

# MSD<sup>®</sup> IGNITION INSTALLATION INSTRUCTIONS

## Programmable Pro Mag Controller PN 8973

### Parts Included:

- |   |  |
|---|--|
| 1 - Pro Mag Controller, PN 8973         | 1 - 12 Pin Harness                           |
| 1 - TI Pressure Gauge Harness           | 1 - Mag Pickup Harness, PN 8164              |
| 1 - MSD Pro-Data+ Disk                  | 2 - 10 feet, 9-Pin Harness                   |
| 4 - Vibration Mounts & Screws           | Optional: Inductive Cam Sync Pickup, PN 7555 |
| 1 - Parts Bag, Terminals and Connectors |  |

The Pro Mag Controller must be used with an MSD Pro Mag 12, 20 or 44. Dual magneto systems will require two Controllers. Also, a 12 volt source is required.

### WIRING

<b>RED</b>	Connects to a switched +12 volt source.
<b>BLACK</b>	Connects to the engine ground or battery negative.
<b>VIOLET/GREEN 2-PIN CONNECTOR</b>	Connects to the generator's magnetic pickup or crank trigger pickup.
<b>ACCESSORIES</b>	
<b>DARK BLUE</b>	This is the main reset wire for several features of the Controller. When 12 volts are applied to this wire it will activate the Launch Rev Limit. It will also activate the Launch Retard value and the Launch Curve.  It will also reset the following programmable features: Shift Light Sequence will go to first gear. The Time Retard Curve timer will reset to 0.0 seconds. The Time Switch timer will reset to 0.0 seconds.
<b>LIGHT BLUE</b>	This controls the Burnout Rev Limit. When 12 volts are applied the Burnout Rev Limit is active. (The Launch Limit will override the Burnout Limit if both are activated at the same time.)
<b>RETARD STAGE WIRES</b>	
<b>PINK DARK BROWN TAN</b>	Step 1 retard enabled at +12 volt input and above Step 1 Rpm value Step 2 retard enabled at +12 volt input and above Step 2 Rpm value Step 3 retard enabled at +12 volt input and above Step 3 Rpm value
<b>Note:</b> When activated at the same time, these retard stages are added together. They are also added with the Launch Retard and Run Curve Retard values as well. Total retard amount is 40°.	

<b>ORANGE/YELLOW</b>	This is the Shift Light output wire. It can switch up to 5 amps continuous to ground when enabled.
<b>YELLOW/YELLOW 2 - PIN MODULE</b>	This is the rev limiter plug for the Pro Mag's rev limiter. It plugs into the side RPM module socket of the Electronic Control Box.
<b>WHITE/BLUE</b>	This is the PSI switch output wire. It can switch up to 5 amps continuous to ground when enabled.
<b>VIOLET/BLUE</b>	This is the RPM/Time switch output wire. It can switch up to 5 amps continuous to ground when enabled.
<b>BROWN/WHITE</b>	Connects to the magneto's input trigger wire.
<b>GRAY</b>	This is the tach output signal wire + 12 volt pulse at 20° - 30° duration.
<b>3-PIN CONNECTOR BROWN/VIOLET BROWN/YELLOW DARK BROWN</b>	Connects to an external MAP or gauge pressure sensor. +5 volt supply Ground Map Signal

