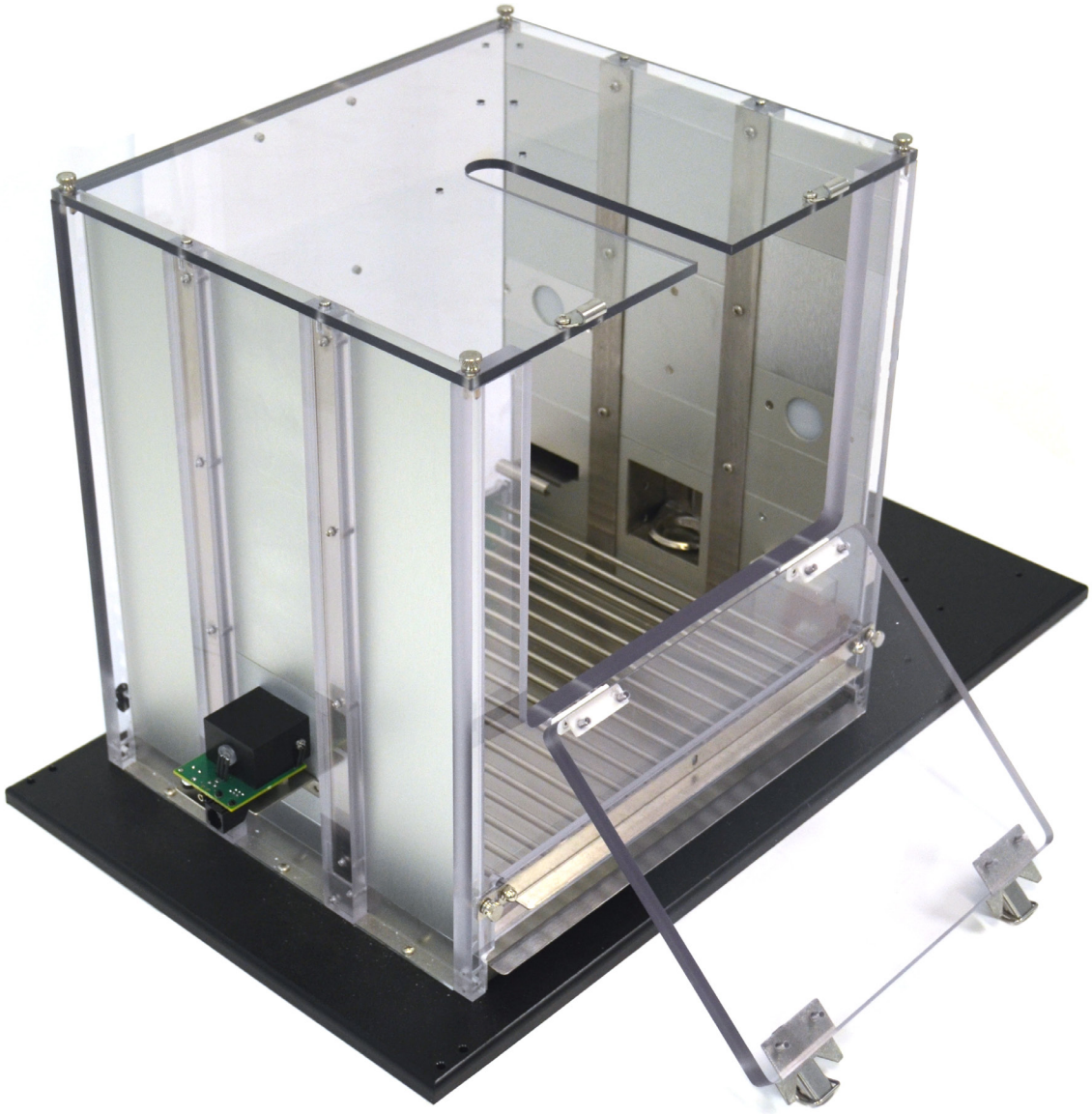
Operant
Control and Conditioning
for Rodents



