

3Sixty

Panoramic Camera Mount

Instruction Manual

Greetings:

The 3Sixty is a versatile and adaptable instrument which will allow you to create panoramas using a wide variety of camera and lens combinations. This manual is designed to help you set up, operate, and maintain your new photographic accessory.

We invented the 3Sixty because we needed a professional solution for our production work, and we have refined the design while using it in a range of conditions in the field.

We have further improved the 3Sixty after getting feed-back from a number of other photographers who have used our prototypes in many places and under often unusual circumstances. Our approach to designing this machine has been entirely pragmatic.

Welcome to this interesting and expanding corner of photography!

Please let us know how it goes for you, or call for assistance if needed.

Sincerely,

John Borden
President, Peace River Studios
eMail: john@peacriverstudios.com
Web site: <http://www.peacriverstudios.com>

Terms and Conditions

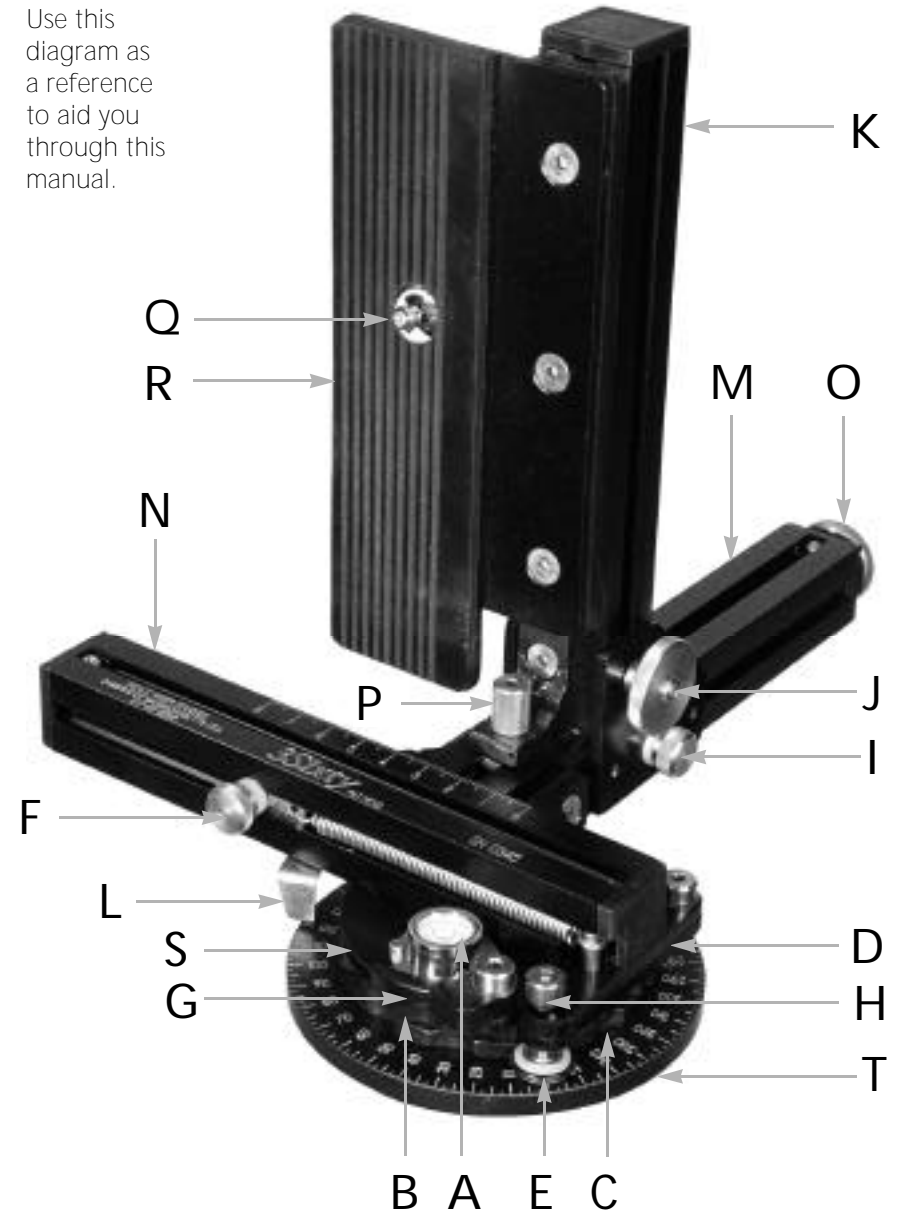
You should carefully read the following terms and conditions before using the equipment in this box. Using this equipment indicates your acceptance of these terms and conditions. If you do not agree to them, you should promptly return the equipment and your money will be refunded.

