The Lecture Gyroscope

This unique lecture gyroscope is based on University gyroscopes from the 19th century the 'lecture' gyroscope adds modern technologies that were not available at the time. This gyroscope is superior to anything else on the market while its large size makes the easily visible in a lecture theatre. A rubber starter wheel is connected to a small electric drill (sold separately) to get the gyroscope up to speed. The large mass of the gyroscope and relatively high spin leaves you to do experiments effortlessly and quietly for over 20 minutes.

- 'Spin time' has been increased to 20 minutes +
- No compromises have been made with the design
- Disk diameter is 100mm
- Disk width has been increased to 28mm
- Total weight 4.7Kg (10.36lb)
- Disk weight 1470g (3.24lb)
- Inner gimbal can be removed
- High speed stainless steel bearings
- The gyroscope and gimbal positions are adjustable
- Made from SOLID brass
- Started with rubber friction starter (supplied)
  (requires a small electric drill - sold separately)
- Size (overall height around 305mm / 12 inches)
- Ideal for practical demonstrations at colleges, universities, flying schools.
- Can be used as executive 'toy'
- Very high quality
- Designed, machined in England
- Comes with friction starter wheel
- and 10mm high quality spanner

WARNING:

- The bearings do not need oiling. Oiling will damage them.
- Tightening the rotor bearing screws (part 5) with ANY force will damage the bearings.
- It is advisable that the nuts are checked every time before the gyroscope is run. The gyroscope would be very dangerous if they were loose.
- Do not drop the gyroscope (at best the bearings will need replacing; at worst the rotor will be damaged).
- Keep loose hair and clothing away from the gyroscope. While spinning, the gyroscope has an extremely large amount of torque. Enough to rip clothing, pull hair out or cause friction burns.

List of Parts

Item	Part No.	No. Supplied	Description
1	19818	1	Base
2	19819	1	Stem (screws into base)
3	19820	1	Spindle (Shaft, pointed one end, thread other end)
4	19853	2	Gimbals Pivot
5	19821	2	Rotor Bearing Screw (holds rotor in place)
6	19822	2	Lock Screw Segment (holds segment to outer gimbal)
7	19823	2	Pin (used to connect segment to outer gimbal)
8	19824	1	Lock Screw Stem (holds spindle in the stem)
9	19825	1	Inner Gimbal (circular piece of brass)
10	19826	4	M6 Brass Nut
11	19827	1	Rotor (the main disk)
12	19828	1	Outer Gimbal (Half circle piece of brass)
13	19829	1	Segment
14	19852	1	Segment
15	20214	1	Friction Drive
16	part a	1	Spanner
17	part b	2	Bearings
18	part c	1 or 2	Rubber O Ring

Small Parts

13

14

17

18

15

8

6

5

4

7

10

16

Large Parts

11

12

3

2

1

9

The gyroscope when assembled

Purpose of the Lecture Gyroscope

The lecture gyroscope is not a toy, it is a serious scientific instrument. It has been designed for practical demonstrations in the work place, schools, colleges and universities. However, because of its fascinating behavior it may also be appealing as an 'executive toy'.
The gyroscope is started with a friction starter wheel (provided) and electric motor. This allows the gyroscope to rotate at much higher speeds using this method, providing longer running times and greater gyroscopic forces.
The starter wheel is connected to a small electric drill (e.g. Dremel type drill) which is held against the gyroscope until the drill/gyroscope is up to speed. The drill can then be taken away and turned off. Leaving you to do experiments with the high speed spinning gyroscope.
It is recommended that a low torque, high speed drill is used. A low torque drill is easier to handle at low speeds. It is preferable if the drill can be operated with one hand as the other hand will be needed to hold the gyroscope.

The Base, Stem and Spindle
The pointed end of the spindle (part 3) should be place into the stem (part 2). Small amounts of oil can be used to make sure it spins easily. There is thumb screw (part 8) to stop the spindle from spinning. Some experiments you will want the spindle, others you will not.

The Inner Gimbal
The inner gimbal (part 9) with its associated parts (parts 11, 4, 5, 17, 10) slot into the outer gimbal (part 12) with associated parts (parts 13, 14, 6, 7). The segments screws (part 6) will need to be loosened to fit the inner gimbal in. They can be tightened loosely for general use and tightened more for some experiments and transportation between rooms.