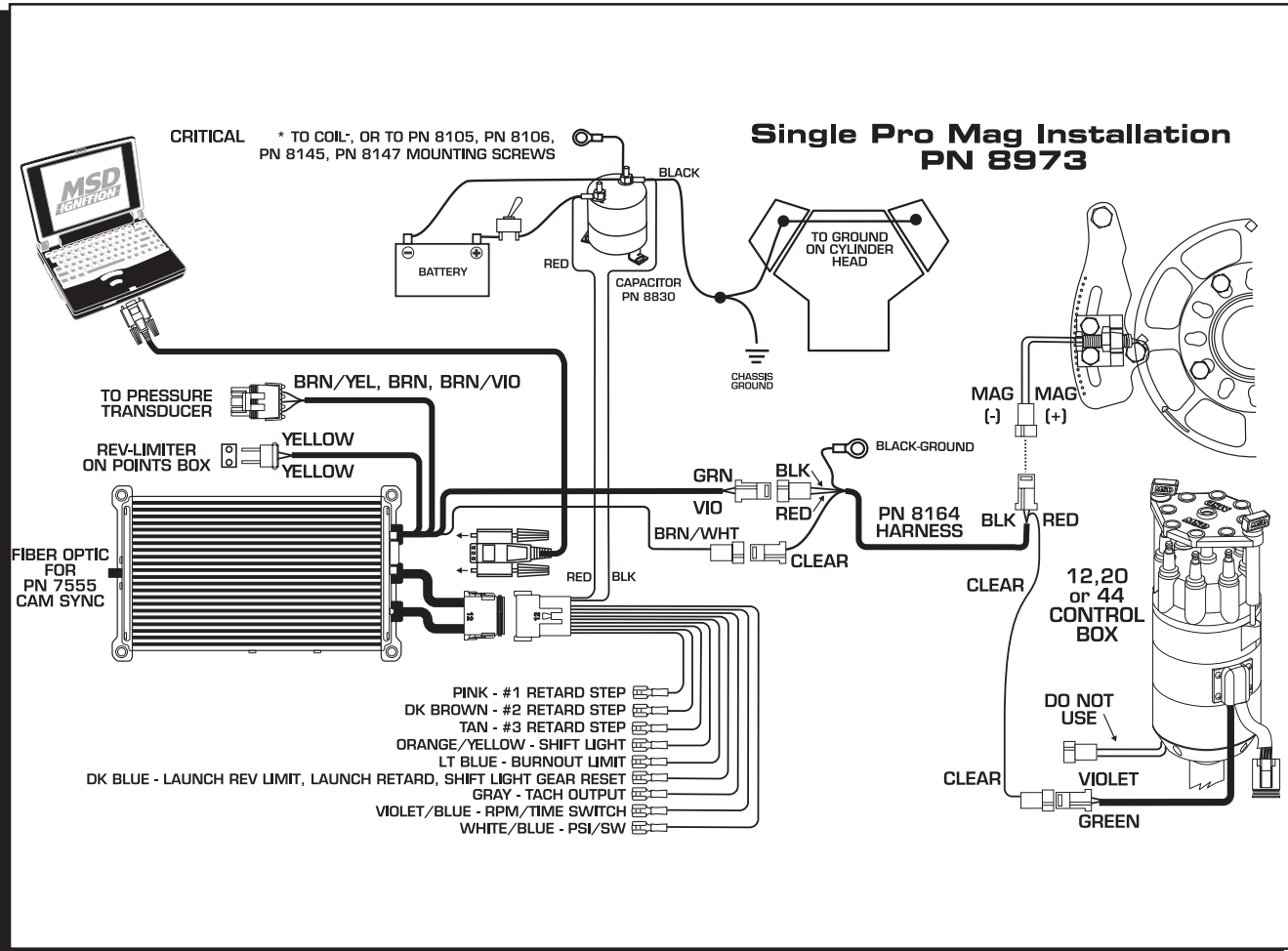


Figure 1 Single Magneto System.



