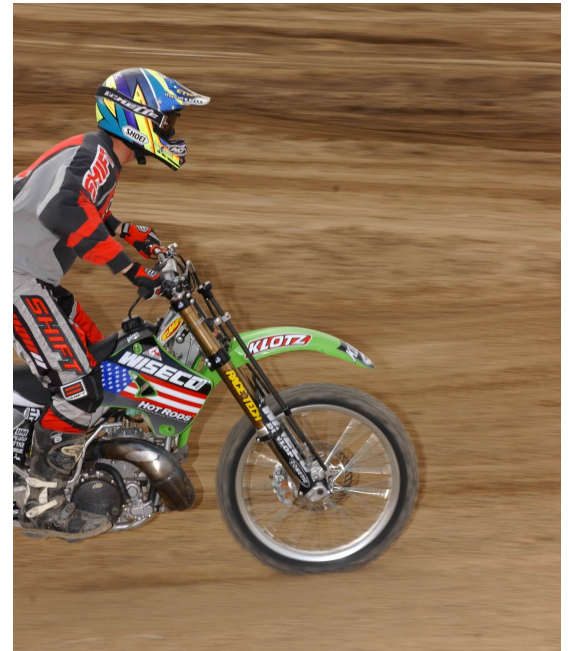


ShockClock

Installation Guide

Contents

- I. First Use and Introduction including ShockClock Software Installation
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I. *First Use and Introduction including ShockClock Software Installation*

Thank you for purchasing the ShockClock® System. To get you up to speed as quickly as possible here's how we suggest you get started:

1. **Install the PC ShockClock Software.**
2. **Make a trial recording by hand.**
3. **Download the recording to your computer.**
4. **View the recording.**
5. **Mount the ShockClock and Transducer on the front end.**
6. **Make a real test run and download it.**

Stay Tuned.....,

Paul Thede

P.S. If you're using a PDA see section XI.

1. ShockClock Software Installation

- **Insert the ShockClock CD into your computer:** It should open the CD automatically to the CD root directory. If it doesn't, open "My Computer", find the CD Drive and open it manually.
- **Go to the "ShockClock Installer" directory on the CD.** Locate the "setup.exe" file and double click it. This will install ShockClock in a new directory C:\Program Files\ShockClock. **Re-boot your computer after installation.**

2. Make a Trial Recording by Hand

- Connect the transducer to the ShockClock (*the transducer should always be connected before powering up the ShockClock*).
- **To turn on the ShockClock** press and hold the “Power” button. The “Power” and “Temp Calib” lights will go on immediately. After about 3 seconds the “Record” light will go on. When this happens release the “Power” button. The “Record” light will then go out.
- To begin recording press the “Record” button or the Remote Record Switch if you have one and are using it. The “Record” light will flash a few times and begin recording. You may be able to hear the transducer buzz if you listen closely.
- Pump the Wave-Guide Tubes in and out for about ten seconds.
- Press the “Record” button again (or the Remote Record Switch) to stop recording.
- Note: The ShockClock keeps the recording in memory until you download it (with Auto Erase turned on in Prefs). To delete a recording in the ShockClock manually, hold down the “Temp Calib” button until the light stops flashing.

3. Download the Recording to your Computer

- Connect the Download Cable from the ShockClock to your computer.

Note: If your computer is not equipped with a serial port but does have a USB port, you will need to purchase and install a USB to Serial Adaptor. If you use an adapter, **be sure to load the proper drivers.** **If you need a USB to Serial Adapter** we have a very good one built into a cable for \$40. If you use our adapter follow the instructions to load the driver software.

- Open the ShockClock Software.
- Select the correct COM Port. If you are using a serial port it is probably called “COM 1” and should download without problems. If you are using the USB to Serial Adapter you will have to change the “COM port” setting to whatever COM port you selected during installation. From the “Edit” Menu, click “Preferences”. In the top left corner select the correct COM Port.
- From the File Menu, select Download or use the shortcut Ctrl+D.
- The temperature selection box will appear. Input the current temperature.
- The Create a Filename screen will appear. Select Forks or Shock. (Either will work fine for now since it is a test run.) Input bike model, rider initials, comments, or clicker settings and watch the software build your file name automatically.
- Click “OK”. The first time it will go to C:\Program Files\ShockClock\ShockClock Data Examples. Click “OK”.
- ShockClock Software will then automatically open this file.
- NOTE: Create a directory in “My Documents” called “ShockClock Data”. Create subdirectories named with the bike model you are testing. Create subdirectories in these directories for individual test days. Save your real recordings to these directories.

4. View the Recording – Changes are automatically saved!

Click on the buttons to check it out. You won’t hurt the software.

