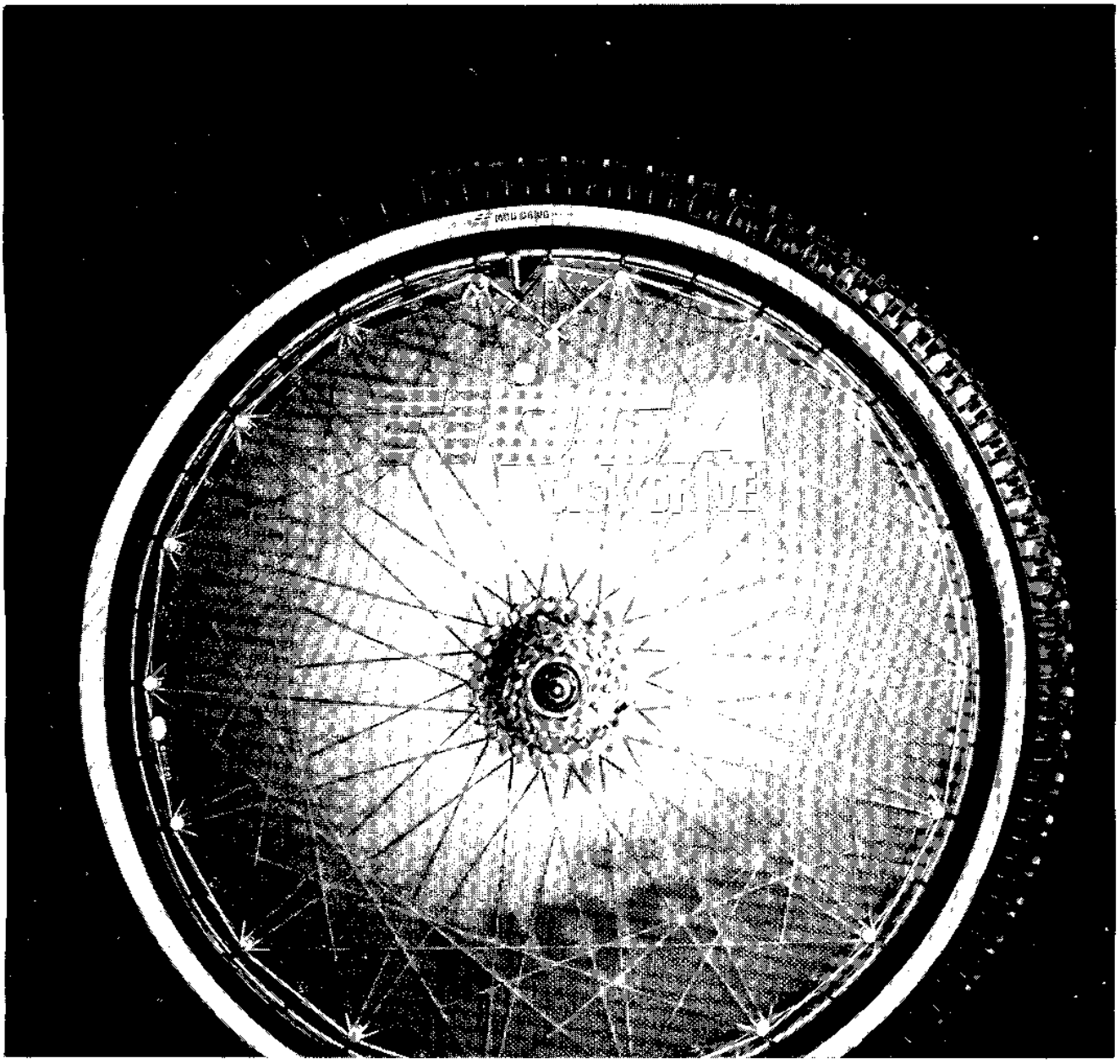
# TIGER

## DISK DRIVE

GEODESIC WEBBING

# INSTRUCTION MANUAL



*Thank you for purchasing the Tioga Disk Drive. Because this is an entirely new form of bicycle wheel, we strongly recommend that you read this manual carefully prior to assembly and use.*

