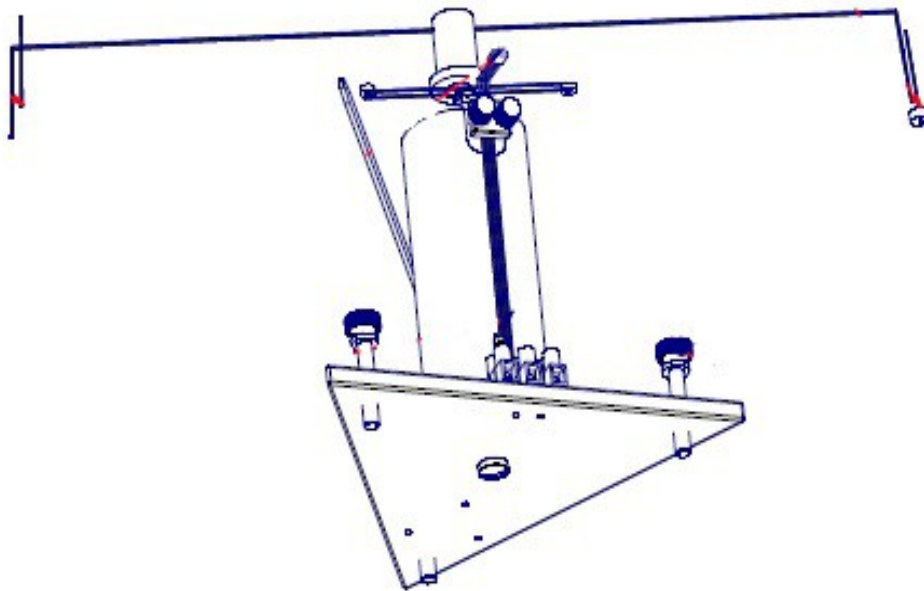




**Flyte Mill  
Model 15-FM**

**USERS MANUAL  
Rev -**



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## BEFORE YOU BEGIN

Be sure following items are in your package.

1. Flight Mill Main Post Assembly.
  - a) Packed in round plastic container for shipping and storage.
2. Rotor Arm Assembly.
  - a) Packed in rectangular plastic box for shipping and storage.
3. Pack of size #1 stainless steel insect pins.
4. Set of counterweights.
  - a) White
  - b) Brown
  - c) Black

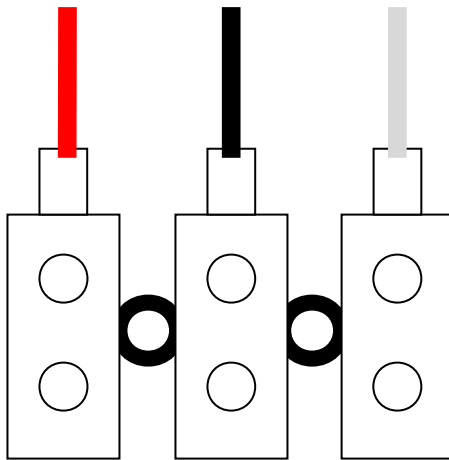
## OVERVIEW & PURPOSE

The Flight Mill is a device to measure the flight speed of various flying insects. It can be used to determine the rate of decline in neural and physical abilities of these insects over time. It can also be used as a way to determine the spread rate of invasive flying species. This device may used for very small insects and with insects as large as butterflies.