- 1. PRICES.** Prices set forth herein are F.O.B. Cambridge, Massachusetts, unless specified to the contrary.
- 2. TAXES.** Prices do not include sales, use, excise or similar taxes. Consequently, in addition to the prices specified herein, the amount of any present or future sales, use, excise, or other tax applicable to the sale, licensing or use of the equipment sold and software licensed hereunder shall be paid by Buyer.
- 3. DELIVERY.** Shipping dates are approximate. PRS shall not be liable for delays in delivery or failure to manufacture or delivery (a) due to causes beyond its reasonable control, or (b) due to acts of God, acts of Buyer, acts of civil or military authorities, priorities, fires strikes, floods, epidemics, quarantine restrictions, war, riot, delays in or lack of transportation, or (c) due to inability due to causes beyond its reasonable control to obtain necessary labor, materials, components or manufacturing facilities, or (d) due to any other commercial impracticability. In the event of any such delay, the date of delivery shall be deferred for a period equal to the time lost by reason of the delay.
- 4. TRANSPORTATION.** Unless otherwise agreed in writing by PRS delivery of the products hereunder shall be made F.O.B. Cambridge, MA with transportation expenses paid by Buyer, and risk of loss or damage to products in transit shall fall upon Buyer, whose responsibility it shall be to file claims with the carrier.
- 5. INSPECTION AND CLAIMS.** Buyer is obligated to inspect with care all products sold to it with reasonable promptness after receipt of shipment and to make written claim for defective products within 15 days of its detection of defect.
- 6. WARRANTY.** PRS warrants only that all equipment manufactured by it (but not by others) will conform to the description contained on the face hereof and will be free from defects in material and workmanship under normal use and service when correctly installed and maintained. These warranties shall apply only to equipment found to be defective within a period of 12C days after shipment and for which claim is made by Buyer in accordance with Paragraph 5 above. The warranty on the equipment shall not be applicable if Buyer has made any unauthorized changes to the equipment.
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- 9. INDEMNIFICATIONS.** Buyer agrees to indemnify PRS from and against all loss, liability, damage and expense, including reasonable attorney fees, due to claims and demands to property and injury or death to persons, which may arise out of Buyer's use of the equipment.
- 10. PROPRIETARY RIGHTS.** The design of the equipment listed on the face includes certain proprietary rights which are and will remain the sole property of PRS. Buyer agrees to keep confidential and to use its best efforts to prevent and protect the equipment from unauthorized disclosure. Buyer shall not (i) sublicense, sell, rent, loan, disclose, in whole or part, reverse engineer, copy or modify any portion of the equipment, except as provided herein: (ii) prepare derivative works from the equipment; (iii) make the equipment available to any person not in the employment of Buyer. In the event that Buyer desires to sell the equipment to a third-party purchaser, Buyer shall notify PRS in writing and shall not transfer or provide the hardware to the purchaser without the prior consent of PRS. PRS will provide such consent only if the purchaser has agreed in writing to the provisions of this Paragraph. Buyer acknowledges that any violation or threatened violation of this Paragraph will cause irreparable harm to PRS that cannot be adequately compensated by damages alone and that, in the event of such violation, PRS would be entitled to injunctive and other equitable relief in the Superior Court of the Commonwealth of Massachusetts pending arbitration as provided in Paragraph 13.
- 11. ASSIGNMENT.** Any assignment of the Agreement, or any rights or obligations hereunder, by Buyer without the written consent PRS shall be void.
- 12. WAIVERS.** No waiver by PRS of any breach of any provision hereof shall constitute a waiver of any other breach of any provision hereof.
- 13. APPLICABLE LAW AND JURISDICTION.** This Agreement and matters connected with its performance shall be construed, interpreted, applied and governed in all respects by the laws of the Commonwealth of Massachusetts and any claims arising therefrom made within one year after purchase by arbitration in Boston, Massachusetts in accordance with rules of the American Arbitration Association.
- 14. GENERAL.** THIS AGREEMENT CONTAINS THE ENTIRE CONTRACT BETWEEN PRS AND BUYER. NO PROVISION OF ANY PAST, PRESENT, OR FUTURE PURCHASE ORDER SUBMITTED BY BUYER TO PRS SHALL BE BINDING ON PRS IF INCONSISTENT WITH, CONTRARY TO, OR IN ADDITION TO THE TERMS AND CONDITIONS CONTAINED HEREIN UNLESS SAID PROVISION IS EXPRESSLY CONSENTED TO IN WRITING BY AN AUTHORIZED EXECUTIVE OFFICER OF PRS.

