COP INTERCEPTOR

USER GUIDE

HICKOK WAEKON

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Safety Information

Before using this equipment, carefully read, understand and follow instructions and safety messages on equipment and in this guide.

This guide cannot anticipate or provide advice and cautions for all situations encountered by technicians. With this in mind, always follow and refer to the manuals provided by the manufacturer of the vehicle or the equipment being tested or used for all information and testing procedures whenever diagnosing, repairing or operating such vehicle or equipment.

Failure to follow the instructions, cautions and warnings provided here as well as those provided by the vehicle and equipment manufacturers can result in fire, explosion, bodily injury and property damage.

In addition to the information listed below, additional warnings and cautions are listed throughout the guide. Please read them carefully.

Before beginning any tests, make sure the test environment is safe and the vehicle meets these conditions:

- Always check the coils for secondary arcing before you begin any testing.
- Test area should be well ventilated.
- Vehicle should be in park.
- Wheels should be blocked.
- Engine should be at normal operating temperature.
- Vehicle should have normal exhaust flow.
- Keep all tester cables clear of exhaust manifolds and radiator fan blades.
- Use caution when testing on a vehicle while the engine is running (surfaces may become hot, electric cooling fans may turn on unexpectedly, etc.)

Contents

Overview 4
Theory of Operation 4
Features 5
Components 6
Using the Controls 7
LCD Screen 7
Left Function Key 7
Right Function Key 7
Digits View 8
Balance View 8
Trend View 9
Using the Setup Menu 10
Where to Place the Signal Receiver Pad 12
Help Locating a Signal 12
Using the Signal Finder Function 12

Testing Procedures 13
Step 1—Connect the probe to the COP Interceptor 13
Step 2—Calibrate the tester using Auto-Set 13
Step 3—Test the coils 14
Step 4—Interpret the results 14

Maintenance 15
Replacing the Battery 15

Specifications 16

Contact Information 17

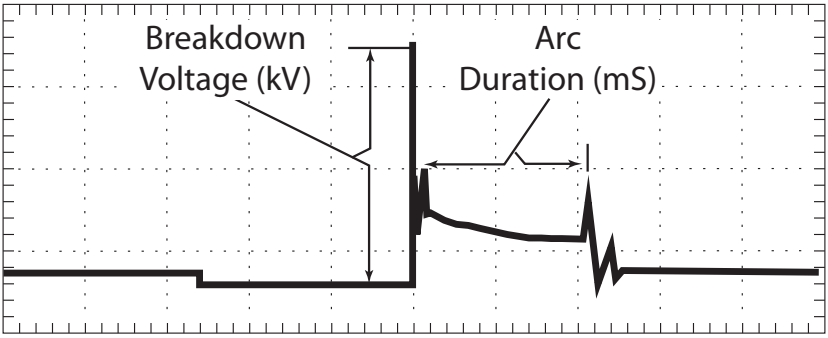
Warranty 18

Overview

Theory of Operation

The COP Interceptor measures a coil on plug's secondary circuit's breakdown voltage (kV) and arc/burn duration (mS) in real time.

- Breakdown Voltage (kV) — Indicates the high voltage required for ionizing the spark gap. This begins each spark event and is determined by several factors including spark gap, air/fuel mixture, turbulence, and the integrity of the secondary circuit.
- Arc / Burn Duration (mS) — Indicates the time that the spark remains ionized and secondary current flows across the spark gap. Duration is determined by coil type, dwell time, breakdown voltage, and integrity of the primary circuit.



Oscilloscopes Secondary Waveform Characteristics

The tester works by receiving the signal from the secondary circuits and then displaying the information which can be viewed three different ways:

- Digits View—displays readings in large formatted numerical values
- Balance View —displays 1-8 saved readings as a bar graph or in numerical values.
- Trend View —displays readings graphically along with the numerical values in real-time for 128 events. Also shows ignition misfire events in real time.