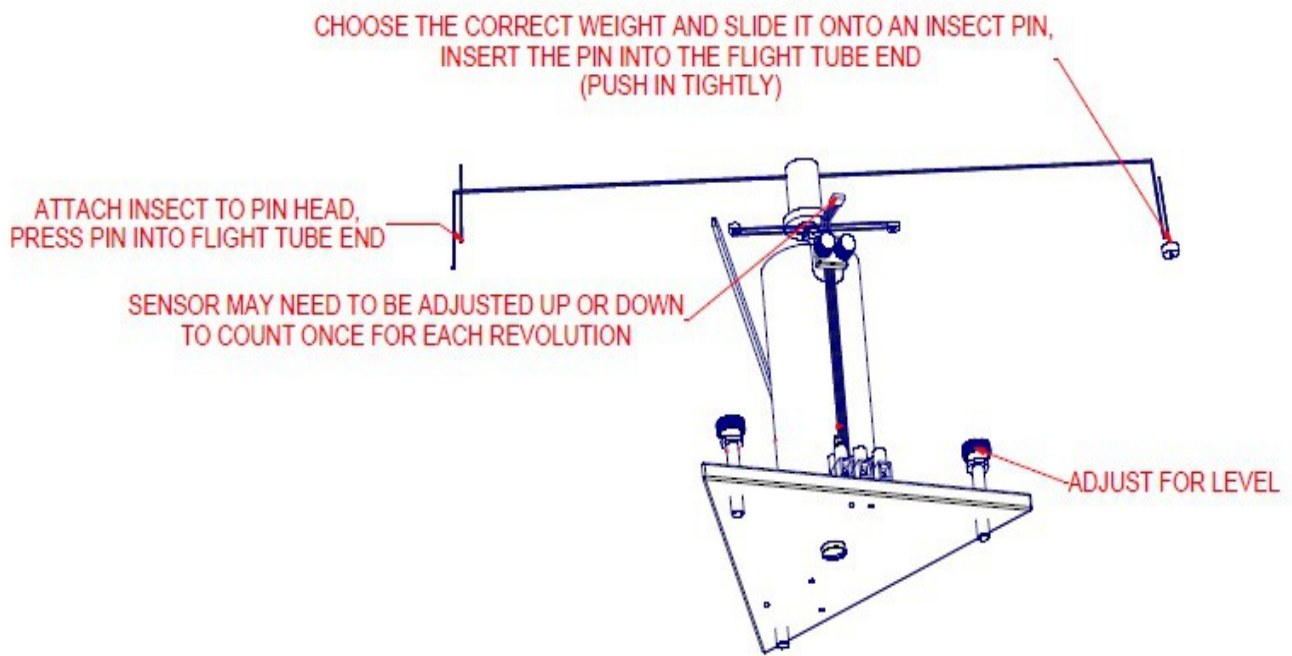
## OUTPUT CONNECTIONS

1. Connect to terminal strip as follows:

- a) Red Is +4.5Vdc to +24Vdc. Nominally +5Vdc from IO Board.
- b) Black is Ground from IO Board.
- c) White is Open collector output to IO Board Input. 20 ma Max sink.



## MILL PARTS



## SET UP & METHOD OF OPERATION

1. Connecting Device
  - a) Connect device to IO board as shown in Connection diagram.
  - b) Level device using adjustment screws and bubble level.
2. Mounting the pin to the insect
  - a) Cool the insect with a "gell ice block" wrapped in a paper towel or cloth. This will prevent condensation on the insect and prevent "freezer burn".
  - b) Once the insect is cooled, remove the thorasic scales using a small brush. This will allow the glue to adhere to the thorax.
  - c) Place a small drop of LOW TEMPRATURE glue to the head of the pin and touch it to the thorax.
    - Make sure you use LOW TEMPRATURE glue so as not to burn or kill the insect.
  - d) Insert the pointed end of the insect pin into the Flight Mill flight arm. The pin will fit snug enough to hold without slipping.
3. Balance the arm.
  - a) Choose the correct weight and slide it onto an insect pin,
  - b) Insert the pin into the flight tube end (push in tightly).
4. IO board setup and considerations.
  - a) The sensor is an open collector device.
    - It must have a pullup to +5v to function properly.
    - Most DIO boards have pullups to keep the input stable with no input, but some may have pulldowns to ground or require some form of jumper on the board.
    - The pullup should be greater than 500 ohms or so. Usually its 1k, 4.7k or 10k.
  - b) Sample rate must be high enough to catch sensor window.
    - Here is how to figure sample rate:
    - Start with max RPM, say 20 rpm. That's 3 sec per rev.
    - divide by 360 deg, that's 1/120 s/deg.
    - Assume a one degree window (actual is wider).

- Therefore sample rate would then need to be greater than 120 Hz to make sure you hit a pulse window.
  - Use your own RPM to determine actual sample rate.
- c) Alternate method to determine RPM (Input Capture).
- Use a timer set for input capture.
  - The pulse "captures" the current timer value and interrupts the PC to read the value.
  - By comparing sequential times, you can measure the RPM.
  - Different DIO systems have such a timer function in them.
  - This is the best way to determine RPM, since you cannot miss a pulse due to sampling.

## APPENDIX A – LIMITED WARRANTY

Crist Instrument Co., Inc. warrants, to the original end user only, that our products substantially conform to the specifications as designed and are substantially free from defects in material and workmanship. Provided that Crist Instrument Co., Inc. is notified of defects within the warranty period (set forth below) and in accordance with paragraphs as detailed below, we will correct all defects in materials and/or workmanship. The warranty begins from the date of product delivery. Flight Mills are warranted for a period of 1 Year.

If the purchaser discovers within the warranty period as described a warranted defect for the product in question, the purchaser must notify Crist Instrument Co., Inc. The purchaser will receive instructions regarding procedures to follow regarding return and/or replacement of the product in question. All repairs will be performed at Crist Instrument Co., Inc. facility in Hagerstown, Maryland unless otherwise advised.

Crist Instrument Co., Inc. does not warrant any products, components or parts not manufactured by Crist Instrument Co., Inc., defects caused by the purchaser's failure to provide a suitable installation environment for the product, damage caused by the use of the product for purposes other than those for which it was designed, damage caused by disasters such as fire, flood, wind or lightening unless and to the extent that the product specification provides for a resistance to a defined disaster, or acts of vandalism or terrorism, damage caused by unauthorized modifications or attachments, or any misuse by the purchaser.

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In the event of problems or questions, call the product specialist at Crist Instrument Co., Inc. (301) 393-8615.

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