Lafayette Instrument®

ABET SOFTWARE FOR OPERANT CONTROL

Standard
Model 89501

Touch
Model 89505

VideoTouch
Model 89509

ABET offers a system that can be **user customized and programmed with no programming experience**. Every effort has been made to make this **easy to use for those with minimal operant conditioning experience, yet powerful enough to run complex schedules for the experimental analysis of behavior**. If you can conceptualize your experiment in a flow chart or a spreadsheet, you can create the conditions and actions needed for virtually any scheduled task.

What is ABET?

Environment Designer

- Easily assign labels to inputs and outputs connected to the computer
- Add or duplicate environments as needed
- Full suite of environment testing and management tools

Schedule Designer

- A single workspace with all the tools needed to program your environment. Simply click on the appropriate tool to add, edit, or delete device aliases, variables (timers, counters, constants), lists, and conditions
- Label and define simple variables, timers, counters, constants and lists without restrictions or limitations
- Draw from a list in truly random order, random without repeat, random without replacement, or sequential order
- Define a simple or complex condition with single or multiple actions
- Never write a single line of program code. ABET II will print all schedule details in a well organized spreadsheet like format that is color-coded to make it easy for anyone to follow each logical step. Schedules can be versioned and locked to prevent any data corruption once an experiment is started

Execution Manager

- Load single or multiple environments with same or different schedules in one step
- Add session variables as needed for notes, animal identification, weight, dose or treatment, and other information
- Adjust variable settings globally or individually from the keyboard or an experiment file
- Activate a real-time debugger when needed to follow and save each performance step of a schedule while it is being tested
- Enjoy the security of the most comprehensive results database of any system

Data Viewer

- Load one or multiple sessions for viewing
- Select your data source, date range or multiple selection criteria to isolate only the sessions of interest
- Display Session information, raw data, event totals, reduced data, IRT's and Bins
- Copy or export selected data or entire data views to Excel or a statistical package of your choice
- Recall locked schedules from the encoded database for future replication if ever needed

Analysis Set Designer

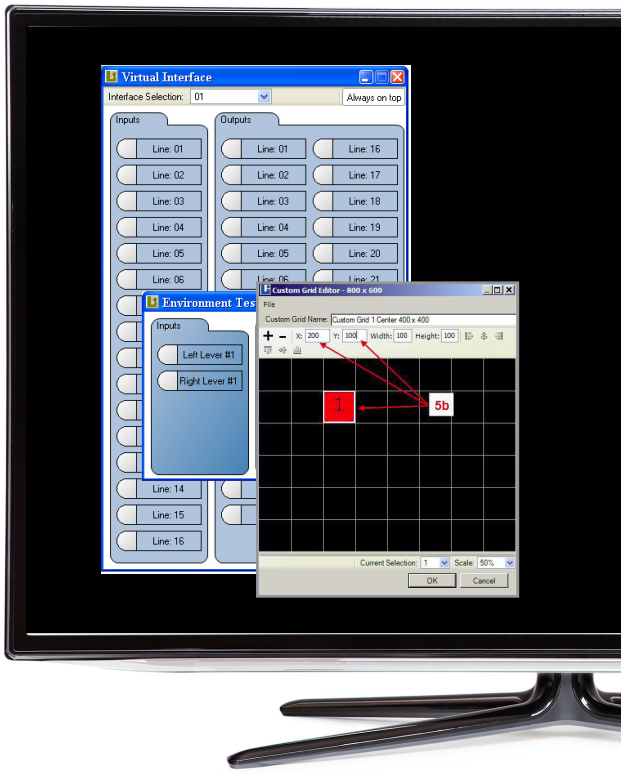
Perform unlimited user defined analysis of measures/paths (latencies), bouts, or counts. Because ABET II records every detail of a session with millisecond precision, data elements need not be pre-programmed as with other systems.

