Product Overview

Sophisticated Life Science Research Instrumentation

TSE Place Preference System

Multi-purpose testing system for mice and rats

www.TSE-Systems.com

Specifications subject to change without notice

TSE Place Preference System

Standard Box Dimensions Mouse
(Inner sizes)

Overall size:	400 x 150 x 200 mm (LxWxH)
Outer compartments:	170 x 150 x 200 mm (LxWxH)
Center:	60 x 150 x 200 mm (LxWxH)

Standard Box Dimensions Rat
(Inner sizes)

Overall size:	720 x 250 x 320 mm (LxWxH)
Outer compartments:	305 x 250 x 320 mm (LxWxH)
Center:	110 x 250 x 320 mm (LxWxH)

- **Option:** The standard dimensions may be modified according to your specific needs.

Conditioned place preference is a widely used technique to assess the rewarding properties of a psychotropic drug.

Treatment with a specific preparation is repeatedly paired with a distinct environment while a control treatment is paired with a different environment.

When the animal has access to both environments during post-conditioning tests, preference for the drug-paired cues will indicate the rewarding effects of the test drug. Aversion is indicated by avoidance of the drug-paired compartment.

Components

The system is available for rats and mice and consists of the following components:

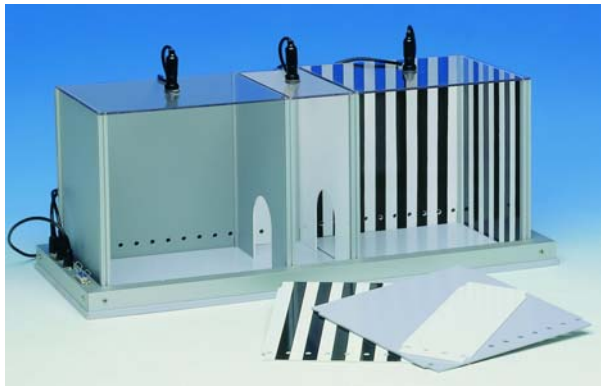
- Place Preference boxes,
- optional floor grids,
- optional manual or automatic doors,
- optional housings,
- a control unit,
- a special control interface, and
- the TSE Place Preference software package.

In the standard configuration up to 8 boxes can be operated simultaneously with one computer but the total number of boxes may be increased if desired.

Our place preference boxes feature 3 distinct compartments: two equally sized large outer compartments (“choice chambers”) separated by a small central area (“neutral chamber”).

In the standard configuration the **walls** are made of non-transparent PVC:

1. One compartment is colored **gray** throughout
2. The center is **white**.
3. The other compartment is covered with **black & white vertically striped** material (20mm width)



Standard color configuration

- **Option:** Other color/pattern configurations are available on request.

The walls elements can be easily exchanged between the outer compartments by individually inserting them in guide rails.

Dividers are used to separate the compartments from each other. They are colored differently on both sides to match the wall color of the corresponding compartment.

Closed dividers are used to restrict the animal's movement to one compartment during conditioning.

Closed dividers

Gateway

These closed dividers are exchanged for dividers containing an arched **gateway** (“tunnel gate”) on pre-exposure and test days.

Dimensions Gateway	
Mouse:	40 x 37 mm (WxH)
Rat:	90 x 115 mm (WxH)

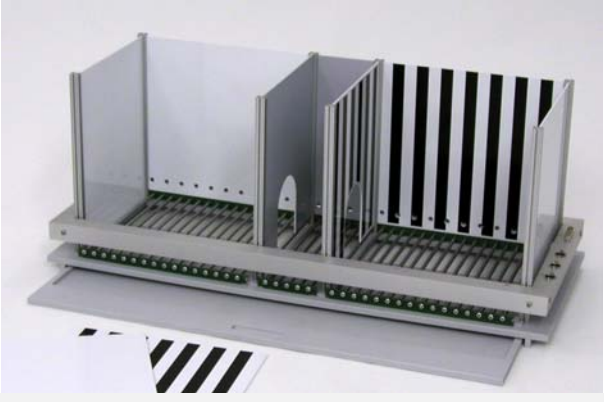
Closed dividers and tunnel gate dividers are included in the basic box configuration.

