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Find the *Ugo Basile 37400-001* at our website: *Click HERE*

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DYNAMIC PLANTAR AESTHESIOMETER

Cat. 37400

1 GENERAL

Impaired cutaneous sensation is usually first shown in a loss of light touch detection. The "mechanical" stimulation has a long history of effective clinical use to diagnose pathologies of hyper- or hypo-aesthesia, brought about by drugs, neural pathology or experimental lesions, etc., in the laboratory animal.

The classic instrument for test of human touch sensitivity, to detect neural damage or drug action, is the Von Frey hair or, more specifically, the Semmes-Weinstein set of Von Frey Hairs, I.E., 20 monofilaments in a linear scale of physical force. The hair is pressed against the skin. The force applied increases with increasing hand pressure, until the hair bends. Once the hair is bent, increasing hand approach causes further bend, but negligible additional force on the skin. In this way, a given filament always applies the same force, not subject to variation by the energy of the operator.

The Semmes-Weinstein set can be used on rodents, which respond to light touch of the paw, if they feel it, by a paw withdrawal reflex. However, it is necessary to hold the animal off the ground, with its paw available for contact.

Ugo Basile introduces an **automated apparatus for applying reproducible light touch to the rodent foot**, the Plantar Von Frey Apparatus. The 37400 Dynamic Plantar Aesthesiometer allows the animal to be in an enclosed area, but unrestrained and untouched by the operator.

The 37400 Dynamic Plantar Aesthesiometer is a microprocessor-controlled unit, providing:-

a) direct connection to a PC (via optional 2010 software)

b) read-out on the multifunction graphic LCD display

c) print-out on the incorporated thermal printer

1.1 Instrument Description

The Instrument consists of:

1) a movable touch-stimulator unit

2) a framed metal mesh

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3) a two-compartment enclosure

4) a microprocessor controlled electronic unit

1.1.1 Touch Stimulator Unit

The Touch Stimulator 37400-002 is lodged into a cylindrical vessel of aluminium, fitted with a side handle, which the operator glides over the surface of the base platform (see the leaflet picture and Figure 1).

The vessel incorporates an electrodynamic actuator of proprietary design which lifts a straight 0.5 mm diam. stainless steel filament.

The actuator filament produces force over the entire range of all typical aesthesiometer test devices.

An adjustable angled-mirror is provided to position the filament below the target area of the paw. Find the most suitable inclination of the mirror by acting on its side knob.

A START key has been provided at both sides of the handle, to help both left- and right- handed operators.