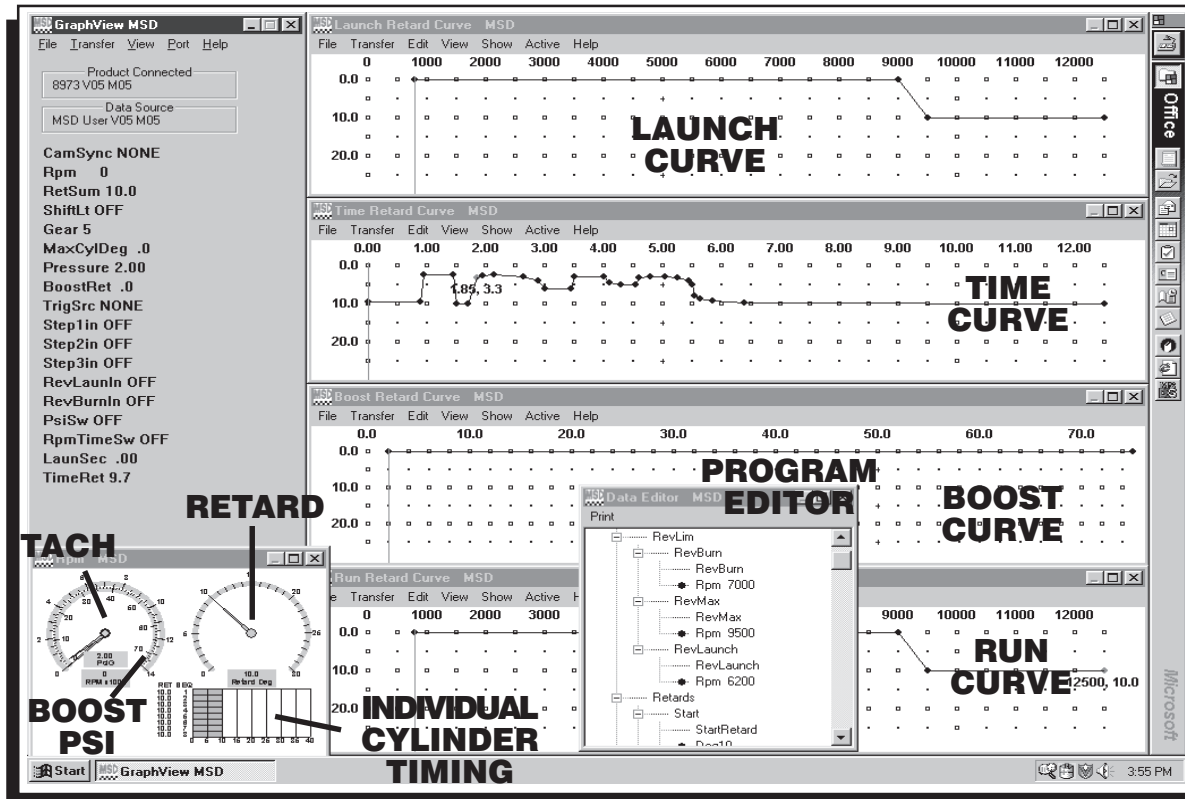


Figure 3 Menu Screen of the Pro Mag Controller.

## PRO-DATA+

### INSTALLATION OF THE PRO-DATA+ SOFTWARE

1. Insert the installation disk into your floppy disk drive.
2. In Windows, click on Start then select Run.
3. In the box type, "A:Setup" and press Enter.
4. The screen will walk you through several steps.
5. Once loaded, your monitor will have an MSD Graph View logo. Click on it to open the software.
6. A program will open. Go to the upper left corner of the screen and click on File, then Open.
7. This will open a menu of part numbers. Select "8973".
8. This will open another menu of versions. Highlight and open the "8973vxx.IGN" (xx determines the versions, such as 02). This will open the Pro-data+ software for the Pro Mag Controller.

### SAVES AND TRANSFERS

Whenever a change is made to a program, it either must be saved to a file in your PC or it needs to be transferred to the ignition. You will notice that whenever you make a change to a program, the bullet next to the modification value will turn red. It will remain red until you save it to a file or the MSD Controller. There are two ways to save your files.

**Save to MSD:** This step will save any changes directly into the ignition. If you are only making one or just a couple modifications this works well.

**Save to PC:** This will save your changes to only show on the PC screen (indicated by a red bullet point next to any altered values). These modifications will not be active or saved until you save the file or transfer the information to the MSD Controller.