- It will automatically open to the “Bottoming” screen. To return to this screen from anyplace in the software, click “Analyze” then “Bottoming” (or use the shortcut Ctrl+1). This screen allows you to setup the maximum travel of the suspension component you are measuring and the “zero point”. This is where you would view the number of Soft and Hard Bottoms as well as the Average Travel.
- “Notes” is where you can record suspension setup and rider feedback. Notice the settings you input during downloading are automatically input into the fields.

- For advanced users click “Analyze” then “Travel & Velocity Overview”. This will display both Travel and Velocity as it changes with Time. (Great for making Damping Adjustments.) “Peak Average” finds the top 10 highest peaks and averages them. This is a lot better than looking at just the one highest peak. “Standard Deviation” gives you an idea as to how active the suspension is. The greater the standard deviation the rougher the track or the more abrupt or aggressive the rider is.
- “File 1 / File 2” lets you see changes as well as “Front to Rear Balance”. To do this, open more than one file at a time. If you want “Front to Rear Balance” open a front recording in File 1 and a rear recording in File 2.

5. Mount the ShockClock to the Front End

- See the mounting sections.
- **WARNING: DO NOT ATTACH THE TRANSDUCER CABLE TO THE FRONT BRAKE LINE! IT WILL BREAK IF YOU DO.**

6. Make a real Test Run and download it.

- Go ride! Take a recording, download and view it. Mount the Transducer on the rear and take a recording. Knowledge comes from use of the product, the more the better. Have fun!

II. Dirt Bike Mounting

1. Installation Overview
2. Mount the ShockClock
3. Grease the O-Rings
4. Front Transducer Mounting
5. Rear Transducer Mounting – Vertical (old style)
6. Rear Laid-Down Transducer Mounting

1. Installation Overview

This section will take you through installation of the ShockClock and the Transducer Wave-Guide Tubes. Please follow these instructions carefully or damage to the ShockClock components may result.

Pay particular attention to the section titled “*Adjusting the Tubes*”.

2. Mount the ShockClock

Mounting the ShockClock is fairly simple. Protecting it and the transducer cable from damage are the main goals. The photo is a typical installation for handlebars with a cross bar pad. Note that the zip tie is routed around the handlebar to keep the ShockClock from rotating.

Make sure the Transducer cable does not get hung up on the brake line (***Remember the brake line rises up as the forks compress – don’t let it catch the cable.***)

If you are using Pro Taper style handlebars (no cross bar), mount the ShockClock directly to the front or rear of the bar pad. If you don’t have a pad, use a piece of foam. Don’t let the



ShockClock be mounted metal-to-metal or damage could result.

If you have one and are using it, mount the Remote Record Switch to the clutch perch bolt and connect it to the ShockClock.

3. Grease the O-Rings

Disassemble and grease the transducer clamp o-rings each time you use the Wave-Guide tubes. They work very well as bearings and last a long time.

Replacement o-rings are available at hardware stores (Buna N size –109).



4. Front Transducer Mounting

Please follow these instructions carefully or damage to the Wave-Guide tubes may result. When you have completed this section, go to **“Adjusting the Tubes”**.

Use 15” Travel Wave-Guide Tubes
This is good for most bikes.

MSWA 62515 \$104.99

The Wave-Guide tubes need to be mounted approximately parallel to the fork tube (***usually the right side because there is no brake line***).



UPPER FORKS

Generally the easiest way to mount the top bracket is to remove the front number plate and hose clamp it to the fork tube. Mount it between the upper and the lower triple clamp.

Make sure the front brake line is guided properly and cannot hang up on anything as the forks compress. This is normally one of the functions of the number plate.



You may be able to mount the upper transducer bracket on the lower triple clamp pinch bolts.

Be careful to allow clearance for the fork guard when the forks bottom out.



LOWER FORKS

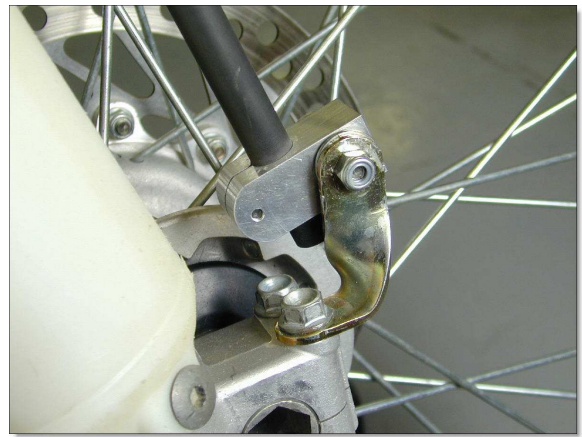
Bolt the appropriate twisted bracket (2 styles supplied) on one of the right side axle pinch bolts. Use the bracket that allows the tube to be mounted parallel to the fork.