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Use this diagram as a reference to aid you through this manual.



- | | | |
|-------------------------------|---------------------------------------|-----------------------------------|
| A bull's eye level | H collar | N first rail |
| B top indexing disk | I (2) hinge plate thumb screws | O fore aft adjustment knob |
| C bottom indexing disk | J hinge thumb nut | P lock down thumb screw |
| D swing arm | K third rail | Q camera screw |
| E indexing wheel | L dial index | R camera plate |
| F spring thumb screw | M second rail | S rotating plate |
| G trigger clutch | | T Base plate |

Introduction

The 3Sixty Panoramic Camera Mount is a versatile and accurate instrument which will enable your camera to record precisely aligned images through a full 360°. It was primarily engineered for use in the creation of QuickTime VR™ panoramic movies but, you can also use it for other photographic special effects, including the recording of 3D images, object photography, and photographic mosaic print alignment.

The 3Sixty supports most standard 35mm single lens reflex film cameras, and digital still cameras. It is fully adjustable so that the axis of rotation will pass through the optical center of each lens used. The mount has an accurate level, so that panoramic sequences can be recorded in true horizontal orientation; two indexing disks, **(B)** and **(C)**, allow you to easily and positively advance the camera to take pictures at precise, pre-set intervals.

The installed set of disks allow you to conveniently photograph in increments of either twelve (12) shots per revolution (every 30 degrees), or in increments of eighteen (18) pictures per revolution (every 20 degrees). With 35mm film cameras set up in the portrait position, the top disk (20 degree increments) is best for shooting with 28 mm lenses, and the bottom disk (30 degree increments) is best for shooting with 15mm rectilinear, wide-angle lenses. (Extra disk sets with different intervals are available upon request.) The trigger clutch **(G)** has two functions. First you can engage the trigger and push the indexing wheel **(E)** up or down to change from one incrementing disk to another. Second you can engage the trigger and rotate the camera freely referencing the dial using the dial index **(L)** - this allows you to shoot at any interval.

Cameras can be oriented in either the landscape (horizontal) or portrait (vertical) orientation. In the landscape position, stereoscopic 3D image pairs can be recorded by sliding the camera to a second position for matched pairs.

Also, placing the 3Sixty in the landscape position allows the unit to fit more easily into your camera case!