You can create numerous files on your PC and download them for testing purposes or by saving programs you used at different races or events.

## **PROGRAMMABLE FEATURES**

The following explains the programmable features of the PN 8973 Programmable Pro Mag Controller. The features are listed in the same order that they show on the Data Editor list in the software. Note that all of the retard amounts are cumulative and the maximum amount of retard is 40°.

### **STATS**

Stat 1: This is only used with the Hand Held Monitors, PN 7550, PN 7553.

### **Rev Limits**

Up to three different rev limits can be programmed in 100 rpm increments.

**Burnout Rev Limit: RevBurn** - This limit is activated when 12 volts are applied to the Light Blue wire. It is adjustable from 2,000 to 12,500 rpm. Default is 7,000 rpm.

**Launch Rev Limit: RevLaunch** - This limit is activated when 12 volts are applied to the Dark Blue wire. It is adjustable from 2,000 to 12,500 rpm. Default is 6,200 rpm.

**Note:** If the Dark Blue and Light Blue wires are activated at the same time, the Launch limit (Dark Blue) will override the Burnout value.

**Max Speed Rev Limit: Revmax** - This is the overrev limit and is adjustable from 2,000 – 12,500 rpm. It is active whenever the Launch and Burnout limits are off. Default is 9,500 rpm.

### **RETARD PROGRAMS**

#### **Start Retard**

Program an amount of retard that will occur while the engine is cranking. It is adjustable from 0° - 25° in 1° increments. This is an automatic feature and will enable below 500 rpm and will deactivate when the engine rpm increases above 800 rpm. Default is 10°.

#### **Launch Retard**

This program lets you select an amount of retard that is activated when the Dark Blue (Launch) wire is connected to 12 volts (and the engine is above 800 rpm). You can program an amount of time that the retard value takes to ramp back to the set Run timing. This is adjustable from 0 – 2.5 seconds in 0.01 second increments and starts as soon as 12 volts are removed from the Dark Blue Wire.

#### **Launch Retard**

##### **Deg 0.0**

The retard value that is activated when the Launch (Dark Blue) wire is connected to 12 volts. Default is 0°

##### **Ramp .50**

This is the time based ramp that controls the rate which the retard amount returns to zero retard. The ramping begins when 12 volts are removed from the Launch wire. It is adjustable in 0.01 second increments up to 2.5 seconds. Default is .5 seconds.

### Step Retards

There are three step retards that are controlled through three corresponding activation wires or through rpm.

**Activation through Wiring:** Each step is activated when 12 volts are applied to its wire. When the steps are enabled at the same time the retard amounts are added together. The maximum retard possible is a total of 40° (including other retard amounts from a launch, run or gear retard).

Step 1 – Pink Wire

Step 2 – Dark Brown Wire

Step 3 – Tan Wire

**Activation through RPM:** Each step retard can also be activated through rpm. In order to achieve this, 12 volts must still be applied to the corresponding wire then the rpm level must be set. The retard will only activate once the engine reaches the programmed rpm level. Note that the retard will remain active above this rpm, even when other stages are activated. It will deactivate if the rpm drops below the set amount.

**Note:** If you prefer to activate the step retards through the activation wires and not rpm, then the rpm value in each of the desired step menus must be set to 800 rpm.

**Step Retard Ramp:** Each retard step can be ramped from its full retard amount to zero over a time based program. There is a Sec 0.0 adjustment for each step. It is adjustable from 0-2.5 seconds in 0.01 second increments. Default is 0.

### Step 1 (2 and 3)

<b>Deg 0.0</b>	The retard amount when the stage is activated.
<b>RPM 800</b>	The rpm that the engine must reach before the retard is activated.
<b>Sec 0.0</b>	The time based ramp of the retard amount to zero retard. Defaults are Step 1 - 2.0°, Step 2 - 3.0°, and Step 3 - 5.0°.

