ugo basile®

instruction manual
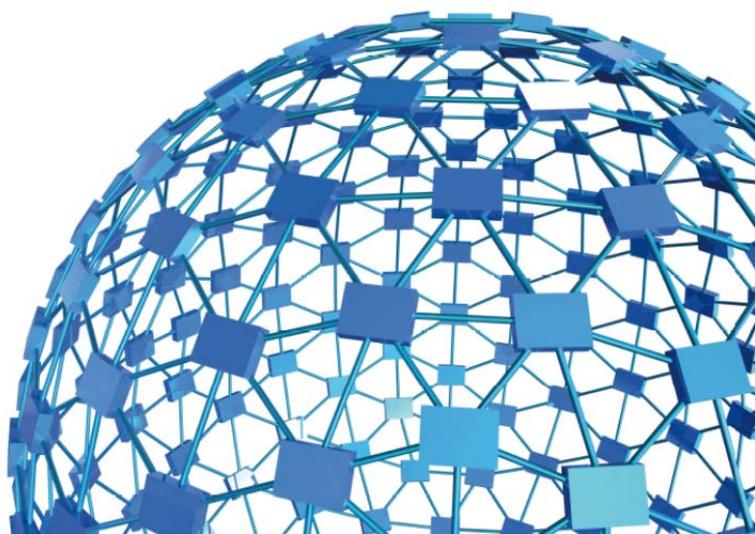
Tail-Flick Unit
Cat. No. 37360

instruction manual

Tail-Flick Unit
Cat. No. 37360

Serial No.

SAFETY CONSIDERATIONS

ALTHOUGH THIS INSTRUMENT HAS BEEN DESIGNED WITH INTERNATIONAL SAFETY STANDARD, THIS MANUAL CONTAINS INFORMATION, CAUTIONS AND WARNINGS WHICH MUST BE FOLLOWED TO ENSURE SAFE OPERATION AND TO RETAIN THE INSTRUMENT IN SAFE CONDITIONS.

SERVICE AND ADJUSTMENTS SHOULD BE CARRIED OUT BY QUALIFIED PERSONNEL, AUTHORIZED BY UGO BASILE ORGANIZATION.

ANY ADJUSTMENT, MAINTENANCE AND REPAIR OF THE OPENED INSTRUMENT UNDER VOLTAGE SHOULD BE AVOIDED AS MUCH AS POSSIBLE AND, WHEN INEVITABLE, SHOULD BE CARRIED OUT BY A SKILLED PERSON WHO IS AWARE OF THE HAZARD INVOLVED.

CAPACITORS INSIDE THE INSTRUMENT MAY STILL BE CHARGED EVEN IF THE INSTRUMENT HAS BEEN DISCONNECTED FROM ITS SOURCE OF SUPPLY.

C E

Tail-Flick Unit

Cat. No. 37360

Dedicated Software

Memory Key included

RAPID and PRECISE SCREENING OF ANALGESIC DRUGS ON THE RAT TAIL

General

This new style Tail Flick Unit has been designed to perform rapid precise screening of analgesic drugs via heat stimulation on the rat tail, **according to D'Amour & Smith**, see bibliography. It basically consists of an I.R. source, whose radiant energy of adjustable intensity is focused on the rat tail by an embodied parabolic mirror.

The rat is held by the operator on the instrument unobstructed upper panel (see picture) in such a way that its tail, placed over a flush mounted window, receives the I.R. energy.

The operator starts the stimulus and the related solid state second counter. When the rat feels pain and **flicks** its tail, a sensor detects it, stops the second counter and switches off the bulb. The **reaction time** of the animal is thus determined and automatically recorded.

Main Features

- Automatic detection of the animal response

- Data portable to USB pen-drive stick or to PC (USB)

- Comfortable, unobstructed working surface (no protruding elements)

- Excellent reproducibility thanks to optics lodged in a rigid structure & electronically controlled I.R. flux

Ugo Basile: more than 10,000 citations

CHECK-LIST
Cat. No. 37360 Tail-Flick Unit

CLIENTE / CUSTOMER_____

Ordine No. / Order No. _____ Data / Date____/_____/_____

UB code	CAT.No.	√	Q.ty	DESCRIPTION		DESCRIZIONE	
37215-303			1	PEDAL SWITCH		PEDALE	
E-WP 008			1	MAINS CABLE	EUROPE	CAVO RETE	EUROPA
E-WP 008-1			1		USA		USA
E-FF 002			2	FUSES (2AF)		FUSIBILI (2AF)	
E-AU 041 USB pen-drive	37360-302		1	INSTRUCTION MANUAL		MANUALE DI ISTRUZIONE	
	52050-09			CUB SOFTWARE		SOFTWARE CUB	
	52010-323		1	USB CABLE		CAVO USB	
OPTIONAL							
37360-325				MOUSE HOLDER (25mm I.D.)		CONTENITORE TOPO, DIAM. 25mm	
37360-330				MOUSE HOLDER (30mm I.D.)		CONTENITORE TOPO, DIAM. 30mm	

DATE / /	Serial No.	IMBALLATO DA / PACKED BY
Universal Input 85-264 VAC, 50-60Hz		

IMPORTANT/IMPORTANTE:

Check the shipment for completeness immediately after receipt: should you find any discrepancy, please fill in the following part and transmit it to our fax no. **+39 0332 745488**

Al ricevimento della merce controllate che la spedizione sia completa: in caso di discrepanza, completate il formulario di seguito riportato ed **inviatelo** al nostro fax no. **0332 745488**

FROM: Name	Company/Institution
DATE	REF.
NOTE	

C O N T E N T S

FIGURE INDEX

Tail Flick Unit

Cat. 3 7 3 6 0

1   GENERAL

This new style Tail Flick Unit has been designed to perform rapid precise screening of analgesic drugs on the rat tail, according to D'Amour & Smith, see BIBLIOGRAPHY, paragraph 13.1-Method Paper.

The instrument measures the latency of the avoidance response when pain is induced by radiant heat applied to the animal's tail.

Its main features are:-

- Direct connection to a PC (USB and serial)
- Adjustable I.R. Intensity
- Multifunction graphic display readout
- USB pen-drive provided with the standard package
- No protruding elements: flush mounted infrared window
- Comfortable, unobstructed working surface
- No stray radiation

1.1   Principle of Operation

The rat is held by the operator on the instrument unobstructed upper panel (see 1, figure 1, figure 2, and datasheet picture) in such a way that its tail, placed over a flush mounted window, receives the I.R. energy.

The operator starts the stimulus and the related reaction-time counter by the pedal switch or by function key located on the front panel.

When the rat feels pain and **flicks** its tail, a sensor detects it, stops the reaction-time counter and switches off the bulb. The reaction time of the animal is thus automatically determined **to the nearest 0.1 second**.

2   INSTRUMENT DESCRIPTION

The Tail Flick Unit basically consists of an I.R. source, whose radiant energy of adjustable intensity is focused by an embodied parabolic mirror on the rat tail.

The instrument compo-nents are neatly arranged in a box of new design, which contains the I.R. source, the sensor, the mi-crocontroller and the elec-tronic circuit.

The instrument front panel encompasses the Com-mand-Display Module (2), see also paragraph 2.1 and the slot for the memory key (3), see also paragraph 3.1-Data Porta-bility3.1.

Figure 1 "Front Panel and USB slot"

The back panel embodies the power module, see paragraph 4.5, and the connection module, see paragraph 4.6.

An inclined Mouse Restrainer is supplied <u>as optional</u>, to be used with the mouse to com-pensate for its tendency to hold its tail at 45 degrees up and therefore away from the heat source. See also 5.5.1Mouse Restrainer.

2.1 The Command-Display Module

This module of original design is located on the instrument front panel, see figure 1, and comprises a graphic display and a command keyboard.

The multifunction liquid-crystal graphic-display monitors the withdrawal latency to the nearest 0.1 second; latency time is the time elapsing from the moment the START key is activated to the moment the animal flicks its tail.

The graphic display presents all available command: the operator sets the experiment configuration via the command keyboard located on the right of the display.

2.1.1 Graphic Display

When the instrument is switched on, our logo with the two mice is displayed.

