

DEM *Drosophila* Eclosion Monitor

The *Drosophila* Eclosion Monitor uses a glass funnel and infrared counting electronics to collect and measure the eclosion time history of a population of hatching flies.

Mature pupae cases are glued to a plastic disk, which is then inverted over the mouth of the glass funnel and held in place by the tapping solenoid. Emerging flies fall down by gravity, and then out through the funnel neck where their passage is detected and counted by infrared light beams within the unit base.

At periodic intervals the solenoid tapping mechanism briefly pushes down the disk/funnel stack, using enough force to dislodge recalcitrant flies which may remain adhered to the disk or funnel surfaces. This insures that all eclosed flies are counted within a short time of their emergence, and that none will remain in the funnel cavity to reach flying maturity.

The onboard electronics maintains a count of the flies which fall through the funnel neck, and periodically on command uplinks this total to the DAMSystem computer for archival storage and analysis.

The funnel neck protrudes through the bottom of the monitor case, allowing for closed capture of the emerging flies by a vial morgue or collection apparatus.

Features

- Wide funnel mouth captures emerging flies over large area.
- Built-in tapping solenoid shakes new imagoes loose from disk and funnel surfaces.
- Consistent operation in ambient light levels from bright laboratory to total darkness.
- Telephone-type wiring jack allows easy connection to DAMSystem wiring network.
- Accessories included: Glass funnel, plastic pupae disk



Specifications

- Dimensions: 4.375" sq. x 9.75" high (111 mm sq. x 248 mm high)
- Mass: 1.8 kg (includes funnel and disk)
- Funnel stem extension below unit housing: 1.5" (38 mm)
- Tap excursion: 0.175" (4 mm)
- Tap frequency/duration: programmable
- Detection size threshold: 0.5 mm
- Interconnect: 4 wire, 6 position, RJ-11 modular telephone line jack to DAMSystem network for DC power input and data transmission
- Glass funnel: Kimble #28950-100 (diameters: 100 mm mouth, 9 mm neck)
- Case material: Anodized aluminum, nylon

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Mechanical Setup

The unit should be placed on an incubator shelf so that the funnel stem may protrude down through and below the base. The funnel is Kimble #28950-100, and should *not* be replaced with any other type if the tapping mechanism is to be used. If the tapping mechanism is not needed, then any funnel whose stem is 9mm or less in diameter should work.

If the funnel is not installed, loosen the large knob which holds the solenoid bracket to the post, lift up the arm over the restraining pin, and rotate the arm to the side. Gently slide the funnel stem down through the coil spring and into the hole in the top of the nylon block - lower it all the way down until the funnel bell rests on the top of the spring. Note that in this position the end of the stem will protrude through the bottom of the unit by about 1 inch.

Place the thin plastic disk over the funnel mouth with the stepped edge to the inside of the funnel. Push down on the center of the disk and verify that the funnel slides smoothly up and down in the nylon block, compressing the spring.

Hold the funnel in its 'down' position and rotate the solenoid bracket over the center of the funnel and disk. Tighten the T-handle to secure it in place, insuring that the restraining pin goes through the alignment holes in the washers.

Release the funnel and verify that the spring pushes the funnel/disk stack up and into the solenoid plunger, which also moves up. Press down and release the top of the solenoid plunger and verify that the stack moves smoothly down and up. The funnel must *not* 'bottom out' on the nylon block when the plunger is all the way down, lest it break.

Solenoid Timing

Solenoid timing is controlled from the *Preferences* tab - the number of taps and their frequency. The *Tap Now* text will cause an immediate tap sequence for the selected monitor.

Note that the monitors tap in sequence, so that only a single monitor taps at a time. Monitor 1 will tap immediately after the time-of-day clock initiates the sequence, and then each monitor will tap in turn. To inhibit all tapping, set the Tap Count to 0, and to inhibit the tapping from a single monitor, unplug its solenoid cable.

Data Collection

The unit counts all objects greater than 0.5mm in extent which fall down through the funnel neck, and is quite adept at discriminating multiple objects in rapid succession. The unit reports 32 channels of counting activity to the host computer, but all will be 0 save channel 1, which contains the count total.

Troubleshooting

To verify that the unit counts properly, remove the plastic disk from the funnel top, and set the DAMSystem *Monitor* tab to show *Live* data for the monitor in question. Verify that the unit status is 1, and that the 32 channel numbers are displayed and updated. If 1 is not the status, check that the unit is plugged in to the DAMSystem network, and consult Troubleshooting in the Help section. Drop some small objects down through the funnel and verify that the channel 1 count increments with each one.

The tapping intensity may be adjusted by changing the number of flat washers between the top of the round post and the solenoid bracket. More washers will raise the solenoid up, providing a firmer down tap and softer return. Fewer washers will lower the solenoid with contrasting results. The units are initially adjusted to provide firm contact on both up and down strokes, and if set right, the flies will be nudged down through the funnel neck before they have a chance to take wing. Silicone coating of the funnel interior will also help with this.

The counting electronics is quite sensitive, and will count the taps of the funnel if specs of dirt on the funnel neck pass by the detectors as a fly would. Keep the funnel neck clean to prevent such spurious counts.

Mounting holes are provided in the sides and bottom of the unit to hold it in place if necessary. The holes in the bottom are especially useful for clamping the unit to an incubator shelf so that it does not 'walk' during taps.

The tapping solenoid draws a substantial current from the Power Supply, and if the total cabling distance between the 2 becomes excessive, the resulting voltage drop will reset the unit. To prevent this, a maximum separation of 15' (5m) should be used.