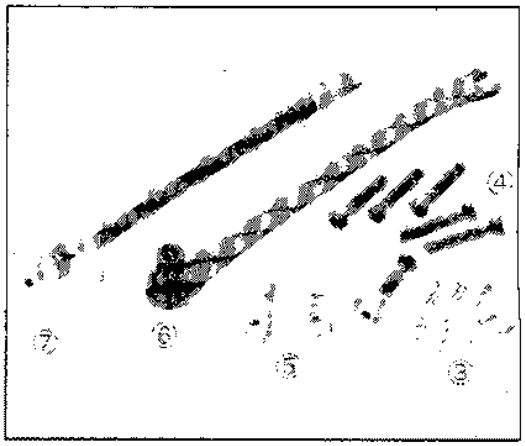
*Unlike conventional disc wheels, the Disk Drive is not a single unit. Accordingly, assembly techniques and technical skill equal to those necessary for the construction of spoke wheels are required. It is advisable therefore to ask your Tioga Disk Drive dealer to assemble your Disk Drive, in order to get the full benefit of its features and durability. (Please note that Disk Drive does not include hub, rim, or assembly charges)*

# Product Explanation

*The Disk Drive has successfully eliminated the disadvantages of conventional spoke wheels and disc wheels while managing to combine the merits of both types of wheels. We are proud to say that this is a revolution of great importance in cycling.*

**CONTENTS:**

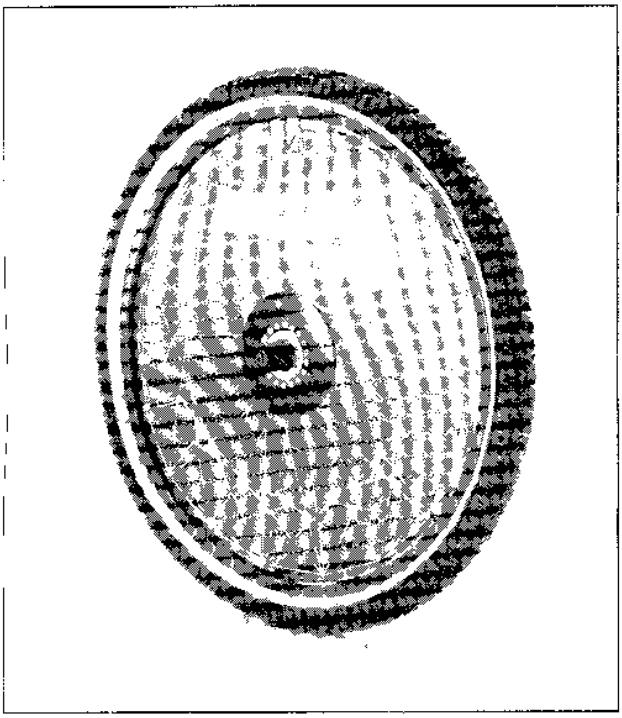
| | |
|---|---|
| *1. Right tension sheet* | *1 pc.* |
| *2. Left tension sheet* | *1 pc.* |
| *3. Hub fixing nuts & bolts (including 2 spare sets)* | *20 sets* |
| *4. Tension bolts (including 5 spare pieces)* | *41 pcs* |
| *5. Spare nipples* | *5 pcs* |
| *6. Nipple wrench* | *1 pc.* |
| *7. Valve extension* | *1 pc.* |
| *( * Disk Drive Pro Only )* | |
| ** Carrying bag* | *1 pc.* |
| ** Patch stickers* | *5 pcs.* |




**MAIN FEATURES:**

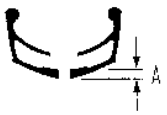
1. *Tioga's exclusive Geodesic Webbing Shock Transformation System - absorbs shock and gives good cornering.*
2. *Maintainability - for adjusting tension and eliminating wobble.*
3. *Lightweight- because of the Geodesic Webbing (Kevlar) construction.*
4. *High aerodynamic efficiency - due to its thin film construction.*
5. *Easy replacement of broken or damaged rims or hubs.*
6. *Quiet running - with minimization of friction and echo noises.*
7. *Easy running - eliminates the need for special truing ability or techniques.*
8. *Economical - stock parts of suitable specifications may be used.*
9. *Durable - Aluminum mesh prevents damage due to rocks or vegetation.*

# Disk Drive Compatibility



**ATB**

*Rim : All 26", 36 hole, hooked edge ATB rims. Not compatible with aero-type rims and other rims having an inside diameter of less than 540 mm or a wall thickness ("A" in the diagram) of more than 3 mm.*