By depressing **F4** (**ESC**), you enter the user area.
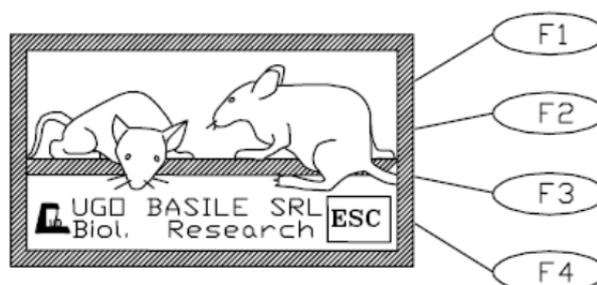
The four lines of the **top area** show:

1) the actual date

2) the actual time

3) the instrument serial number

4) the firmware version
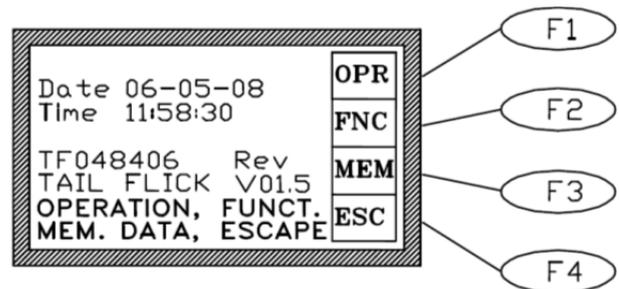
In all menus, the last two lines show the functions available by depressing the corresponding key on the right of the display.

The right portion of the display window shows the abbreviation of the key function, meaning:

- **OPR** Operation
- **FNC** Function
- **MEM** Memory
- **ESC** Escape

The **display contrast** can be modified, see paragraph 5.2-Display Contrast.

2.1.2 Keyboard

The keyboard, consisting of 4 soft push-button keys **F1**, **F2**, **F3** and **F4**, sets the experiment parameters, see paragraph 2.1.3 for reference.

2.1.3 Function Key Abbreviations

|	
CAL	Calibration
CFG	Configuration
CLK	Clock setting
CUT	Cut-off time
DIS	Display contrast
DWN	Decrement
ENT	Enter
EPR	External printer
ESC	Escape
FNC	Function menu
FTR	Feature menu
IR	I.R. intensity
MEM	Memory menu
MPR	MiniPrinter
MSK	Memory stick
NO	No
NUL	Annulment
OK	Confirm
OPR	Operation menu
OUT	Out
PRN	Data printing selection
RES	Data memory reset
STR	Start
STP	Stop

*The **F4 key**, which has the function of **ESCAPE** key, enables the operator to leave a menu and go back to a previously selected one.*

UP	Increment
V.W	Data view
YES	Yes
>	Shift to right

3   DATA ACQUISITION & DATA PRINT-OUT

The Tail Flick Unit is a microprocessor controlled unit. The experimental data, stored in the 37360 internal memory and shown on its graphic display, can be directly exported to PC.

The USB connector type B connects directly into the PC USB port. This connector is located on the instrument back panel (see paragraph 4.6.1). The connection to PC is also possible via the serial port RS 232 C by the Delta 9-pin female connector (COM 1).

Communication is managed by the dedicated **CUB Package Cat. 52050-09**, supplied as standard.

The **CUB 52050** is a Windows® based Data Acquisition Software Package, which enables the research worker to route to the PC the data originated by all Ugo Basile instruments and store them into individual files, ready to be easily managed by most statistical analysis packages available on the market. See also paragraph 4.7.

Ask for details!

3.1   Data Portability

Data portability is arranged via the **USB pen-drive** (E-AU 041) provided with the standard package. Via the USB slot provided on the front panel, all the experimental data of one or more sessions can be easily uploaded on the pen-drive, see **1**, Figure 1, in paragraph 2.

Programming the experiment layouts from a remote PC is also made easy by the use of the pen-drive.

3.2   57145 MiniPrinter

The **MiniPrinter** 57145 is a compact thermal printer device, supplied as an optional part, suitable to print experimental data on 58mm wide paper, see paragraph 12.3-Thermal MiniPrinter

See paragraph 4.6 for connection to the Tail Flick Unit via the 10-pin cable provided with the Mini-Printer and paragraph 6.2 to enable the data print-out on the MiniPrinter.

For further details, please refer to MiniPrinter Instruction Manual.

4 INSTALLATION

4.1 Unpacking & Preliminary Check

Check the contents of the shipment for completeness, packing list to hand, and visually inspect the instrument as soon you take it out of the packaging. Use the supplied **Check List**. The 37360 functional design which avoids protruding elements is the best defence against rough transport handling.

If the instrument is damaged, inform the carrier immediately, notifying our company. If after having tested it, the Tail Flick Test fails to meet rated performances, please contact our after sales service, see paragraph 10.5-Customer Support.

> *Protect the environment!*
>
> Dispose of packaging properly, according to existing and applicable waste management rules and regulations.

4.2 Notes on the Instruction Manual

The Tail Flick Instruction Manual included in the package (on the USB pen-drive) is necessary for the correct installation and operation of the instrument.

We recommend reading the manual with attention, as it is essential for the correct installation and operation of the instrument.

Please save the manual, ready to be consulted by the qualified personnel who use the instrument. Print it, only if necessary.

Our Instruction Manuals are available as free download on our web, see http://www.ugobasile.com/support/documentation.html. For any additional information and/or assistance, you are welcome to contact our Service Department (see paragraph 10.5-Customer Support), specifying the serial number of your instrument.

4.3 Assembling the Equipment

Position the Tail Flick on a stable and flat bench or table surface.

Fit the top panel extension, as indicated in figure 2, and secure it by tightening the two screws.

Figure 2 "Top Panel"

4.4   Environment

Avoid direct illumination of the enclosure compartments, e.g., from a table lamp.

This will definitely upset the animals which dislike full light, not to speak of the risk to raise their body temperature.

Moreover, **intense light may cause the sensor to miss the tail removal**, as a light source from above tends to mask the I.R. energy reflected back by the paw.

We recommend absorbing with cotton wool any occasional large emission of urine during familiarization or test time. The tail skin, if wet by urine, will be definitely less sensitive to the thermal stimulus because of the large specific heat of any watery solution, see paragraph 5.6.1.

4.5   Before Applying Power

Consider the Power Module on the back panel of the Tail Flick, which includes (from left to right):

- the inlet connector of the mains cord
- the mains switch
- the fuse holder
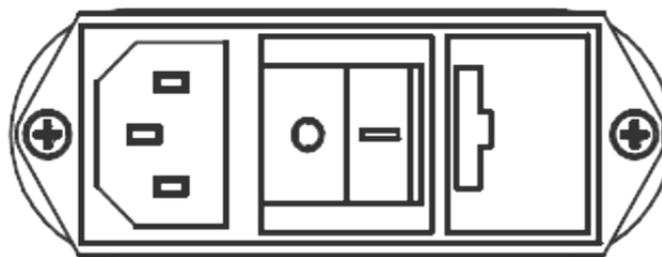
Figure 3 "Power Module"

4.5.1   Fuse Holder

The instrument is provided with 2 fuses, on both neutral and live. To replace fuses, if necessary, pull out the fuse slide, see paragraph 10.1-Electrical.

It is recommended to use fast-blow fuses type F2A; make sure that only fuses with the required rated current and of the specified types are used for replacement. The use of repaired fuses and the short circuiting of the fuse holders must be avoided.

4.5.2   Main Switch

This two-pole toggle switch, which complies with international safety standards, provides a visual cue, to signal the:

- **OFF** position by **O**
- **ON**   position by **I**

4.5.3   Mains Cord

It is a standard cable, Cat. # E-WP008, see paragraph 12-ORDERING INFORMATION. Make sure your power outtake is provided with a reliable ground connection.

4.6   Connections

Connect the mains cord to a power outtake, provided with a reliable earth connection, protected by a differential earth-leakage switch (CGFI) that breaks at the threshold of 0.03A, within a max. acceptable delay of 1s. The maximum breaking compliance required by the CGFI is 10kA at rated current is 6A.

4.6.1   Back Panel

Beside the mains module, the back panel embodies a connection module, see figure below:
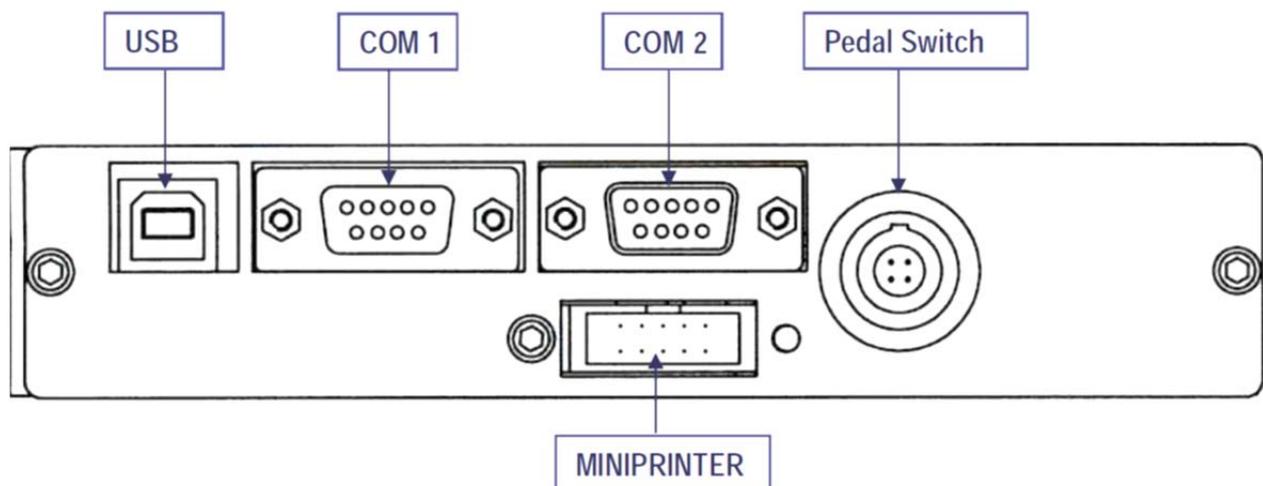
Figure 4 "Back Panel"

The connection module encompasses, from left to right:

USB   this USB type B connector for linking the Tail Flick to the USB port of the PC

COM1   a delta 9-pin female connector for connection to the serial port RS232C of the PC

COM2   a second delta 9-pin connector (male) for connection to an external serial printer

**MINI
PRINTER** a 10-pin connector to the Mini Printer Cat. 57145, see also (see paragraphs 3.2 and 12.3

**PEDAL
SWITCH** a 4-pin circular connector for the pedal switch. Insert the male connector of the pedal switch cable until it locks into its socket; a "click" confirms it is locked.

