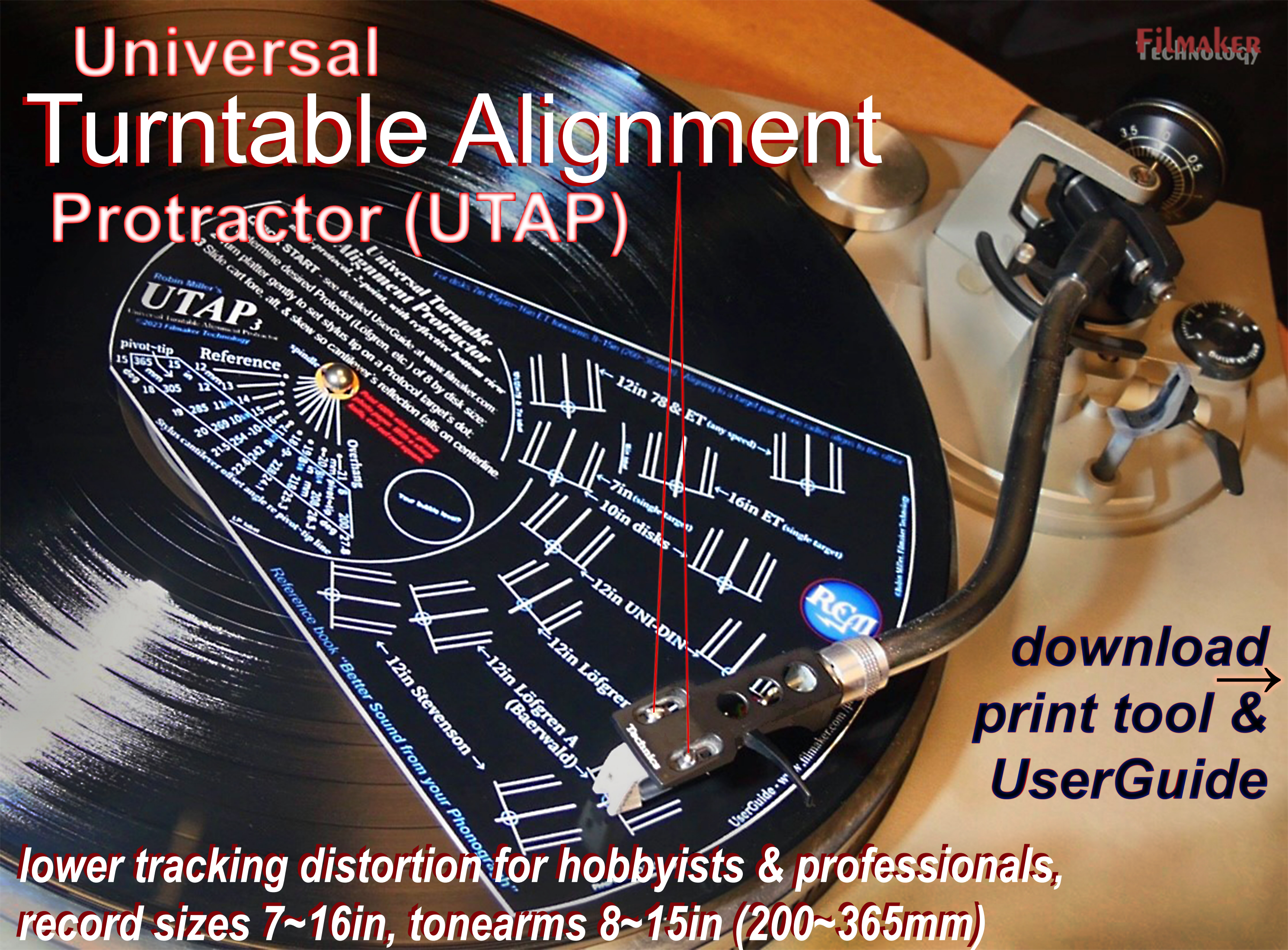


# Universal Turntable Alignment Protractor (UTAP)



**download  
print tool &  
UserGuide**

**lower tracking distortion for hobbyists & professionals,  
record sizes 7~16in, tonearms 8~15in (200~365mm)**



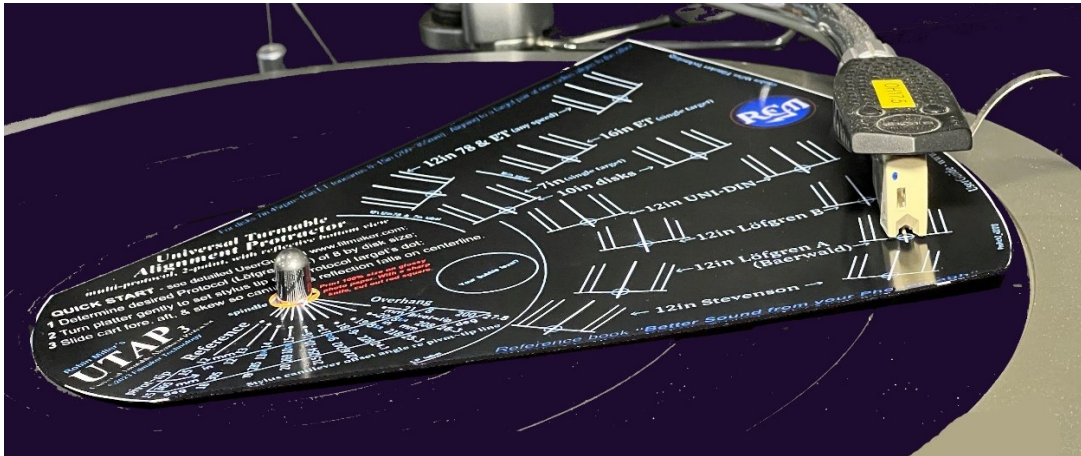
# Filmaker Technology

## Universal Turntable Alignment Protractor

### UTAP<sub>3</sub> - USER GUIDE by Robin Miller ©2023i

The Universal Turntable Alignment Protractor (UTAP) is the most practical & precise tool available to adjust phonograph pickups for lowest distortion, lowest stylus wear, and lowest permanent groove damage. "Universal" for disks 7~16 inch and tonearms of 8in~15in (200~365mm), it accommodates changing among cartridges, headshells, or styli. In only seconds for a **QUICK CHECK** or minutes for **FULL ALIGNMENT**, the

UTAP gauges key stylus **azimuth**, spindle **overhang**, and **offset angle**. Available either online as a printable download or fabricated of structurally stable fiberglass double-clad in metal, its multi-arc design ensures tip motion is optimally perpendicular to both Left & Right groove modulations, critical for best sound. Unlike paper protractors, you view to align the stylus *accurately from underneath*. Both the online and fabricated versions of the UTAP have simplified 3 step instructions on top. For skating, resonance, and other setup plus the science of playing "vinyl," see the author's book *Better Sound from your Phonograph* in paperback at [www.amazon.com/dp/0692903119](http://www.amazon.com/dp/0692903119) and booksellers supplied by Ingram.



The mirror-like UTAP finely aligns styli from underneath for disks 7~16 inches and tonearms 8~15in (200~375mm) pivot to tip.

#### UTAP particulars...

**A:** Once fully aligned, aligned pickup(s) mounted in headshell(s) may be freely interchanged, or verified with a Quick Check.

**B:** The downloadable version is user-printed on 8x10 glossy photo paper at 100% size (not borderless).

**C:** Immobilizing the platter from spinning avoids the stylus scratching the UTAP. In time a diamond stylus may scratch any mirror protractor.