*Hubs : All cassettle type, 36 hole ATB hubs.*

**ROAD**

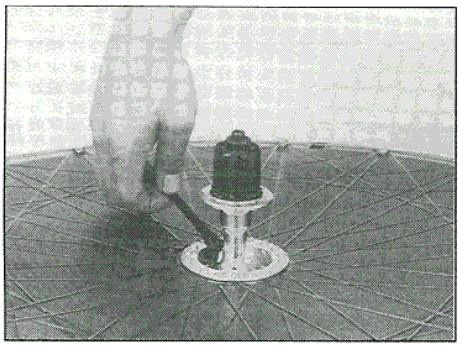
*Rims : All 700C, 36 hole rims except aero-type rims.*

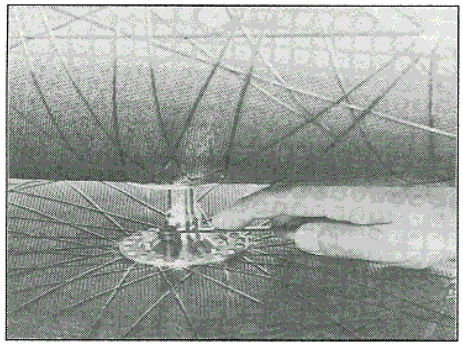
*Hubs : All cassette type, 36 hole ATB hubs.*

# Specifications

| Item | ATB | Road |
|---|---|---|
| Sheet Weight ( 1set ) | PRO : 260g<br>COMP : 292g | 305g |
| Tension Bolt Torque | Optimum torque from 10 ~ 12kgf.cm<br>Maximum 13kgf.cm ( right side sheet ) | |
| Assembly Temperature | Room temperature from + 15 to + 25 ℃ | |
| Temperature Range | − 20 ° ~ +100 ℃ | |
| Load | 100kg maximum bicycle weight<br>( including rider and fittings ) | |

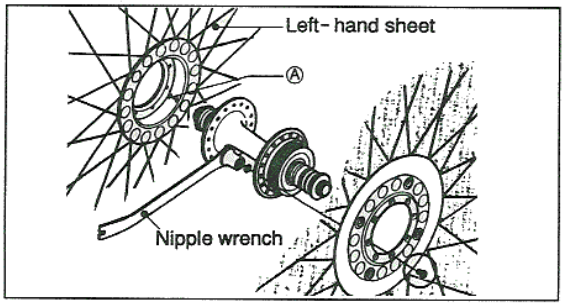
# Assembly Instructions



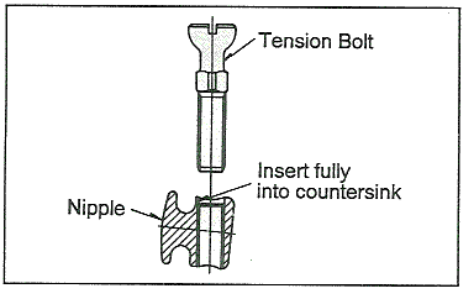


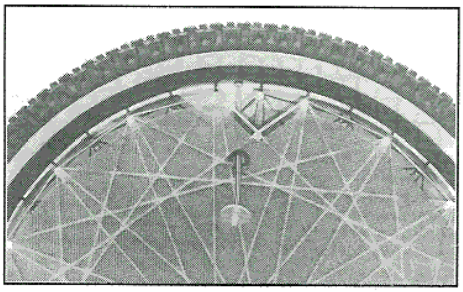
## 1. ATTACHMENT OF TENSION SHEETS TO HUB

■ *Install the left-hand tension sheet first for easier assembly. Then install the right-hand sheet.*



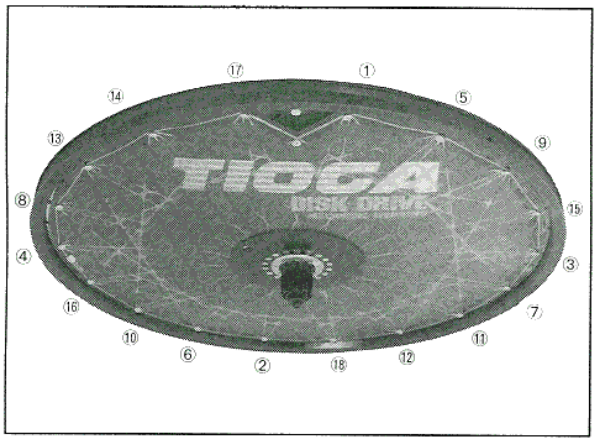

■ *Flange Ⓐ is deeper for the left-hand sheet than the right-hand one. Attach firmly using the nipple wrench provided.*