Getting Started

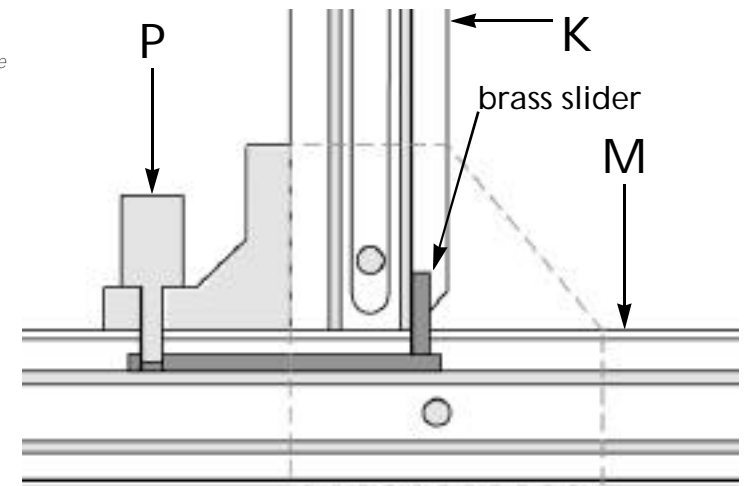
Setting up the 3Sixty

The 3Sixty is shipped in the landscape or folded position. To raise the camera plate **(R)** to the portrait position for normal shooting, slightly loosen the thumb screws **(I)** on both sides of the second horizontal rail **(M)**. Also, slightly loosen the hinge plate tightening knob **(J)** on the front hinge plate.

Rail **(K)** should now be loose enough to raise to the vertical position. Before doing so, slide rail **(K)** along horizontal rail **(M)** to expose the 2-inch brass slider in the top channel of rail **(M)**. Allow the brass slider to slide all the way to the plastic end cap near knob **(O)**.

Now raise the third rail **(K)** fully, and tilt the unit back the other way until the slider stops beneath the lower end of the third rail. The protruding pin at the end of the brass slider is an alignment pin. Screw the thumb screw **(P)** into the hole on the right end of the slider. Then tighten the other thumb screws. The 3Sixty is now set up in the portrait position. (see illustration below)

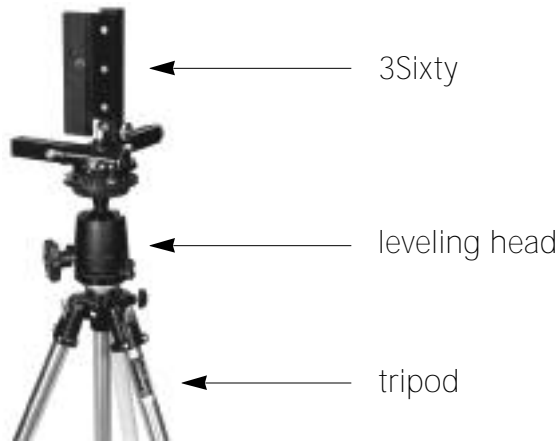
Illustration :
Side view of the
intersection
between rail K
and rail M



Mounting the 3Sixty on a tripod

The 3Sixty is normally used on a tripod equipped with a tilt-roll leveling head. There are two mounting holes on the underside of the 360 degree dial which are used to attach the 3Sixty to a tripod. Mount the 3Sixty on a leveling head with either a 1/4" -20 screw or a 3/8" -16 screw. Refer to the bull's eye level (**A**) on the rotating plate (**S**) when adjusting the level. Other levels on the tripod, or on the tilt head, should be ignored. Only refer to the level (**A**) on the 3Sixty.

Tip: One leveling head that works well is the Bogen 410(manfrotto 3275). Many other tilt and ball heads will work well, but they must allow you to adjust in both the tilt and roll axes.



Tip: The grooves that are cut out of the rubber on the camera plate **R** are made to correspond with the grooves on the bottom of a Nikon N90 camera body. It prevents the camera from moving out of vertical alignment.

