device controlled by the relay off until you have completed the module software setup as detailed on the following pages.

Software Setup and Module Configuration

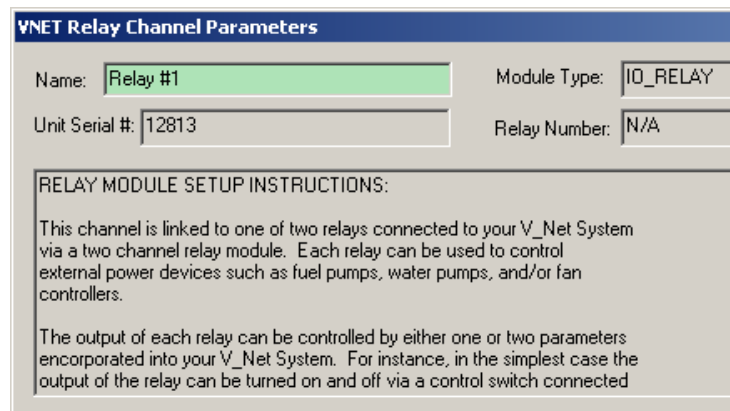
The module has been factory configured as described in the setup box located on the second page of this installation guide. Before applying power to the devices controlled by the relay you must review the factory configuration and insure the unit has been properly programmed for your application. In addition, you should read in the configuration of the relay module into your PC and verify the programming of the module.

To perform these steps you will need to connect either your V-Net Series data logger to your PC using the units serial interface cable (See your units instruction manual for details). Next start the RacePak DataLink program. If you selected your car configuration file as the default configuration file, the file will be opened and the file tab for the car configuration file will be selected automatically. If it is not, open your car configuration file by selecting the **Open Car Configuration** menu item located in the **Files** main menu selection.

Next apply power to your onboard V_Net system, **(DO NOT APPLY POWER TO THE DEVICES CONTROLLED BY THE RELAYS)** wait 10 seconds and select the **Read VNET Config** menu item located in the **Edit** main menu selection. The DataLink program will read in the configuration of your system. If everything works properly, a channel button will appear for each relay in the configuration file representing this module. The buttons will be captioned **“Relay #1 and Relay #2”**.

To verify and edit the setup parameters on each of the relays position the mouse cursor over the channel button and click the right mouse button. The VNET Relay Channel Parameters dialog box will be displayed. A Portion of this dialog box is show to the right.

Locate the text box labeled **Relay Module Setup Instructions**. This text box provides online instructions for modifying the setup of this module. Read the instructions and modify the setup as desired. (Please note the scroll bars located on the left- hand portion of the text box are used to scroll through the instructions). A complete set of setup instructions and examples is also included at the end of this instruction sheet. Be sure you have read and understood these instructions prior to operating the relay module.

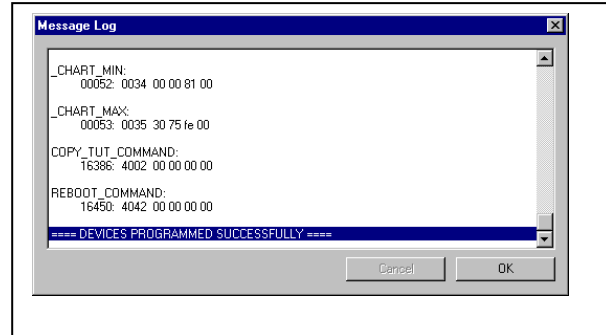


Sending the Configuration to the Module:

When you have finished editing the configuration on your PC, you will need to send the information to the module. Be sure the serial interface cable is connected to your data logger and power is applied to the system. To send the information position the mouse cursor over the **Send Configuration** button and click the left mouse button. The progress box as shown below will be displayed.



When finished sending the message “**Device Programmed Successfully**” should be displayed at the bottom of the progress box. If you receive an error message, turn power to the system off and then back on and repeat the send configuration process. If problems persist, check the troubleshooting section in your manual and then contact RacePak.



Save your configuration file and update the Module Configuration Setup Box on the front of this worksheet with the new setup configuration.

IMPORTANT:

Save this Installation Worksheet in your System Manual in Appendix V. This worksheet is part of your system documentation. You may need this worksheet when modifying or trouble shooting your system.

DETAILED RELAY MODULE SETUP INSTRUCTIONS:

The V_Net relay module offers a high degree of programmability to allow the customer to configure the operation of the relay to best meet his/her application. This programmability means, however, that the user must take the time and effort to read and understand operation of the relay module before using the module if proper operation is to be achieved. The following information takes the user through a step by step process in setting up a relay output channel.