Box equipped with automatic doors
The gateway is opened and closed by the software

◆ **Option:** The tunnel gate dividers can be exchanged for **manual doors** (to be opened manually by the user by pulling a handle) or software-controlled **automatic doors**.

The basic box is equipped with a smooth PVC floor that can be easily cleaned.

◆ **Option:** We also supply a stainless steel grid rod floor.



Stainless steel grid floor	
Mouse:	rod ∅ 4 mm, distance* 8.9 mm
Rat:	rod ∅ 6 mm, distance* 19.5 mm

** distance rod center to rod center*

◆ **Option:** Mesh floor is available on request.

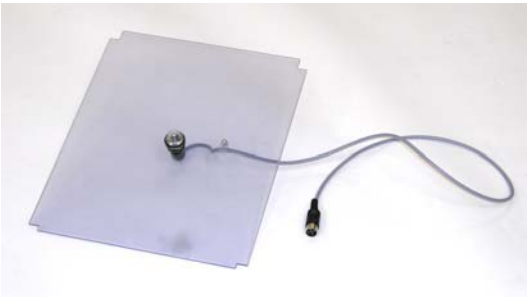
Mesh floor	
Mouse:	∅ 1 mm wire mesh, 6 mm square
Rat:	custom made (animal weight required)

If you use a grid or mesh floor the box compartments are equipped with a **waste pan** underneath that can be easily removed for cleaning purposes.

◆ **Option:** PVC floor inserts with varying surface structures (smooth or roughened) may also be used to increase the difference between choice chambers. All floor inserts can be manufactured according to your specific needs. They have to be ordered separately.

The animal is placed in the selected compartment or the center from above.

◆ **Option:** Alternatively an **entry tube** is available that connects to the central compartment. It is opened manually by the user giving the animal access to the center compartment (standardized access to the center eliminates any bias introduced by the experimenter's handling of the animal).



Transparent removable lids are used to close the box in order to prevent the animal from escaping. Lamps (2 watts) mounted in the lid center may be used to counterbalance a natural preference of the animal to specific compartments.

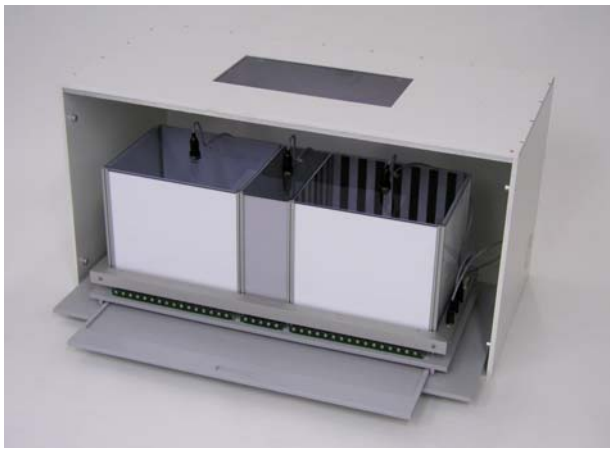
Entries into the choice chambers and the center are monitored with **infra-red location sensors**. It is always possible to recognize whether the animal is located in the right or left outer compartment or in the center during test trials.

Since the sensors (pink arrow) are mounted along the entire length of the box walls - the side-walls are pierced at these points - they also allow the monitoring of locomotor activity during conditioning, testing and during drug challenges resulting in the output of the “distance traveled” in each of the 3 compartments.

The photobeam detectors are scanned with a frequency of 15Hz ensuring that even the fastest movements are detected.

Mouse Sensors	
Outer compartments:	11 sensor pairs each
Center:	4 sensor pairs
Distance between sensors:	14mm
Rat Sensors	
Outer compartments:	11 sensor pairs each
Center:	4 sensor pairs
Distance between sensors:	28mm

- **Option:** The boxes can be manufactured with a **reduced** number of light-beam sensors located only on both sides of the archways. In this configuration only location is detected – this means that no information on locomotion is available.