**CAUTION:** a stylus & its cantilever are fragile; handle gently to avoid damage.

#### FULL ALIGNMENT PROCEDURE for new arm \ cartridge \ stylus <sup>A</sup>

1) Measure the tonearm's length pivot-to-stylus-tip to **select alignment grid** by disk size. Place UTAP on the spindle, and unlock the tonearm.

2) Using a magnifier or smartphone to view the cartridge from the front, turn the platter to **sight & place gently the stylus tip on the selected grid's tip dot**. Lock the platter using removable tape <sup>C</sup>. For turntables with integrated fixed-pivot tonearms, adjust alignment by two cartridge headshell mounting screws. *Lift the stylus off the UTAP's surface when loosening or tightening screws to avoid damaging stylus or UTAP.*

3a) Bouncing a flashlight beam off the UTAP to the underside of the cartridge, **verify cartridge body is plumb**, observing in the mirror-like surface no dog-leg angle between the real and reflected images. Adjust by twisting a removable headshell at its connector after loosening its locking screw. *If headshell is fixed, add shim(s) between the headshell and the appropriate cartridge mounting ear.* Viewed in a magnifier or smartphone, the cantilever (the delicate arm holding the disk contacting tip) should also appear plumb, showing no dogleg angle with its reflection.

3b) **Set overhang with tip on the dot** of the alignment grid. After just loosening the cartridge mounting screws of the headshell's slotted holes, slide the cartridge fore or aft as needed, then snug the mounting screws. *For fixed-mount "P" tonearms, move the arm's pivot at its base.*

3c) **Adjust stylus offset angle** by aiming (yawing) the cartridge so the cantilever overlays the bold centerline of the grid. Many cartridge bodies have irregular shapes, so refer only to the angle of the cantilever along its full length with respect to the target center-line, as reflected in the mirror-like UTAP. Viewed from directly in front, carefully aim the cartridge in the headshell so the cantilever & tip appear precisely in line, or appear evenly obscured by the grid's center line side-to-side (nearly so in image at right). Recheck the tip is still on the grid's tip dot, and gently tighten all screws.

#### QUICK ALIGNMENT CHECK (easy verification done in seconds)

- 1) Place the UTAP on the spindle; unlock the tonearm in its armrest.
- 2) Rest the stylus gently on the selected UTAP protocol alignment grid target dot. Using removable tape, lock the platter from spinning. <sup>C</sup>
- 3) Bounce a flashlight beam off the UTAP's mirror surface to the cartridge underside, focusing on stylus cantilever. With magnifier or smartphone view, observe from directly in front the cantilever's reflection in the mirror surface. Adjust mounting screws so the cantilever's virtual image falls on the UTAP grid's center line, or is obscured by the line evenly side-to-side.

*If the stylus fails a Quick Check, it must be fully aligned, as **at left**.*



#### WHY TURNTABLE SYSTEMS NEED USER ALIGNMENT?

Compared to the simplicity playing digital media, analog records require more care. A well-recorded disk's ultimate quality is baked in its groove, awaiting users to extract it properly. *Its sound when mastered was quality controlled using a finely aligned cartridge.* Alignment, tracking pressure, skating etc. are *not* disk defects, but the responsibility of the user/installer. Precise stylus alignment results in *better* sound of less distorted audio. A century+ of recorded history, less processed, much not available digitally, awaits the romance of placing a microscopic rock in a half-mile rut! →

The UTAP has multiple arc alignment for disks 7~16 inches & tonearms 8~15in tip-to-pivot. Without alignment, “mistracking” contributes several % of harsh distortion. The UTAP offers a selection of alignments, e.g. the popular Löfgren-A (Baerwald), where the stylus is precisely tangent to the groove at two radiuses, where tracking distortion is zero %. Elsewhere across the disk, distortion is optimized. In the inner groove, so-called “sibilance” is minimized. Shown below right, the common 9in tonearm can be optimized for zero-to-0.67% maximum distortion – lower for longer arms. *With no double work: either UTAP radius grid aligns for the other.*

Issues beyond the UTAP are setting tonearm tracking pressure, skating compensation, and Stylus Rake or Vertical Tracking Angle (SRA or VTA) for tips other than spherical. These issues are in the author’s companion reference book **Better Sound from your Phonograph**, see cover below.

