

## EA-75, EA-76 Precision Air Tracks

These instructions apply to Daedalon precision air tracks EA-75 and EA-76. The air tracks have the same design and differ only in length. They are characterized by a triangular air track which connects to a hollow I beam by a double row of threaded studs. The combination of track and beam results in a very stiff mechanical system which can be adjusted for straightness by tightening the nuts on the connecting threaded studs. Each track is supplied with three 100g gliders. The support beam is fitted with a jack screw for leveling the track.

In order to protect the unit from damage, the beam and the track are shipped separate. Consequently, some assembly work is required before use. It will be necessary for the user to attach the crossfoot to the beam. The beam and track must then be connected by the threaded studs, which will take a little longer. Finally, you must straighten the track, which may take considerable time, depending upon the degree of perfection desired.

### Assembly of Track

Daedalon precision air tracks must be supported on a sturdy table to keep them level. The track will not stay level if its support can move about, so the first requirement is a stable supporting surface.

### Attaching the Leveling Stud and Crossfoot

1. Set the beam upside down on the supporting surface. The 1/4"-20 mounting bracket should be facing up.
2. Thread the 1/4-20 x 10 cm leveling stud 2 cm into the nut. Spin the 1/4-20 knurled lock ring on the stud up to the track surface. This serves as a lock for the stud. (Figure 1)



**Figure One**

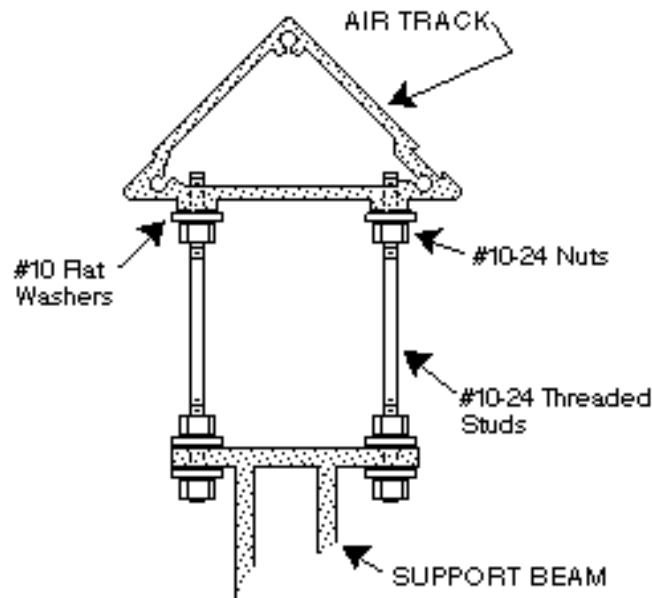
3. Using the two 1/4 - 20 screws and wing nuts attach the crossfoot to the bottom of the I beam. (Figure 2)
4. Turn over the beam so that it rests on the leveling stud and crossfoot.



**Figure Two**

### Connecting the Air Track and Support Beam

5. Find the bag containing the #10-24 threaded studs. Each stud should come with three nuts and three washers. Move one of the washers to the top of the stud and screw the stud into the bottom of the air track. Leave approximately half the thread exposed. Loosely tighten the nut to secure the stud until the leveling process.
6. When all of the studs have been attached, support the track over the beam so that the studs line up with the holes in the beam. The air fitting and the zero end of the meter tape should be at the leveling stud end of the beam. There should be a washer between the lock nut and the beam at each hole. Adjust the alignment of the studs in pairs, bending slightly if necessary, until they all pass through the holes in the beam.
7. Fasten with washers and nuts from the lower side of the flange of the beam. The nuts need only be finger tight since they will have to be re-adjusted during the alignment of the track.