Graphical Cumulative Record

Design a graphical cumulative record with numerous tools to define the chart size, step traces, pips, and events.

Virtual Interface

Install ABET II on your laptop, office computer or any computer not connected to hardware and use the Virtual Interface as a duplicate of the environment that you have in your lab. Write/program, review, and test schedules or analyze lab data while disconnected from the lab hardware or offline. Schedules and data are easily passed to and from your lab via a network connection or any removable media.



Virtual Touch Interface

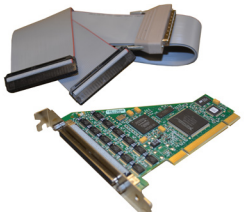
In addtion to the original Virtual Interface, ABET II Touch and ABET II VideoTouch also include a Virtual Touch Interface system where graphic and touch-based schedules can be generated and emulated via a computer's mouse.

Contact us for a demonstration!

Whisker® Multimedia

ABET II Touch and ABET II VideoTouch rely on the Whisker operating system to control the advanced graphical output on multiple screens, and touch screen input from multiple chambers when running the Bussey-Saksida Rodent Test Chambers. This is the same underlying platform used in primate and human CANTAB touch screen stations for translational cognitive testing. **Whisker has been cited in over 142 publications across more than 34 journals.**

ABET HARDWARE FOR OPERANT CONTROL



ABET 2G PCI Interface Card and Cable
Model 81504

A single computer PCI circuit board and 100 conductor ribbon cable now connect directly to the ABET 2G Starter Interface to support 1 – 12 test chambers. The driver box and additional cables used in older systems have now been eliminated.

ABET 2G Starter Interface
Model 81501

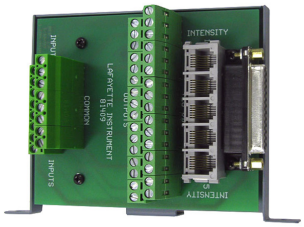
This base unit may be used to support two test stations with 8 Inputs and 15 Outputs each, or a single test station with 16 Inputs and 30 Outputs. Each half is independently fused, with software controlled safety relays to shut off the 28 V DC when not actively controlled. Output drivers are more robust with higher current limits than previous units. This unit features latched inputs to filter and de-bounce animal responses. Order Model 81501-NL with non-latched inputs if required.

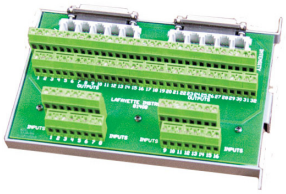
ABET 2G Expansion Interface
Model 81502

This unit stacks on top of the 81501 to support additional chambers. There are no cards to install or cables to connect between modules. Standard DB-25 cables connect between the interface and the chamber I/O connection block.

Mini I/O Connection Block
Model 81409

This functional connection block features connections for 8 Inputs and 15 Outputs through convenient multilevel, screw clamp terminals. Five modular connections parallel the 15 Outputs for those chamber components that provide intensity or other programmable control from three sequential output lines. The Model 81409 Connection Block mounts to the chamber base and connects to the interface with a standard DB-25 Connector.





Full I/O Connection Block (for ABET 2G)
Model 81508

This unit is functionally identical to the model 81409 above except it is designed to provide 16 Inputs and 30 Outputs to a single chamber. An edge connector is provided for easy connect to Plexon Data Acquisition systems as well as other similar products for time stamp synchronization of chamber events with the recorded signal.