Mounting a Camera on the 3Sixty

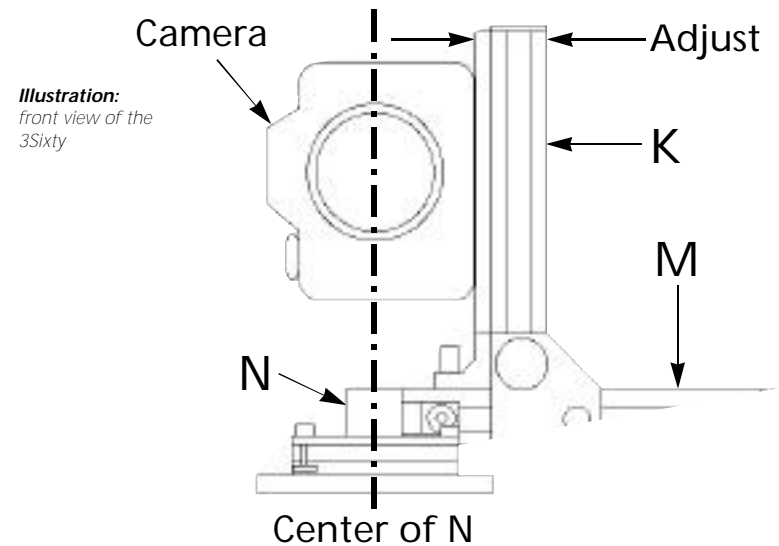
To mount a camera onto the 3Sixty, place the base of the camera onto the camera plate (**R**), and screw the 1/4" screw (**Q**) into the camera's mounting hole. Then tighten the gray check nut against the back of the camera mounting plate.

Adjustment for Rotating the Camera Around the Optical Center of the Lens

Before shooting, it is important that the camera lens' nodal point, or optical center, is on the axis of rotation of the 3Sixty. This is accomplished by adjusting the position of the camera along the two horizontal rails (**M**) and (**N**).

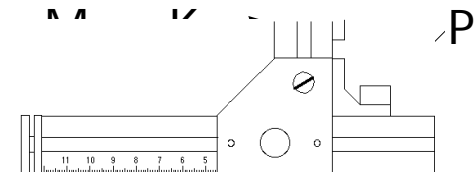
Step 1

- Slightly loosen thumb screws (**I**) on both sides of (**M**) and the thumb screw (**P**).
- Slide the camera along rail (**M**) until the center of the lens is directly above the center of the slot on top of rail (**N**). (refer to diagram below) This is the rail with the engraved scale on top.
- Once aligned tighten screws (**J**), (**I**) and (**P**).



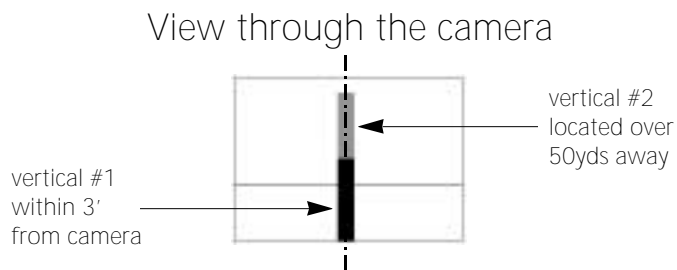
Once **step 1** is complete take note of the metric gauge on the back of (**M**) for future reference.

Tip: The reading on the gauge corresponds with the distance between the center of the lens and the base of the camera.



Step 2.

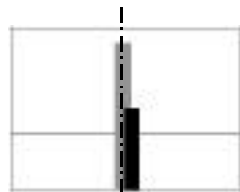
- Slightly loosen the one-inch knob **(O)** on the end of the second rail **(M)**. This will allow you to move the camera forward or backward.
- Swing the trigger clutch **(G)** forward so that the unit rotates freely.
- Looking through the camera's lens, bring into alignment two vertical objects. Vertical #1 should be nearby (within three feet) and the other vertical #2 should be far away in the distance. While panning left and right, make small adjustments by sliding the camera forward or back trying to get the 2 vertical objects not to move apart while panning. When the two stay perfectly in-line with each other the fore-aft adjustment is correct. Re-tighten knob **(O)**.



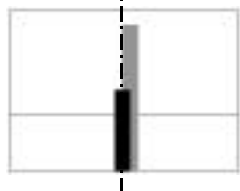
Tips:

for vertical #1
use light stands,
tripods, rulers.

For vertical #2 try
using telephone
poles, street
lights, edges of
buildings.



If the foreground appears to move while panning back and forth. This means the camera is set too far back.



If the background appears to move while panning back and forth. This means the camera is set too far forward.