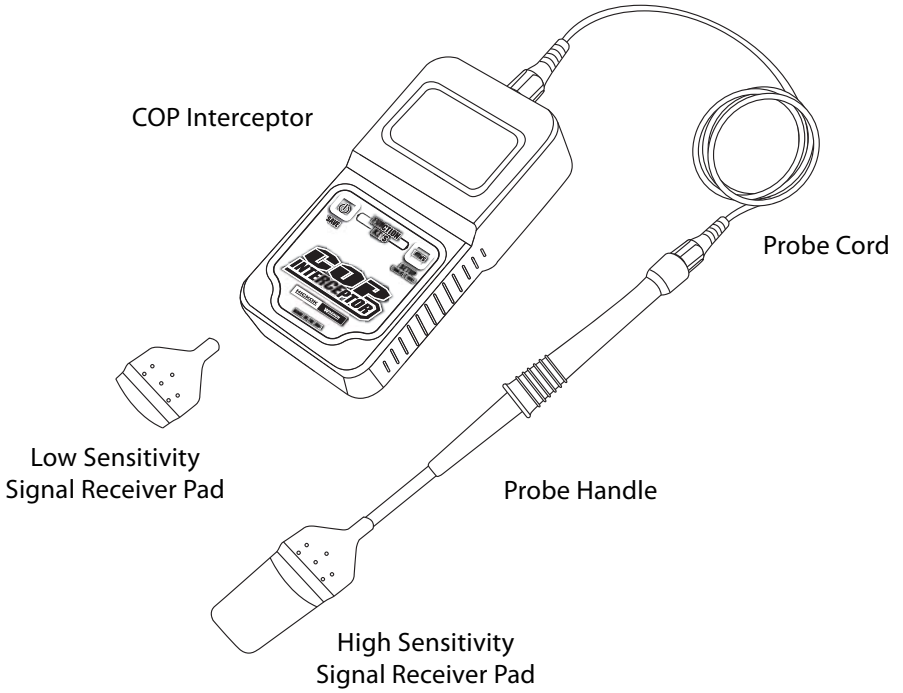
This information can be used to help you diagnose problems with a vehicle's ignition system or the engine combustion environment such as a weak or inoperative coil on plug.

Features

- Adjusts to a wide range of COP ignition systems
- Single or Multi-Strike COP ignition signals
- Auto-Set calibration adjusts for COP Coil variations
- Saves Balance Data for later viewing
- Real-Time spark data and graphing
- Adjustable Misfire Detection and graphing
- Bendable probe handle
- Interchangeable low/high sensitivity pickups
- Operates on a 9V battery

Overview

Components



COP Interceptor— Used along with the supplied accessories listed below, the COP Interceptor measures a coil on plug's secondary circuit's breakdown voltage (kV) and arc/burn duration (mS) in real time.

Low Sensitivity Signal Receiver Pad— Picks up the coil's signal from the secondary circuits. For most applications you will use this receiver pad to avoid picking up false signals from the other coils.

High Sensitivity Signal Receiver Pad— Picks up the coil's signal from the secondary circuits. Use this receiver pad when you are having difficulty picking up signals such as coils with heavy shielding

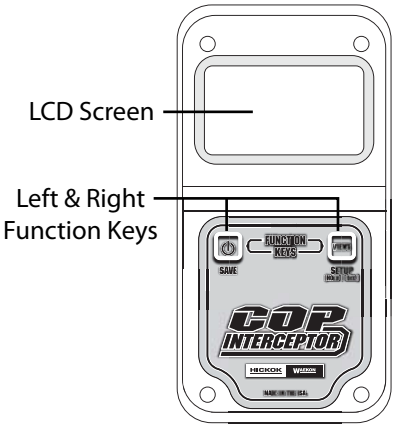
Probe Handle— handle with a 2½-inch bendable arm. Can also be used as a signal receiver by bending the arm around the coil.

Probe Cord— 6-ft detachable probe cord connects the probe handle to the tester.