Mismatching the connection is prevented by the different individual pin arrangement.

4.7 Installation of CUB software

The CUB software is contained in the USB pen-drive provided with the instrument. Install it on your PC.

At the first installation, a code will be generated: send the code to registration@ugobasile.com to receive an **activation key**.

From the installation, you have 30 days to enter the activation key; when the 30 days trial period expires, it will not be possible to activate the software and it will be necessary to uninstall and install it again (ask for instruction at our Customer Support, see paragraph 10.5).

4.8 Intended Use

The Tail Flick Unit is intended for investigation use on laboratory animals only.

4.9 General Safety Instructions

The following guidelines must be followed to ensure safe operation.

- ! **DO NOT** attempt to open or perform any service work
- ! **DO NOT** connect up human subjects

4.10 Additional Safety Consideration

- **a.** Place your Tail Flick on a flat surface;
- **b.** Do not obstruct free and comfortable access to the power module;
- **c.** Use original accessories and spare parts only, see also paragraph 12-ORDERING INFORMATION
- **d.** Immediately disconnect and replace a damaged mains cable;
- **e.** Do not operate the instrument in hazardous environments or outside prescribed environmental limitations (i.e. +18C°/+24C°, 60% relative humidity, non-condensing);
- **f.** Do not spray any liquid on the connectors;
- **g.** Keep inflammables far from the heating source.

UGO BASILE DOES NOT ACCEPT ANY RESPONSIBILITY FOR PROBLEMS OR HARM CAUSED TO THINGS OR PERSONS, ARISING FROM:

- incorrect electrical supply;
- incorrect installation procedure;
- incorrect or improper use or, in any case, not in accordance with the purpose for which the instrument has been designed and the warnings stated in the instruction manual supplied with the instrument;

- replacement of original components, accessories or parts with others not approved by the manufacturer;

- servicing carried out by unauthorized personnel

5   OPERATION

5.1   Switching On

Switch on the 37360; the software takes some seconds to perform a complete checking of the electronic circuit. During the checking, the display shows the mice logo. By depressing ESC, the display shows the software version which is actually installed, e.g., "V1.0", see paragraph 2.1.1.

The software version is necessary in case of communication with our laboratory for operational or servicing problems.

In case the captions MEMORY LOSS!! appears on the display, please refer to paragraph 10.1.1-Battery Replacement.

5.2   Display Contrast

To modify the display contrast, depress the **F2 (FNC)** key from the Main Menu, then the **F3 (DIS)** key. The display shows:
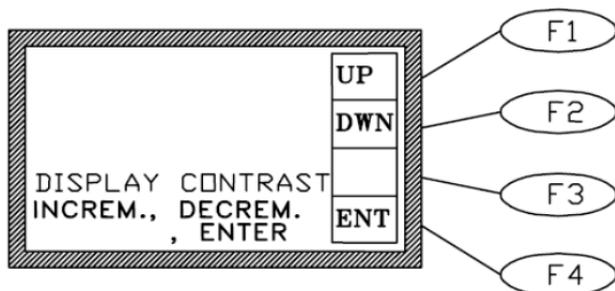
Keep the arrow keys **F1 (UP)** or **F2 (DWN)** depressed until you reach the desired display contrast.

The readability of the liquid crystal display depends on the angle of view: select the ideal contrast according to the height of the table, the operator's distance and so on.

5.3   Setting I.R. Intensity

Before carrying out the test on the animal, set the I.R. intensity. Enter the I.R. setting menu, by depressing **F1** (**OPR**), **F2** (**SET**) and **F1** (**IR**).

The following display will appear:
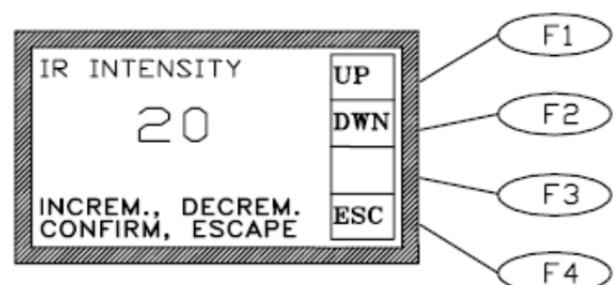
Now use the **F1** (**UP**) or **F2** (**DWN**) keys to set intensity to the desired value.

5.4   Initial "Dry Run"

We suggest to make an initial "dry run" to realize how the whole works, without the presence of the animal which will inevitably catch all available attention, in particular before the operator masters how to position it.

Switch on! Use a strip of white paper, put it as to cover the I.R. window and depress the pedal switch (momentary action is sufficient). This will turn on the I.R. source and start the second counter (in 0.1 s steps).

Move away the strip: the bulb is turned off and the counter stops, providing a digital read-out of the reaction time.

5.5   Holding the Animal

It is advisable to gather some experience in holding the rat/mouse on the top panel.

The animal must be kept firmly but not to the point of causing it a too severe discomfort: it should in fact flick its tail **when the heating reaches the threshold of pain** and not as a consequence of its struggling to slip out from the operator's hand.

Some researchers roll up a cloth around the rat, leaving the tail protruding, a procedure that is in most cases satisfactory.

5.5.1   Mouse Restrainer

The availability of mice with specific gene knockout is driving a substantial shift from rats to mice as a research animal of first choice.

Inclined Mouse Restrainers are available as optional, to be used with the mouse, to compensate for its tendency to hold its tail at 45 degrees up and therefore away from the heat source.

Two restrainers are available:

- **37360-325**, I.D. 25 mm
- **37360-330**, I.D. 30 mm

See also paragraph 12.2-Optional.

Figure 5 "Back Panel"

5.6   Carrying out the Test on the Animal

Repeat the experiment with the animal. Position the animal so that its tail is over the I.R. window. A trial is commenced by depressing the pedal switch or **F1** (**STR**) on the front panel, which activates the I.R. source and digital counter.

When the animal feels pain and flicks its tail, the I.R. source switches off and the reaction time counter stops. The withdrawal latency to the nearest 0.1 s is automatically determined.

The datum shown on the display can be printed on the MiniPrinter or routed to the PC, see paragraph 6-OPERATING WITH MINI PRINTER AND PC.

5.6.1   Note on Wet Surfaces

We recommend absorbing with cotton wool any occasional large emission of urine during familiarization or test time. The tail skin, if wet by urine, will be definitely less sensitive to the thermal stimulus because of the large specific heat of any watery solution.

Be patient and dry the upper panel pane before the first test and at least between each test.

5.7   How to Set a Customized Experimental Configuration

This function enables the operator to personalize the basic datum by adding, in sequence:

- sequence number (see 5.7.1)
- experiment number (see 5.7.2)
- animal gender (see 5.7.3)

From the main menu, depress the **F2** (**FNC**) key, followed by the **F1** (**OUT**) key. Depress again the key **F2** (**FTR**); the display shows the first setting, the sequence number.

All the available selections for each additional information are displayed in a loop. Scan them by the **F1** (**UP**) or **F2** (**DWN**) keys, select the suitable one and confirm the selection by depressing the **F4** (**OK**) key, or avoid one or more features by depressing the **F3** (**NUL**) key.

The selected features will be maintained even if the instrument is turned off. To erase one or more features previously set, simply enter this software level, highlight the concerned feature and depress the **F3** (**NUL**) key.

After entering the last feature (M or F), the software goes automatically back to the main menu.