**Step Retard Off Delay:** This feature will set a time based delay to deactivate the step retards. This is designed to keep the timing retarded to clear the engine of any nitrous oxide prior to deactivating the retard. It is adjustable from 0 – 2.5 seconds in 0.01 second increments. When the step retard wire is deactivated or the engine rpm drops below the set activation point, this delay time is activated. Default is .5 seconds.

### Gear Retards

These retards allow an additional retard to be activated automatically by sensing the rpm drop between shifts. This way no additional wiring or switches need to be connected. Each gear retard can be programmed from 0°-5° in 0.1° increments. These retards are cumulative with any other retards programmed in the Run Curve, Step Retards or Cylinder Timing, with 40° being the maximum.

The number of gears is adjustable under the SHIFT menu, as well as the amount of rpm drop the controller needs to see to know that a different gear has been selected. Up to six gears can be programmed. The retards are programmable for 3-6 gears (this is due to the launch curve and run curve being used for 1-2 gears). Default is 0° for the retards, five gears and a 600 rpm drop.

<b>Gear 3</b>	The selected gear to retard the programmed amount.
<b>Deg 0.0</b>	The amount of retard for the selected gear, 0 – 5°, 0.1° increments.

## SENSORS

**PSI Sensor:** This allows you to input the specification of the MAP sensor. The data used from this sensor is averaged over a minimum of two engine revolutions to thoroughly filter pressure spikes at the sensor. This can be programmed for 2, 4, 6 or 8 revolutions.

**RevAvg4**                      The number of engine revolutions to average the pressure.  
**Psig**                              Program the MAP sensor specifications. Select 30 psia, 45 psia, 75 psia or 75 psig.

**Low Boost Range**      This menu is used with the 30-45 psia sensors.

**High Boost Range**      This menu is used with the 75 psia and 75 psig sensors.

### MSD MAP Sensors:

1-Bar, for n/a engines, PN 23111  
2-Bar, for 2-30psia, PN 23121  
3-Bar, for 2-45psia, PN 23131  
TI PSIG (gauge) Sensor available through Racepak, PN 810-PT-75GVT

## RUN TIMING CURVE

Think of this curve as an electronic mechanical advance. This curve lets you program the timing curve of the ignition from 800 – 12,500 rpm in 0.1° increments for every 100 rpm (up to 25°). It is active once the engine shifts to second gear (the launch curve is selected in first). The maximum amount of retard is 40° and that includes any other retards that are programmed such as step retards, cylinder timing, gear retards or others. This is the default timing curve and is easiest to edit through the Pro-Data software.

## LAUNCH CURVE

This Curve is programmed by plotting a curve on the Launch Chart. Adjustments are made in 100 rpm increments in 0.1°. This curve will become active when the Dark Blue Launch/Reset wire is connected to 12 volts and will remain active until the first shift occurs (rpm drop). When the Launch Curve is active, the Run Curve is deactivated. The default for the Launch Curve is 0°.

## TIME CURVE

This chart lets you program a retard curve based on time. The Launch (dark blue) wire resets the Time Curve and when it is removed from 12 volts, the Time Retard Curve begins. The Curve can be set for up to 12.5 seconds and is adjustable from 0° - 25° in 0.1° increments. Default for this curve is 0°.

Note that this retard amount will be added to any other active retards with a max of 40°.

## BOOST RETARD CURVE

This timing curve can be programmed in relation to boost pressure within the intake manifold. The curve can be programmed from 2psia - 45psia or 2psig to 75psig in 0.25psia from 0°- 25° in 0.1° increments. This curve can easily be edited using the Boost Curve chart. An MSD MAP sensor is required to use this feature and three are offered:

1-Bar, for n/a engines, PN 23111  
2-Bar, for 2-30psia, PN 23121  
3-Bar, for 2-45psia, PN 23131  
TI PSIG (gauge) Sensor available through Racepak, PN 810-PT-75GVT

**Note:** The Boost Retard Curve default is 0° retard.

## CYLINDER COUNT

**CylCnt 8** The number of cylinders of the engine. Default is 8 but can be programmed for 4 and 6.

## INDIVIDUAL CYLINDER TIMING

Each cylinder can be retarded up to 10° in 0.1° increments. Adjustments are made through the CylDeg menu. Default for each cylinder is 0°. An Inductive Cam Sync sensor (MSD 7555) must be incorporated to use this feature. The optical cam sync sensor identifies cylinder number. These retards can also be programmed and viewed from the RPM Meter chart from your PC monitor.

