MB5 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 MB5 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. To compare results with those from single-beam monitors such as the DAM2, extract channel 9, the center of the 17 beams, from the counts tube file. The results should be identical.

6. 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, but if the fly moves around in the beam, multiple counts may be recorded in succession.

7. Moves are registered only when the fly repositions from one beam to the next. Activity which occurs within a beam will be ignored until the fly moves to an adjacent beam.

8. Dwell data builds a simple histogram for each tube of the fly position at each second over the course of a reading. Such data reveals the position preference over time within the tube.

9. The Rest column increments each second for each tube, and is reset to 0 when a move occurs. Thus Rest indicates the number of seconds since the last detected move.

10. 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.

11. 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 42-column tab-delimited Monitor text files which are similar in layout to those of the DAMSystem3 single-beam monitors. Each selected output data type in the Preferences window will cause one or more lines of text to be written to the monitor file at each reading.

Selections in the Monitor column generate only a single row at each reading, and contain summary data for each tube (count totals, move totals, position.)

Selections in the Tube column generate one 42-column output row for each tube, and therefore contain the full-fidelity data for each tube (counts, moves, dwell at each beam position.)

All data rows for each monitor are written to a single Monitor file at each reading. The FileScan application can be used at the conclusion of an experiment to separate the individual data types within the monitor file into distinct files for analysis (counts, moves, dwell, position.)

Monitor File: Header Columns - common to all data types

Index	Column 1	Incremented with each reading, 1 at program launch
Date at reading	Column 2	DD MMM YY
Time at reading	Column 3	HH:MM:SS
Monitor Status	Column 4	1 Valid data status green 51 no monitor data received status red 50 no connection to PSIU status black
Extras	Column 5	Number of extra readings, if any, consolidated by Filescan
Monitor number	Column 6	1-255
Tube number	Column 7	1-32 or 0 if monitor row
Data type	Column 8	Mv = moves, Ct = Counts, Pn = Positions, Dw = Dwell
	Column 9	unused
Light Sensor	Column 10	1 = On, 0 = Off (not present in all units)

Monitor FIle: Data columns - specific to each output data type selected in preferences

Monitor rows contain summary data for all tubes in a single row

Monitor Counts	Columns 11-42	Total counts for each tube
Monitor Moves	Columns 11-42	Total moves for each tube
Monitor Positions	Columns 11-42	Position for each tube

Tube rows contain complete data for each tube in a separate row

Tube Counts	Column 11	Position
	Column 12	Total counts for tube
	Column 13-42	Counts in each beam
Tube Moves	Column 11	Position
	Column 12	Total moves for tube
	Column 13-29	Moves in each beam
	Column 30	Rest for tube (seconds since move)
	Column 31-42	unused
Tube Dwell	Column 11	Position
	Column 12	Total dwell (seconds)
	Column 13-42	Dwell in each beam (seconds)

Columns will contain 0 if unused.

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.

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 output file options for each monitor and tube data type, as well as the legacy channel format for monitor counts.

Monitor Files	1 output file per monitor, 42 columns, Monitor rows only
Tube Files	Multiple output files per monitor, 1 for each tube, 42 columns each
Channel Files	32 output files per monitor, 1 column each from columns 11-42 of monitor counts rows

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.

Release Notes

v1.6   November 2012
      - Introduce Moves measurement as complement to Counts
      - Expand preferences selection of output file options
      - Redefine output file format as follows:
      -- All output files now 42 columns wide
      -- Separate rows for each selected data type: Counts, Moves, Positions, Dwell
      -- Column 8 to alphanumeric data type identifier: Ct, Mv, Pn, Dw
      - Update FileScan application to include data type selection

Existing users should upgrade both DAMSystemMB and Filescan to process the revised 42-column output data formats.