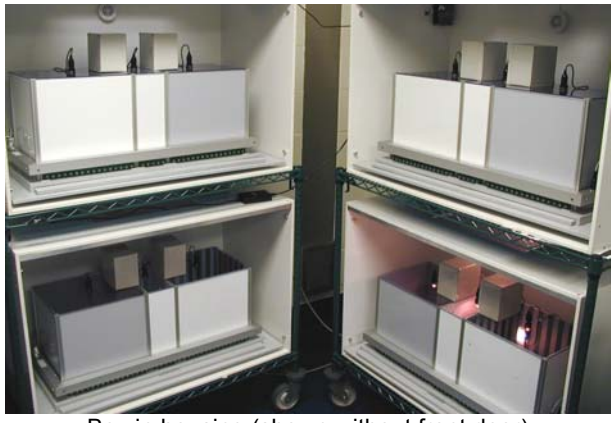


Box in housing (shown without front door)

- **Option:** The whole setup can be operated in sound-attenuating **housings** equipped with a ventilation fan. The housing features an observation window in the ceiling to allow monitoring during the experiment. A manually operated house-light is also included.

Mouse Housing
Dimensions: 670 x 400 x 450 mm (LxWxH)

Rat Housing
Dimensions: 1000 x 410 x 660 mm (LxWxH)



Box in housing (shown without front door)

The **control unit** provides the connection between the boxes and the computer. It contains all the electronics for controlling the box components and transfers the measuring data to the control **interface** (PCI slot) built into the system computer. An IBM- compatible computer (Pentium) is required.

Further Box Options

- **Loudspeakers** can be integrated into the box if auditory stimuli (sound and noise) are to be applied or if continuous white noise throughout the whole experiment is required. The control unit is then equipped with an audio/noise generator.
- If continuous **drug administration** is required during conditioning a counterbalance arm can be fixed to the box side. The TSE counterbalance arm is made of lightweight aluminium and is suitable for connecting a variety of swivels.
- If microdialysis is to be performed during conditioning, swivels with a collecting attachment are

available. A detailed brochure on infusion and microdialysis equipment will be sent to you on request.

Left: Counterbalance Arm
Right: 1-channel fluid swivel with button tether

If fluid administration or microdialysis are to be performed during the **test trials** then the box has to be operated without lids and without dividing walls!

- The system can also be upgraded to perform **operant place conditioning experiments (OPPC)**.

The OPPC paradigm does not use passive administration of a drug but instead the **active** intake of a reinforcing agent by the animal. The OPPC extension features special wall inserts for the outer compartments equipped with a mounting device that will hold a substance reservoir (fluid bottle or food crib). Removal events are registered by an additional light-beam sensor mounted in the vicinity of the reinforcer container. If the animal drinks or feeds this sensor is interrupted and gives information on frequency and duration.

In training trials the animal learns to associate one compartment with the reinforcer (e.g. ethanol), the other one with the non-reinforcer (e.g. water). In a series of subsequent tests in the absence of the reinforcer and non-reinforcer the preference of the animal for the compartments and the effects of drug treatment on this preference can be established.

If you are interested in high-resolution intake data over the course of the experiment the contents of the drinking dispensers or food baskets can be continuously monitored. Information on this "TSE Drinking & Feeding Monitor" option will be sent to you on request.

Software Control

The comfortable "**Place Preference**" software that controls the experimental procedure and collects the measuring data is very easy to learn and use. It currently runs under the operating systems Windows 9x, WindowsNT and Windows2000.