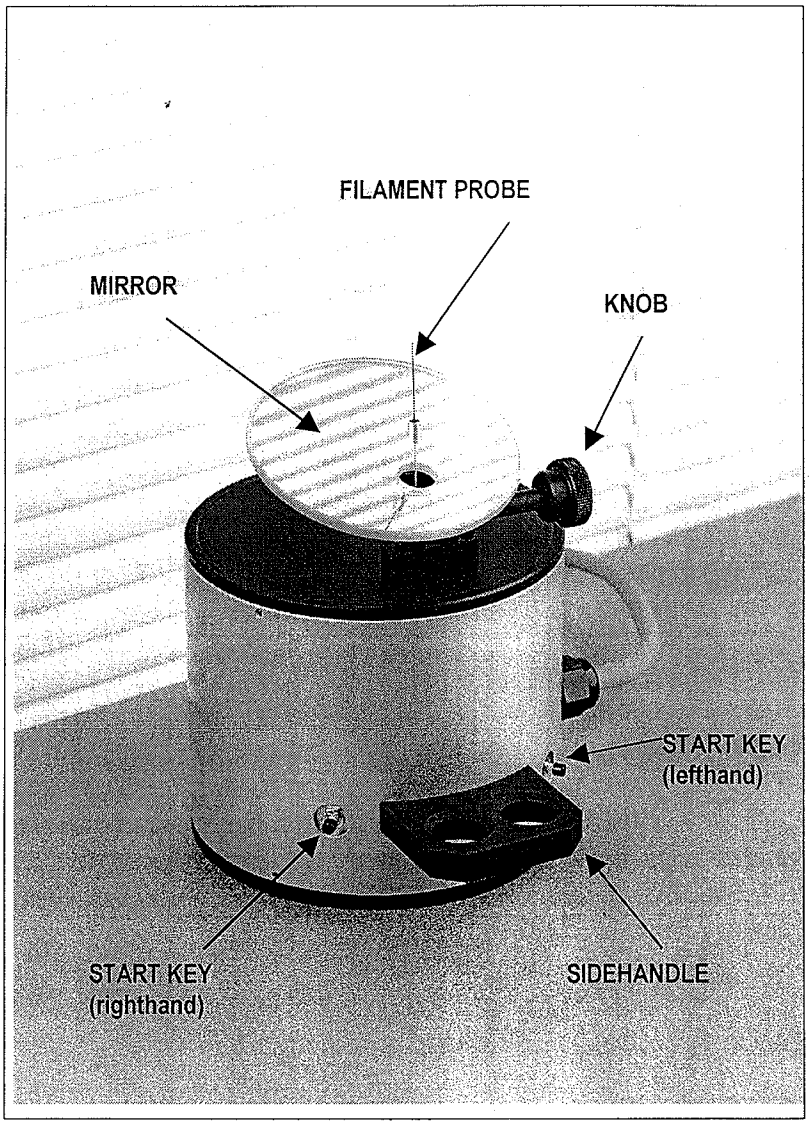


Figure 1 "Touch Stimulator"

1.1.2 The Platform / Metal Mesh / Enclosure Assembly

The Touch Stimulator glides on a Platform Box made of Perspex. Four supporting columns are provided, to be tightened at the corners of the platform.

The Metal Mesh is inserted into a consistent frame, built from square section tubes fitted together by die-cast angles. Angles and tubes are made of aluminium alloy. The tubes are anodized whilst the angles have a stove enamel black finish.

The frame is held in position by its own weight on the top of the supporting columns.

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The Animal Enclosure is divided into two compartments; individual lids make it easier to deposit/remove the animals individually.

Several models of acrylic dividers can be provided as optional, to accomodate four or six animals, small or larger rodents, etc. See 9.1Optional.

1.1.3 Electronic Unit

The Electronic unit is enclosed into a tiltable cylindrical case of original design, with graphic LCD display, serial port (RS232) and a printer.

The unit also has an internal memory for data storage, scrolling screen review, and optional output to PC.

The **back panel** (see figure 1) embodies, from left to right:

- the socket 6-pin connector to the Touch Stimulator
- the Delta 9-pin connector for branching the 37400 to the PC
- the POWER MODULE, see also paragraph 3.7-Connections.

