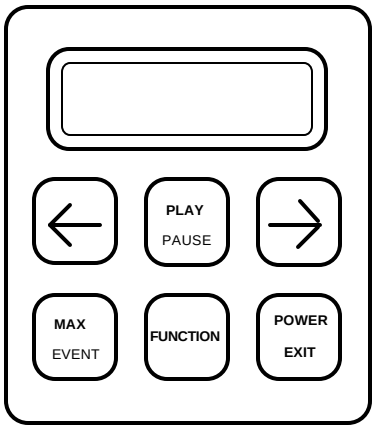
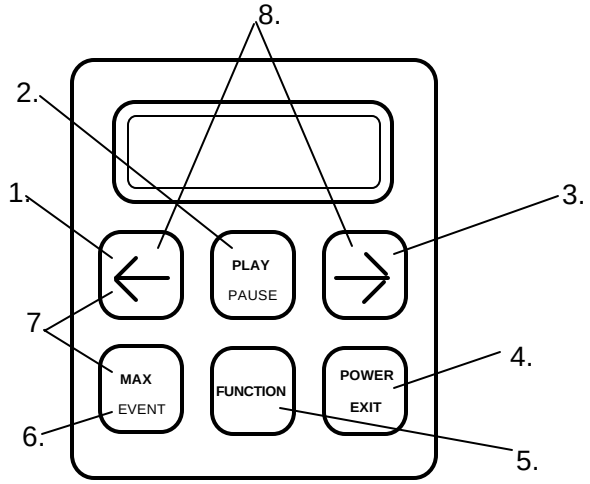
Digatron’s DT-46K Instruction Manual



Introduction

Congratulations on the purchase of your new DT-46K. The DT-46K is Digatron’s small, easy to use, multi-function, digital engine monitoring system. This instrument was designed for the customer who wants to know how their engine is functioning without spending a lot of time and money. Depending on which version of this instrument you purchased, it can monitor some or all of the following functions: cylinder head temperature (CHT), exhaust gas temperature (EGT) and tachometer (Tach). It datalogs all of these inputs, along with lap times. Lap times can be stored manually or with a beacon (if you bought the optional beacon receiver with this instrument). All of this information can then be played back on the DT-46K.

Included with your instrument is a simple instruction sheet that allows you to quickly install and use your Digatron DT-46K. The instructions in this booklet are more detailed to help you learn all of the capabilities of your new instrument.



Button Functions Defined for Each Mode

1. ¬ Set Limits: Decreases the value of the limit being set. Hold this button down for the number to change faster. Pg. 4
Monitor/Record: Toggles the backlight on and off. Pg. 6
Lap/Max: Finds previous lap's data. Pg. 7
Function Playback: Causes the data to be played in reverse direction, while data is being played back. If playback is paused, this button will step through data in 0.1 second intervals, in reverse direction. Pg. 7

2. ***Play/Pause*** Set Limits: Button not used.
Monitor/Record: Instrument enters Lap/Max and displays Lap #. Pg. 7
Lap/Max: Instrument enters Function Playback and begins reviewing data for the selected lap. Pg. 7
Function Playback: Pauses and resumes playback. Pg. 7

3. ® Set Limits: Increases the value of the limit being set. Hold this button down for the number to change faster. Pg. 4
Monitor/Record: Instrument enters Set Limits mode. Pg. 4,6
Lap/Max: Finds next lap's data. Pg. 7
Function Playback: Causes the data to be played in forward direction, while data is being played back. If playback is paused, this button will step through data in 0.1 second intervals, in forward direction. Pg. 7

4. ***Exit/Power*** Powers on the instrument.
Set Limits: Press this button to exit Set Limits and return to Monitor/Record. Pg. 5
Monitor/Record: Powers off the instrument or stops recording data. It will only turn off the instrument if it is not recording and not receiving a Tach signal. Pg. 6,7
Lap/Max: Exits Lap/Max and returns the instrument to Monitor/Record mode. Pg. 7
Function Playback: Exits Function Playback and returns the instrument to Lap/Max. Pg. 7

5. ***Function*** Set Limits: Changes the function limit being set in this order: CHT, EGT, Tach, Tach calibration number. Pg. 4
Monitor/Record: Changes function being displayed in this order: CHT, EGT, Tach, Lap # and Lap Time. Pg. 6
Lap/Max: Displays the maximum value of each function, lap number or total lap time for the currently selected lap. Displayed in this order: CHT, EGT, Tach, Lap # and Lap Time. Pg. 7
Function Playback: Changes the function playing back in this order: CHT, EGT, Tach, Lap #, and Lap Time. Pg. 7