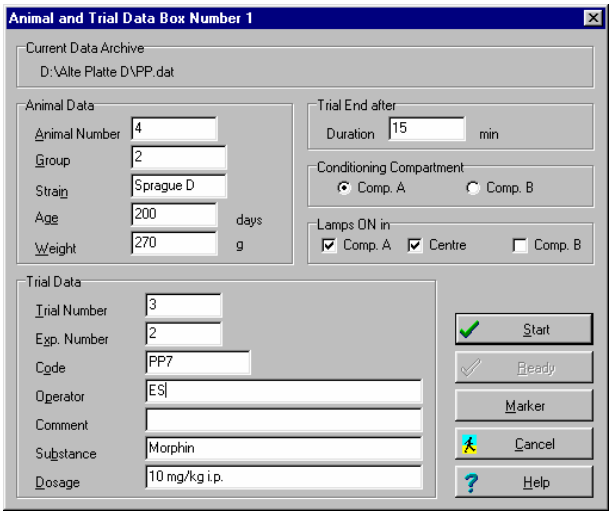
Working with the system is performed according to the following pattern:

- preparing the setup for an experiment,
- running the experiment, and
- analyzing the collected data.

Preparing an Experiment

For conditioning the animal is either injected with a drug immediately before it is placed into the box or it is continuously infused via a swivel/tether combination. The test trial is either performed with undrugged animals, with animals in the drugged state under which they had been conditioned or after administration of a challenge treatment.

In order to characterize the experiment various entry fields are available that are filled in before the experiment is started. These identifiers later allow easy searching through the data base and are also outputted in the protocols.

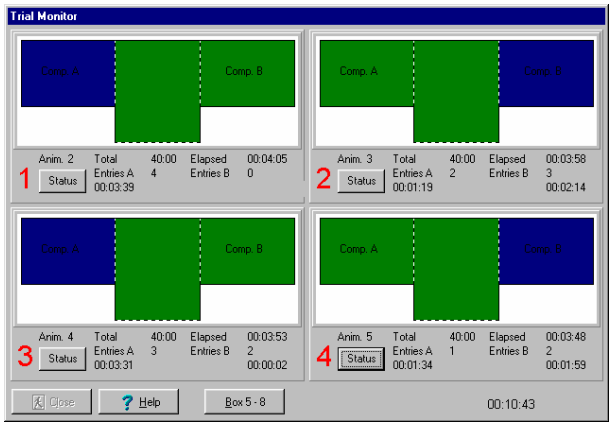


In the "Animal and Trial Data" window the total trial duration is set and the decision is made whether any of the lamps are to be switched on during the experiment.

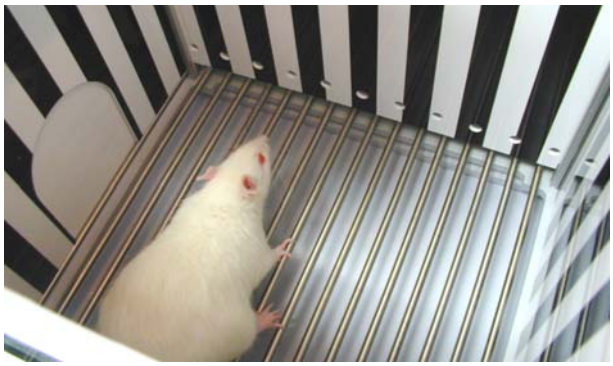
Experiment Start

After all data have been entered, the animal is placed into the selected conditioning compartment (conditioning trial) or in the center (test trial). If a start tube is available the animal is placed in the tube and the door to the center compartment is opened manually. Data acquisition is then started by pressing a single key. All boxes that are connected up can be started and stopped independently in this way.

The Running Experiment

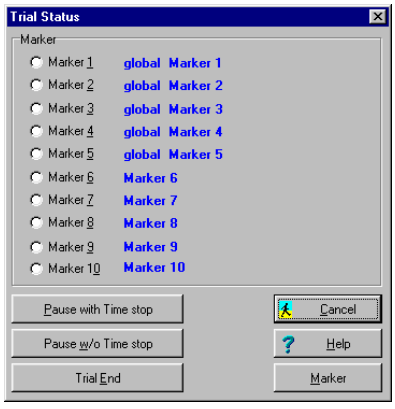


The so-called “trial monitor” allows a rapid overview throughout the course of the experiment, allowing the status of all connected boxes to be seen at a glance.



