

MultiBeam Activity Monitor - Operating Notes

1. The multibeam monitor requires use of the PSIU24 Power Supply Interface Unit, PS24 Power Supply, and CAB6 cables. It is *not* compatible with the PSIU9 Power Supply Interface or its cables and monitors, and should not be connected to them.
2. The DAMSystemMB collection software should be used to acquire data from multibeam monitors, up to 32 simultaneously. Single-beam monitors such as the DAM2 or DAM5 are *not* compatible with this software, and will not work with it.
3. The 16 tubes of the MB monitor are numbered 1-16 as shown on the white mask plate. The 17 IR beams for each tube are numbered 1-17 from left to right, and are separated by 3mm. Thus the entire 51mm of exposed tube between the side plates is covered by the multiple beams, and fly movement anywhere along this length will be detected and registered.
4. Activity counts are registered independently at each beam position for each tube, and thus multiple flies in a tube will generate counts at separate beam positions simultaneously. If only a single fly is loaded into each tube, then activity counts will occur in only a single beam channel, and the fly position will be registered as the last beam to count.
5. Activity counts are registered by each beam as the fly enters the beam. If the fly moves into the beam and sits, only a single count will be accumulated.
6. To compare results with those from single-beam monitors such as the DAM2, extract channel 9, the center of the 17 beams, from the tube file. The results should be identical.
7. Dwell data builds a simple histogram for each tube of the most recent fly position for each second of each bin, and is reported in the extended Tube data rows.
8. Beware of operation in proximity to incandescent light, where stray infrared illumination can easily interfere with the exposed detectors. Perform an empty-tube run to verify zero counts prior to operation with live specimens.
9. Beware of liquid spills onto the green circuit boards. Unplug the unit immediately if water or any liquid drips inside, and dry thoroughly in a warm (40C) oven prior to reuse.

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Comments are welcome.

MultiBeam Data Output Format

Multibeam data is saved into Monitor files which are similar in layout to those of the DAMSystem single-beam monitors. If the 'Full tube data' box in the DAMSystemMB Preferences tab is checked, then 17 rows will be written to each monitor file at each reading. The first row is the monitor row, containing the count total and fly position for each of the 16 tubes. The next 16 rows are tube rows, containing the position, activity counts, and dwell for each of the 17 beams of each tube.

If the 'Full Tube Data' preferences box is not checked, then only the monitor row will be written to the output Monitor file.

Column	Monitor Row		Tube Row	Column
1	Index		Index	1
2	Date		Date	2
3	Time		Time	3
4	Status		Status	4
5	Extra readings in bin		Extra readings in bin	5
6	Monitor		Monitor	6
7	Tube (0)		Tube (1-16)	7
8	Row format (0)		Row Format (10)	8
9-10	unused (0)		unused (0)	9-10
11-26	Count total (tubes 1-16)		Position (1-17)	11
27-42	Position (tubes 1-16)		Count total	12
			Channel count	13-29
			Dwell total	30
			Channel dwell	31-47
			Rest	48

MultiBeam FileScan

The FileScan program will properly manage multibeam data files, and may be used to scan for errors, consolidate bins, select start and stop bins, etc. There are 3 output file options:

Monitor Files	1 output file per monitor, 42 columns, Monitor rows only
Channel Files	32 output files per monitor, 1 column, Monitor row columns 11-42
Tube Files	16 output files per monitor, 42-99 columns, Tube rows only

Monitor Status Codes

The status of each monitor is indicated by its colored status box, and recorded in column 4 of its monitor file at each reading, as follows:

Color green	Status 1	Valid monitor data received
Color red	Status 51	No monitor data received
Color black	Status 50	No connection to PSIU

System Setup

1. Download and install the USB driver from the TriKinetics web site.
2. Connect the PSIU24 to its PS24 power supply, and connect the USB cable from the PSIU24 to a port on the data collection computer (Macintosh or Windows PC.) Verify that the PSIU green led is on.
3. Download the DAMSystemMB data collection software application from the TriKinetics web site, and place it into a separate folder on the hard drive.
4. Launch the application, and click on Preferences.
5. Select the Serial Port corresponding to the PSIU USB connection, most likely the last one. Verify that the monitor status boxes are red and not black.
6. Select the reading interval, monitor range, and output file options.
7. Connect the multibeam monitor(s) to the PSIU24 using the 6-conductor phone cables provided. Verify that the status box for each monitor turns from red to green.
8. Load 5x65 or 5x80mm tubes containing flies into the 16 positions of each monitor by inserting the tubes from one side, through the monitor, and out the other side. Beams 1 and 17 graze the 2 sides of the monitor case at each tube position, so cotton or food in the tube ends should just barely, if at all, extend into the tube interior beyond the monitor sides. No harm will come from blocking one or more of the 17 beams, just no counts will be recorded at that position.
9. If flies are allowed to roam beyond the monitor sides, they clearly will be out of the detection range of the IR beams, and will not be counted. The current position will remain accurate.

Data file management

Monitor data is saved in the individual Monitor text files in the DAMSystem4Data folder. This folder resides in the same directory with the DAMSystem4 application, as does the DAMSystem4Settings file and the DAMSystem4Log file. All of these files are automatically generated by the program when necessary.

At the conclusion of an experiment, the relevant Monitor files (perhaps only a few of the total) should be moved (drag or cut/paste) out of the DAMSystem4Data folder and into another folder on the computer. This will effectively terminate the data collection, for at the next reading the program will create new Monitor files for these monitors, and begin writing new data into them. Thus the files just moved will contain the activity records for the experiment just ended, and a new set of files will begin for the next one.

The moved monitor files, now disconnected from the data collection process by being out of the DAMSystem4Data folder, may be transferred to another computer for archival storage, FileScan, and analysis or plotting.