6. ***Max/Event*** Set Limits: Button not used.
Monitor/Record: Displays the maximum value for each engine function, since the instrument was turned on. If the instrument is displaying Lap # and you press the ***Max/Event*** button, it will display the current Event number. Pg. 6
Lap/Max: Displays Event number if Lap # is being displayed. (The display will show E and two numbers.) pg. 7
Function Playback: Displays the maximum reading for each function for the current lap, the current Event number or the total lap time for the current lap. Pg. 7

7. ¬ & ***Max/Event*** Press this button combination to clear memory, Lap # and Event #. Press them until the display shows PrS PLA, then press the ***Play/Pause*** button. Pg. 6

8. ¬ & ® Toggles between high and low resolution of time display.
High = 1:59.9 max. time displayed from this resolution. (minutes : seconds . tenths of seconds)
Low = 19:59 max. time displayed from this resolution. (minutes : seconds) Pg. 4

- **Lap Switch** Monitor/Record: Starts and stops the recording of a lap. Pg. 6

Installing Your Sensors and Batteries

These instructions cover all the sensors that can be used with the DT-46K. Some may not pertain to your particular model.

Do not operate your DT-46K unless all the sensors are connected. *Inputs that are left open can cause erratic readings and possible instrument damage*. Any unused instrument inputs, except the Lap switch, must be terminated at the back of the instrument with a shorting plug available from Digatron.

Sensor cables that run from the engine compartment to the instrument should always be routed as far away from the ignition system components as possible (plug wires, spark plugs, ignition coils, distributor or magneto). Sensor cables too close to these components may pick up radiated electrical interference and cause erratic instrument readings and operation. A distance of at least 6" from these components is desirable in all installations.

When routing sensor cables through any panels, be sure to use a rubber grommet to keep the cables from being cut by a sharp edge. It is also good practice to protect all of the sensors with a short piece of fuel line at any point that the cable may rub against a hard surface.

If any of your cables are too long to route back to your instrument fully extended, we recommend sending your sensors back to Digatron to be cut to the appropriate length for your needs or coiling them each separately. If you do coil your sensors, keep the coils away from the engine.

Installing Your Tach Sensor

Our standard Tach sensor can be installed on both two and four cycle engines.

Use a cable tie on the shrink tube, at the end of the green wire, to attach the sensor to the plug wire, keeping the end at least 2" from the plug boot. Keep the sensor electronics (red) away from any ignition component. If you experience erratically low Tach readings, attach the green wire, inch by inch, to the plug wire until you have correct readings. Attach the end of the black ground wire to the bare metal on the engine block. Route the sensor cable from the motor to the rear of your instrument and secure with cable ties. Plug into the pigtail with the “push-on” type connector.

For best results, keep the Tach sensor cable separated as much as possible from any other cables running to your instrument.

Installing Your CHT Sensor

Our standard CHT sensor is for air cooled engines only. For temperatures consistently above 450ºF we have a thermocouple sensor.

Remove the spark plug from the cylinder you wish to monitor and discard the plug washer. Check the surface of the head around the spark plug hole for a smooth, flat finish to assure a good seal when the sensor is installed.

Position the sensor over the spark plug hole and check that you have sufficient clearance around the outside of the sensor body to avoid damage when the plug is installed and tightened. This may require some minor machining on some installations.

Install the spark plug finger tight to hold the sensor in position. Finish tightening with a plug wrench to the same torque as normally recommended. *Do not allow the sensor to turn as you tighten the plug.* The sensor is easily damaged if forced into a cooling fin.

Route the sensor cable from the motor to the instrument. Secure the cable to the frame of the kart with cable ties. Connect to the small, threaded pigtail on the instrument and turn the connector until tight.

Installing Your EGT Sensor

Our standard EGT sensor is a type K thermocouple temperature sensor. Install the sensor clamp assembly, or weld on, to the exhaust header. Position the clamp so that the sensor will be in the center of the header and approximately 2" from the head side of the exhaust flange. Using the fitting on the clamp assembly as a drill bushing, drill a 3/16" hole through the header. Remove the clamp assembly from the header and redrill the hole to 13/64". Reinstall the clamp assembly aligning it with the hole just drilled.

Insert the sensor into the fitting so that the tip of the sensor extends ¼" past the center of the header. Tighten the compression nut to lock it in place. Connect the black wire to any clean, unpainted metal surface on the engine (it is important that this is a good electrical connection).