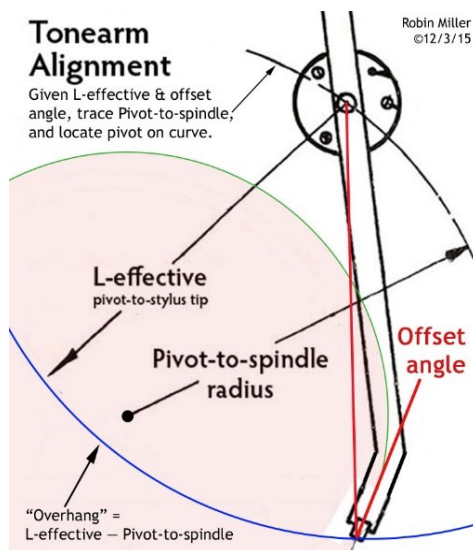
The book and its *Update* also have free solutions for checking speed. For optimizing tonearm-stylus resonance that causes feedback, groove hopping, muddy bass, & rumble. Fixing too weak or too pronounced high frequencies, set by capacitive loading. Two precise methods for skating compensation. Well-recorded disks can only be wrecked by these replay errors, but users attending to them are rewarded by best sound quality, lowest coloration distortion, and lowest wear of both stylus & disks.

## UTAP SPECIFICATIONS (subject to change without notice):

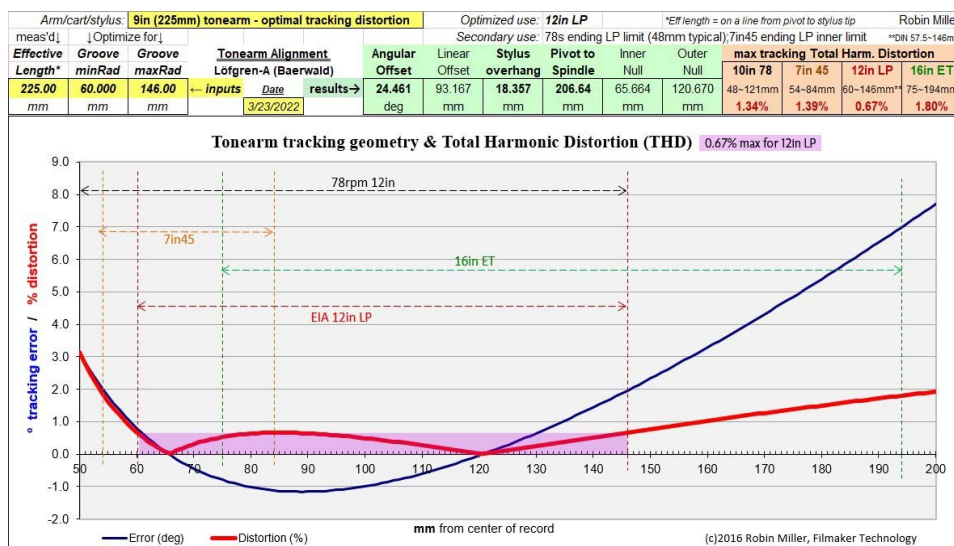
- Precision instrument, either downloadable instantly for printing, or by special order fabricated of stable, durable metal-reinforced fiberglass;
- Multi-arc protractor used by professionals for lowest distortion & wear;
- Sets Overhang & Offset Angle for tonearms by effective length, pivot to stylus tip, consumer 8in (20cm) up to pro transcription 15in (37.5cm);
- Mirror-like finish for viewing the stylus cantilever from below cartridge;
- Fabricated version has plated spindle hole for dimensional integrity, thickness same as a record for no error from thin paper or a thick block;
- USER GUIDE for Quick Check (takes only seconds) and Full Alignment for a change of arm, or freely interchanging headshell, cartridge, stylus;
- Size 7½ x 6¾ in (192.4 x 170.6 mm); black mirror-like finish.