Using the Controls

LCD Screen
Displays the readings three ways:

- ***Digits View***—displays readings in large formatted numerical values along with various tester information.
- ***Balance View*** —displays 1-8 saved readings as a bar graph or in numerical values.
- ***Trend View*** —displays readings graphically for 128 events along with the numerical values in real-time. Also shows ignition misfire events in real-time.



Left Function Key
Use this multi-function key to:

- ***Power the tester ON/OFF***. Press and release to turn the tester on. The default start-up screen is the Digits View.

  Press and hold to turn off. The tester will also automatically turn off after five minutes of non-use.
- ***Save a reading***. In Digits View, press and release to save a reading to view in the Balance View. You can save up to eight readings.
- ***Toggle between bar graph and numerical values***. In Balance View, press and release to toggle between viewing the data as a bar graph or as numerical values.
- ***Scroll through menu selections***. Press and release to scroll through and highlight the setup menu selections.

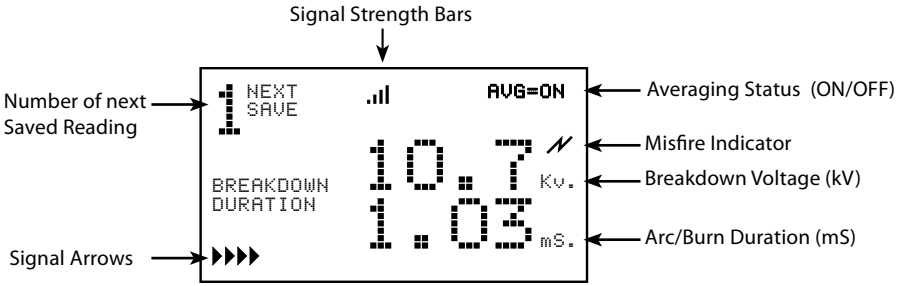
Right Function Key
Use this multi-function key to:

- ***Toggle between data views***. Press and release to toggle between Digits View, Balance View, and Trend View.
- ***Enter the Setup Menu***. Press and hold to enter the Setup Menu.
- ***Select a menu item***. Press and release to select a highlighted menu item.
- ***Pause graph***. When in Trend mode, press and release to pause the graph.

Overview

Digits View

The Digits View screen is the first screen and it displays the readings in large formatted numerical values. It also shows the signal status, averaging status, and misfires (indicated by a lightening bolt symbol next to the Kv readout).

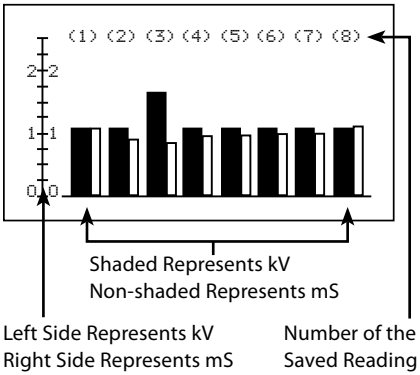


Tapping the left function key saves the reading for later viewing in Balance View. You can save up to eight readings. Any additional readings after eight will overwrite the previous information beginning with saved number one. The number of the next saved reading is shown in the upper left corner of the screen.

Balance View

Displays the saved reading from the Digits View as a bar graph or as numerical values. The bar graph view is scaled according to the values. *Note: Because the kV value on left side of bar graph is 1/10th of the **actual** kV value, multiply that number by 10 for the actual kV value (e.g. 1.07 bar graph reading x 10 = 10.7kV).*

Balance View Bar Graph



Balance View Data Chart

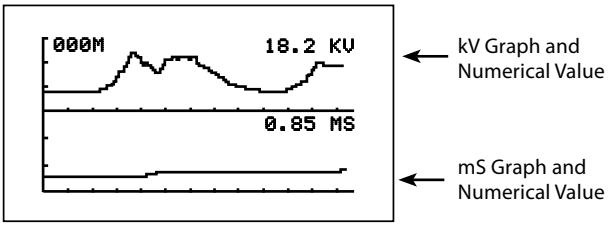
1	10.7	KV	1.03	MS
2	10.8	KV	0.89	MS
3	10.5	KV	0.77	MS
4	10.6	KV	0.94	MS
5	10.7	KV	0.93	MS
6	10.7	KV	0.96	MS
7	10.7	KV	0.97	MS
8	10.7	KV	1.05	MS

Tapping the left function key alternates between the graph and chart views.