**SparkSeq1** This is cylinder number one. The following cylinders, Seq2, Seq3, do not represent the cylinder firing order! They are the firing sequence numbers.  
**Deg. 0** The retard for each cylinder. Adjustable in 0.1° increments up to 10°.

**Note:** If the engine does not receive a Cam Sync signal on start up, all cylinder timing will default to the greatest cylinder retard value programmed.

## MAG COMP

This program can be used to compensate for different magnetic pickup styles. It is adjustable from 0° - 3° in 0.5° increments. When set for manual control, the compensation is active from 3,000 - 12,500 rpm. In Auto mode, it is active from 800 - 12,500 rpm.

**Crank Triggers** should typically be set at 2°.

**Distributors** should typically be set at 1°.

**Pro Mag** users should use the Auto setting.

**Note:** There is a 4° offset from the input signal to the output signal.

## SHIFT

### Shift Gears

**Last Gear:** The program lets you select the number of gears to use with the shift light from 2-6 gears. Default is five gears.

**Drop RPM:** This is where you program the amount of rpm drop that must occur for the ignition to see a gear change. The drop is measured from the peak rpm and is adjustable in 100 rpm increments from 200-1,500 rpm. Default is 600 rpm.

**Shift Lights:** This allows you to set a different rpm point to activate a shift light. (MSD offers an LED Shift Light, PN 7552.) The Orange/Yellow wire will provide a ground to activate the shift light.

**ShiftLight 1** Select the gear for the rpm value that you select below.

**Rpm 12500** The rpm shift point for the gear selected above.

## LAUNCH LIGHT

This control lets you turn on a light to let you know when the engine rpm is in the correct launch rpm window. You can set a low and a high rpm to create a launch window. When the rpm is

within these two values, a launch light will be activated. If the rpm is below the low value, the light will stay off. If the rpm goes above the value, the light will flash. Note that the Dark Blue wire must be connected to 12 volts to enable the launch light.

- RpmHi 3400** The high side of the launch window
- RpmLo 2800** The low side of the launch window

These are both programmable from 800 to 12,500 rpms in 100 rpm increments.

**PRESSURE SWITCH**

This program allows you to activate a circuit by supplying a ground path through the White/Blue wire (up to five amps continuous). You can also select a pressure to deactivate the same circuit.

- PsiSwOn** This is the pressure point that grounds the White/Blue wire. It is adjustable from 0 - 75-psi in 0.5-psi increments.
- PsiSwOff** This setting acts as a window switch. When set at a higher pressure than the On setting, it will remove the ground from the White/Blue wire to deactivate a circuit.
- Hysteresis** This allows the pressure activation point to be higher than the deactivation pressure point. Adjustable from 0-75-psi in 0.5-psi increments.

**PRESSURE SWITCH DELAY**

This allows you to select an On delay or Off delay when switching at certain pressure points.

- OffDly** The amount of time delay that occurs before the circuit is deactivated. Adjustable from 0-25 seconds in 0.1 second increments.
- OnDly** The amount of time delay that occurs before the circuit is activated. Adjustable from 0-25 seconds in 0.1 second increments.