Conditioning – the compartment is closed

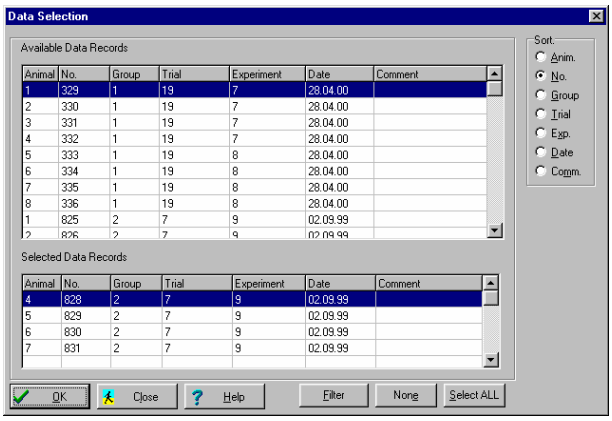
In the **conditioning phase** – which is usually performed repeatedly over a couple of days – the trial is automatically stopped when the preset time has elapsed. In the subsequent **test trial** the animal is free to explore both chambers. The number of entries and the time spent in each compartment is continuously updated. The location of the animal is indicated by a color change of the respective compartment.



Markers can be set in order to document any events that are of importance for the experiment. They are output in the run table.

Data Analysis

Search functions allow the easy selection of data records to be analyzed from the data base. A filter function is provided to facilitate data management.



The Run Table

The run table provides a chronological overview over the course of the experiment.

Run Table

Animal No.	:	4
Group	:	2
Trial	:	3
Experiment	:	2
Date	:	17.08.00 17:40
Comment	:	
Age	:	200 days
Weight	:	270 g
Code	:	PP7
Total Time	:	00:15:00
Elapsed Time	:	00:15:00
Operator	:	ES
Substance	:	Morphin
Dosage	:	10 mg/kg i.p.
Cond. Comp.	:	A
Lamps ON	:	Comp. A/ Centre/

Time	A*	Centre	B	Duration	Dist mm
00:00:00		X		00:00:02	196
00:00:02	X			00:00:04	564
00:00:05		X		00:00:03	216
00:00:09	X			00:00:34	1783
00:00:43		X		00:00:01	168
00:00:44			X	00:00:04	476
00:00:48		X		00:00:05	273
00:00:53	X			00:00:46	1457
00:01:39		X		00:00:02	182
00:01:42			X	00:00:02	98
00:01:44		X		00:00:01	210
00:01:45	X			00:00:00	14

Test trial of a morphine conditioned animal
Only the beginning of the table is shown

It lists

- the position of the animal in the box, i.e. in compartment A, B or in the center,

- the time of transfer between compartments (relative from start),
- the time spent in the compartment during each visit, and
- the distance traveled during each visit (in mm).

The conditioning compartment is marked with an asterisk. Locomotion monitored with the infra-red location sensors is converted into a distance in mm. If markers have been set they appear in a separate column.

The Results Table

The results table is divided into 2 parts. The first part gives information on:

- the total time spent in each of the 3 compartments,
- the percentage of time spent in each of the 3 compartments compared to the total time in the box (%T),
- the percentage of time spent in each choice chamber compared to the total time spent in the choice chambers (%C) and
- the number of entries in the outer compartments.