Trend View

Trend View displays readings graphically for 128 events along with the numerical values in real-time. It also shows ignition misfire events in real-time. The graphs are auto scaled according to the values.

Trend View

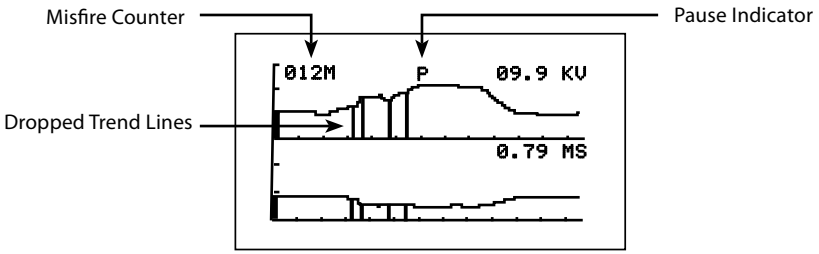


Tapping the left function key pauses the screen. A blinking letter "P" is displayed at the top of the screen while in pause mode. To resume trending, press the left function key.

Misfires

The Trend View also shows ignition misfire events in real time. A counter in the upper left corner of the screen displays counted misfires up to 255M. The counter automatically zeros when the signals stop for more than 1 second. Each counted misfire also drops the trend line to 0kV/mS for that event. Misfires are also identified on the Digits view screen with lightening bolt symbol.

Paused Trend View Showing Misfires



Note: It is possible to see occasional misfires even if a coil is firing normally. If this happens after running Auto-Set, repeat using a different signal pad receiver or adjust the sensitivity (misfire trigger) in the setup menu.

Using the Setup Menu

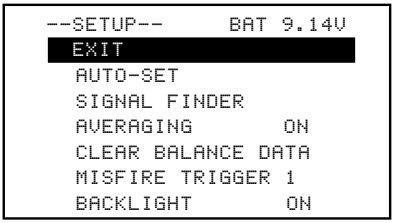
In addition to launching the Auto-Set function and viewing the battery status, you can set a variety of user's preferences from the Setup Menu.

To access the Setup Menu—Press and hold the ***right*** function key until the Setup Menu is displayed

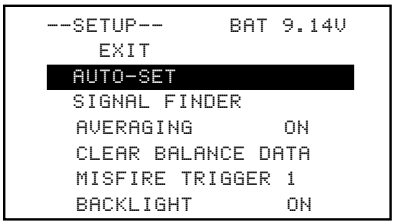
To select an item—Press the ***left*** function key to scroll through and highlight the desired setup menu item. Press the ***right*** function key to select the menu item.

To change a setting—Once the menu item is selected, continue to press the ***right*** function key to select the desired option such as ON or OFF.

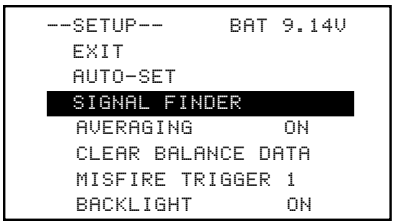
Battery Status —The battery's current voltage is automatically displayed in the upper right corner of the screen. It is recommended that you check the battery status before you begin testing and replace the battery if below 8.0v.



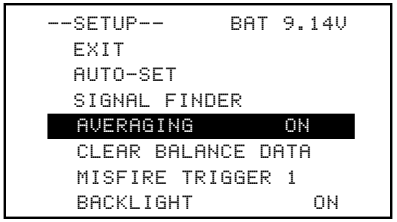
EXIT—To exit the setup menu, press the ***left*** function key. Scroll to EXIT and press the ***right*** function key.