Route the sensor cable from the motor to the instrument. Secure the cable with cable ties to prevent excessive movement. *The thermocouple cable is brittle and will break at the flex points if not properly tied down.* It is also good practice to protect the cable with a short piece of fuel line at any point where the sensor may rub against a hard surface.

Mounting Your Lap Switch (for Manual Lap Time Only)

The Lap switch should be mounted to the steering wheel within thumbs reach of the driver. This switch requires a 15/32" mounting hole for installation. Mount the switch in a position that will provide easy access while driving.

Tie the coil cord to the steering column where needed to prevent it from interfering with the driver. If the Lap switch is not used, leave it’s input connector open; do not use a shorting plug.

The DT-46K Uses Three AAA Batteries (not included)

The DT-46K is powered by three AAA batteries. These allow the instrument to run for 100 hours with the backlight on and 500 hours with the backlight off.

Replacing the batteries is simple. With the front of the instrument facing you, remove the left end cap. Slide the battery pack out from inside the unit and replace the batteries. Slide the battery pack back into the instrument, making sure that the batteries are facing the back of the unit. Replace the end cap and you are done.

Turning Your DT-46K On

There are two ways for your instrument to be powered on:

- The unit will turn on and begin recording automatically when the engine is started.
- The unit can be turned on with the ***Exit/Power*** button before the engine is started. It will then begin recording when the Lap switch is pressed or it passes a beacon (if you purchased the optional beacon receiver). Also, when the engine is running, the ***Exit/Power*** button can start and stop recording.

Note: When the instrument is first powered on, it is always in the Monitor/Record mode.

Display Resolution

When the instrument is powered on, the display is in high resolution. This means that it shows time in tenths of a second and the highest number that can be displayed is 1 minute, 59 seconds and 9/10s of a second. After that time, the instrument continues to record, and the 1 on the left of the display toggles every other minute.

To change the display to low resolution, press the ¬ and the ® button at the same time, while in Monitor/Record mode. In low resolution, the instrument can display up to 19 minutes and 59 seconds. The instrument will continue to record beyond that amount of time, but the 1 on the left of the display will toggle every 10 minutes.

The Three Modes of the DT-46K

This instrument has three basic modes of operation, Set Limits, Monitor/Record and Playback.

A. Set Limits mode is necessary before using your unit for the first time and if you use it on different engines. Limits help you prevent possible engine damage.

B. Monitor/Record mode is used while you are on the track, during races or practice.

C. Playback mode allows you to review all of your recorded data. This information is played back to you on the display of your DT-46K.

A. Setting the Function Limits On Your DT-46K

Before using your DT-46K, be sure to set the operating limits for each input. Limits allow the instrument to give you a visual warning (the display flashes) if any of the inputs exceed their limit. *Limits should be set at levels that allow you to react to the visual warning before engine damage occurs.*

Set Limits mode can only be entered from Monitor/Record mode, which is the mode the instrument is in when powered on. Enter Set Limits mode by pressing the ® button. The instrument is now in Set Limits mode, which is indicated by the flashing display.

- To change the number being displayed press the ¬ or the ® button. Hold either of these buttons down and the number will change faster.
- When you are finished setting the first limit, press the ***Function*** button to set the next limit.
- Repeat the above procedure to set the remaining limits and the Tach calibration number.
- To save the current limits and return to Monitor/Record mode, press the ***Exit/Power*** button.

Note: Set limits at levels high enough for normal operation, but not so high that engine damage can occur before you can respond to a problem.

Limits can only be set for the functions your gauge is designed to monitor. If your gauge monitors all three possible functions, the limits are set in the following order: CHT, EGT, Tach and Tach calibration number. If you do not have all of these functions, it will also set limits in this order, minus the function(s) you are missing. Tach requires two separate parameters. The first is the maximum revolutions per minute (RPM) for safe engine operation. The second number is for Tach calibration. In order to display the correct RPM for different engine types, the instrument divides the Tach input signal by the Tach calibration number. This number can be between .5 and 31.

The most frequently used numbers are:
.5 - for some single cylinder 4 cycle motors
1 - for single cylinder 2 cycle and some 4 cycle motors
2 - for 2 cylinder 2 cycle and 4 cylinder 4 cycle motors

If you are unsure of the exact Tach calibration number for your engine, experiment. If your calibration number is currently set at 1 and the RPM displayed is double what it should be, set the calibration number to 2. Alternately, if the RPM displayed is half of the correct value, decrease the calibration number to half the current number.