**RPM/TIME ACTIVATION SWITCH**

This program lets you activate a circuit by supplying a ground path on the Violet/Blue wire (up to 5 Amps continuous). This can be activated in one of several ways:

**RPM Window:** Program an rpm value to activate and deactivate a circuit from 800 – 12,500 rpm in 100 rpm increments.

**Time Based:** Program an activation point in 0.1 second increments after the launch. Up to 25 seconds of total time.

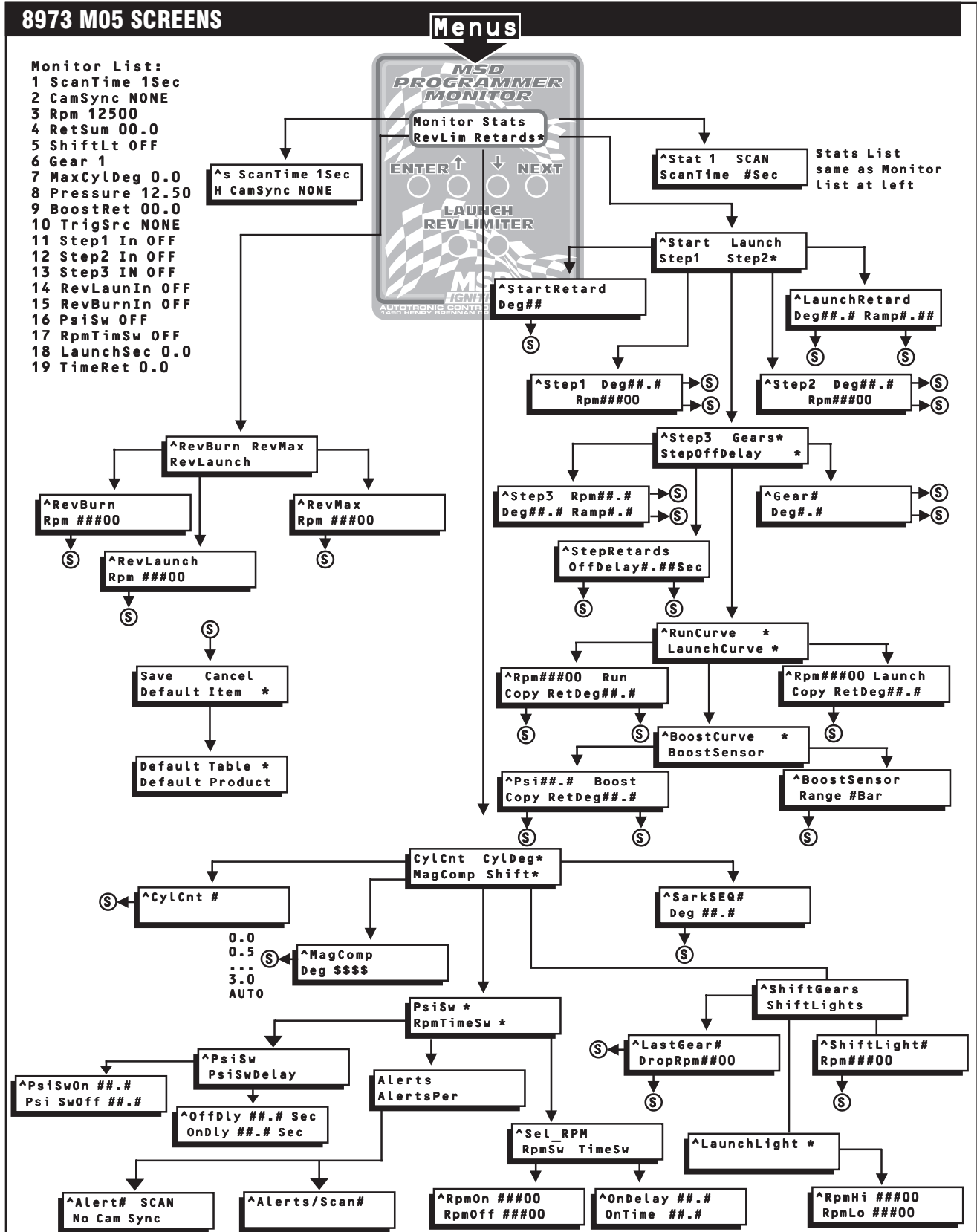
- RpmTimeSW** Select either rpm or time to activate a circuit through the Violet/Blue wire.
- RpmSW** Select rpm points to turn On and Off a circuit.
- TimeSW** Program an activation point (OnDelay) to turn on a circuit, then a time to leave that circuit activated (OnTime). The max time is 25 seconds.