Connect the lower tube clamp to the twisted bracket.

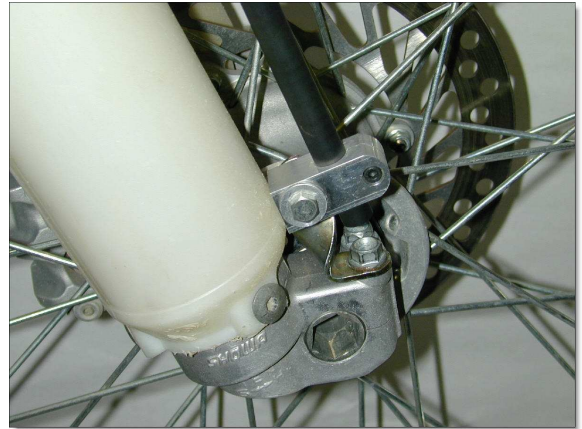
Locate the bracket so the tube sticks out 1/2" (12 mm) below the clamp. Tighten the pinch bolt securely.

Wiggle the clamp and tube to see that it freely pivots on the o-ring pivot bearing.



This bracket can also be reversed.

Connect the transducer cable to the ShockClock and to the transducer. Zip tie any extra cable. Proceed to **“Adjusting the Tubes”**.



5. Rear Transducer Mounting Vertical (Old Style)

Please follow these instructions carefully or damage to the Wave-Guide tubes may result. When you have completed this section, go to **“Adjusting the Tubes”**.

The transducer Wave-Guide tube should be mounted near vertically at the rear axle.



Upper Rear

Begin by locating the parts that will be used for the upper rear mounting.

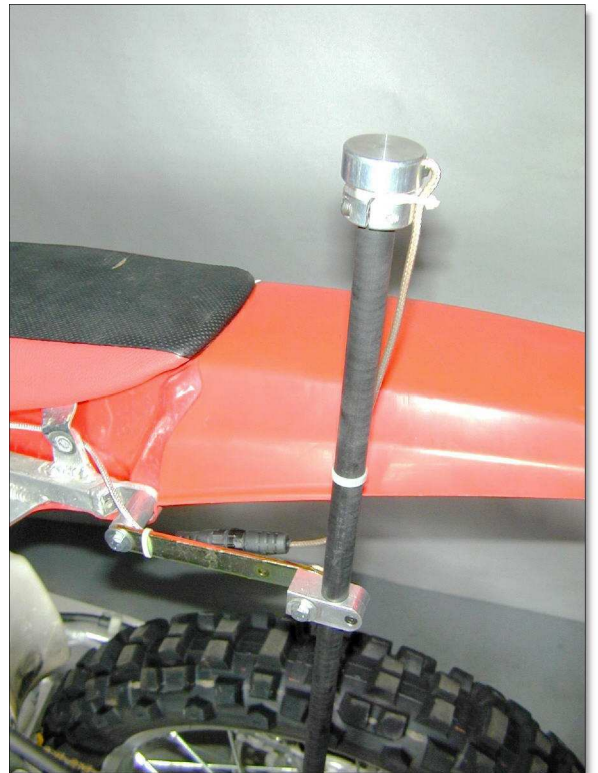


Typical installation is on the left side of the bike (the side without the pipe). Find a side panel, fender or seat mount and attach the upper bracket horizontally (you may need to remove the side panel. Tighten securely.

If the supplied upper bracket does not work for your installation use 3/4"x 3/16" (19 x 5 mm) steel flat stock and make a custom length (bending it as necessary). **Do not use aluminum as it will fatigue and break!**



Zip-tie the transducer cable securely then route it across the bike frame to the handlebar mounted ShockClock. Make sure the cable is not stretched when the bars are turned.



Lower Rear

For hollow rear axles choose the correct size lock stem to fit in the hole in the axle. There are three sizes supplied to fit most models. You can sometimes get away with wrapping the lock stem with almost anything (including duct tape) to get in-between sizes.

If the axle is not hollow you will need to make a custom mounting bracket. If this is the case locate the pivot point as close to the center of the axle as possible.



This photo shows the completed assembly ready to be inserted into the axle.

Locate the clamp within 1/2" (12 mm) of the bottom of the tube. Tighten the pinch bolt securely.



Mount the Lower Tube Clamp to the Axle

Insert the assembly into the hollow axle and tighten it. Wiggle the clamp and tube to check that it moves freely on the o-ring pivot bearing.



The complete rear assembly should have the transducer tube mounted approximately vertically when viewed from all angles as shown.



6. Rear Transducer Mounting Laid-Down (New Style)

This is the latest mounting for dirt bikes. It solves the uncomfortable feeling some taller riders get when they are far back and bump the transducer.