Helpful Hints & Troubleshooting

Helpful Hints

Fixed lenses work better than zoom lenses because they are more compact and the images tend to be sharper. Also, zoom lenses are often heavier and make it more difficult to keep the camera level. Lenses in the 15mm range work well indoors, or in places where there is a lot of close vertical information. Lenses in the 28mm range work better outdoors, or where there is less close-up vertical information. Rectilinear wide angle lenses are recommended over fish eye wide angle lenses. If you are shooting images on film, you can either scan the images using a scanner or send them out to a service bureau for scanning onto a Photo CD.

Troubleshooting

- Check that the nodal point is set up correctly (verify that the center of the lens can be lined up with the center of rail **(N)**).
- Make sure the camera is properly mounted
- The pan head is designed to index more effectively in a clockwise manner.
- Confirm that the mount is initially leveled
- Make sure the mount is securely attached to the tripod or pan tilt head (depending upon set up)
- For portrait set up make sure that the thumb screw **(P)** is fastened tightly to the brass slider.
- Check **(F)** for spring tension
- Make sure that the trigger is retracted back unless shooting in freewheel mode

Accessories

Pedestal Attachment

Turn your 3Sixty into an object filming pedestal. This 9 inch long pedestal attaches to your 3Sixty in a matter of seconds. Its a great way to get started in shooting H pans. A Compact accessory that fits into your camera bag and gives you the ability to shoot in the field with very little equipment. The pedestal is designed for small objects weighing under a few pounds. The cost of the pedestal is \$30.00(USD).

Instructions for Installing the 3Sixty Object Pedestal Attachment

- remove back end cap of first rail (the one with the serial number) with a phillips screwdriver.
- loosen T-nut from pedestal attachment, and slide it into the top slot, to the 0 mm. mark.
- tighten the pedestal attachment by turning the screw clockwise.
- replace end cap.
- do not overload (2 pounds maximum if well centered).
- Plasticine or double surface tape is recommended for securing the object to the disc.

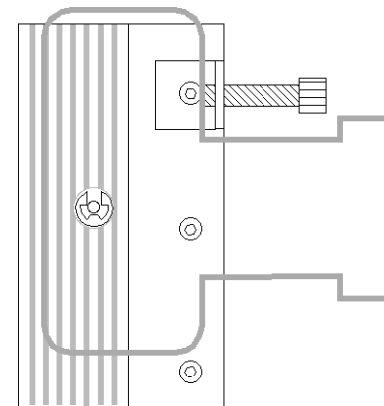
Custom Indexing Discs

The 3Sixty comes standard with a 30 degree and a 20 degree indexing disc. We also have available 6, 7, 8, 9, 11, 12, 15, 16, 17, 18, 20, 24, 28, 30, 36 increment discs. The cost of the discs are \$35.00 (USD) each. Please specify top or bottom placement when ordering.

3Sixty Toolkit (included with your 3Sixty)

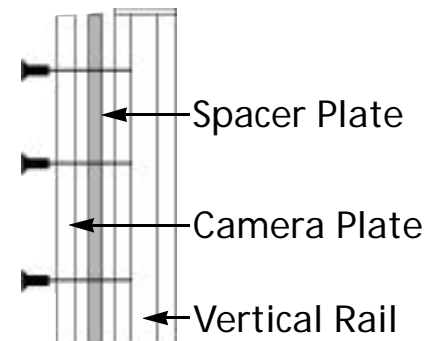
- (1) L-bracket with nylon screw
- (2) O-rings
- (1) L-wrench
- (1) L-wrench
- (1) L-wrench
- (4) flat head screws
- (1) grease
- (1) spacer plate

L-bracket with nylon screw



A stabilizing bracket has been provided in the tool kit to keep the camera from rotating on the camera plate. This can occur especially when using a heavy lens. To install remove one of the camera plate mounting screws and replace it with the bracket screw.

Spacer Plate



A spacer has been provided for use with low profile cameras such as the Apple QuickTake 150 and the Kodak DC 40. The three longer screws necessary to install this are in the tool kit. (one screw is on the L-bracket)

Modifications & Maintenance

Changing indexing disks

The tools needed to replace one or more of the indexing discs on your 3Sixty are included in the tool kit you received with your camera mount. These are the 3/16" Allen wrench and the 1/8" Allen wrench.