30 Volt DC Power Supply
Model 83619

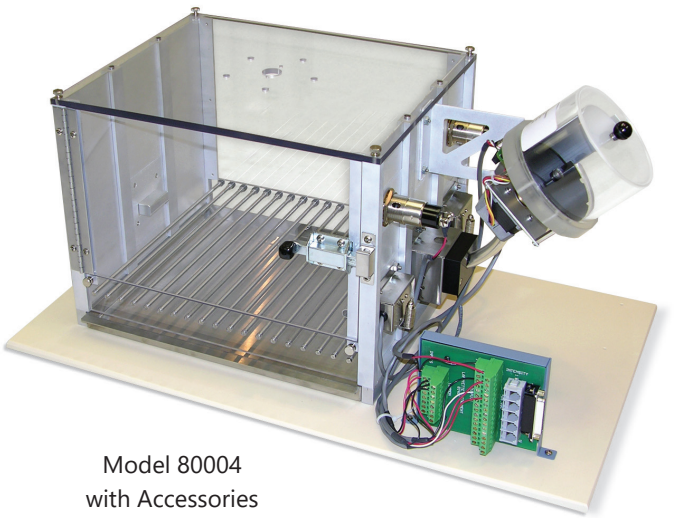
Multiple power supplies may be combined to increase the current capacity for multiple chamber operation from a single interface package. The number of supplies needed depends on the current needs of the chamber components and sound attenuating cubicle when present. Short circuit protection is provided by internal current fold-back circuitry.

RAT MODULAR CHAMBERS

Modular Chamber
Model 80004 Model 80004NS

Tall Modular Chamber
Model 80016 Model 80016NS

The operant conditioning test chambers boast features not found in other chambers, yet are fully compatible with all 3" wide modular panels available from other manufacturers. A shockable stainless steel grid rod floor comes standard with these units. Models 80004NS/80016NS are identical to Models 80004/80016 in all respects except the shockable grid floor has been replaced by a less expensive perforated stainless steel non-shock floor.



Model 80004
with Accessories

Chamber Features

- Easy to remove top with just four thumbscrews
- Large Stainless Steel waste pan slides on smooth rails to eliminate the gap between the pan and modular panels found in other systems
- Channel Supports that can not twist for no-bind module removal
- A heavy-duty latch that is easy to close and cannot be accidentally opened
- A full line of modules are available including nose pokes, simple tone, tone with intensity control, variable frequency tone, stimulus light with or without intensity level, standard or extra thick fixed or retractable response levers, pellet or liquid reward, simple receptacle, or receptacle with door, head entry detection, and house light

80004 Chamber Dimensions

Overall
- 23.5" L x 13.4" D x 10.5" H
- 59.7 x 34.0 x 26.7 cm

Animal Workspace
- 12.0" L x 10.2" D x 7.9" H
- 30.5 x 25.9 x 20.1 cm

Grid Rod Floor
- 0.188" (4.775mm) rods on 0.610" (15.494 mm) centers

80016 Chamber Dimensions

Overall
- 23.5"L x 13.5"D x 15" H
- 59.7 x 34.3 x 38.1 cm

Animal Workspace
- 12.0" L x 10.2" D x 12.0" H
- 30.5 x 25.9 x 30.5 cm

Grid Rod Floor
- 0.188" (4.775mm) rods on 0.610" (15.494 mm) centers

Modular Rat Test Chamber with Touch Screen
Model 80004TS Model 80016TS

This unit is the same as the 80004/80016 above except the inside rear channels have been removed and a touch screen has been added to support a wide range of additional testing capabilities. This chamber requires additional interface, software, and reward components. Ready to run Bussey-Saksida Touch Chambers are also available to run Standard Applications. Please contact Lafayette Instrument Company for more information.

Press Bar
Model 80110M

The heavy duty (0.032" thick) stainless steel construction of this lever ensures long lasting reliable operation. A micro switch is used to provide a Normally Open (NO) and Normally Closed (NC) contact that senses lever activation. The force required to move the bar is factory calibrated to be less than 10 gm and is field adjustable via counterbalance washers located on the back. This is preferred over spring systems that can change over time or hang up on the moving lever. Movement required to activate the lever switch is 3 mm. (Normally Closed (NC) contact available on request)

Thick Profile Response Lever
Model 80112M

This is a high quality lever designed in the image of the Ralph Gerbrands and BRS levers that are no longer available. It features a solid aluminum bar that requires a nominal 25g of force with adjustable travel, adjustable trigger point and adjustable force. Both NO and NC contacts are provided to monitor lever press and lever release. The response paddle measures 1.5" (3.8 cm) wide x 0.5" (1.27 cm) thick with a protrusion of 0.625" (1.5875 cm).