When you have completed this section go to **“Adjusting the Tubes”**.



Things to notice:

The Transducer is mounted above the swingarm from just above the rear axle to just below the bottom side panel mount. There is clearance throughout the entire travel. The cable is zip tied to the Transducer Head, it has a big loop and is zip tied to the frame on the inside where it can't be hit with a rider's boot.

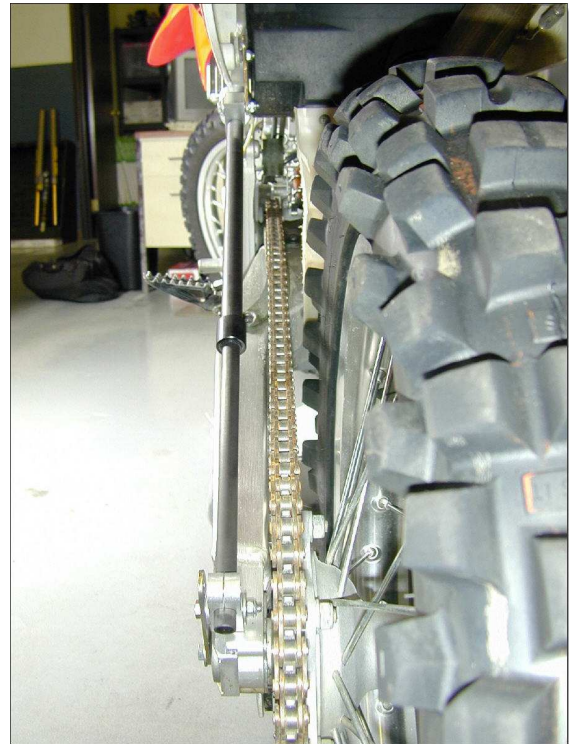
Use 8" (215 mm) Travel Wave-Guide Tubes
This is good for most bikes.

MSWA 62508 \$104.99

Or see **“IV. Shortening the Tubes”**

Outer Wave-Guide – 320 mm end to end

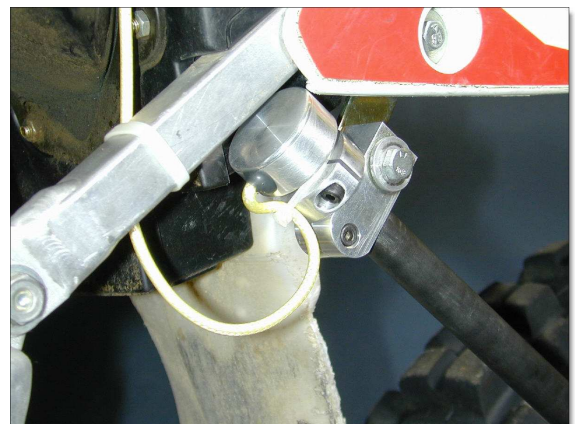
Inner Wave-Guide – 275 mm end to end



Upper Rear – Laid-Down

The best location is as high and as far forward as possible.

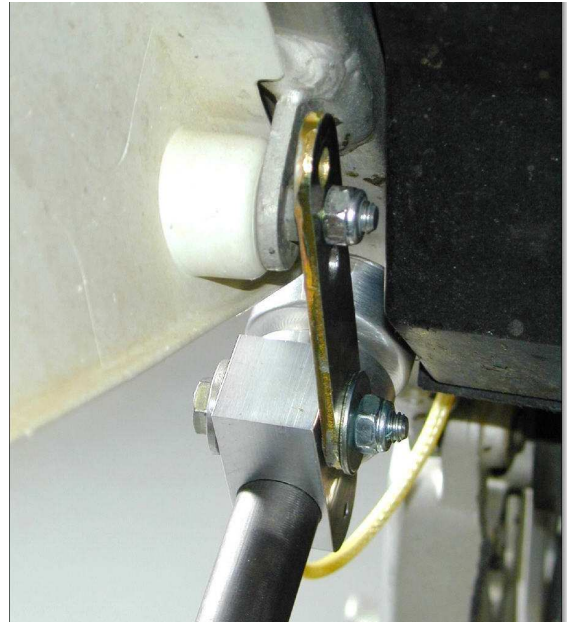
Usually the lower number plate tab can be used. Most of the time the best mounting is on the inside of the tab instead of the outside. This requires a longer number plate bolt.



It's important the rider doesn't hit it with his boot while riding. Mounting on the inside allows the number plate to be reinstalled for testing. Use washers as necessary to space the number plate out or the Transducer in.

The Transducer Cable should be securely zip tied and routed inside the frame where there is no chance of snagging it. Put a large loop so the rotation of the Transducer doesn't break the cable.