About Cylinder Head Temperature

Cylinder head temperatures (CHT) usually run in the 300ºF to 475ºF range. The best way to determine the correct temperature for your particular motor is to tune for proper plug or piston color and then observe what the head temperature is for various throttle settings and atmospheric conditions.

Temperatures consistently over 450ºF will damage the standard CHT sensor. If your motor frequently runs at cylinder head temperatures over 450ºF your instrument should have an exhaust gas temperature function, which can use a thermocouple CHT sensor. This sensor can be used without damage at higher temperatures, but it is not as accurate as our standard CHT sensor.

About Exhaust Gas Temperature

Exhaust gas temperature (EGT) is used primarily for adjusting the air/fuel ratio. Because of its quick response, the effects of carburetor adjustments are seen immediately. Fuel system and carburetor problems can often be spotted quickly enough to prevent engine damage.

Exhaust gas temperatures typically run between 1100°F and 1350°F. The EGT on a properly tuned engine will increase rapidly as the throttle is opened and as the load on the engine is increased. At full throttle and full load the EGT will stabilize at a temperature dependent on the air/fuel ratio. Both a “too lean” or a “too rich” condition will be indicated by a lower than peak temperature. The “too lean” condition can damage your engine. An increase in coolant temperature or cylinder head temperature is usually an indication of this. The best way to determine what temperature is normal for your motor is to tune for good plug or piston color and then observe the temperature at various throttle settings.

How the Tachometer Reading is Displayed

The Tach displays RPM in thousands of RPM. For example, if your display shows 9.50, your RPM is 9500.

B. Monitor/Record Mode is Used While on the Track

When your instrument is powered on, it is in Monitor/Record mode. This is the mode the unit will be in during the Event (race or practice) so you can observe and record your engine functions and lap times. This information is recorded for review in Playback mode.

Note: The memory of this instrument holds 35 minutes of information. After that amount of time, the instrument will keep recording and begin writing over previously recorded data.

During Monitor/Record mode you can make quick tuning adjustments to your engine that allow you to run safe and fast. The instrument will visually warn you, by flashing the display, if your engine exceeds any of it's set limits. These limits allow you to avoid engine damage.

Recording information is very simple. Once you have started recording, you can change what function is being displayed. Laps are recorded manually with the Lap switch or automatically when a beacon is passed, if you have a beacon receiver.

These are the buttons used to start recording, change what is being displayed and stop recording:

1. Press the ***Exit/Power*** button, Lap switch or pass a beacon to begin recording. (The beacon method only works if you have a beacon receiver.)
2. Press the ***Function*** button to change what is being displayed. It toggles through the functions in this order: CHT, EGT, RPM, Lap # and Lap Time. (Not all instruments have all of these functions.)
3. Press the ***Exit/Power*** button, or turn your engine off, to stop recording and end the current Event.

There are two other buttons that can be used in Monitor/Record mode:

- The backlight is used to illuminate your display for use at night. Press the ¬ button to toggle the backlight on or off. The backlight can only be turned on or off while in Monitor /Record mode.
- The ***Max/Event*** button is used to display the maximum reading for each engine function and the Event number in progress. If the instrument is displaying an engine function and you press the ***Max/Event*** button, it will display the maximum reading for that function since the instrument was turned on. If the instrument is displaying Lap # (display shows L and two or three numbers), and you press the ***Max/Event*** button, it will display the current Event number (display shows E and two numbers).

Ways to Begin Recording

There are three ways to begin recording data:

1. Starting the engine while the instrument is turned off, automatically starts the instrument and begins recording the Event.
2. Manually turn the instrument on with the ***Exit/Power*** button before the engine is started. Press the Lap switch or the ***Exit/Power*** button to begin recording. (The instrument must be receiving a Tach signal to begin recording with the ***Exit/Power*** button. If it does not have a Tach signal, pressing this button will turn the instrument off.)
3. Manually turn the instrument on with the ***Exit/Power*** button before the engine is started. When the kart passes a beacon, the instrument will begin recording, if you have a beacon receiver.

Information about Recording

Each time you press the Lap switch or pass a beacon while recording, the current lap stops and a new lap begins. (The beacon receiver that can be bought to go with this instrument recognizes both Digatron and My-Chron beacon signals.)