Retractable Response Lever
Model CI4460-M

This deluxe retractable response lever is designed for use in the Modular Test Chambers and comes mounted on a 4U panel (not shown). Features include a thick stainless steel lever with reliable transport, friction free pivot, I/R sensor, adjustable travel (0.125" (0.3175 cm) nominal) and adjustable force (10-35g). Both Normal and Inverted response lines are provided along with a position status line (inserted or retracted). The response paddle measures 1.9" (4.8 cm) wide x 0.63" (1.6 cm) thick with a protrusion of 0.787" (2.0 cm).

Nose Poke w/ Tri-Color Light
Models 80116TRM and 80117RM

These Nose Poke modules feature a reliable I/R sensor and tricolor light with color and intensity control as well as multiple mode control. Three output control lines are required at 24-29 V DC. The Model 80117RM adds a liquid delivery tube, conical aperture, and large plastic surround specially designed for animals wearing head stages

80117RM

80116TRM

White Stimulus Light
Models 80225M and 80226M

This 1" stimulus light has been introduced to replace the 80221M. It uses the same bulb as the 80221M for identical intensities. The lens is recessed behind the modular panel and is perfectly flat to minimize damage from chewing. The lens is easy and inexpensive to replace.

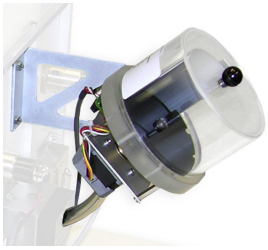
Tone Generator
Model 81415

This Tone Generator is a digitally controlled frequency generator that can be used for auditory stimulus in animal behavior studies. It produces seven frequencies ranging from 1 to 16 kilohertz and offers convenient modular cable connection to either of the ABET I/O modules (Models 81408 or 81409).

White Noise Module
Model 80136M

Clicker Module
Model 80137M

A number of components are available for auditory stimulation. Just two are listed above. Contact Lafayette Instrument Company with specific needs to obtain additional information on components not found in this brochure.

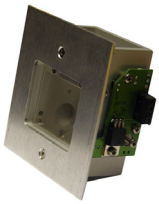


45mg Pellet Dispenser
Model 80209M

This 45mg Pellet Dispenser uses the latest design features to provide consistent and reliable pellet delivery. It can easily be converted to other pellet sizes and made even more reliable with an optional pellet drop detector. The dispenser is supplied with a selector disk suitable for 45mg pellets as standard, alternative disks suitable for 14mg or 20mg pellets are available. Order replacement disks or optional pellet detector separately.

Standard Pellet Trough
Model 80210M

This basic pellet only reward module with receptacle cup is supplied on a convenient 4U modular panel. The front opening measures 2.15" x 2.15" (5.5 x 5.5 cm).

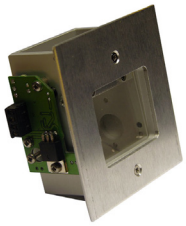


Pellet Trough w/ Head Entry and Door
Model 80210M-R

This deluxe pellet receptacle includes a clear door with door sensor, receptacle light, and second I/R sensor for head detection when the door is not used.

Liquid/Pellet Trough w/ Head Entry and Door
Model 80210LM-R

This deluxe receptacle is suitable for both pellet and liquid reward. It includes a clear door with door sensor, receptacle light, and second I/R sensor for head detection when the door is not used. The bottom cup is milled aluminum and features two liquid delivery tubes with removable stylets that can be flushed and cleaned outside the receptacle.