5.7.1   Sequence Number
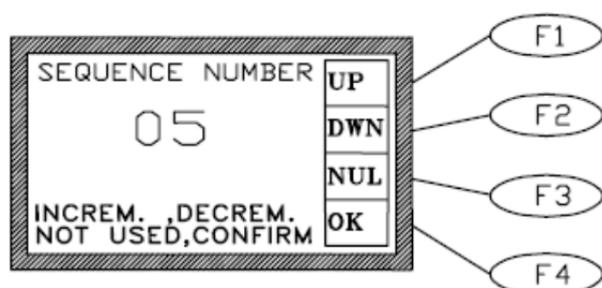
The first additional information to be defined is the sequence number. This section is highlighted as soon as the **F2** (**FTR**) key is depressed.

Use the **F1** (**UP**) or **F2** (**DWN**) key to set the desired sequence number from 01 to 99 and confirm by depressing **F4** (**OK**).

The sequence number will automatically increase by one figure at any subsequent measurement. It trips once a datum has been acquired and recorded, indicating the fresh sequence number ready for the next measurement.

If a sequence number is not necessary, depress the **F3** (**NUL**) key.

IMPORTANT:

When a fresh experimental session is begun, the sequence number can be carried on from the number reached at the end of the previous trial or a new number can be entered, following the instructions outlined above, for example starting from 01.

5.7.2 Experiment Number

As soon the **F4** (**OK**) or **F3** (**NUL**) keys are depressed, followed by the **F4** key again, the second option is highlighted.

The experiment number, from 1 to 9, can now be selected via the **F1** (**UP**) or **F2** (**DWN**) key and confirmed via the **F4** (**OK**) key.
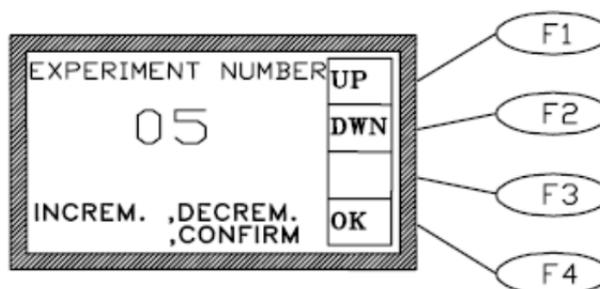
IMPORTANT:

The experiment number is also used to label the data export file on the USB pen-drive (for example: DATA01.txt, where the experiment number is 1, DATA02.txt, where the experiment number is 2, etc.

5.7.3 Animal Gender

After the experiment number, it is possible to define the gender of the animal to be processed: MALE/FEMALE.

Select it by depressing the **F1** (**UP**) or **F2** (**DWN**) key and confirm it via the **F4** (**OK**) key; avoid the gender selection by depressing the **F3** (**NUL**) key.
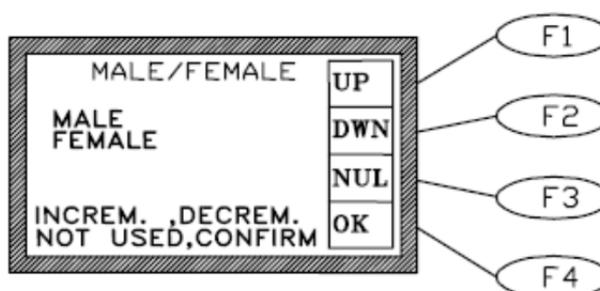
5.7.4 Cut-Off Time

To get over a "false start", i.e., in case the beam, misaligned with the aimed tail area, has been accidentally triggered, and to avoid useless overheating of the tail when the animal does not react within the expected reaction time, a cut-off time can be set.

The preset value indicates the time (in seconds) after which the experiment will be interrupted.
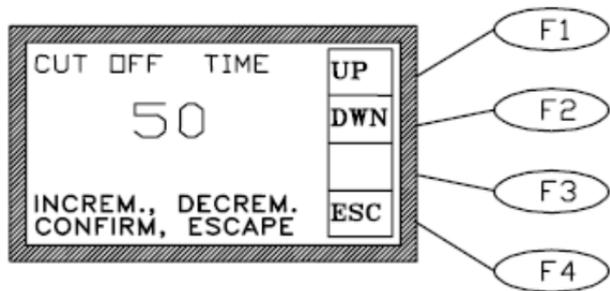
Select the cut-off time by depressing the **F1** (**OPR**), **F2** (**SET**) and **F2** (**CUT**).

Depress the **F1** (**UP**) or **F2** (**DWN**) key until you reach the desired value and confirm it via the **F4** (**OK**) key.

5.8 Configuration File

Up to 6 different experiments can be configured, following the instructions outlined in previous paragraphs, saved in the memory key, ready to be recalled to the PC and/or to the instrument.

The involved parameters are:

- I.R. Intensity
- Cut-Off Time
- Experiment Number
- Gender
- Sequence Number
- MiniPrinter

5.8.1 From the Memory Key to the Instrument

With the memory key inserted in its slot on the front panel, depress **F1** (**OPR**), **F2** (**SET**) and **F3** (**CFG**).

The "READING CONFIGURATION" window appears; after some seconds, select the desired configuration by the **F1 (UP**) or **F2 (DWN)** key, then confirm the selection by the **F3 (OK**) key.

Under the configuration name, for example "CONFIG01.CFG**"**, the related date appears (save date).

If the configuration is not present, the caption "NOT PRESENT" appears instead of the date.
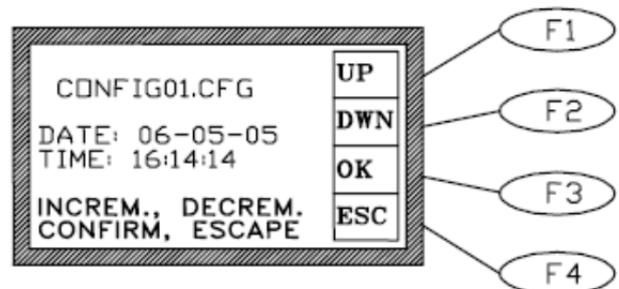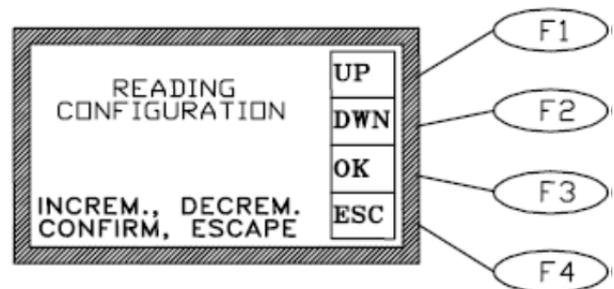
5.8.2   Uploading

If the configuration is present, it can be uploaded and the instrument parameters can be changed, by depressing **F1 (CHG).**
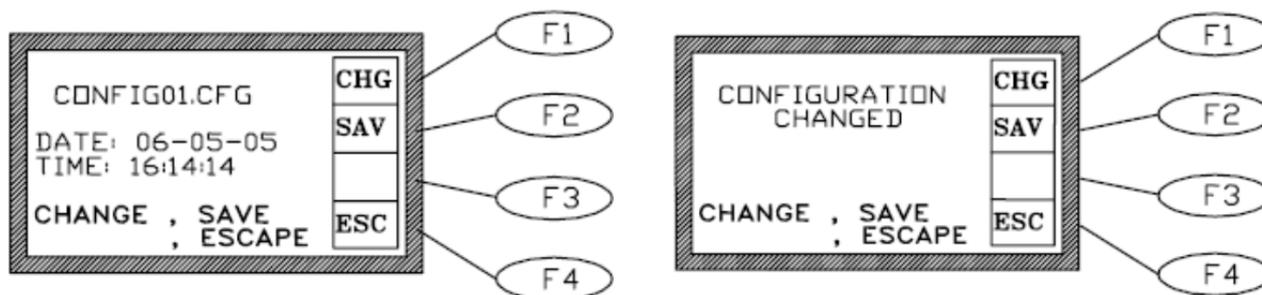

The caption **"CONFIGURATION CHANGED"** confirms the change.

5.8.3   Downloading

If the configuration is present, the user can overwrite it with the current instrument parameters by depressing **F2 (SAV)** and **F1 (YES)** or create a new configuration file, by depressing only and **F2 (SAV)**.

The caption **"CONFIGURATION SAVED"** confirms the overwriting.
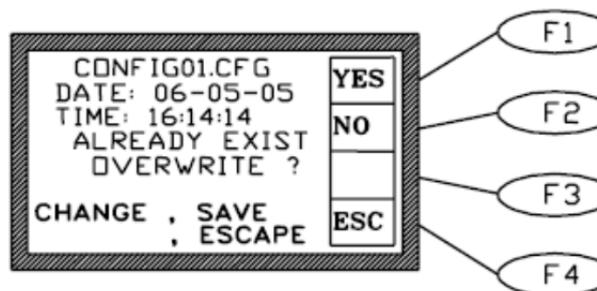
5.8.4   From Memory Key to PC

With the memory key inserted in its slot on the PC, it is possible to import or export a configuration to/from the memory key.