Be sure to grease the o-rings in the clamp.



Lower Rear – Laid-Down

For hollow rear axles choose the correct lockstem to fit in the axle. There are three sizes supplied to fit most models. Wrap the lockstem with masking or duct tape to fit "in-between" sizes. Grease the clamp o-rings.



Locate the clamp as close to the top of the swingarm as possible without hitting.

If the axle is not hollow you will need to make a custom mounting bracket.

The shock must be disassembled so the bottom-out bumper can be removed. It must be reassembled without the spring and reinstalled to check clearance and travel.



Convert to Vertical

The “Laid-Down Data” is not “Vertical” Wheel Travel. You have 3 choices. The preferred method is to collect and convert the data using a PDA. If you are only using a PC you can convert the data using a Motion Ratio (MR) File or you can use the Laid-Down Data unconverted as a bottoming counter.

PDA - Auto Convert

If you are using a PDA it's easy. The Laid-Down data can be converted into Vertical data automatically while downloading. This requires measuring the geometry of the Laid-Down Transducer with a tape measure and inputting it into the PDA's Prefs. See the PDA Help Guide. You can transfer the file into the PC for in-depth analysis if you like.

PC - Converting Files with “Apply MR”

1. Once you have created the Motion Ratio file, you can convert “Laid-Down” data into “Vertical Rear Wheel” data. See **PC Help 9 Apply MR**.

2. If all you need is bottoming information you do not have to create a Motion Ratio file. You can use the data directly if you know how much Transducer Travel equals fully bottomed Wheel Travel. To get this:

- Disassemble the shock and remove the bottom-out bumper.
- Reassemble the shock (without the spring) and install it back on the bike.
- Bottom the shock and measure the Laid-Down Transducer travel. This is the Maximum Available Travel.

III. Adjusting the Tubes

After installing the transducer Wave-Guide tubes, perform the following adjustments to avoid damage from either bottoming or full extension.

To make the adjustments described in this section, place the motorcycle on a center stand so that **the suspension is fully extended**.

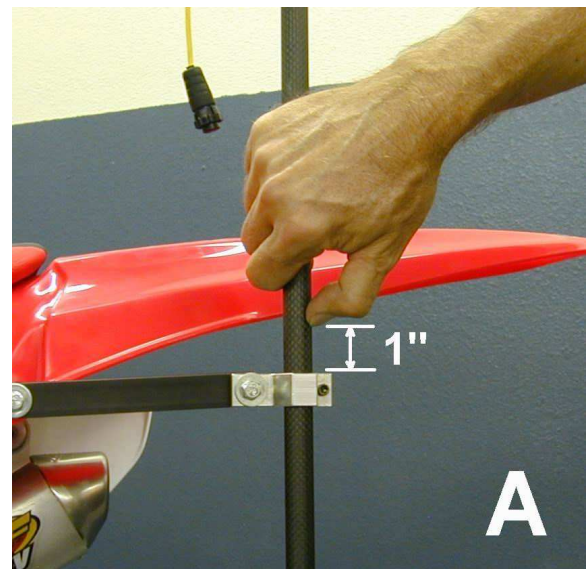
Set the Maximum Extension Point

The maximum extension point adjustment is necessary to allow about 1” (25 mm) overlap to exist between the upper and lower tubes at full suspension extension.

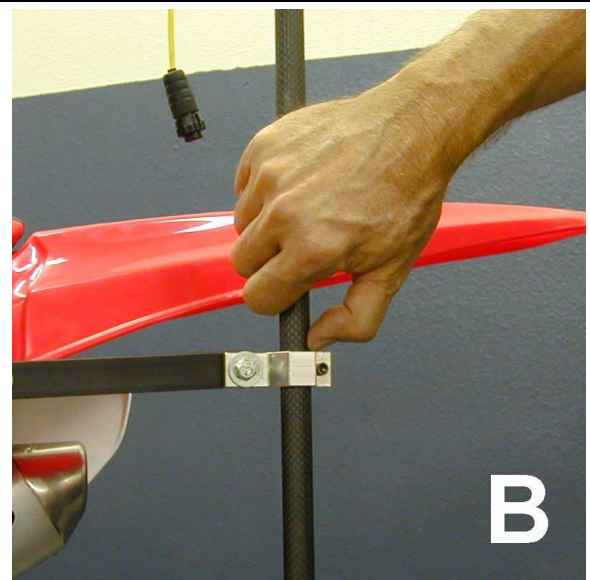
Without this overlap, the tubes could bind up and break as the rider lands from a jump. Also if the tubes extend too far, the inner piston or the outer seal head could pull off the end of the tube.