- 1.** Disengage the pawl from the indexing discs by pushing trigger clutch (**G**) forward.
- 2.** Insert the short leg of the 3/16" Allen wrench into the access hole in the slot of the first T-slotted rail (**N**). The hole is at the "0" mark. Be careful not to mar the anodized surfaces on either side of the slot. A little tape wrapped around the wrench will help.
- 3.** Loosen the Allen nut located in this hole by turning the wrench counter-clockwise.
- 4.** When this has been loosened two or three turns, you will be able to loosen the screw that holds the base to the rotating plate. The head of this screw can be accessed through the center tripod hole underneath the base.
- 5.** Insert the 1/8" Allen wrench into this hole and engage the button head screw.
- 6.** Loosen this screw until the base is disengaged from the rotating plate.
- 7.** Lay the upper portion of the 3Sixty to the side, taking care not to get dirt on the now exposed bearing surface of the rotating plate.
- 8.** Place the base in front of you and loosen the 6 flat head screws in the upper disc with the short leg of the 1/8" Allen wrench. Some effort may be needed to do this.
- 9.** Remove the disc or discs you want to replace, noting that the upper disc is different from the lower disc in the size and kind of holes it has. As a result these discs are not interchangeable.

10. Put the replacement disc or discs into the disc assembly. This assembly includes the two discs, the 6 flat head screws, and the button head shoulder screw with its two washers. The proper order and orientation of these washers is, first, the convex side of the spring washer underneath the screw head, then the large washer with its smooth rounded side away from the spring washer.

11. Lubricate the screw and washers with some thin oil or bicycle grease (Park Polylube, e.g.) especially on the surfaces where they bear against the plastic upper disc.

12. Engage the 1/4" shoulder of the screw into the 1/4" central hole of the top disc.

13. Before screwing the disc assembly back onto the base, place it on the base with the six screws in alignment with the base holes.

14. Verify that a notch on each disc is located at exactly 240°. This is important for the dial index to read 0° when one of the notches is engaged by the pawl. If this is not the case rotate the misaligned disc relative to the other one until this is corrected.

15. Now you can secure the disc assembly to the base. Engage each screw a few turns, and then tighten these in a repeating star pattern so that the plastic discs are uniformly tightened over their whole surface. The screws should be quite tight, as tight as your fingers can turn them using the short leg of the L wrench (the long leg as lever) without using your wrist. The L wrench should be in full engagement with the screw head so that it does not slip and mar it. Should it slip, a raised burr could interfere with the smooth rotation of the 3Sixty.

16. Uniformly spread some bicycle grease onto the top disc surface. Wipe away any excess.

17. Screw the base back onto the rotating plate until you feel resistance. Back the screw off about 30° and hold the screw at this position. Flip the 3Sixty to the upright position and slightly retighten the Allen nut with the 3/16" Allen wrench with the 1/8" Allen wrench still engaged. Do not bear down on this wrench at this time.

18. Remove the wrenches and rotate the base to determine if the desired tightness has been achieved. If so, reinsert the wrenches and tighten (bearing down with a little wrist muscle) the Allen nut with the 3/16" wrench while holding the screw with the 1/8" Allen wrench. If not, loosen the Allen nut a half turn, and repeat the process backing off a little more or a little less after resistance is felt.

19. Release the trigger clutch and verify that the 3Sixty rotates and indexes correctly.

Maintenance

Keep the 3Sixty as clean and dry as possible. With normal use, it will require very little maintenance. Occasional lubrication may be necessary. A tube of lubricant is included in the tool kit to lubricate the surface between the top indexing disc **(B)** and the rotating plates **(S)**. To lubricate your 3Sixty, it is necessary to separate these two parts. Do so by following steps 1-8 and 16-19 from the beginning of this section.

Tip: Never carry or transport a tripod with the camera attached to the 3Sixty Panoramic Camera Mount. Removing the camera will prevent accidental damage to the camera or the 3Sixty.