## 2. ATTACHMENT OF TENSION SHEETS TO RIM

■ *The valve access hole of the tension sheets should be attached adjacent to the valve hole in the rim.*



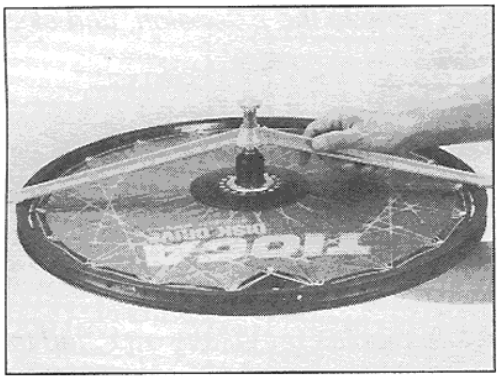

■ *Temporarily attach left-hand sheet first, in the same sequence as the numbers shown in the diagram opposite.*

■ *Next attach the right hand sheet according to the same sequence.*

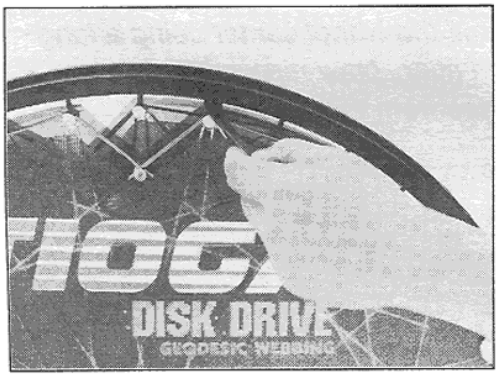
■ *Tighten tension bolts uniformly (e.g. two turns each) so that tension sheets are attached but not tightened (this will ensure easier installation of the right-hand sheet and will help avoid damage to the tension sheets, rim, or hub).*

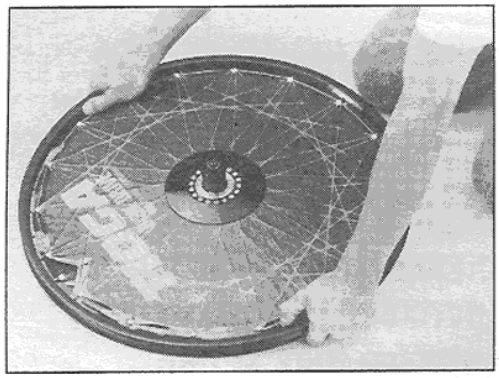



■ *Mount wheel on truing stand and turn each bolt a few extra turns. (Modify vertical distortion at this point while tightening the tension bolts)*



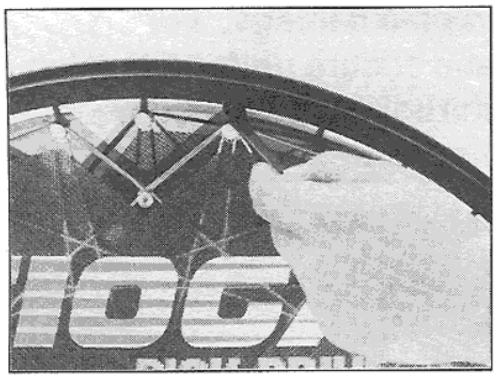
■ *Tighten the tension bolts of the right-hand tension sheet uniformly so that the rim is centered between the over-locknuts on the axle. Adjust the rim center by using a rim-centering gauge. The tension of the left-hand sheet will be adjusted automatically. (If there are still wrinkles remaining in the left-hand tension sheet, further tighten its bolts.)*