AUTO-SETUP—Calibrates the COP Interceptor and should be performed before each test (see *Testing Procedures* for more information).

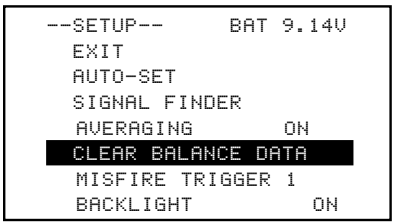


SIGNAL FINDER—Assists in locating the best possible signal from the coil (see *Help Locating a Signal* for more information).

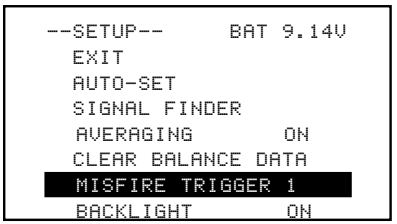


AVERAGING—When ON, the display is updated once per 10 kV/mS readings and values shown are the averages of the 10 readings.

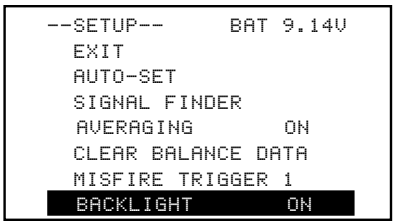
OFF—Each reading is shown as it is happening which rapidly updates the data being displayed. *Note: when in Trend View, the Kv/mS fluctuations are more visible when averaging is set to OFF.*



CLEAR BALANCE DATA—Clears any saved balance data.



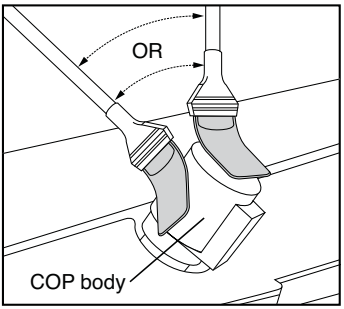
MISFIRE TRIGGER—Adjusts to trigger on 1, 2 or 3 consecutive misfire events. Once highlighted, continue to press the ***right*** function key to select the desired setting. Select OFF to turn off the feature.



BACKLIGHT—Turns the backlight ON or OFF. Once highlighted, continue to press the ***right*** function key to change the setting.

Where to Place the Signal Receiver Pad

The preferred Signal Pad Receiver placement is on top of the coil, but in some cases, the side may provide a better signal. Make sure to keep the probe handle's arm from touching any metal engine parts and away from other coils.



The Low Sensitivity Signal Receiver is recommended on unsheilded coils because it reduces interference from adjacent coils. Coils with better shielding will require using the High Sensitivity Signal Pad.

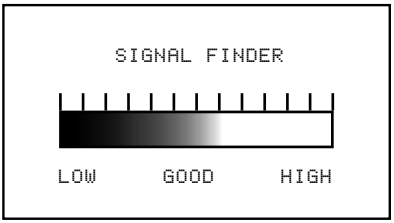
Help Locating a Signal

Because the tester relies on a signal emitted from the coil's body, it is necessary to locate the best possible signal. If you are having difficulty locating a good signal, try placing the signal pad in different locations. You may also need to switch from the Low to the High Sensitivity Receiver Signal Pad.

Using the Signal Finder Function

If needed, you can also use the Signal Finder to help locate the best signal.

1. From the Setup Menu select SIGNAL FINDER.
2. Place the signal receiver on the coil in different locations noting what the bar graph on the screen is indicating. Use the position that reads the closest to the GOOD area on the bar.



> ⚠ **Shock Hazard Warning!**
> To avoid personal injury, always check the coil for secondary arcing *before* you begin any testing.

Step 1—Connect the probe to the COP Interceptor

a. Select a signal receiver pad and slide it on to the probe handle.

Low Sensitivity Signal Receiver Pad— For most applications you will use this receiver pad to avoid picking up false signals from the other coils.