From the CUB software, select **DATA/MEMSTICK > LOAD CONFIG** or **SAVE CONFIG.**

5.8.5   From PC to Instrument

It is possible to send or read the current configuration directly from/to the instrument.

From the CUB software, select **DATA/MEMSTICK > READ CONFIG** or **WRITE CONFIG**.

6   OPERATING WITH MINI PRINTER AND PC

6.1   How to set the Data output to PC

The experimental data are saved in the instrument internal memory. During the experimental trial, the data can also be routed to the PC for real-time or remote communication.

First of all, install the CUB Software, see paragraph 4.7. Then connect the cables as outlined in paragraph 4.6-Connections.

Open the CUB Program and select 'FILE-CONFIGURATION' and the type of connection, serial or USB (Help).

It is not necessary to take any further action: the data are always routed to the PC (even when the PC is not connected).

USB and serial communication between the Tail Flick and the PC is managed by the Ugo Basile CUB (or Win-DAS) software, see paragraph 3 and software manual.

6.2   How to set the Data output to MiniPrinter

The experimental data are saved in the instrument internal memory. During the experimental trial, the data can also be printed-out in real time via the optional **57145 Thermal MiniPrinter**, see paragraph 12.2.

In case of operation in conjunction with the Mini-Printer the operator has to select the data output path menu.

From the main menu, depress **F2** (**FNC**) key, followed by the **F1** (**OUT**) key. The display shows:
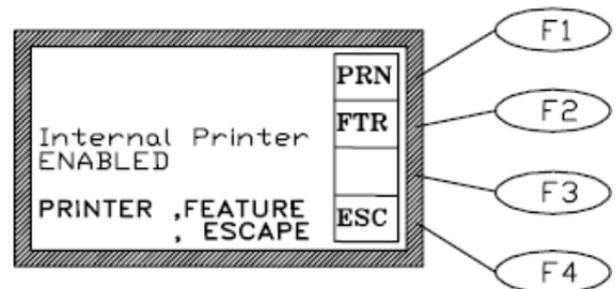
Depress now the **F1** (**PRN**) key, the display shows:

> Internal Printer
> ENABLED (or DISABLED)

Each time the **F1** (**PRN**) is depressed, the printer status changes (from ENABLED to DISABLED or from DISABLED to ENABLED).

6.3   Datum Format

When routed to the PC via the CUB (or Win-DAS) Data Acquisition Software (see the related manual), the data can be monitored on the "ACQUIRED DATA" column, in the "ACQUIRED DATA" window, from menu "FILE".

Each string begins with the initials of the instrument to which the datum refers. In the "IDENT" column, TF means Tail Flick.

See the following sample of the datum, as it appears on the PC:

Figure 6 "Acquired Data Window"

Beside the column **DATE**, which indicates date and time, you find the following columns:

TYPE   indicating the type of instrument, TAILFLICK, in our case

IDENT   indicating the serial number of the instrument in use, in our case TF047906, where **TF** stays for Tail Flick Unit

and the column **ACQUIRED DATA**, which lists the experimental datum proper, in the following format:

04.2;30;1;M;01;Y;

where:

      04.2   =   Reaction time

      30   =   I.R. Intensity

      1   =   Experiment number

      M   =   Animal gender

      01   =   Sequence number

      Y   =   Test OK

6.4   Quick setting of the 37360 Tail Flick Unit

This Instruction Manual extensively explains how to take advantage of all the features offered by this microprocessor controlled unit.

The following table summarizes them; however, we recommend you to browse the complete manual to go deep into details.

Each sequence of commands is described starting from the **MAIN MENU**.

Command Description	Command Sequence	Paragraph reference
Set **Printer ON**	**(FNC) - (OUT) - (PRN)**	6.2
Print DATA previously saved in the 37360 memory	**(MEM) - (OUT) - (MPR)**	7
Send DATA previously saved in the 37360 memory to **memory key**	**(MEM) - (OUT) - (MSK)**	7
Send DATA previously saved in the 37360 memory to **PC**	<u>from **CUB** program</u>: Data/Mem Stick – send all data in mem **YES**	
Set **DATE & TIME**	**(FNC) - (CLK) - (UP)/(DWN) - (>) - (ESC)**	7.2
Set **DISPLAY Contrast**	**(FNC) - (DIS) - (UP)/(DWN)** depressed until the desired contrast is reached - **(ESC) - (ESC)**	5.2

7   MEMORY MANAGEMENT

Each datum point, no matter whether printed or sent to the PC, is saved in the memory (which can store about 300 measures, including the datum proper and the date/time indication).

By depressing the **F3 (MEM)** key from the main menu, the **MEMORY** Menu can be reached.
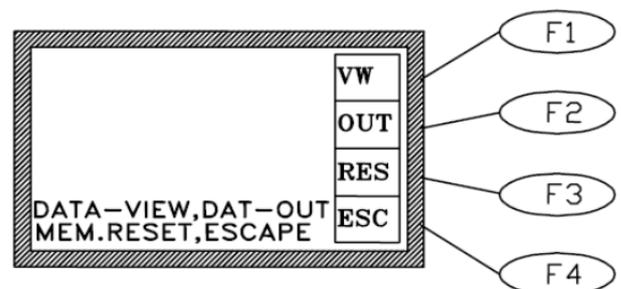
The **F1 (VW)** key enables the operator to visualize on the data stored in the memory, each datum complete with acquisition Date & Time. The top datum, is the last datum which has been memorized.

Use the vertical-arrow keys **F1 (UP)** or **F2 (DWN)** to scan the data; by momentarily depressing the key, the displayed datum will increase (or decrease) of one measurement.
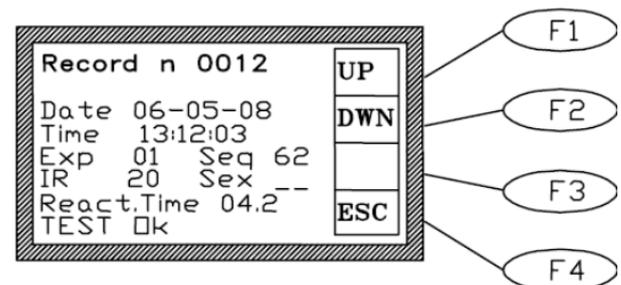
Keeping these keys depressed longer will scan the data.

As usual the **F4 (ESC)** recalls the previous menu software.

From the **MEMORY** Menu, the **F2** (**OUT**) key enables the researcher to export the data stored in the internal memory to the Memory Key or to print them on the MiniPrinter.
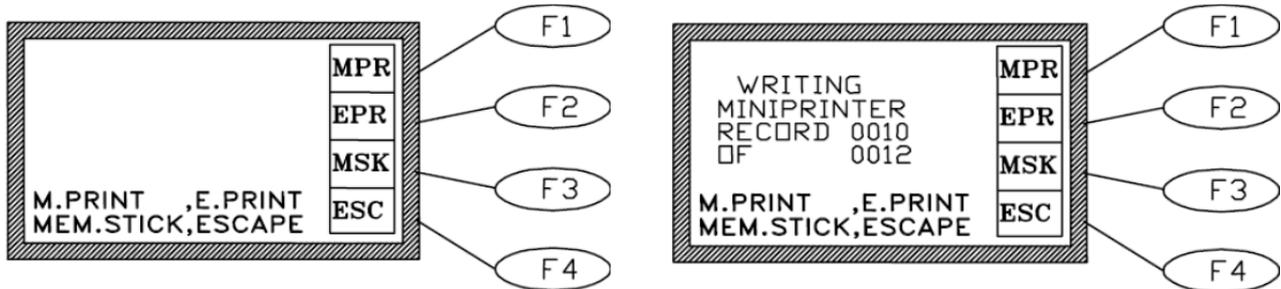
You can now select the data output path, see paragraph 6, by depressing:

F2 (**EPR**) to select an External Printer (*) via COM2, located on the back panel, see paragraph 4.6.1.

(*)   customer printer connected in serial on COM2 at 9600 baud-rate
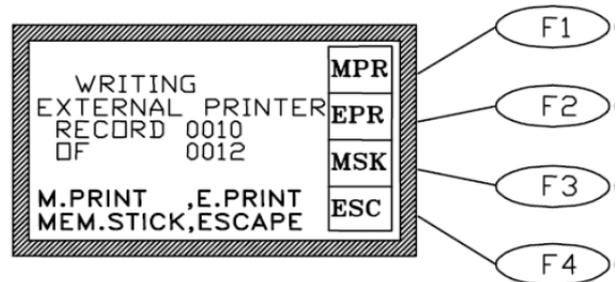
F3 (**MSK**) to select the **Memory Key,** inserted in its slot on the front panel.
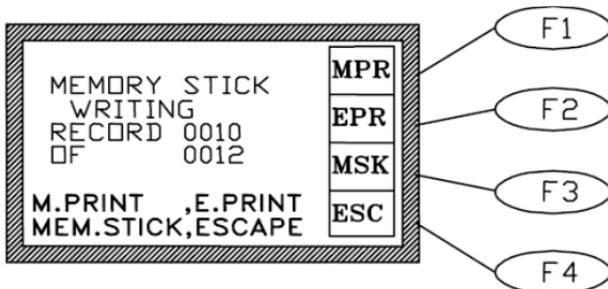
To interrupt the print-out response of the stored data, depress the **F4 (ESC)** key for one second at least.