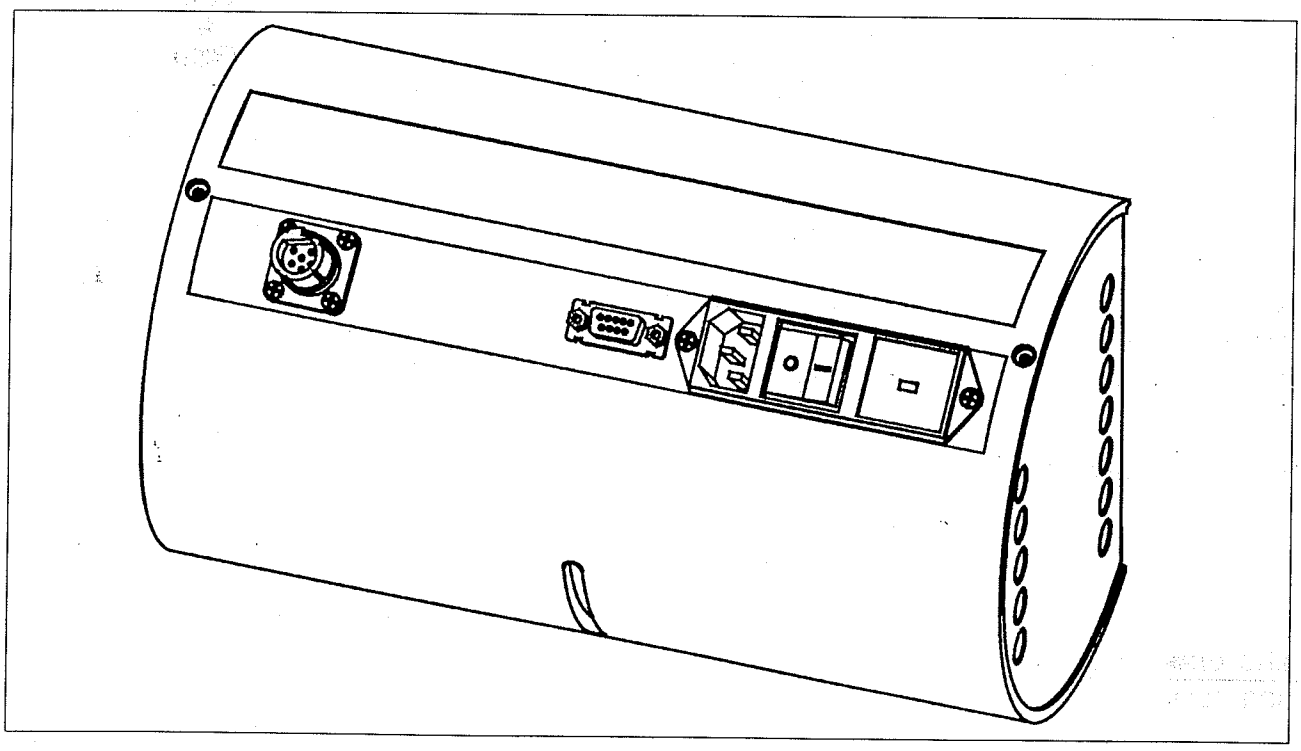


Figure 2 "Back Panel "

The **front panel** embodies a thermal printer and a multifunction liquid-crystal graphic-display, see picture.

Paw withdrawal reflex is automatically recorded and monitored on the graphic display using two metrics: the latency until withdrawal, in seconds, and the force at which paw was withdrawn, in grams, both sets of figures in large highly readable format.

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1.1.8 Function Key Abbreviations

All function keys are indicated on the graphic display by abbreviations, meaning:-

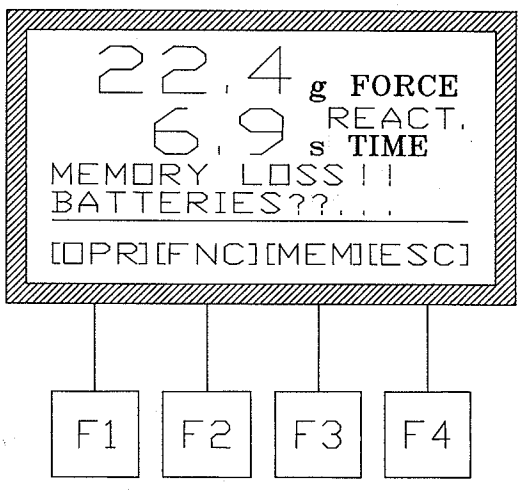
(ADD)	set instrument address
(ALL)	all (serial + printer)
(B-R)	baud rate
(CAL)	calibration menu
(CLK)	clock setting
(DAT)	date setting
(DIS)	display contrast
(ENT)	enter
(ESC)	escape (see paragraph 1.1.7)
(FNC)	function menu
(FOR)	force menu
(FTR)	feature menu
(MEM)	memory menu
(NO)	no
(NUL)	annulment
(OK)	enter
(OPR)	operation menu
(OUT)	out
(PAT)	output path (PC and/or printer)
(PRN)	data printing selection
(RAM)	ramp (force increasing rate) menu
(RES)	data memory reset
(SER)	serial (PC) path
(V.W)	data view
(YES)	yes

See also the **FUNCTION KEY BLOCK DIAGRAM, 37400-001EF01**, in the section "WIRING DIAGRAMS".