High Sensitivity Signal Receiver Pad— Use this receiver pad when you are having difficulty picking up signals such as coils with heavy shielding.

Special Note: The bendable arm of the probe handle may also be used as a signal receiver by bending it around a coil body.

b. Plug the probe cord into the COP Interceptor and the probe handle.

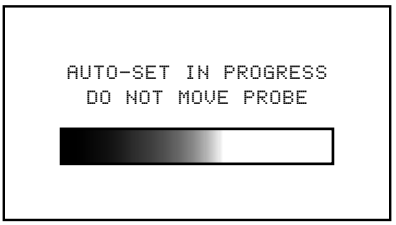
Step 2—Calibrate the tester using Auto-Set

Note: Only run Auto-set once before you begin testing the coils otherwise you will invalidate any previous readings.

a. With the vehicle running at idle, turn the tester on.

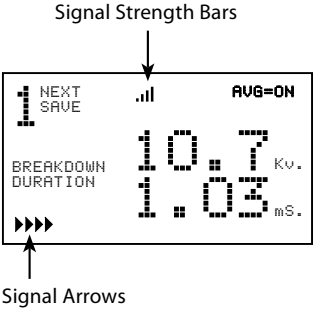
b. Place the signal receiver on one of the coils and then select AUTO-SETUP from the Setup Menu. *Note: It is important that the signal receiver is fully positioned on the COP before the select key is pressed.*

The following screen is displayed to show the progress:



When completed, the Digits View screen is displayed. *Note: If a NO SIGNAL FOUND message is displayed instead, use the Signal finder to help locate the best signal and then re-run the AUTO-SET function.*

c. Verify that the signal arrows are cycling steadily from left to right and that you have a minimum of 3 signal strength bars.



If the arrows are cycling steadily — proceed to the next step.

If the arrows are not cycling steadily — try different pickup placement locations. If you are still having difficulty, you may need to switch Signal Receiver Pads. Once the arrows are cycling steadily, re-run the Auto-Set function.

If you have a weak signal — repeat the above steps on another coil or use the Signal Finder feature in the Setup Menu.

Step 3—Test the coils

a. After verifying a good signal, place the signal receiver pad on the other coils to compare readings. The data can be viewed in Digits View, Balance View and/or Trend View. See *Data View Screens* for more information on each of these screens.

Step 4—Interpret the results

a. The combination of Breakdown Voltage (kv) and Arc Duration (mS) information can help in pinpointing several different problems with the ignition system or the engine combustion environment. Below are some typical diagnostic relationships and their possible causes:

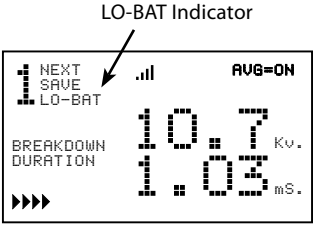
Results	Possible Problem
High kV. / Short mS.	Large spark gap, lean mixture, high compression
Low kV. / Long mS.	Small spark gap, rich mixture, low compression
Normal kV. / Short mS.	Poor Primary circuit connections, shorted windings
Zero kV. / Zero mS.	Open circuit primary, shorted secondary windings
Erratic kV. / Normal mS.	Flashover, Plug Corrosion, misfire, plug fouling
Erratic kV. / Erratic mS.	Intermittent primary coil or circuit, connections

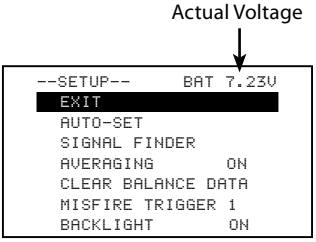
Please refer to the vehicle's shop manual for instructions on troubleshooting and repairing/replacing defective COPs.

Replacing the Battery

When the battery voltage drops below 8.0V, LO-BAT is displayed on the Digits View screen. You may also view the actual battery voltage at any time in the Setup Menu.