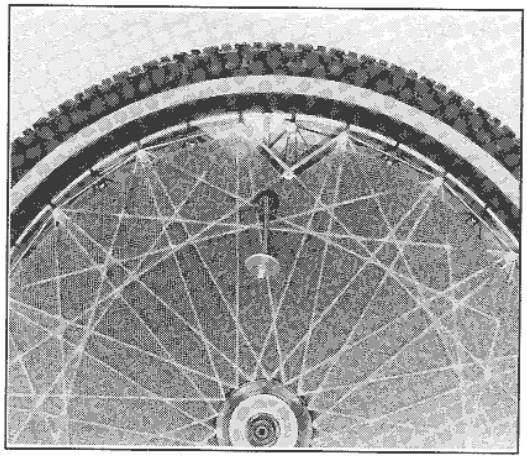
### 3. Pre-Stretching (Idling)

■ *After completing Steps 1 and 2, prestretch the wheel as for a spoke wheel. This is accomplished by placing the wheel on a flat surface and repeatedly pressing down simultaneously at two points on opposite sides of the rim around the entire circumference to help seat the nipples and stabilize the wheel.*



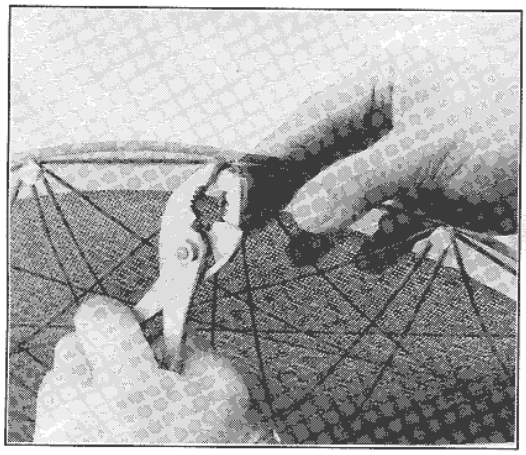
### 4. Finishing

■ *Make fine readjustments by checking distortion. (Note: Do not over-tighten the bolts- see question and answer number 3 for explanation)*



### 5. Installation of Valve Extension

■ *Your Tioga Disk Drive includes a 3-way valve extension to make tire inflation easier. To use it, insert the tubular end of the extension through the hole below the valve access, and attach it to the valve as illustrated. Attach a pump or CO2 inflator to the extension and inflate the tire. When finished, remove the extension, and close the valve.*



### 6. Replacement of nipples

■ *Broken nipples remaining attached to the sheet should be removed by pulling them towards the wheel center using a long-nosed plier. New nipples should be inserted from the wheel center.*

*** Your wheel will last longer if the tension is uniform. Your installation may look good at first if sheet distortion is eliminated, but if tension mis-match persists, distortion will soon arise and moreover the rim and nipples may suffer unnecessary damage. Once such distortion or rim deformation occurs, no readjustment will prevent nipple damage. For optimum performance, therefore, please ensure uniform tension at the nipples to minimize vertical distortion, and make any adjustments for distortion after a riding test.**

# BASIC CHECK POINTS

*As with any product, prolonged use will leave its mark. To ensure safe use, please check the following prior to riding. Take note of air pressure in the tires, slackness in the hub, and any unusual noises, as well as whether any Kevlar filaments have snapped.*

| ITEM | Check points |
|---|---|
| Hub | Check if hub set threads are loose. |
| | Check if chain touches right-hand sheet. |
| Rim | Check if tension bolts are broken. |
| | Check if tension bolts are loose. |
| | Check if filaments have broken. |
| | Check if the filaments have come off. |
| Sheets | Check if filaments have broken. |
| | Check if film is damaged. |
| | Check if sheets have slackened. |

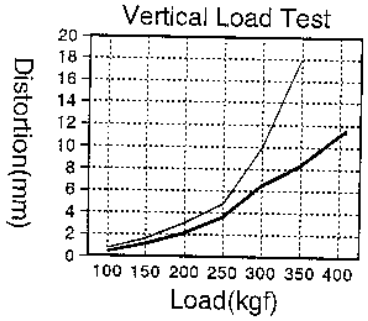
*If any of the above components are damaged or improperly set, they should be replaced or readjusted.(All components are sold separately.)*