Analysis Length of Stay

	Time	%T	%C	E
Comp. A*	14:10	94,4	98,4	8
Comp. B	00:14	1,6	1,6	3
Center	00:36	4,0		

Analysis Distance

	Dist in mm	%T	%C
Comp. A*	15918	81,3	92,7
Comp. B	1257	6,4	7,3
Center	2399	12,3	

Test trial of a morphine conditioned animal. The morphine induced place preference is evident

In the second part the locomotory data are summarized:

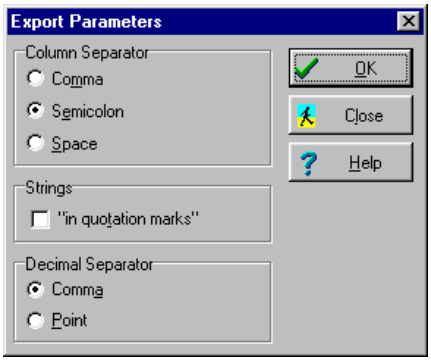
- the distance traveled in the 3 compartments,
- the percentage of distance traveled in each of the 3 compartments compared to the total distance traveled in the box (%T), and
- the percentage of distance traveled in each choice chamber compared to the total distance traveled in the choice chambers (%C).

In the test trials the percentage of time spent in a specific compartment provides a reliable measure of preference.

The system outputs distance traveled as a measure of activity. Locomotor stimulating effects of drugs or any drug-induced sedative effects can easily be seen when data is compared with control animals.

In **conditioned place preference configurations** the list also outputs the time and overall frequency of removal events at the liquid/food containers.

Data Export

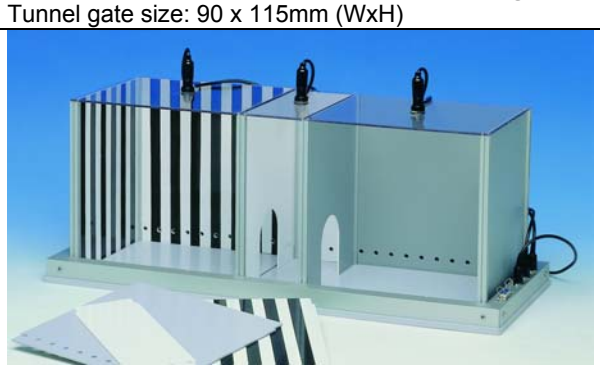


All measuring data can be converted into ASCII files for further-reaching complex statistics with statistical, database or spreadsheet programs. Adjustable export parameters allow the adaptation of the file structure to the individual requirements of the user. An example of an export file is shown below (results table with 4 trials).

Anim	Trial	Exp	Date	Start	Elapsed	Cond.Comp.	TimeA	TimeC	TimeB	DistA	DistC	DistB
4	7	9	02.09.99	09:23:05	900	A	849814	36174	14012	15918	2399	1257
5	7	9	02.09.99	09:23:19	900	B	43470	190892	665638	3256	3671	6371
6	7	9	02.09.99	09:23:29	900	B	16134	11712	872154	2206	1204	12390
7	7	9	02.09.99	09:23:37	900	B	51560	98362	750078	4784	6674	17967

Export file example

Ordering Information

Cat.No.	Description
257000	**Place Preference Test System**
1. Boxes	
257000-MAU	**Place Preference Box "Mouse"** – ***Standard color configuration*** 3-chamber box equipped with infra-red sensors for exact determination of locomotion. Sensor distance: 14mm. Overall inner size: 400 x 150 x 200 mm (LxWxH); size outer compartments: 170 x 150 x 200 mm (LxWxH); size center: 60 x 150 x 200 mm (LxWxH). Each compartment comes with a removable lid and integrated lamp. *Other dimensions are available on request.* **2 closed dividers and 2 dividers with tunnel gates are included in the scope of supply**. Tunnel gate size: 40 x 37mm (WXH)
257000-RAT	**Place Preference Box "Rat" - *Standard color configuration*** 3-chamber box equipped with infra-red sensors for exact determination of locomotion. Sensor distance: 28mm Overall inner size: 720 x 250 x 320 mm (LxWxH); size outer compartments: 305 x 250 x 320 mm (LxWxH); size center: 110 x 250 x 320 mm (LxWxH). Each compartment comes with a removable lid and integrated lamp. *Other dimensions are available on request.* **2 closed dividers and 2 dividers with tunnel gates are included in the scope of supply**. Tunnel gate size: 90 x 115mm (WxH)
	 ***Standard color configuration & arrangement*** ◆ Compartment 1 (**left***) = Vertical black & white stripes ◆ Center = White ◆ Compartment 2 (**right***) = Gray. *Other colors or patterns are available on request (e.g. horizontal black & white stripes, black walls etc).* * **Standard shipping configuration.** The walls, the dividers and the manual doors can be easily exchanged between the left and the right side of the box, i.e. it is possible to run the same box in 2 configurations: Comp.1 left/Comp.2 right and vice versa. If you tell us the desired arrangement with your order, the boxes will already be shipped according to your specification (i.e. 8-place system = 4 boxes with stripes on the left side and 4 boxes with stripes on the right side). Please note that automatic doors cannot be exchanged between compartments. They always have a fixed location. If you order boxes with automatic doors please let us know the color arrangement required in your system.
2. Door Options	
257000-DM	**Manual door for Place Preference Box**. *You need 2 positions 257000-DM for 1 box.* If you order the door unit separately please specify the colors of the adjacent compartments since these doors are differently colored on both sides in order to match compartment color. *Please specify box type with your order (rat or mouse).*