When you finish a lap, while the instrument is recording, it will display the total time for the last lap for three seconds, before returning to the previously displayed data. If you are displaying Lap Time while recording, the instrument will continuously display the time of the last lap. To show running time for the current lap, press the ® button. When the clock is running, a colon will flash in the display.

Turning off the engine or pressing the ***Exit/Power*** button terminates the current lap and the current Event. A new Event is started when the instrument starts recording again. When the unit is turned off, it does not lose it's data. When it begins recording again, it will start a new Event, on lap one, at the end of the last recorded Event. After 35 minutes of total record time, the instrument will begin recording over previously recorded data.

Note: The instrument will not record while the PRS (**PR**eviou**S**ly recorded data) annunciator is visible on the left side of the display. The PRS annunciator shows that the instrument is in Playback mode. Press the ***Exit/Power*** button until PRS is not displayed to return to Monitor/Record mode.

Reset Lap and Event Number and Clear Memory

To reset the lap and event number to zero and clear all recorded data, press the ¬ and the ***Max/Event*** buttons. When the display flashes PrS PLA, press the ***Play/Pause*** button. The memory is now clear. If the ***Play/Pause*** button is not pressed within 5 seconds, the reset function is aborted.

Note: The memory is **not** automatically reset when you turn the instrument off. All data is retained when the instrument is turned off and even when the batteries are removed.

C. Playback Mode is Used to Analyze Lap Data

Recorded information is reviewed in Playback mode by lap. There are two levels in Playback mode, Lap/Max and Function Playback. In Lap/Max, you view lap times and maximum values for each function during that lap. During Function Playback you review each lap's information in detail.

Note: PRS (**PR**eviou**S**ly recorded data) is visible on the left side of the display during both Lap/Max and Function Playback.

Lap/Max Shows Lap Numbers and Maximums for Each Lap

Lap/Max is the first of two levels in Playback mode. Lap numbers and maximum values for each lap are reviewed in Lap/Max. Lap numbers are represented by an L on the display. You must change to the desired lap in Lap/Max before reviewing the information available in Function Playback.

- When in Monitor/Record mode, press the ***Play/Pause*** button to enter Lap/Max.
- Press the ¬ or ® button to change the lap number being displayed. If you are viewing the last lap of an Event, the ® button moves you to the first lap of the next Event. If you are at the first lap of an Event, the ¬ button moves you to the last lap of the previous Event.
  Note: If your display shows the word LooP after pressing one of the arrow buttons, this means that it is searching for the beginning of the next lap's information.
- Press the ***Function*** button to review the maximum values for the different functions during this lap.
- Press the ***Max/Event*** button to see which Event you are reviewing. (The display will show E and two numbers.)
- To turn off Lap/Max and return to Monitor/Record mode, press the ***Exit/Power*** button.

Function Playback Allows Detailed Review of a Lap

Function Playback is the second of the two levels in Playback mode. In Function Playback you can review all of the detailed information recorded for the lap that was selected in Lap/Max. The information can be played back, for each function recorded, in real time or stepped through in 0.1 second increments.

- When in Lap/Max, press the ***Play/Pause*** button to enter Function Playback and begin reviewing the data for the lap that was selected in Lap/Max. The instrument will begin playing back the time for the selected lap.

- Press the ***Play/Pause*** button to pause the playback of data and again to resume playback. (The information for this lap will continue to replay until this button is pressed.)
- Press the ¬ or ® button to change the direction of playback. If playback is paused, use the arrow buttons to step through the data in 0.1 second intervals.
- Press the ***Function*** button to view the different functions' readings for this lap.
- Press the ***Max/Event*** button to review the maximum readings for each function, the current Event number or the total lap time for the current lap, depending on what function is being displayed.
- To review a different lap's data, press the ***Exit/Power*** button to return to Lap/Max. While there, use the arrow buttons to select a different lap. Then press the ***Play/Pause*** button to begin reviewing data for the newly selected lap.
- Press the ***Exit/Power*** button to return to Lap/Max.

Turning Your Instrument Off

The unit can be turned off by pressing the ***Exit/Power*** button while it is in Record/Monitor mode (if there is no Tach signal and it is not recording). The instrument will turn itself off automatically after ten minutes if no keys have been pressed and there has been no tach signal.

Note: All data is saved when the instrument is turned off.