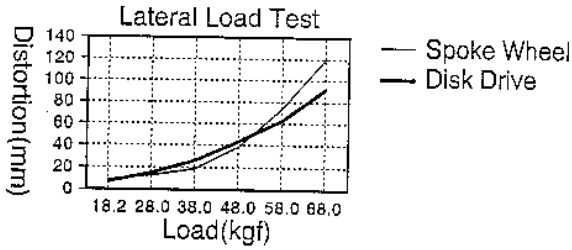
# STORAGE INSTRUCTION

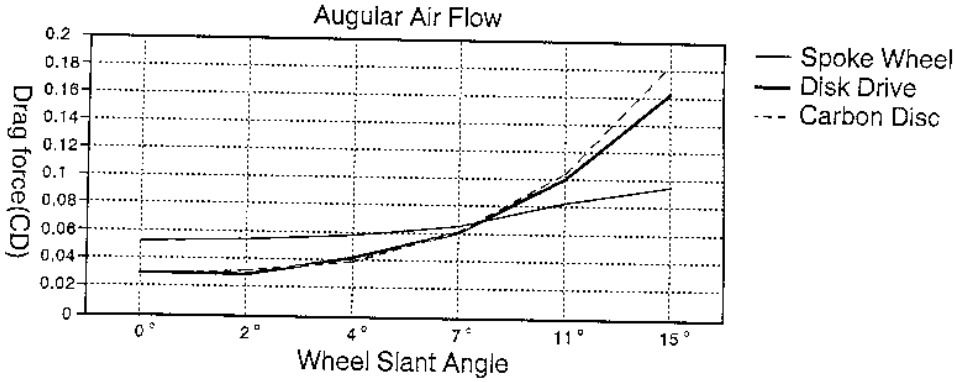
*After use, the Disk Drive should be cleaned and dried carefully, and stored in a wheel bag in an airy place out of direct sunlight. Tension bolts may weaken during prolonged storage, so you may wish to replace them for like-new performance. Please read this storage advice carefully.*

| Storage advice | Reasons |
|---|---|
| Do not store after use without proper cleaning and drying. | As Kevlar fiber is vulnerable to water, its torsion will weaken if improperly dried. |
| Do not store outdoors(e.g. on a veranda)for a long period. | Kevlar fiber may weaken under prolonged exposure to direct sunlight. |
| Do not put heavy loads on top of Disk Drive. | Pressure during storage will cause stress damage to tension bolts and sheets. |

# STRENGTH / EFFICIENCY COMPARISONS




| Tests | CRITERIA | Disk Drive | Spoke Wheel |
|---|---|---|---|
| Vertical Strength Load Test | Distortion at 250kgf load | 3.8mm | 4.8mm |
| | Residual Distortion at 250kgf load | 0.5mm | 0.6mm |
| | Load at failure | 400kgf | 350kgf |
| | Fatigued components | Damage to the nipple | Damage to the rim |
| Lateral Strength Load Test | Distortion at 18.2kgf load | 9.0mm | 6.6mm |
| | Residual Distortion at 18.2kgf load | 0.4mm | 0.6mm |
| | Distortion at 70kgf load | 110mm | 140mm |
| Overall Strength Load Test | Distortion at 120/40kgf load | 15/73.5mm | 18.2/72.0mm |
| | Residual Distortion at 120/40kgf load | 5.0mm(Vertical) | 6.7mm(Vertical) |
| Torque Strength Cycle Test | 40kgf/60 cpm | No damage after 1.000.000 cycles | No damage after 1.000.000 cycles |

**Relative Moment of Inertia**

| Disk Drive | Spoke Wheel | Sugino Carbon Disc | Sugino Aluminum Disc |
|---|---|---|---|
| 98 | 100 | 88 | 101 |

**Relative Air Drag**

| Angular Air Flow | Disk Drive | Spoke Wheel | Sugino Carbon Disc |
|---|---|---|---|
| 0° 00 | 54 | 100 | 54 |
| 3° 00 | 60 | 107 | 66 |

**Relative Efficiency of Power Transfer from Hub to Rim(50kgf pedal pressure)**

| Disk Drive | Spoke Wheel | Sugino Carbon Disc |
|---|---|---|
| 152 | 100 | 195 |

# Typical Questions & Answers about Tioga Disk Drive

**Q1. Compared with spoke wheels, the Disk Drive feels softer while riding. Is there anything wrong with the assembly?**

A. *No. The Disk Drive is designed to be set so that it feels slightly loose (when compared with a spoke wheel) to improve durability. However, you can adjust the tension of the Disk Drive according to your own preference.*

**Q2. Is it possible to replace the rim if it has been damaged?**

A. *Yes. However, you should also replace the tension bolts whenever the rim is replaced as rim failure could also indicate bolt fatigue. If any Kevlar fibers have also been damaged, the appropriate tension sheet should be replaced.*