**Figure Three**

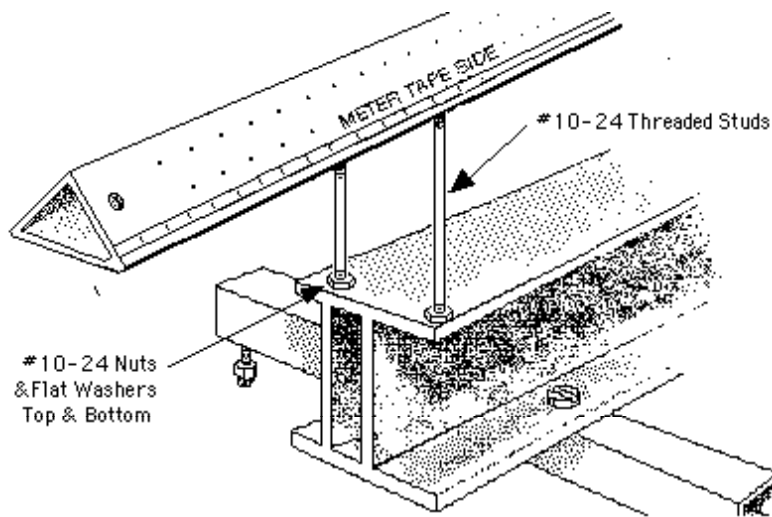


Figure Four

### Attaching the End Stops

8. Attach the rubber band glider launcher end stop to the end of the track near the zero of the meter tape. The launcher arms should face down the track.
9. Attach the plain end stop at the other end of the track. The bumper spring should face the length of the track.

This completes the assembly of the air track.

### Straightening the Air Track

Since the beam is much stiffer than the track, the straightness of the track is determined by the length of the studs connecting the track and beam together. Their lengths must all be adjusted by the nuts at the beam so that the track is straight. There are a number of ways to carry out this adjustment. The simplest of these methods is described in the following section. This method uses a taut wire stretched tightly between the end stops as a straight reference line. A glider is placed on the track and the studs are adjusted until the position of the line above the glider is constant. The adjustment should be made to an accuracy of at least 2 mm, so considerable care should be taken.

10. Locate the bag containing the monofilament line. You will also need a wrench for a #10 nut.
11. Using a thumbscrew from the accessories kit attach the line to one end of the air track at the top of the end stop.
12. Attach the other end of the line to the opposite end of the air track in the same manner as above pulling the line tight while tightening the thumbscrew..
13. Make sure the line comes off the stop the same way on both ends..
14. Place a 100g glider on the air track so that the line passes along the top of the glider.
15. Do not turn the air track on.
16. Survey the length of the track by moving the glider to various spots along the track. If there are any points that are serious departure from straight, adjust those first..

Straightening the track is a series of iterations that gradually align it. After removing any gross hills or valleys, then

17. Move the test glider to the center of the track and adjust the nuts on the leveling studs so the line passes over the glider at the same height.
18. Move the test glider to a point 60 cm away (2 stud positions) and repeat the adjustment.
19. Move the test glider to a point 60 cm away on the other side of the center and repeat.
20. Continue this procedure alternating from one side of the center to the other. When the first pass is finished, return to the center and readjust, this time adjusting each stud. Only small adjustments should be made at this point. Large changes will upset the work that is already done.

The track is quite stiff and will not deflect much at each stud so don't try to make a large change at any one point. It will usually be necessary to adjust the studs at each side of the high (or low) point as well as the stud nearest it. It is usually possible to adjust the track to plus or minus 0.2 mm using this technique. Limitations are due to the ability to measure the position of the line relative to the test glider. A laser beam and a mirror mounted on a glider is the next step in straightening the track if you want to approach perfection. This procedure is complicated relative to those described and is seldom needed. Certainly a straightness of  $\pm 0.2$  mm is adequate for most mechanics experiments.

### **Leveling the Air Track**

21. Connect the air supply to the nozzle on the end of the air track. The recommended air supply is the Daedalon EA-20 Air Source.
22. Place the 100 gm glider on the air track and turn on the air source. The glider will float and likely drift down to one end of the track or the other.
23. Loosen the locking ring on the leveling screw and twist the screw until the glider wanders on the middle of the track. The air supported glider makes a very sensitive level and it will detect the smallest departure from horizontal.
24. Tighten the locking wing nut. The track is now ready for use.