Before starting a new experimental session, we suggest checking the memory which may contain some data of the previous trial.

If it is the case, enter the proper software level and RESET the memory, see paragraph 7.1

7.1   Memory Reset

From the Memory menu, the **F3** key (**RES**) enables the operator to reset the data stored in the memory.

Answer (**YES**) (**F3** key) or (**NO**) (**F4** key) to the question: "ARE YOU SURE?".
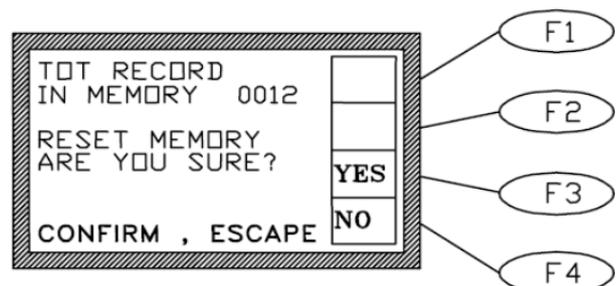
This command can be useful, for instance, before starting a new experimental session, if the operators prefers to cancel the data saved from previous experiments.

The Memory menu automatically appears also when the memory is <u>fully loaded</u>, which means it has reached its maximum capability of about 300 measures.

7.1.1 "Memory Full" Message

If the "MEMORY FULL" message appears during acquisition, the operator has three options:

- **if not interested in the data** saved in the memory, the researcher may simply depress the **F4 (ESC)** key, followed by the **F3 (RES)** and confirm the reset by answering **F3 (YES)** to the question "ARE YOU SURE?", see paragraph 7.1.
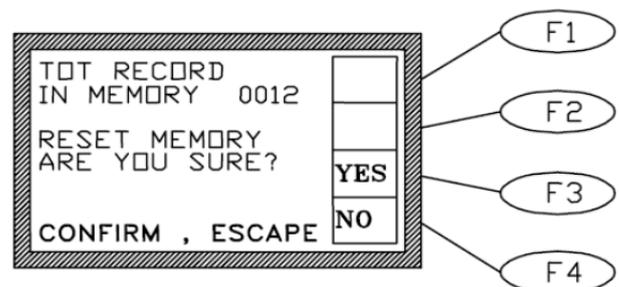
- When **the data** previously saved in the memory are **to not to be cancelled**, the researcher may print and/or send them to the memory key or PC as previously explained (see paragraph 7-MEMORY MANAGEMENT).

- There is also the possibility to **ignore the indication of** "MEMORY FULL" and go on with the experiment. The data acquired onwards will not be saved.

  Consider that, in this case, the memory remains fully loaded and the reminds it by showing the message "MEMORY FULL" at each measure.

7.2 Setting Time & Date

To set time and date, from the Main menu depress the **F2 (FNC)** key, followed again by the **F2 (CLK)** key.
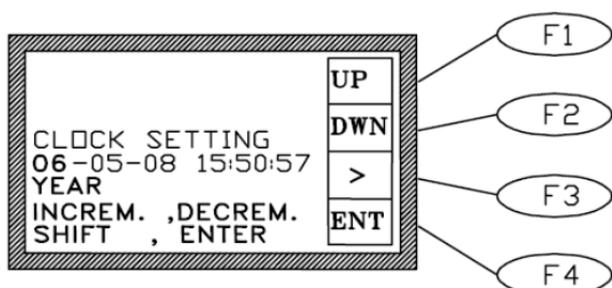
Use the **F3** horizontal arrow key to highlight the parameter to be modified.

Now use the **F1 (UP)** or **F2 (DWN)** keys to set the correct value; a momentarily action on the keys will increase or decrease the numerical value of one step: depress the keys longer for faster selection.

Depress the **F2** (**ENT**) key to confirm the selection.

8 REPRODUCIBILITY OF THE TEST

Any repetitive test, in particular if carried out on experimental animals, challenges the experimenter with a number of variables she/he tries to minimize, to obtain results as consistent as possible.

In our case, it is evident that:

1) the positioning of the I.R. window in relation to the aimed stimulation area

2) the I.R. intensity

are the parameters which should be closely monitored by the researcher.

On what concerns the situs positioning, a minimum of experience will lead to a satisfactory standard.

Being the optics lodged in a rigid structure, the bulb voltage accurately controlled and the I.R. output **factory calibrated by a Radiometer** (see paragraph 9-CALIBRATION), the I.R. intensity is remarkably constant (±1%).

9 CALIBRATION

The **calibration** consists of the measurement of the I.R. **output** power of the Tail Flick with an I.R. Radiometer[1], which in turn has been calibrated with a standard I.R. source.

To enter the calibration menu, depress **F1** (**OPR**), followed by the **F3 (CAL)** key.
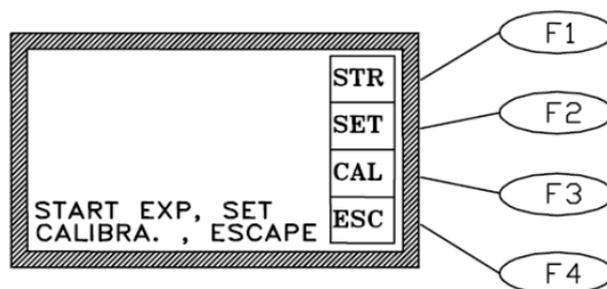
9.1 Radiometer

The Radiometer enables us to deliver, and the user to maintain, the I.R. source of each Tail Flick Unit with identical power flux output (mW per square cm).

There is no way to calibrate the Tail Flick Unit (as any other I.R. emitting device) without a Radiometer; the researcher should consider this extremely useful accessory, the optional I.R. Radiometer Cat. **37300**, a battery operated self-sufficient instrument, complete with I.R. probe, digital meter and adaptors for the Tail Flick (and Plantar Test), all parts neatly lodged in a sturdy plastic case.

Ask for details and manual of the 37300 Radiometer!

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[1] **RADIOMETER** = *a high precision I.R. Flow Meter*

The knowledge of the I.R. power flux in quantitative terms enables the operator to:

A.   Check with the Radiometer (and adjust if necessary) the I.R. emission. In fact, the I.R. output of the Tail Flick Unit may undergo to a certain reduction, due to dust gathered on the optics, blackening of the I.R. bulb, accidental knocks, ageing of components, etc.

Moreover, in case the bulb is replaced or the electronics serviced, output alteration of more significant magnitude may take place.

B.   Make sure that two or more Tail Flick Unit units deliver the same I.R. flux, hence thermal nociceptive stimuli of exactly the same intensity and balance them, if necessary.

C.   Know the I.R. energy (1 mW for the duration of 1s corresponds to 1 mJ) in absolute terms, a useful datum to compare with any equal or different method/instrument described in the literature.

9.2   Calibration via the 37300 I.R. Radiometer

For the use of 37300 I.R. Radiometer, also refer to the Radiometer manual supplied with the 37300 standard package, or available on our web page.

From the Calibration menu, depress **F2** (**RAD**) key, followed by the **F3** (**YES**) key.
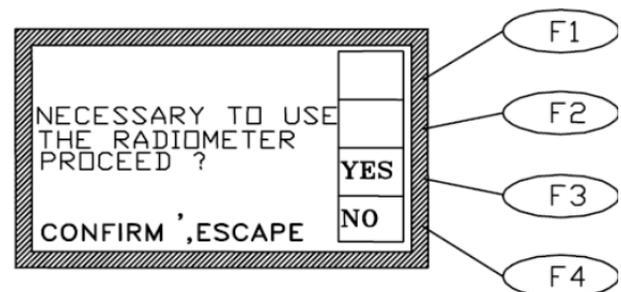
Now depress **F1** (**MIN**), then **F3** (**STR**), to start calibration.
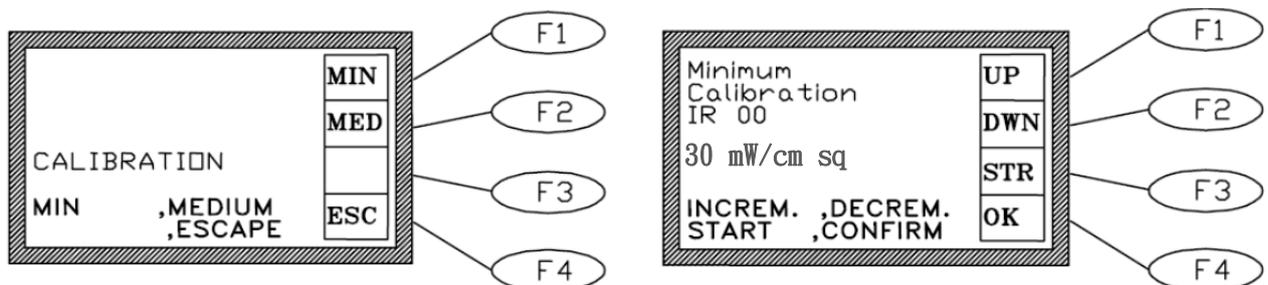
Depress the **F1** (**UP**) or **F2** (**DWN**) key to reach the value indicated on the Radiometer, **30mW/cm^2**, then depress **F3** (**STP**) to save the calibration and confirm it by the **F4** (**OK**) key.