Appendix A

Replacement Parts

We offer replacements for all parts included with your mount.

part #	description	price
172	Base with dial (T)	\$48.15
264	Top Plate (S)	\$25.45
375	Swing arm with spring pin and indexing wheel (D)	\$11.00
456	Front hinge plate with guide pins	\$15.70
484	Rear hinge plate with guide pins	\$15.70
590	Camera plate only with standard hole (R)	\$15.00
602a	8" MK2 black anodized with angles and clamping knob (M)	\$100.00
636	MK1 with front end cap (N)	\$25.04
656	MK2 with vinyl bushing (M)	\$18.70
663	MK2 with angles and clamping knob (M)	\$45.15
693	MK3 (K)	\$16.40
751	MK3 angle	\$4.90
781	Front MK2 angle	\$5.05
799	Rear MK2 angle	\$5.05
880	Camera support bracket complete	\$11.44
1155	Hinge slider with pin	\$3.20
1160	spring slider	\$3.10
1210	dial index with 1/4" button head screw, washer and nut	\$4.40
2255	camera plate spacer	\$4.50
2355	trigger clutch (G)	\$3.00
2615	MK1 front end cap	\$5.00
2635	MK1 rear end cap	\$3.40
2640	MK2 end cap	\$4.40
2655	MK3 end cap	\$3.40
2700	MK1 front end cap fastener	\$.30
2810	Base rubber black neoprene with 3M adhesive	\$1.20
3000	10-32 x 5/16" knurled thumb screw stainless steel (F)	\$3.64
3200	10-32 x 7/16" knurled thumb screw stainless steel (I,P)	\$3.64
4800	1/4-20 bogen screw (Q)	\$3.90
5400	3/8" -16 grey aluminum thumb wheel	\$3.10
6700	7/8" O.D. x 3/8" I.D. fiber washer	\$.40
7010	1/4" external E-ring	\$1.05
7200	1/16" thick x 3/8" I.D. x 1/2" O.D. Buna O-ring	\$.15
7300	1/8" bore shaft collar (H)	\$4.70
7800	black 1" circular spirit level (A)	\$8.35
8100	indexing spring	\$1.85
8400	Krytech Teflon grease 6.5cc	\$.60
8500	1/16" Allen L-wrench	\$.35
8600	1/8" Allen L-wrench	\$.40
8700	3/16" Allen L-wrench	\$.60
9010	MK1 top plate / base including indexing mechanism and level	\$250.00
9055	toolkit with camera support bracket	\$14.50

Appendix B

Panorama Stitching Software

QuickTime VR Authoring Studio (Platform: Mac OS)

Apple Computer, Inc.

1 Infinite Loop, Cupertino, California 95014-2084, USA

Tel: 408.996.1010, www.apple.com

Photovista (Platform: Mac OS & Windows)

Live Picture, Inc.

910 East Hamilton Ave., Suite 300, Campbell, California 95008, USA

800.724.7900, www.livepicture.com

Nodester (Platform: Mac OS)

Roundabout Logic, Inc

209 North Moss Road, Suite 101, Winter Springs, Florida 32708, USA

Tel: 407.327.4500, www.roundaboutlogic.com

VR Pano Worx (Platform: Mac OS & Windows)

VR Toolbox, Inc.

PO Box 111419, Pittsburgh, PA 15238

Tel: 877.878.6657, www.vrtoolbox.com

Appendix C

Focal Length / Increments

Lens	number of images		Vertical Field of View		% Of Overlap	
	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape
14mm	12	6	102°	64°	56%	-
15mm	12	6	98°	63°	54%	-
18mm	12	8	88°	58°	49%	49%
20mm	12	8	82°	54°	45%	45%
22mm	12	8	77°	51°	41%	41%
24mm	18	10	72°	48°	58%	50%
28mm	18	12	64°	42°	53%	53%
35mm	24	12	53°	35°	43%	43%
50mm	28	18	38°	25°	53%	48%

Appendix D

Nodal Points / Notes

This page is here for you to record nodal point information for future use of your current equipment.

camera	_____
lens	_____
rail M	_____
rail N	_____
camera	_____
lens	_____
rail M	_____
rail N	_____
camera	_____
lens	_____
rail M	_____
rail N	_____
camera	_____
lens	_____
rail M	_____
rail N	_____