The rotor/disk, bearings and screws

The rotor/disk has high speed bearings at either end of the axle. Lower the rotor/disk (part 11) into the inner ring (part 9), aligning axle with the screws (parts 5). Slowly rotate the screws so they are JUST touching the bearings. DO NOT TIGHTEN the screws, so there is no pressure on the bearings. Now tighten the nuts on the screws. Be careful not to tighten the screws at the same time. ***No pressure should be placed on the bearings by the screws.***

Tighten the nuts well. If the disk comes out of the inner ring at high speed it has the force to go though a brick wall!

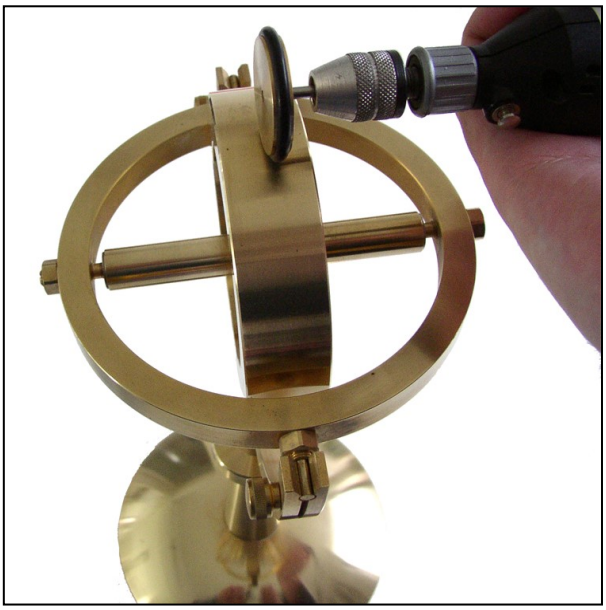
Cleaning the gyroscope

Some people prefer to polish brass, others prefer to leave it to naturally discolor. You can use any normal brass polish to clean the gyroscope. We recommend that you avoid getting polish near the bearings.

Transportation

The rotor/disk (part 11) and bearings are the most delicate part of the gyroscope. When transporting, remove this from the gimbals and pack separately to avoid shock (and hence damage). For transporting between rooms just tighten the screws (parts 6 and 8).

Using the electric drill with the gyroscope



Once a suitable high speed drill is found, place the friction starter wheel securely in the chuck of the drill. Hold the inner ring (inner gimbals) of the gyroscope firmly in one hand so the shaft is horizontal. While the drill is turned off place the friction starter on the outer part of the disk/rotor. The friction starter is will be parallel with the disk and on the centre of the disk. Start the drill, ensuring that the inner ring is held firmly and the friction starter is held against the disk/rotor firmly. The gyroscope may take up to a minute or more to get up speed. Once the gyroscope is up to speed take the drill away from the disk/rotor and turn off. You can now take your hand off the gyroscope and perform a number of experiments and demonstrations. Don't worry if the rubber marks the gyroscope, this comes off.

Handle with care

The gyroscope can rotate at high speed and hence care should be taken to ensure that you do not touch the spinning disk/shaft. Do not drop or give the gyroscope a shock when running or still as this may damage the gyroscope. At very minimum the bearings will need to be replaced. Keep hair, skin and clothing away from the gyroscope when spinning. Always check the nuts are done up before running the gyroscope.

Lecture Gyroscope Lubrication

The lecture gyroscope should never need lubricating. High quality instrument bearings have been used, which are self-lubricating. The bearings are perfectly capable of running at tens of thousands of rpm and are made from stainless steel so there is no worry of rust. You may find the bearings run smoother (and hence longer) after repeated use.

Adjusting the rotor/disk

If the rotor/disk is not in the center of the inner ring when released the gyroscope will slowly precess round. If this is the case you can simply use ‘trial and error’ to get it very close to the center. Just undo the nuts and adjust the screws carefully (do not apply any pressure on the bearings) then retighten the nuts. Repeat this task until it does not fall when let go or when precessing.

Experiments

Start the gyroscope spinning. Try picking up the base/stem (by part 2) and moving it around, You will see the gyroscope wants to point in the same direction. While the base is on a desk, try pushing the inner ring (part 9). Then try the outer gimbal (part 12).
You can then try tightening the screws (part 8 or 6) and see what difference this makes.
If you have any more questions just e-mail.