Now depress **F3** (**MED**) key, then **F3** (**STR**).

Depress the **F1** (**UP**) or **F2** (**DWN**) key to reach the value indicated on the Radiometer, **260mW/cm^2**, then save and confirm it by the **F3** (**STP**) and **F4** (**OK**) keys.
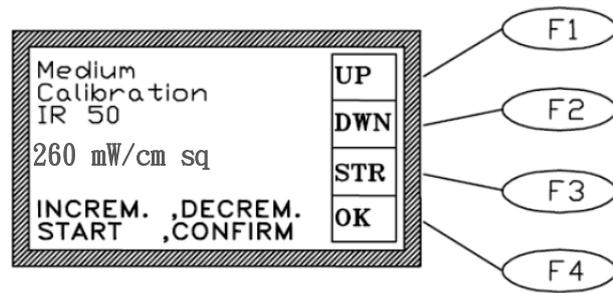
9.3 Calibration without I.R. Radiometer

Calibrating the Tail Flick Unit without the I.R. Radiometer, means to recall the default calibration value set at our factory during the testing phase.

From the Calibration Menu, depress the **F1** (**DEF**) key and proceed by the **F3** (**YES**) key, to confirm the change.
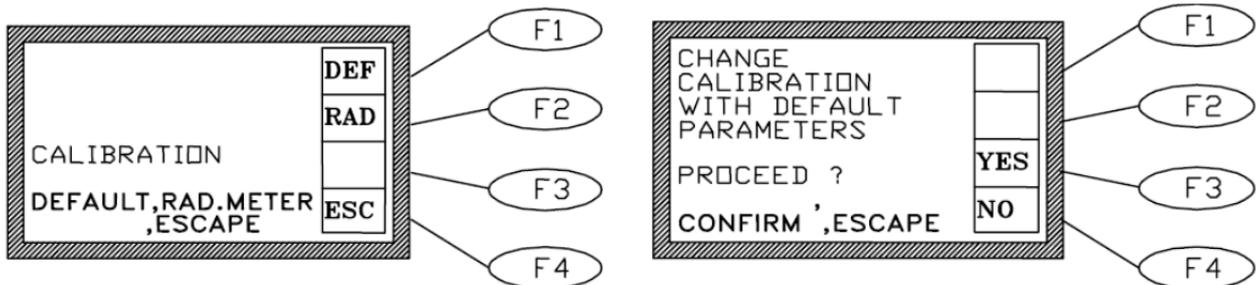
The default calibration value is thus recalled.

10 MAINTENANCE

While any service of the instrument ought to be carried out by Ugo Basile personnel or by qualified personnel authorized by UGO BASILE organization, this section of the instruction manuals describes normal maintenance procedures which can be carried out at your facility.

UNPLUG THE MAINS CORD BEFORE CARRYING OUT ANY MAINTENANCE JOB!

10.1 Electrical

To inspect and/or replace the fuses, disconnect the mains cable first! Insert a miniature screwdriver in the slot indentation, see paragraph 4.5.1, and snap out the slide which houses the fuses.

The Tail Flick Unit universal mains input accepts any voltage from 85 to 264 Volt AC., for which we recommend the use of 2A fast-blow fuses (type F2A).

Snap in the fuse slide: the mechanical "click" ensures that it is locked.

10.1.1   Battery Replacement

The Tail Flick Unit memory is supported by a battery snaphat type **M4T32-BRI2SH1** of ST. The rated battery endurance is 10 years, therefore replacing the batteries is not a frequent task.

When the batteries are exhausted, the display shows the caption "MEMORY LOSS!!".
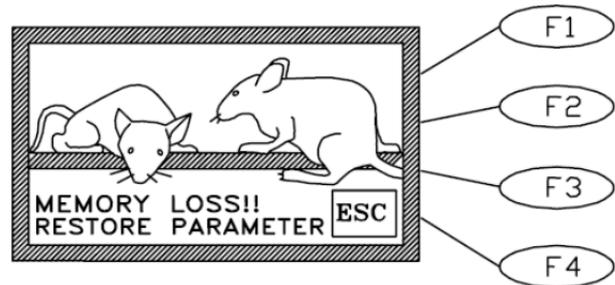
To replace batteries, first of all switch off the unit and disconnect the mains cable!

N O T E :

when the caption "**MEMORY LOSS!!**" appears, the internal memory is lost.

The loss of relevant data can be avoided by **saving data before exiting any experimental session**, see also paragraph 0-This command can be useful, for instance, before starting a new experimental session, if the operators prefers to cancel the data saved from previous experiments.
The Memory menu automatically appears also when the memory is <u>fully loaded</u>, which means it has reached its maximum capability of about 300 measures.

"Memory Full" Message

Always use the same type of batteries for replacement, our part number **E-US 063-1** see paragraph 12-ORDERING INFORMATION.

The batteries are located on the PCB of the controller; Take off the bottom panel of the Tail-Flick Unit by removing its four screws.

If needed, wiring diagrams are available; please contact our Customer Support, see paragraph 10.5.

You will notice a mini PCB, assembled on a larger one. On the mini-board there is a small box, marked U3. This 4-pin box contains the batteries and the clock quartz. Extract it with care, by lifting its longer sides with the help of a miniature screwdriver.

Insert the fresh snaphat paying attention to its orientation; its white dot should match the dot on the PCB. A "click" assures you that a proper insertion took place.

Reassemble the bottom panel.

To restore the configuration, you have to restore the standard factory parameters first: depress the **F1** key and keep it depressed for some seconds, then depress together **F4**. The caption "DEFAULT PARAMETERS RESTORED" confirms the action.

At this point, set again date and time, see paragraph 7.2 and configuration, see paragraph 5.7.

If a Radiometer 37300 is available, recalibrate, see paragraph 9.2.

10.2   Replacing the Bulb

You will realize, in the course of an experiment that the bulb is burnt-out (glow lamps have unfortunately a finite life span) because the missing I.R. source causes the counter to stop automatically after the preset cut-off time, see paragraph 5.7.4.

But even before that, you will have noticed the absence of any animal reaction! The bulb is located into the I.R. Source, see paragraph 2.1.

To replace the bulb and, in general, to service the I.R. Source, it is necessary to remove the top and bottom panels.

To take the bulb out, first loose the two miniature contact screws which fasten the socket to the bulb current-carrying studs. Swing the socket apart.

Free the bulb by removing its holding collar. You will notice the small protrusion on the glass rim of the bulb reflector.

Position the fresh bulb into its pentagonal receptor and rotate it until the mentioned protrusion mates the rectangular cut of the supporting winglet.

Try to turn the bulb, both CW & CCW. If it doesn't, it means the fit is O.K. Reposition the collar.

Then fit the socket to the studs of the fresh bulb and retighten the contact screws. There is no polarity to worry about. Avoid leaving "finger prints" on the concave reflector, while you are handling the bulb.

Needless to add, recalibrate (see paragraph 9-CALIBRATION).

10.3   Cleaning the Optics Thoroughly

Fan cooling, using room air, and protecting the I.R. optics from dust are both laudable but – alas – conflicting requirements.

After 2-3 years and during major instrument overhauls, a thorough cleaning of the optics is advisable: it can be done at the factory only, where appropriate tools and facilities are available for dismantling, cleaning (ultrasonic bath), reassembling, realigning, etc.

Please contact our Customer Support, see paragraph 10.5.

10.4   Long Inactivity

The instrument does not require any particular maintenance after long inactivity, except cleaning.

Calibration is recommended, if the Radiometer 37300 is available, see paragraph 9-CALIBRATION.

10.5   Customer Support

For any further information you may desire concerning the use and/or maintenance of the Tail Flick Unit and accessories, please do not hesitate to contact our **service department** (or our local distributor) either directly of via our support page http://www.ugobasile.com/support.html :

UGO BASILE s.r.l.
Via G. Di Vittorio 2
21036 GEMONIO – Varese, ITALY

Phone :   +39 0332 744574

service@ugobasile.com
logistics@ugobasile.com
sales@ugobasile.com

Before sending any instrument to our factory for repair, please contact our logistics department to obtain a return authorization number (RMA) and shipping/packing instructions.