**RPM Hysterisis** This allows the rpm or pressure activation value to be higher than the deactivation value. Adjustable from 800-12,500 rpm in 100 rpm increments.

**Alerts** Display NO CAM SYNC - LED on PN8903 Blinks on-off-on-repeat.

**MENU TREE**

As Displayed on the 7550 Terminal



**DEFAULT MENU**

**Notes:** 8973v05. Uses menu 8973 M05.  
 Programmable boost retard.  
 Factory default data and menu.

<p>8973 M95                  Monitor                  Stats                    Stat 1</p> <p>RevLim                    RevBurn                      Rev Burn                    *Rpm 7000</p> <p>  RevMax                      RevMax                    * Rpm 9500</p> <p>  RevLaunch                      RevLaunch                    *Rpm 6200</p> <p>Retards                    Start                      StartRetard                    *Deg10</p> <p>  Launch                      LaunchRetard                    *Deg .0                    *Ramp .50</p> <p>  Step1                      Step1                    *Rpm 800                    *Sec .00                    *Deg 2.0</p> <p>  Step2                      Step2                    *Rpm 800                    *Sec .00                    *Deg 3.0</p> <p>  Step3                      Step3                    *Rpm 800                    *Sec .00                    *Deg 5.0</p> <p>  StepDly                      StepRetards                    *OffDelay .50 Sec</p> <p>  RunCurve                      Rpm 800                      Run                      Copy @                      RetDeg .0</p>	<p>Gears                    Gear 3                    * (3) Deg .0                    * (4) Deg .0                    * (5) Deg .0                    * (6) Deg .0</p> <p>  LoBoost                      Psi 1.00                      Boost                      Copy@                      RetDeg .0</p> <p>  HiBoost                      Psi 2.0                      HiBoost                      Copy@                      RetDeg .0</p> <p>  Sensor                      PsiSensor                    *RevAvg4                    *Psig75</p> <p>  LaunchCurve                      Rpm 800                      Launch                      Copy@                      RetDeg .0</p> <p>  TimeCurve                      Sec .00                      Time                      Copy@                      RetDeg .0</p> <p>  CylCnt                    *CylCnt 8</p> <p>  CylDeg                    SparkSEQ1                    * (1) Deg .0                    * (2) Deg .0                    * (3) Deg .0                    * (4) Deg .0                    * (5) Deg .0                    * (6) Deg .0                    * (7) Deg .0                    * (8) Deg .0</p>	<p>MagComp                    MagCom                    *DegAuto</p> <p>  Shift                      ShiftGear                      *LastGear5                      *DropRpm 600</p> <p>  ShiftLights                      ShiftLights1                      * (1) Rpm12500                      * (2) Rpm12300                      * (3) Rpm12100                      * (4) Rpm11900                      * (5) Rpm11700</p> <p>  LaunchLight                      *RpmHi 3200                      *RpmLo 2800</p> <p>  PsiSw                      PsiSw                      *PsiSwOn50.0                      *PsiSwOff40.0</p> <p>  PsiSwDelay                      *OffDly 2.0Sec                      *OnDly 1.0Sec</p> <p>  RpmTimeSw                      *SwSel RPM                      RpmSw                      *RpmOn 2000                      *RpmOff 6000</p> <p>  TimeSw                      *OnDelay 1.0                      *OnTime 2.0</p> <p>  Alerts                      Alert 1                      SCAN</p> <p>  Alerts Per                      *Alerts/Scan 0</p>
---	---	---