Note: Continuing to use the battery when it drops below 8.0v may result in inaccurate readings and erratic behavior (such as the screen going blank).





To replace the 9V alkaline battery:

1. Remove the soft battery access cover on the back of the tester.
2. Remove the old battery and replace it with the new one.
   - Remove the battery terminal end first, then lift the battery out of the tester.
   - See the red dot inside the battery compartment for correct polarity.
   - Insert the new battery bottom first and then press into the terminals.
3. Put the battery access cover back on to the tester.

Specifications

Breakdown Voltage Measurement Range:	+/-30 kV
Arc Duration Measurement Range:	0.3 - 5.0 mS
Resolution:	0.1 kV Breakdown and 0.01 mS Duration
Multi-Strike Ign:	First kV event, Last mS event are displayed
Misfire Detection:	240-4000 RPM (1,2, 3 events or OFF)
Voltage Supply:	9V Battery (8-10 VDC)
Operating Temp:	20-110 Degrees. F.
Operating Current:	45 mA. (30 mA w/o backlight)
Power off Battery Drain	< 10uA
Low Battery Indication:	< 8.0V
Data Retention:	Auto-Set settings, Balance data
Auto-Off:	5 minutes
LCD Back Light:	always auto-off after 1-Min.
Unit Dimensions (LxWxD):	6″ x 3″ x 1.75″

Contact Information

If you have any questions about our products including technical assistance, call our customer care department during standard business hours EST. If a customer care representative directs you to return any equipment, be sure to include these items:

- a written description of the problem;
- the name and telephone number of your contact person;
- your shipping address, and
- our return authorization number (from customer care).

Customer care and tech support:	**800/342-5080 or 216/541-8060**
Service and repair center:	**662/453-6212**
Fax:	**216/761-9879**
E-mail:	**support@hickok-inc.com** **repaircenter@hickok-inc.com**
Service address:	**Hickok Inc.** **Automotive Group** **1716 Carrollton Avenue Dock E** **Greenwood, MS 38930**



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Warranty

Subject to the conditions that follow and are noted below, this product is warranted to be free from defects in material and workmanship, under proper use and in accordance with the manufacturer's written recommendation and specifications, for a period designated below on all products:

- This product carries a one year limited warranty.

The manufacturer's obligation under this warranty is limited to unaltered products returned to the manufacturer by the initial end user of the new products. Therefore, this warranty does not cover any products resold by the end user to third parties, nor any reconditioned products sold as such, by the manufacturer. The sole remedy for any such defect shall be the repair, or replacement, of the product at the sole discretion of the manufacturer. This warranty does not cover expendable parts, such as batteries, nor does it cover shipping or handling. In addition, manufacturer is not liable for any loss or damage to product during shipping.

In the event it is determined that the product has been tampered with, or altered in any way, this warranty is void and all claims against the product will not be honored. All warranty claims must be submitted as outlined by the manufacturer and shall be processed in accordance with the manufacturer's established warranty claim procedures. These procedures include provisions that proof of purchase must be established (by either warranty card from the seller or by point of purchase receipt) and that the manufacturer will make every attempt to return ship the product within one business day from receipt of the returned product, freight prepaid.

In addition, all maintenance procedures, as outlined by the product manuals, should be followed for the warranty to be kept in force. Should the product not be used in accordance with procedures as specified, or if the product otherwise fails outside of the warranty, the manufacturer reserves the right to make such judgment and the party returning the product will be notified that written notification will be necessary to repair the product at a cost which the manufacturer deems as reasonable. The product will then be shipped back to the customer, COD; or as the manufacturer deems appropriate.

This is the only authorized manufacturer's warranty and is in lieu of all other expressed, or implied, warranties or representations, including but not limited to any implied warranties of merchantability or fitness or any other obligations on the part of the manufacturer. In no event will the manufacturer be liable for business interruptions, loss of profit, personal injury, costs of delays, or any special, indirect, incidental or consequential damages, costs or losses.

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