What you need to do:

With the fork or swingarm at full extension loosen the pinch bolt on the upper Wave-Guide clamp. Extend the upper Wave-Guide until it tops out and place your thumb about 1” (25 mm) above the top of the clamp.



Collapse the upper tube 1" (25 mm). This allows for top out bumpers and flex in the swingarm. Tighten the pinch bolt on the clamp.



Check the Transducer Travel

Make sure your setup has more travel in the Transducer than the wheel has.

What you need to do:

Determine how much travel your fork or swingarm has and add a safety margin of at least 1/2 inch (12 mm) for the forks and 1 inch (25 mm) for the swingarm. Adjust the Wave-Guide tubes within the upper clamp as needed to meet the travel requirements. Tighten all mounting brackets securely.



Measure the travel of the transducer as it is mounted. Make sure the exposed transducer travel is greater than the wheel travel.



If you don't already know the maximum wheel travel, measure the tire to fender clearance.

Since the rear wheel usually doesn't travel more than the distance between the top of the tire and the fender this should be more than you need.

Check for tire marks on the rear fender and give it a little room for error.



Measure the travel of the transducer as it is mounted. Make sure the exposed transducer travel is greater than the wheel travel.

If you have more than an inch more travel in the transducer than the wheel has, you can collapse the transducer a bit so it doesn't stick up so high.

You must make sure your transducer is setup with more travel than the wheel has!

This photo shows a setup for the CR250. The CR250 needs a full 14 inches (355 mm) of lower tube travel to handle the travel and swingarm flex. This same setup applies to most full size dirt bikes.



After Adjusting the Tubes

Connect the transducer cable to the ShockClock and to the transducer. Zip tie any extra cable out of the way making sure it is not stretched when the bars are turned.

Check that all of the brackets and clamps (including the transducer housing clamp) are tight.

Time to go testing! Have fun.



IV. Shortening the Tubes

Shortening the Wave-Guide Tubes

The Wave-Guide Tubes can easily be shortened for street, road race, and bicycle.

The main thing to keep in mind is to shorten the upper and lower tubes the same amount.

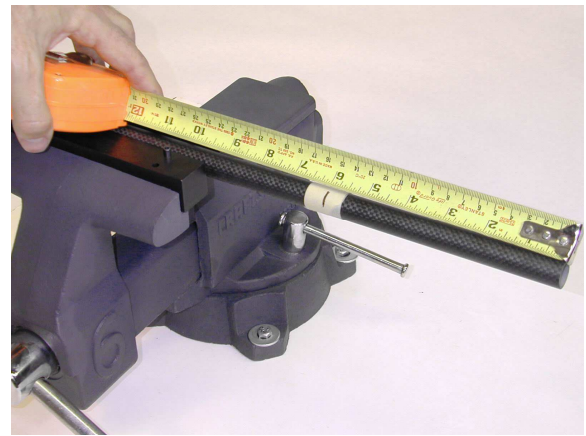
Material should be removed from the open ends of the upper and lower tubes.

Gently clamp the upper tube in a non-marring vise.

Wrap the tube with 3 layers of masking tape at the location you are going to cut the tube. This keeps the carbon fiber from fraying.



Mark a line on the tape the amount you want to shorten the travel with a felt tip pen.



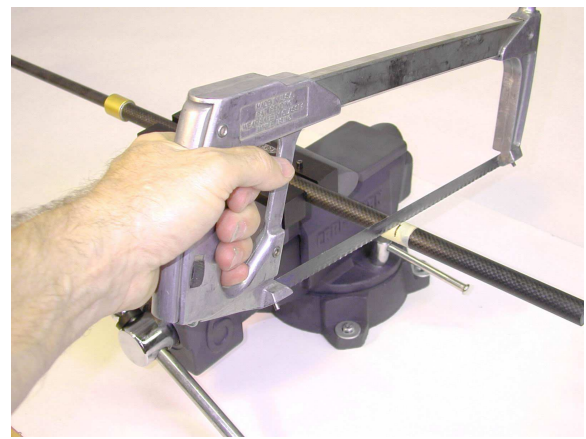
Cut the tube with a fine tooth hacksaw or chop saw.

Remove the tape and chamfer the end with sandpaper or a fine file.

Shorten the lower tube the same amount using the same procedure.

That's it!

Remember: Both the upper and lower tubes must be shortened the same amount.



V. Road Race Mounting

1. Front Transducer Mounting

Use the 7" Travel Control Rod Style Wave-Guide for most bikes.

MSWA 62507R \$84.99

The mounting in the picture is for Conventional forks and sticks up slightly above the triple clamps.