The output of each relay can be controlled by either one or two parameters incorporated into your V_Net System. For instance, in the simplest case the output of the relay can be turned on and off via a control switch connected to your V_Net system or by a parameter such as water temperature exceeding a user programmable limit.

In a more complex usage the relay can be controlled by two parameters incorporated into your V_Net system. As an example the relay can be set to turn on only if two conditions are met. For example a fan control relay can be set to turn on only if an on/off switch is turned on **AND** the water temperature exceeds a user programmable limit.

Each control parameter has a user programmable low set point and a high set point that control when the relay is turned on. In addition, the relay can be programmed to turn on when the measured value is either between the two set points (inside the window) or is below the low set point or above the high set point (outside the window). This allows the relay to be used for different purposes. For example, if oil pressure is the monitored value with a low set point of 30 PSI and a high set point of 100 PSI, the relay can be set to turn on outside the window providing a low/high oil alarm or can be programmed to turn on inside the window providing an OK signal used to control other operations.

If one of the control parameters is a switch you must set the low set point to a minus1 and the high set point to 0. Switches only send two values 0 for Off and 1 for ON. Setting the high set point to 0 instructs the relay to turn on any time the value sent by the switch is greater than 0 (i.e. 1 when the switch is on).

Each channel can also be programmed with a hystoresis value. This value causes the relay to turn off and on at different set points preventing chattering of the relay. For instance a hystoresis of 5 PSI can be programmed in our oil pressure example above. In the low oil alarm setup (outside window relay operation) the relay would turn on when the oil pressure dropped below 30 PSI or exceeded 100 PSI and would turn back off when the oil pressure raised above 35 PSI or fell below 95 PSI.

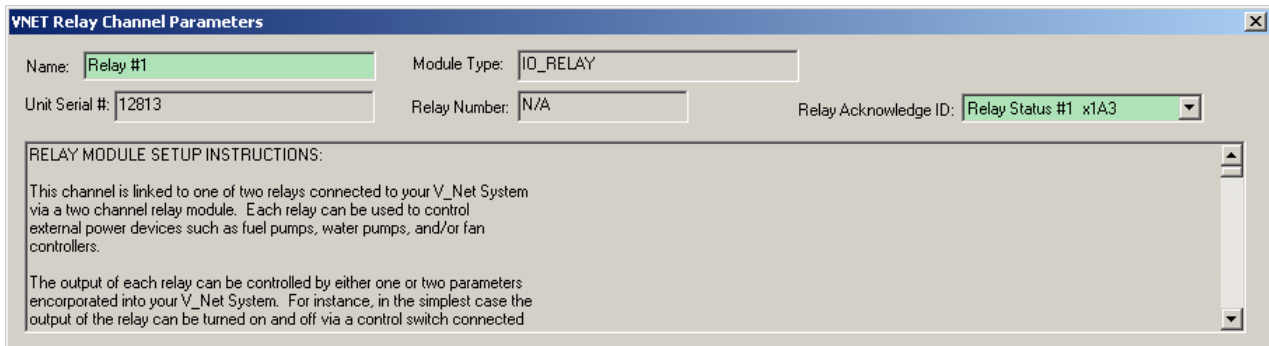
When two parameters are used to control the relay output, the parameters can be combined in two different ways. The parameters can either be 'ORed' or **ANDed** together to cause the relay to be turned on. In the **ORed** case when the set point conditions on either of the control parameters would cause the relay to turn on the relay will turn on. In the **ANDed** case the set point conditions of both of the control parameters must be met before the relay will turn on. The setting of each of these parameters is discussed in detail below. In addition to setting the conditions that cause the relay to turn on or off, each relay can be programmed with an on delay time and a separate off delay of up to up to 100 seconds providing added flexibility.