## CUSTOMER SUPPORT for assistance, or to purchase fabricated version:

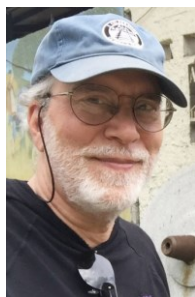
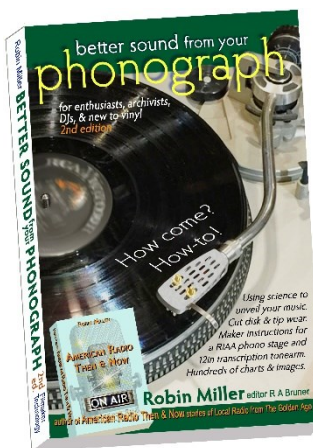
After heeding these instructions email [enquire@filmaker.com](mailto:enquire@filmaker.com) with “UTAP” as **subject**. USER GUIDE may be updated at [www.filmaker.com](http://www.filmaker.com). Original buyer of fabricated version is protected by limited 90da warranty. Other setup tools, stylus replacement info, maker projects are in paperback reference **Better Sound from your Phonograph** - [amazon.com/dp/0692903119](https://amazon.com/dp/0692903119) & Ingram-supplied booksellers.



Geometry for aligning a pivoted tonearm; dimensions mounting a typical 9in tonearm is at right boxed green.



The red curve in pink box shows an optimally aligned 9in tonearm adds distortion between zero~0.67% max. Proper replay calls for reducing distortion produced by the stylus tip shape and wrong skating compensation.



**Robin Miller** is an audio engineer & sound conservator with more than 60 years in recording and mixing films and television specials. With Filmaker Technology he designs and integrates studios and publishes about audio.

<sup>i</sup> Universal Turntable Alignment Protractor (UTAP) and User Guide are the intellectual property of the author and may not be disseminated without his or his heirs & assigns prior permission in writing.



# UTAP<sub>3</sub> Universal Turntable Alignment protractor

downloadable version for user printing landscape on heavy glossy photo paper at 100% of size (not borderless).

See **USER GUIDE** for full & quick-check of phonograph cartridge alignment.

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Filmmaker Technology  
www.filmmaker.com

## Universal Turntable Alignment Protractor

multi-protocol, 2-point, with reflective bottom view

**QUICK START** - see detailed UserGuide at [www.filmmaker.com](http://www.filmmaker.com):

- 1 Determine desired Protocol (Löfgren, etc.) of 8 by disk size;
- 2 Turn platter gently to set stylus tip on a Protocol target's dot;
- 3 Slide cart fore, aft, & skew so cantilever's reflection falls on centerline.

Robin Miller's  
**UTAP<sub>3</sub>**  
Universal Turntable Alignment Protractor  
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spindle

Print 100% size on glossy photo paper. With a sharp knife, cut out red square.

Reference

Overhang

Your bubble level?

Stylus cantilever offset angle re pivot-tip line

LP label

Reference book "Better Sound from your Phonograph"



Filmmaker Technology

UserGuide - [www.filmmaker.com/papers.htm](http://www.filmmaker.com/papers.htm)

## INSTRUCTIONS:

- ☐ Confirm size 7½x6¼in (192x170mm);
- ☐ Apply tape to underside to reinforce spindle area;
- ☐ With sharp knife, carefully cut four (4) sides of **red square** around spindle hole, and remove the gray square of photo paper & backing tape;
- ☐ With scissors, cut out UTAP around permimeter. Congrats - done! **Go To USER GUIDE**