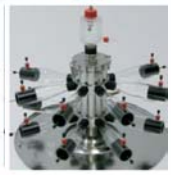
257000-DE	**Automatic (software-controlled) door for Place Preference Box**. *You need 2 positions 257000-DE for 1 box.* If you order the door unit separately please specify door position **and** the colors of the adjacent compartments since these doors are differently colored on both sides in order to match compartment color. *Please specify box type with your order (rat or mouse).*
257000-ST	**Start tube** for the center compartment with manually operated inlet. To be exchanged for the front wall insert.
3. Options	
257000-FG-M	**Non-shockable stainless steel floor set for Place Preference Box "Mouse"** complete with droppings collector set.
257000-FG-R	**Non-shockable stainless steel floor set for Place Preference Box "Rat"** complete with droppings collector set.
257000-OPPC	**Operant Place Preference Conditioning Extension Module for Place Preference Box.** Consists of 2 special side wall inserts for the outer compartments each equipped with a drinking bottle or a food container (please specify type, size and box type (mouse or rat) when ordering) and an additional infra-red sensor that is mounted on the long side wall to monitor removal events.
257000-LP	**Loudspeaker for Place Preference Box.** Requires 257000-AG audio generator or 257000-NG noise generator.
4. Control Unit	*For control and data acquisition of place preference boxes. The control unit package also includes a PCI special interface to be built into the computer (Pentium required).*
257000-C	**Place Preference Box Control Unit** for connection of up to 8 Place Preference Boxes, expandable.
257000-ANG	**Audio/Noise Generator** – 1 pc. per system required. in connection with loudspeaker 257000-LP. *To be built into the control unit 257000-C.* Used.
5. Software	
257000-S	**Software Package "Place Preference"** for Windows. For control of up to 8 Place Preference Boxes, expandable.
6. Housing	
257000-MAU-HOUS	**Sound Attenuating Housing for Mouse Place Preference Box**. With observation window, ventilator and house light.
257000-RAT-HOUS	**Sound Attenuating Housing for Rat Place Preference Box**. With observation window, ventilator and house light.

A complete system consists of:

1. **N** x boxes, mouse or rat
2. Your choice of options, extensions and accessories
3. 1 control unit
4. 1 software package
5. **N** x housing, mouse or rat

N= Number of measuring places

Note: The Place Preference box can also be manufactured **without** any light-beam sensors if it is intended to be used in conjunction with a video tracking system, e.g. TSE VideoMot2. Special color/pattern combinations are required then. Please contact us for details.



■ Inhalation

TSE Systems – your Partner !

As your partner TSE Systems offers you solutions that are fully intergrated with state-of-the-art technology and powerful software, customized to your specific needs, dependably consistent and easier to use for meeting even the most challenging research work.

Our committed team is ready to assist you in formulating solutions for your research. Let us become part of your team. Do not hesitate to contact us.

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■ Behavior

■ Motor Function

■ Physiology

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