SETTING THE RELAY CHANNEL PARAMETERS

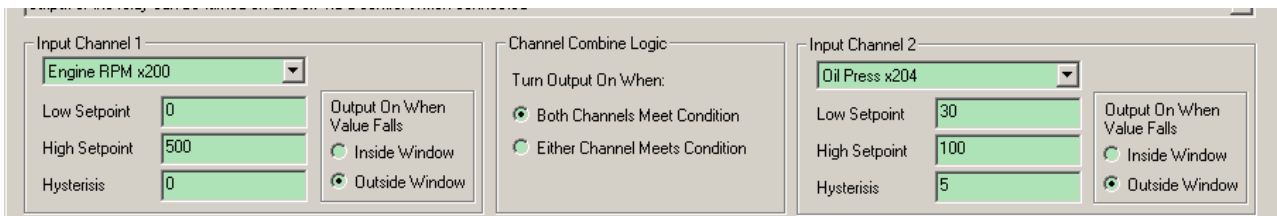
When you first install a two channel relay module in your system you will need to program each of the relay channels in the module so the module will know which parameters in your system to monitor and what low and high set point when exceeded will turn on the relay. To perform the programming, move the mouse cursor over the channel button of the relay to be programmed and click the right mouse button. The V_Net Relay Channel Parameter Edit Dialog box will be displayed. At the top of the box will be several text boxes as shown below. These boxes can be used to identify which relay you are currently programming. The **Unit Serial #** identifies to which V_NET relay module the relay you are programming is connected. The **Relay Number** box represents which relay on this module you are programming. The **Name** box will initially contain the default name give by the system, in this case Relay #1. You can rename the relay to correspond to how you will be using it for instance OIL ALARM by positioning the mouse cursor over the box and then click the left mouse button. You will then be able to edit the name of the channel.

The operating condition of the relay module can be monitored during telemetry sessions and/or by the RacePak intelligent switch modules. This feature can be helpful in setting up and trouble shooting the relay module. This feature is an advanced debug feature designed for use by RacePak personnel. Contact RacePak if you require further help in debugging your relay operation.

Directly below the text boxes is a large dialog box. This box offers an on line version of these programming instructions. Use the scroll bars on the side of the box to scroll through the online instructions.



Once you are sure you have selected the correct relay you are ready to setup the relay for operation. The setup is performed by editing the setup parameters located at the center of the Parameters edit box. A sample of the setup parameters is shown below. We will refer to this example during the remainder of these instructions.



SETTING THE PRIMARY CONTROL CHANNEL:

The first step in programming the relay output is to select the first parameter “**Input Channel 1**” used to control the relay. This is accomplished by setting the relays **Input Channel 1** VNet ID. To set the Input Channel 1 click on the Input Channel 1 selection list. A list of all of the measured parameters, such as Water Temperature will be displayed. Select the parameter you wish to use to control the relay by clicking on it. Remember the V_Net ID of the channel measuring the parameter must be set before its name will appear on the list. In this example we have selected Engine RPM. Engine RPM will be the first parameter used to control the relay.

SETTING THE PRIMARY CHANNELS OPERATING CONDITIONS:

After you have selected the desired first control parameter, the next step is to set the low and high control set points for the channel. This is accomplished by entering the values in the **Input Channel 1** low and high set point entry boxes as shown above. If either the low or the high set point is not to be used simply enter a value for the set point that will not be encountered in normal operation. For instance enter a -100 for a low set point or +500 for a high set point for water temperature.

The next step is to determine whether you want the relay on when the measured value is between the low and high set points or on when the measured value is below the low set point or above the high set point. Find the **Input Channel 1** window selection box captioned **Output On When Value Falls**. Select **Inside Window** if you want the relay on when the measured value falls between the low and high set point. Select **Outside Window** if you want the relay on when the measured value falls below the low set point or above the high set point for the channel.

The final step in setting up the Primary Control Input is to enter a hystoresis value desired for the channel. The hystoresis value will cause the relay to turn on and off at different points to avoid chattering the relay as discussed previously. Enter the value in the appropriate box below.

In our example as shown above, Engine RPM is used as the first parameter to be used in controlling the relay. When engine rpm exceeds 500 rpm the input logic for input channel 1 will be met. When the conditions are met the relay will turn on depending on the programming of the Input Channel #2 and the Channel Combine Logic as detailed below.

SETTING THE SECONDARY CONTROL CHANNEL

If a secondary channel is to be used to control the relay repeat the steps above to setup the Input Channel 2 setup parameters. If a secondary channel is not to be used be sure to set the Secondary Input Channel V_Net ID to disabled.

In our example Oil Pressure is used as the Input Channel 2 for controlling the relay. In this case the input logic for the input channel 2 conditions will be met any time oil pressure falls below 30 and above 100. When the conditions are met the relay will turn on depending on the programming of the Channel Combine Logic detailed below.