**Q3. Why should tension bolts break?**

A. *In order to preserve the structural integrity of the Geodesic Webbing, the Disk Drive has been designed to react to stress overloads through the breakage of tension bolts. Since most stress overloads are caused by over - tightening of the tension sheets, excessive tightening should be avoided.*

**Q4. Can I keep on riding even if the film or aluminum mesh has been damaged?**

A. *Check carefully whether any of the Kevlar filaments have been broken. If not, there will be no difference in strength; however performance efficiency will be reduced. The film can be repaired with a special patch.*

**Q5. Can I keep on riding if any of the Kevlar Filaments have been broken?**

A. *The Disk Drive can be used for a short time period even with a snapped or severed filament in the Geodesic Webbing. However, please ride slowly and with caution, then replace the damaged sheet as soon as possible. Do not attempt to repair the filaments as each strand in the Geodesic Webbing is interconnected and a broken filament can greatly affect the structural integrity.*

**Q6. Is it possible to write on the tension sheets?**

A. *No problem if you use a marker pen or spray paint, but please note that some official races may forbid such markings.*

**Q7. Can I improve the wheel by making it lighter?**

A. *No. The Disk Drive should not be altered in any way, or the strength of the entire unit will be weakened. Alterations will also affect the original function, and we can offer no guarantee in this case. If lightness is essential, use a lighter rim and/or hub.*

**Q8. Can I assemble my Tioga Disk Drive even without experience in wheel assembly?**

A. *Wheel construction is one of the finest skills of bicycle making. Although assembly without experience is possible, to be sure of reliability and long life it is better to leave it to a skilled person.*

**Q9. Is it possible to carry out wheel truing when a tire is on the rim?**

A. *Yes. Truing can be performed easily, using the special nipple wrench provided.*

**Q10. It is very hard to inflate the tire because I can't get the pump onto the valve. What can I do?**

A. *Utilize the valve extension which we have provided. This allows you to use a frame pump, floor pump, CO2 inflator, or any other conventional inflation system.*

**Q11. How should I deal with dirt?**

A. *Ordinary dirt can be wiped off with a cloth. Thinner can be used, but care must be taken not to touch the Kevlar filaments. If you wash the Disk Drive with water, be sure to let it dry properly before storage.*

**Q12. Do I need any practice or training before riding the Disk Drive?**

A. *No. You will need no special training or riding skill to ride the Disk Drive. Treat the wheel as you would a spoke wheel.*

# WARRANTY

***All*** *implied warranties, including implied warranties of merchantability and fitness for a particular purpose, are limited in duration to six months from the date of original retail purchase of this product.*

***These*** *warranties and remedies are the sole and exclusive warranties and remedies in connection with the sale and use of the product. No other warranties, oral or written, express or implied, are given.*

***TIOGA*** *is not responsible or liable for any special, incidental or consequential damages resulting from any breach of warranty, the inability to use the product or under any legal theory, including lost profits, goodwill, damage to or replacement of other equipment and property, and personal injury.*

***No TIOGA*** *dealer, agent, or employee is authorized to make any modification, extension, change or amendment to this warranty.*

***Some*** *states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.*

# WARNINGS

*This product is intended and is designed for use by professionals or highly skilled riders for whom the features and materials used are valuable. This product is not intended for normal consumer use. As a result, the product should be visually inspected before each use! Any sign of torn, broken, or severed Kevlar filaments, broken nipple bolts, or torn or damaged film or mesh may be a sign of possible fatigue or stress overload. If you should observe any of these signs, DO NOT USE the product until you consult your owner's manual for guidance. If you have lost your owner's manual, or are unsure of the proper remedy, consult your authorized Tioga Disk Drive dealer before use.*

# *Tension Disc Building Tips*

***Regarding tension disk assembly:***

***-Use permanent thread lock for hub-mating bolts/nuts***

***-Use blue (non-permanent) thread lock for the rim mounting bolts/nipples***

***-IT's critical that tension be EVEN throughout the wheeL When you idle it, don't be timid- stretch it and even things out all around.***

***They really should have come pre-built. Most people have problems at the hub, or with delaminating Kevlar. Keep 'em out of sunlight, and don't use any chemical cleaners on them.***