Conventional Forks

The completed mounting is typically on the left fork leg and look something like this:

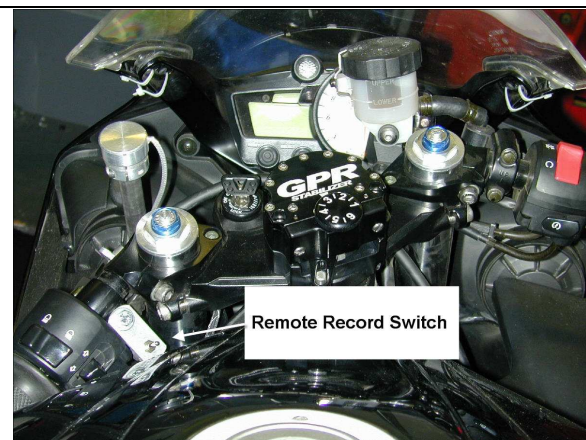
Conventional Fork Upper Mount

Use the "Stepped" Control Rod. This allows for the difference in diameters of the mounting locations.

Hose clamp the upper bracket to the fork tube between the triple clamps.



Notice the Remote Record Switch mounted on the Clutch perch. This Switch comes with the Pro kit and allows remote control of two ShockClocks.



Conventional Fork Lower Mount

Hose clamp the “Stepped” Control Rod to the seal area of the fork leg. Rotate it so it so there is no binding.

Make sure there is more travel in the Transducer than the fork has and it has clearance when the fork is fully extended (including the top-out spring).

Tighten the hose clamps.



Upside-Down Forks

The completed mounting is typically on the left fork leg using the “Looped” Control Rod.

The top of the Transducer will be below the bottom triple clamp.

Check the clearance with the radiator when the forks are turned to the stops.

USD Fork Upper Mount

Use the “Looped” Control Rod and loosely hose clamp it to the fork tube.

Position it so it is out of the way and has clearance during fork travel use.



USD Fork Lower Mount

Replace the inner axle pinch bolt with a longer one and torque it normally. Put the Looped end of the control rod on, add a washer, and a Nylock nut.

Bend the control rod so everything lines up without a side load.

Make sure there is more travel in the Transducer than the fork has and it has clearance when the fork is fully extended (including the top-out spring).

Tighten the hose clamp.



2. Rear Transducer Mounting - RR

Use 6" Travel Wave-Guide Tubes.

This is good for most bikes.

MSWA 62506 \$104.99

Or see "IV. Shortening the Tubes"

Upper Wave-Guide – 280 mm end to end

Lower Wave-Guide – 230 mm end to end

You cannot use the Control Rod Style Tubes as they can't handle side loading as the swingarm rotates during the travel.



Rear Upper Mount

This mounting uses the buddy peg mounts. Because of the variation of road bikes you may have to do a little fabrication. Triangulate the brackets for rigidity.



Rear Lower Mount

Basically the same as dirt applications. Use the appropriate Lockstem for the axle ID. You may have to wrap the Lockstem for in-between axle ID's.

This bracket is spaced out to clear the swingarm as well.

Note: You may want to reverse the axle direction.



3. ShockClock Mounting - RR

Pretty much anywhere you want that is out of the way. On this application we zip tied the ShockClocks to the underside of the rear tail section. We used the Remote Record Switch mounted on the triple clamp or on the clutch bracket.

If the stock tail section with the buddy seat and tool compartment is used you can mount the ShockClocks inside the compartment.

Get creative, use zip ties.



VI. Mountain Bike Mounting

Use 8" (215 mm) Travel Wave-Guide Tubes
This is good for most bikes.

MSWA 62508 \$104.99

Or see "IV. Shortening the Tubes"

Outer Wave-Guide – 320 mm end to end

Inner Wave-Guide – 275 mm end to end



1. Front Transducer Mounting

Front Upper Mount

Generally the easiest way to mount the top clamp is to zip tie it to the fork or handlebars. Use a bit of foam tape between the clamp and the tube to help keep it from moving up and down. It is OK to have a bit of side movement. Crisscrossing the zip ties is often helpful.



Front Lower Mount

Similar to the upper mount. Zip ties and foam tape are the ticket.

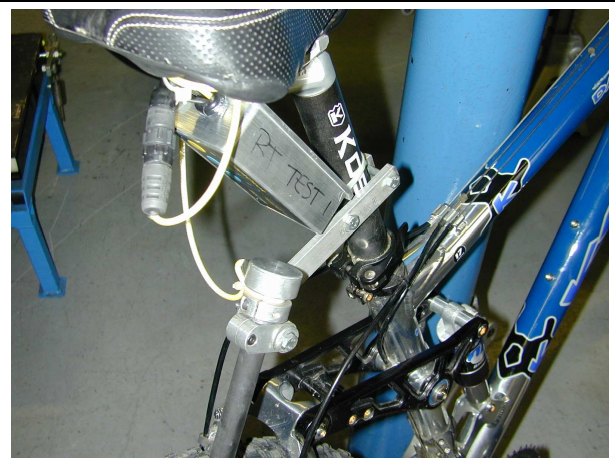


2. Rear Transducer Mounting

Rear Upper Mount

Use the Seat Post Bracket mounting the flat strap on the right side of the seat post. The Wave-Guide Clamp should be mounted on the outside (right side) of the strap.