We may not be held responsible for damages during transport due to poor packing; whenever possible, please use the original packing.

11   INSTRUMENT SPECIFICATIONS

Operation	
Power Requirement	Universal mains 85-264 VAC, 50-60Hz
Commands	via soft-buttons
Read-out	multifunction graphic display
Print-out	Via optional thermal MiniPrinter or panel-mount printer
Starting	via pedal switch. Additional key on the Controller
I.R. Intensity	Adjustable in the interval 01-99 (in one digit steps)
Latency Time	displayed on the graphic display, in 0.1s steps
Connection to PC	via USB
Data Portability to PC	Via USB pen-drive provided
Calibration	Via appropriate I.R. Radiometer, see paragraph 9.1
Operating Temperature	10° to 40° C

Sound Level	negligible
Physical	
Total Weight	4Kg
Shipping Weight	5.8Kg approx.
Dimensions	43x22x10 cm (assembled)
Packing Dimensions	45x34x26cm
Warranty	
Warranty	Tail Flick Unit is covered by a 24-month warranty.

12   ORDERING INFORMATION

37360	**Tail Flick Unit,** standard package, including:

37215-303 Pedal Switch

E-AU 041 Memory Key, including the following:

    37370-302 Instruction Manual

    52050-10 CUB Data Acquisition Software Package

E-WP 008 Mains Cable

E-FF 002 Set of 2 fuses 2A 6.3x32

52010-323 USB cable

12.1   Spare parts

E-HR 002 Spare I.R. Bulb (Halogen "Bellaphot", Mod. 64607 OSRAM, 8V-50W)

E-US 063-1 Battery Snaphat type M4T32-BRI2SH1

12.2   Optional

37360-325 Mouse Holder (25mm I.D.)

37360-330 Mouse Holder (30mm I.D.)

37300 Heat-Flux I.R. Radiometer (see also paragraph 9.1)

57145 MiniPrinter (see also paragraph 3.2 and 12.3)

37400-305 Package of 10 Heat Sensitive Paper Rolls (58 mm paper width, diam. 30 mm roll)

12.3   Thermal MiniPrinter

The Mini-Printer 57145 is a thermal array device, for easy connection to the 37140 Plethysmometer, and other Ugo Basile devices, to print experimental data on its 58mm wide paper Cat. 37400-305.

It is complete with connection cable 7178.

57145 features:

- **very** quiet printing
- **easy** paper loading
- fast **print-out** of several information strings

13   BIBLIOGRAPHY

13.1   Method Paper

- F.E. D'Amour & D.L. Smith: "**A Method for Determining Loss of Pain Sensation**" J. Pharmacol. Exp. Therap. 72: 74-79, **1941**

13.2   Papers Mentioning Ugo Basile Tail Flick Unit

- T.O. Lilius et alia: "**The Mineralocorticoid Receptor Antagonist Spironolactone Enhances Morphine Antinociception**" Eur. J. of Pain online view, **2013**

- J.W. Little et alia: "**Spinal Mitochondrial-Derived Peroxynitrite Enhances Neuroimmune Activation During Morphine Hyperalgesia and Antinociceptive Tolerance**" Pain 154 (7): 978-986, **2013**

- P.J. McLaughlin et alia: "**Behavioral Effects of the Novel Potent Cannabinoid CB1 Agonist AM 4054**" Pharmacology Biochemistry and Behavior 109: 16-22, **2013**

- T.A. Kosten et alia: "**A Morphine Conjugate Vaccine Attenuates the Behavioral Effects of Morphine in Rats**" Progr. in Neuro-Psychopharmacol. and Biol. Psychiatry 45: 223–229, **2013**

- T.C. Chen et alia: "**Spontaneous inflammatory Pain Model From a Mouse Line With N-ethyl-N-nitrosourea Mutagenesis**" J. Biomed. Science 19 (55): 2–15, **2012**

- J. Walsh et alia: "**Disruption of Thermal Nociceptive Behaviour in Mice Mutant for the Schizophrenia-Associated Genes NRG1, COMT and DISC1**" Brain Res. 1348: 114-119, **2012**

- K. Guillemyn et alia: "**In vivo Antinociception of Potent mu Opioid Agonist Tetrapeptide Analogues and Comparison with a Compact Opioid Agonist-neurokin 1 Receptor Antagonist Chimera**" Molecular Brain 5 (4): 2-11, **2012**

- A.J. Morrison et alia: "**Design, Synthesis, and Structure–Activity Relationships of indole-3-heterocycles as Agonists of the CB1 Receptor**" Bioorganic & Medicinal Chemistry Letters 21: 506-509, **2011**

- M. Spetea et alia: "**In vitro and *in vivo* Pharmacological Profile of the 5-benzyl Analogue of 14-methoxymetopon, a Novel μ Opioid Analgesic with Reduced Propensity to Alter Motor Function**" Eur. J. Pharmac. Sciences 41: 125-135, **2010**

- C.A. Boehm et alia: "**Midazolam Enhances the Analgesic Properties of Dexmedetomidine in the Rat**" Vet. Anaesthesia and Analgesia 37 (6): 550-556, **2010**

- M.A. Philips et alia: "**Myg1-Deficient Mice Display Alterations in Stress-Induced Responses and Reduction of Sex-Dependent Behavioural Differences**" Behav. Brain Res. 207: 182-195, **2010**

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14 APPENDIX

Foot Withdrawal Response to Noxious Radiant Heat in the Rat

In the living animal, the temperature at the target site, to which the infrared (IR) beam is applied, is definitely an elusive datum.

Physiological and anatomical features significantly affect "temperature". Heat transfer constantly occurs via vascular flow, dissipating the heat from the site where the IR stimulus is applied. Obviously, the extent of vascularization of the target site affects the heat transfer from the stimulated site. And although vascularization of tissue is generally comparable between animals, there also may be a measurable degree of variation among test animals within a group.

Pigmentation strongly affects the rate of absorption of heat; it is well known that darker skin will "heat" more quickly than lighter areas of the epidermis.

Further still, temperature measurements (using subdermal thermocouples or thermistor probes, etc.) are affected by variation between experimental animals, due to small or great differences in the orientation of external probes or sensors, due to variation in depth of subcutaneous implantation of subdermal probes, and perhaps even more seriously, due to tissue damage when positioning subcutaneous probes or sensors.

There is a relevant and logical solution to these questions about temperature; one should measure a parameter that is able to be quantified, and is not affected by the physiological and anatomical problems which affect "temperature", per se.

An objective way to quantify the intensity of the IR stimulus is to calibrate its power. Power may be quickly and definitively be measured in mW per square centimetre, by a suitable radiometer (see our Cat. No. 37300).

To quantify power of the IR stimulus is to measure something certain. Any measure of power is a metric not subject to the above physiological and anatomical variation lacking in definiteness and precision.

The power of the IR stimulus, in physical sense, is the basic parameter. We know by experience with this type of experiment, that the animal reacts to the stimulus after a certain time (latency) at a certain IR power. Power multiplied by time is equal to energy, which is a parameter that we can measure in Watts per second or Joule.

The experiment therefore delivers a certain quantity of energy. Classical experiments, (see paragraph 13) show that the threshold of pain takes place at epidermis temperature of 45°C.

Heat transfer and absorption may be affected by treatment, whether anti-inflammatory drug treatment, nerve blocking drug CIA, induced inflammation, nerve injury, etc.

The pathophysiology of any injured site is quite different from a non-treated site, and the temperature fluctuation via vascular heat transfer becomes a relative and moot term, further complicating comparison of heat per se.

It is obvious that the instruments Plantar Test and Tail Flick are not lesion making devices; they are not meant to be. The threshold of irreversible tissue damage should not be reached. In an uninjured paw or tail, experimentation should be a sequence of algesia tests carried out on consistently sound tissues.

Notes

Notes

Notes

CE CONFORMITY STATEMENT

Manufacturer	**UGO BASILE srl**
Address	Via G. di Vittorio, 2 – 21036 Gemonio, VA, ITALY
Phone n.	+39 0332 744574
Fax n.	+39 0332 745488

We hereby declare that

Instrument.	**TAIL FLICK UNIT**
Catalog number	**37360**

It is manufactured in compliance with the following European Union Directives and relevant harmonized standards

- *2006/95/CE relating to electrical equipment designed for use within certain voltage limits*

- *2004/108/CE relating to electromagnetic compatibility*

- *2011/65/UE on the restriction of the use of certain hazardous substances in electrical and electronic equipment*

Account *Manager*

Adriano Basile

Nome / *Name*

April 2014

Date

Firma / *Signature*