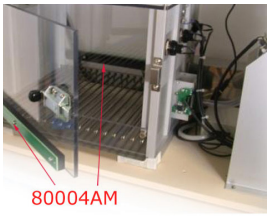


Infusion Pump for Drug Self Administration or Liquid Reward
Model 80203

This 3.33 RPM Constant Speed Pump will accept a number of syringe sizes to meet a range of flow rates from approximately 2uL/second to 0.07mL/second. A timed pulse on the control line is used for the precise amount desired for each delivery. This unit includes an end of syringe limit switch and safety time limit to prevent overdose in drug delivery applications. Model 80204 Peristaltic Pump (with flow rate of 0.025 ml/sec) is recommended for liquid reward only.

Ambulatory Monitor for 80004 Modular Test Chamber
Model 80004AM

A single strip at the back of the chamber and on the door hold three I/R photo beams strategically located at the rear, center and front of the chamber. They can be use for classical conditioning procedures, procedures that require the animal to be in a certain location for a trial to start, or for general ambulatory monitoring in the operant test chamber.

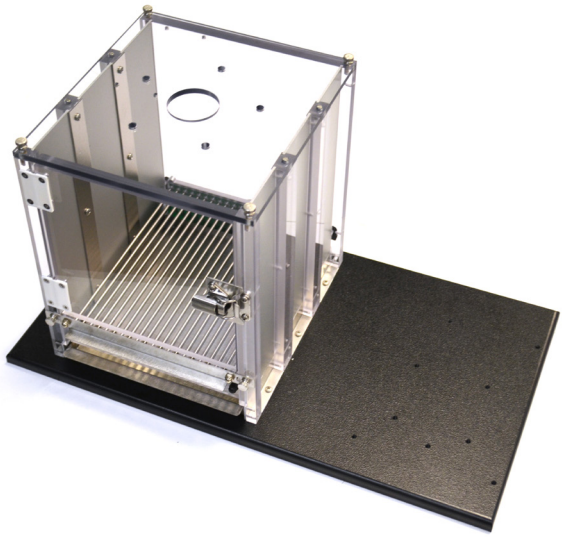


MOUSE MODULAR CHAMBERS

Model 80015 Model 80015NS

These carefully designed operant conditioning test chambers feature a reduced floor area to facilitate training mice on operant tasks. Units include many of the same features found in the standard rat modular test chambers.

You get the choice of a chamber with a perforated stainless steel non-shock floor (Model 80015NS), or a stainless steel grid rod floor (Model 80015), a stainless steel waste pan, and full filler panels are included with each chamber.



Chamber Features

- Easily removable top with just four thumbscrews
- Large Stainless Steel waste pan slides on smooth rails to eliminate the gap between the pan and modular panels found in other systems

Chamber Dimensions

Overall

- 19.3" L x 10.6" D x 10.5" H
- 48.9 x 26.9 x 26.7 cm

Animal Workspace

- 7.4" L x 8.1" D x 7.9" H
- 18.8 x 20.6 x 20.1 cm

Floors

- Model 80015NS perforated stainless steel non-shock floor 0.25" (6.35 mm) diameter holes staggered rows 0.315" (8 mm) center to center
- Model 80015 Grid Rod Floor 0.156" (3.962mm) diameter stainless steel rods on 0.321" (8.15mm) spacing center to center

Modular Mouse Test Chamber with Touch Screen

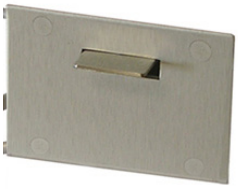
Model 80015TS

This unit boasts many of the features of the 80015NS. The inside rear channels have been removed and a touch screen added to support a wide range of new testing capabilities. The side walls have been tapered to help position the animal for better viewing of the stimuli. This chamber requires additional interface, software, and reward components. Ready to run Bussey-Saksida Touch Chamber packages are also available with standard validated applications. Please contact Lafayette Instrument Company for additional information on both.