Electrical Interference

If the instrument encounters excessive electrical interference it will display ERR on the left side of the display. This indicates that the stored data might be invalid. Press the ***Function*** button, then turn the instrument off for 30 seconds. Now check if it is working properly. If it is not, turn the instrument off and back on again. Immediately after turning the instrument on press the ¬ and the ***Max/Event*** buttons. When the display flashes PrS PLA, press the ***Play/Pause*** button. The error and memory should now be cleared.

The ERR annunciator can also indicate an incorrect instrument or sensor installation. Severe electrical interference can cause the limits and calibration to reprogram themselves. If your instrument is doing strange things, put it in Set Limits mode and check to see that the limits and calibration are still where you set them.

Electrical interference problems can normally be solved by installing a *resistance plug boot*. We recommend using an NGK boot, # LB05EMH.

To avoid erratic readings:

- Keep your temperature and Tach leads separated by at least 3". Do <u>not</u> wrap leads together, this can induce interference into the system.
- Route the leads as far away from the coil as possible.
- Install the Tach lead on the plug wire at least 2" back from the plug boot. If you still have a problem, try a different location on the plug wire.
- Running your leads through separate sections of fuel line will protect them from cuts and abrasions, but will ***<u>not</u>*** shield them from ignition generated interference.
- Be sure that ***<u>all</u>*** ***<u>sensors</u>*** are connected to the instrument, and that all connectors fit together snugly. If a sensor is not being used, the input at the back of the instrument must have a shorting plug, which is available from Digatron.

Troubleshooting

The following are explanations to some commonly asked questions.

What are those letters on the side of my display?

There are five annunciators that may be displayed on the left side of your display. The most common ones represent the engine function being displayed at that time:
CHT stands for Cylinder Head Temperature
EGT stands for Exhaust Gas Temperature
RPM stands for Revolutions per Minute, also called Tach

There are a couple other annunciators that do not stand for engine functions.
PRS stands for **PR**eviou**S**ly recorded data and signifies that the instrument is in Playback mode.
ERR stands for Error and could mean that your instrument has encountered extreme electrical interference. This can ruin the recorded information and possibly cause the instrument to reprogram it's limits and calibration values.

Why does my instrument only record for 2 minutes?

Your instrument will record for longer than 2 minutes, but your display has a limit to what it can show. The instrument has two resolution levels, high and low. High resolution shows tenths of a second, and can display up to 1 minute, 59 seconds and 9/10s of a second. The 1 on the left of the display toggles every other minute in high resolution. Low resolution does not show tenths of a second, but it displays up to 19 minutes and 59 seconds. The 1 on the left of the display toggles every 10 minutes in low resolution. To change the resolution of your display, press the ¬ and the ® button at the same time, while in Monitor/Record mode.

Why does my display keep saying LooP?

This means that your instrument is searching for data, usually the beginning of a lap during Playback mode.

Why does my lap number have a 1 in front of the L?

If your display shows 1L and two other numbers, it means that you have recorded over 100 laps during the current Event.

Why is the colon (:) flashing?

This signifies that the clock is running, either during record or playback.

Why is the Display Flashing?

This signifies that you are either in Set Limits mode or that your engine exceeded a set limit.

Why won't my instrument record?

The instrument will not record if it is in Playback mode. If PRS is displayed on the left side of the display, your instrument is in Playback mode. Press the ***Exit/Power*** button until PRS is no longer displayed and then you can begin recording.

Why won't my instrument respond when I press a button?

The computer in your instrument needs to be reset. It should still respond to the ***Function*** button. Press this button, then turn the instrument off for 30 seconds. Turn the instrument back on and check to see if it is working properly. If it is not, turn it off and on again. Immediately after turning it back on, press the ¬ and the ***Max/Event*** buttons to reset the instrument. When the display flashes PrS PLA, press the ***Play/Pause*** button. If you had to reset the instrument, all of your previously recorded data was erased, but it should now be working properly.

Repairs

If you have any questions about the operation of your instrument, please call. One of our technicians will be happy to help you.

Your instrument is warranted to be free from factory defects and electronic failure for one year from the date of purchase. Physical damage during normal usage is not covered under the warranty. Be sure to fill out and return your warranty card for our records. If we do not have a card on file for your instrument, you will be charged for repairs unless you can provide us with proof of purchase date.

When returning an instrument for repair, please use the repair form found on our website or enclose a note indicating your return address, phone number and a detailed description of the problem. Send your instrument and sensors so that we can check the complete system.

Send repairs to:

Digatron
8102 N. Freya St.
Spokane, WA 99217
www.digatron.cc
Phone: (509) 467-3128 Fax: (509) 467-2952

7/24/2001