Securely zip tie the Transducer Cable and route it where there is no chance of snagging it. Put a large loop so the rotation of the Transducer doesn't break the cable.



Rear Lower Mount

Mount the flat Bracket Strap on the right side of the bike (gear cluster side) with the axle clamp. Angle the strap up about 30 degrees from horizontal.

Mount the Wave-Guide Clamp on the inside of the bracket (toward the gear cluster). Check the clearance of the chain for gear changes.

If you have an oversize axle you may need to make a custom bracket.



3. ShockClock Mounting

Zip tie it in any convenient location. Use foam tape to protect paint. Make sure it is out of the riders' way.



VII. Computer System Requirements

Minimum

- 400 MHz or greater Intel Celeron or equivalent AMD processor
- Windows 2000/XP
- VGA or Super VGA supporting 800x600 or 1024x768 resolution
- 128 MB or greater RAM memory
- 9-pin male serial port or USB to Serial Adapter (the video port looks like a female serial port but isn't)
- Available hard-disk space of 50 MB
- CD Rom Drive

Recommended

- 1.2 GHz or greater Intel Pentium 4 or equivalent AMD
- 512 MB or greater RAM memory

VIII. Technical Support

- **Help** – Click on Help.
- **Example Files** – Example files are provided to get familiar with ShockClock Software. They are located in C:\Program Files\ShockClock\ShockClock Data Examples. Open them up and play with the settings.
- **Tech Support** – Email support is available at support@shockclock.com. We promise to be very responsive to your questions.

IX. ShockClock Warranty

The ShockClock System comes with a ninety (90) day warranty. Please review the details of the warranty in Help. **Please register your purchase on www.shockclock.com.** This will also allow us to keep you updated on software developments.

X. Extras You May Need

- **Thermometer** – Home Depot has a digital unit for around \$12.
- **Battery Tester** – Radio Shack has a decent one.
- **AA Batteries** – Bring extras
- **Zip Ties** – Bring lots of them.
- **Assorted Bolts and Washers** – 6 & 8 mm
- **Steel Flat Stock** – 3/4" x 1/8" x 3 or 4 feet for custom mounting brackets (Aluminum brackets can break.)
- **Drills and Drill Motor** – for custom mounting brackets
- **Hacksaw** – for custom mounting brackets
- **Transducer Wave-Guide Tube Sets** – Extras are nice if you break one or if you want to shorten them for road race or mini's.

Tube Set 6" (RR)	MSWA 62506	\$104.99
Tube Set 7" (RR Front Control Rod)	MSWA 62507R	\$84.99
Tube Set 8" (MX Laid-Down).....	MSWA 62508	\$104.99
Tube Set 15" (MX)	MSWA 62515	\$104.99

XI. PDA Instructions

1. Computer & PDA Requirements

Requires IBM PC or compatible.

Approved PDA's

- HP iPAQ with a Serial Port
- h2200 Series, h3800, h3950, h3970, h4150, h4350, h5100 Series, h5400 Series, h5500 Series, hx2100, hx2400, hx2700, hx4700, rz1710 (\$250)
- Note: The faster the processor the faster the data is displayed.

Other Requirements

- Windows Pocket PC 2003 or newer
- 8 MB available Memory
- HP iPAQ USB/Serial ActiveSync Cable FA122A (available from HP) or the standard cradle if it has a 9-pin Serial Port Connector
- **MSDC 02PDA Download Cable & Software License** (available from Race Tech - \$74.99)



2. Installing ShockClock PDA Software



1. Establish an ActiveSync Connection between your PC and the PDA. This requires installation of the PDA Software onto your PC according to HP's instructions. Then connect the PC and PDA via the ActiveSync Cable or the standard Cradle and establish an ActiveSync connection.
2. Insert the ShockClock Software CD in your drive. It will open the CD automatically. Go to the "**ShockClock PDA**" folder then double-click **ShockClock_Setup.exe**. This will install ShockClock PDA Software directly onto your PDA. Follow the prompts.

3. Launch ShockClockPDA Software

Turn on the PDA, select Start, Programs, and then ShockClock. This will bring up the Main Menu. From there on it is pretty simple. See the Help Guide in the PDA Software for further assistance.