Retractable Response Lever

Model CI4461-M

This deluxe retractable response lever is designed for use in the Mouse Modular Test Chambers and comes mounted on a 4U panel. Features include a thin stainless steel lever with reliable transport, friction free pivot, I/R sensor, adjustable travel (0.08" (2.032 mm) nominal) and adjustable force (2 - 9 grams). Both Normal and Inverted response lines are provided along with a position status line (inserted or retracted). The response paddle measures 0.63" (16 mm) wide with a protrusion of 0.433" (11 mm). This unit operates on 24 - 28 V DC. The operate line must be grounded to extend the lever. The position report provides a GND sink when the lever is extended and is open when retracted. The NO & NC "Contacts" provide GND when activated.

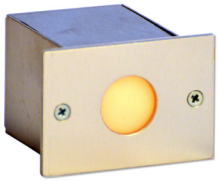


Standard Response Lever
Model 80120MM

This lever features a small stainless steel paddle mounted on a 2U aluminum modular panel. The low response force of less than 3g is adjustable. The paddle dimensions are 0.632″ (16 mm) wide x 0.04″ (1.02 mm) thick with a protrusion of 0.3455″ (8.77 mm). Electrically, both NO & NC Contacts are provided.

Mouse Nose Poke with Tri Color Stimulus
Model 80116TM14

This nose poke module feature a reliable I/R sensor and tricolor stimulus light with color and intensity control as well as multiple mode control. Three output control lines are required. Other models are available on request.



White Stimulus Light
Model 80225M14 Model 80226M14

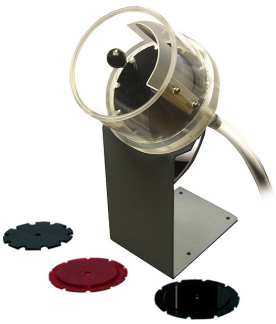
This 1″ stimulus light is recessed behind the modular panel and is perfectly flat to minimize damage from chewing. The lens is easy and inexpensive to replace should it ever be damaged.

Auditory Stimulus Components for Modular Mouse Test Chambers

A number of components are available similar to those described for the Rat Modular Test Chamber on previous pages. Contact Lafayette Instrument Company with specific requirements to receive additional information.

Peristaltic Pump for Liquid Reward
Model 80204M

This Liquid Pump with electronic brake is designed for precise delivery of liquid reward when operated from a short duration electrical pulse. This pump is supplied with a small length of 0.5 mm bore tubing for a flow rate of approximately 0.025 ml/sec. Contact Lafayette Instrument Company for alternative flow rates and pumps.



20mg Pellet Dispenser with Stand
Model 80209-20

This dispenser mechanism is identical to the Model 80209M, as described with the Rat Modular Test Chambers, except that it comes on a base mounted stand and features a delivery disk with 20 mg pellet dimensions. This disk may be interchanged with a 14mg or 45mg disk (optional disks sold separately) with no additional modification or adjustment. Connections to the dispenser are made via the 5 way terminal block on the edge of the control printed circuit board. An optional pellet drop detector is also available.

Mouse Reward Area for Modular Test Chamber
Model 80211RAXMM

A deluxe Liquid / Pellet Reward Area that includes a clear door with door sensor, receptacle light, and second I/R sensor for head detection when the door is not used. The bottom cup is milled aluminum and features two liquid delivery tubes with removable stylets that can be flushed and cleaned outside the receptacle.

SOUND ATTENUATING CUBICLES

Sound Cubicle - Double Door Peep
Model 83018DDP

This cubicle is one of several models constructed of expanded PVC foam panels that resist moisture and many chemicals. All outside walls are 0.75" (19 mm) thick. This Model features double doors with a rubber seal to minimize air and light incursion and a covered peephole for animal viewing. The left door is larger than the right so that animals may be loaded by opening a single door. The door hinges allow 180 degrees of movement (twice that of other units) and can be quickly released without tools to remove the doors when necessary. The standard slide out tray makes this cubicle usable with both front and top loading chambers. A 28 Volt DC ventilation fan and house light are included with each cubicle. Visit our web site or contact the Lafayette Instrument Company offices for information on alternative designs and sizes.