SETTING THE CHANNEL COMBINE LOGIC:

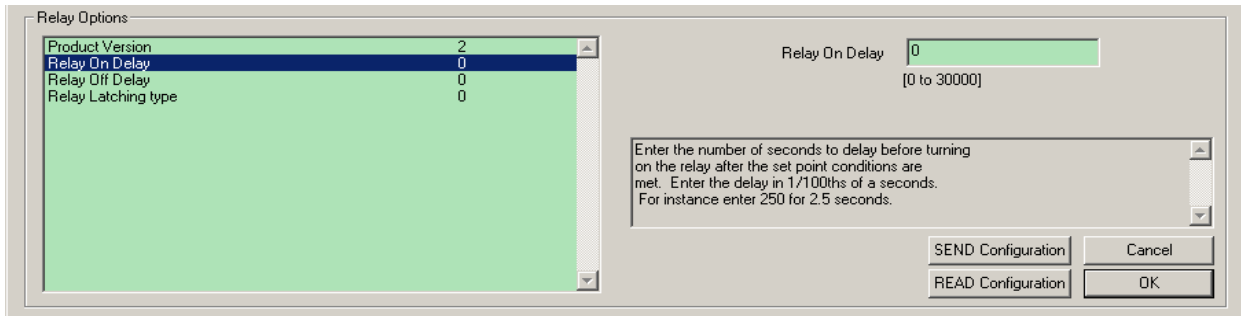
If two channels will be used to control the relay output the final step in setting up the relay control is to determine whether the set point conditions on both channels must be met before the relay will turn on or whether the relay will turn on if either channels conditions are met. Select **Both Channels Meet Conditions** for turning on the relay if the conditions of both channels must be met before the relay is turned on. Selected **Either Channel meets Conditions** if the conditions being met in either of the control channels is sufficient to turn on the relay.

WARNING!!!!!!__ If you select **Both Channels Meet Conditions** and you have set hystoresis on either channel be aware that if a channel with hystoresis exceeds a set point and then becomes less than the set point but still exceeds the hystoresis value the conditions on that channel are still valid for turning on the relay even if the relay does not turn on as conditions for the second channel are not met. For instance if a relay is setup to turn on when Rpm is greater than 5000 with a hystoresis of 1000 Rpm and water temp is greater than 180 the following sequence can occur. If the water temp is below 180 degrees and the Rpm exceeds 5000 rpm but slows to 4500 rpm the relay will be off. If the water temp then raises above 180 the relay will turn on even though the rpm is below 5000. This is due to the fact the engine rpm has not dropped below 4000 rpm. The 5000 rpm set point minus the 1000 rpm hystoresis value. If you do not understand the setup procedures contact RacePak before implementing your relay setup.

In our example above, the relay will turn on only if Engine Rpm is greater than 500 rpm and the oil pressure is either less than 30 PSI or greater than 100 PSI.

SETTING THE RELAY CHANNEL OPTIONS:

The final step in setting up the relay channel is to program the control options for the relay channel. These options are located in the **Relay Options** box located at the bottom of the **V_Net Relay Channel Parameters** edit dialog box as shown below.



To select an option for edit simply position the mouse cursor over the option and click the left mouse button. The option will be highlighted and the dialog boxes to the left on the options selection list will be updated to provide information on the option and to allow editing of the option. The lower right hand dialog box will provide help on setting the option. The upper right text box will allow the option to be edited. Edit the options as detailed below.

SETTING THE ON and OFF DELAY FOR THE RELAY:

The turning on and off of the relay can be delayed by up to 30 seconds by programming the on and off delay found in the relay options box located in the lower left hand portion of this dialog box. The times are entered in 1/100 of a second. Enter 250 for a 2.5 second delay.

SETTING UP THE LATCHING MODE FOR YOUR RELAY:

In most cases you will want your relay to turn on and off as the setup conditions are met. In some instances, however, you may want to set the relay to be latching. When set to latching, once the relay has turned on the relay will remain on until power to the system is removed or the relay is reset by reprogramming the relay. This option is set in the channel options box in the lower left hand section of this dialog box.

SENDING THE CONFIGURATION TO THE MODULE:

When you have finished editing the configuration on your PC, you will need to send the information to the sensor module. Connect your PC to your V50 Record Playback unit or data logger using the serial interface cable supplied with your system. Apply power to the system and wait approximately 10 seconds for the system to initialize. To send the information position the mouse cursor over the Send Configuration button in the lower left-hand corner of this dialog box and click the left mouse button. A progress box will be displayed. When finished sending the message **DEVICE PROGRAMMED SUCCESSFULLY** should be displayed at the bottom of the progress box. If you receive an error message, turn power to the system off and then back on and repeat the send configuration process. If the problems persist, check the troubleshooting section in your manual and then contact RacePak.