Sound Cubicle - Double Door Window
Model 83018DDW

This unit is identical to the above except the covered peep hole is replaced with a large red tinted double pane viewing window.

Single Door Sound Isolation Cubicle - Window
Model 83018SDW

These units feature a sound cubicle enclosure identical to the above except the double hinged doors are replaced by a single fully removable door. Recommended where it is necessary but not practical to have the cubicle doors open for extended periods of time.

Single Door Sound Isolation Cubicle - Peep
Model 83018SDP

This unit is identical to the model 83018SDW above with the same viewing peep hole shown on the Model 83018DDP.

ADDITIONAL CHAMBERS FOR RODENTS

The 5CSRT Task

Nose Poke Chambers and Touch Screen Chambers are Available for the 5CSRT task and other cognitive testing in both rats and mice.

The 5CSRT Task is a test of sustained and selective attention and reaction time, which has been well characterized in the rat and mouse to show clinical validity in a variety of settings. Clinical models showing impairment in this area include Alzheimer's, Depression, Huntington's, Schizophrenia, ADHD and OCD. The neural systems that have been implicated include Prefrontal cortex, basal forebrain, cholinergic (accuracy), serotonin (impulsivity), noradrenalin (distraction), and dopamine (motivation). It is one of the oldest of operant based tests in mice designed to exploit molecular genetics methods in unraveling the genetic contribution to complex psychological and behavioral processes.

The standard application packages provided by Lafayette Instrument Company and Campden Instruments Ltd. include nine separate schedules for the rat and eleven for the mouse to test the hardware, calibrate the reward (liquid only), train the animal, and run basic and advanced forms of the 5CSRT Task. The individually written schedules run on ABET II Standard and are written with multiple user set options and extensive data analysis and reporting.

The Bussey-Saksida Touch Screen Chamber

The Bussey-Saksida Touch Screen Chamber packages may be used to run the same 5CSRT Task described above. Furthermore, they have bridged the gap in translational research from non-human primates to rats and mice.

Using virtually the same cognitive tests such as Visual Discrimination and Reversal, Paired Associates Learning, Visuomotor Conditional Learning, Extinction, Trial-Unique Nonmatching to Location, Location Discrimination, and Pavlovian Autoshaping, rats and mice can now be used in investigations of several neural systems, models of several clinical impairments and drug discovery. Standard applications are available for all the above tests using the unique ABET II Touch Software from Lafayette Instrument Co. In addition to running standard applications, this software lets the user create original schedules with all the stimulus-response features of the touch chamber. The user friendly tools provided with ABET II Touch do not require you to be a programmer.

Not just another square sheet metal box, the Bussey-Saksida chamber has a unique trapezoidal wall shape to focus the animal's attention and is made from machined parts that simply slot together. The chamber can also be configured to a modular square chamber with panels, levers, lights, and a range of other operators. Not just a touch screen, this is the ultimate modular chamber for high throughput. For example, do Visual Discrimination and Reversal in the morning and Five Choice Serial Reaction Time Task in the afternoon.

Drug Self Infusion/Administration Test Package

This package retains those features necessary for consistent and reliable animal testing with the addition of features and improvements not found in any other system. It is fully compatible with all 3" modules manufactured by Lafayette Instrument Company, as well as, those manufactured by others.

The standard chamber configuration includes two standard response levers, stimulus lights, and an Infusion Pump is used to deliver drug rewards. Select from the standard stainless steel shock grid floor or an economical perforated stainless steel floor. Other configurations are available on request.

Lafayette Instrument®

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