1.1.9 Memory Loss!

In case the caption "MEMORY LOSS!! BATTERIES??" appears on the display, it means that the internal watch-type batteries which maintain the memory, are down and consequently have to be replaced.

The data saved in the memory are lost. Once the batteries have been replaced, the operator has to set again date, time (see paragraph 6.2) and the experiment configuration including sequence number, calibration, etc., see paragraph 4.4.



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NOTE : *When the caption "MEMORY LOSS!! BATTERIES??" appears, the 37400 internal memory is lost. To avoid the loss of relevant data, we suggest to save them on the PC or to print them before exiting any experimental session.*

2 DATA ACQUISITION

The 37400 Dynamic Plantar Aesthesiometer is microprocessor controlled and features direct PC output. Internally-stores data can be routed via 9-pin D-type connector to the PC serial port (RS232) see paragraph 3.7-Connections.

Data output requires Win-DAS Software Cat. 2010 to interface the Dynamic Plantar instrument and PC.

The 2010 is a Windows® based Data Acquisition Software Package, which enables the research worker to store the data into individual files, ready to be easily managed by most statistical analysis packages available on the market.

Ask for details!

3 INSTALLATION

3.1 How to Handle the Instrument

The Dynamic Plantar Aesthesiometer is a relatively bulky instrument (see paragraph 9.2 Specifications).

Once the Plantar Aesthesiometer is assembled, do not attempt to lift or move the combined unit. In particular, do not incline the base, as the framed mesh may accidentally come off the supporting columns.

3.2 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 ***Check List*** supplied.

If the instrument is damaged or, after having tested it, fails to meet rated performances, notify the carrier and our company immediately.

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3.6.3 Mains Cord

It is a standard cable, Cat. # E-WP008. Make sure your power outtake is provided with a reliable ground connection, see also 3.7 & 3.8.

3.7 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 is10kA at rated current is 6A.

The back panel (see paragraph 1.1.3) also embodies two connectors:

TO TOUCH STIMULATOR: the socket 6-pin connector enables the connection of the Touch Stimulator to the electronic unit

TO PC RS232C: this delta 9-pin connector enables the operator to connect the Hot Plate to the serial port RS232C of the PC.

Mismatching the connection is prevented by a different pin arrangement.

3.8 Additional Safety Consideration

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.

a. Place your Dynamic Plantar Aesthesiometer on a steady flat surface (e.g. your experimentation table).

b. Do not obstruct free and comfortable access to the power module.

c. Use original accessories and spare parts only, see also paragraph 9-ORDERING INFORMATION.

d. Immediately disconnect and replace a damaged mains cable.

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e. Do not use in hazardous environments or outside prescribed environmental limitations (i.e. +10C° / +40C°, 95% relative humidity, non-condensing), see also paragraph 9.2-Specifications.

f. Do not spray any liquid on the connectors; see also paragraph 8-MAINTENANCE.

4 OPERATION

4.1 Switching On

Before switching on, make sure the probe-guard has been removed and the filament probe is correctly positioned on the vessel.

Switch on the 37400 by acting on the Mains Switch placed on the back side of the instrument; see paragraph 3.6.2.

4.1.1 Electronic Unit

The software takes some seconds to perform a complete checking of the electronic circuit. During the checking, the display shows the software version which is actually installed, e.g., *"V02"*, which appears on the right side of the screen, at the intermediate level, see paragraph 1.1.4.

It is important to let us know the software version, in case of any operational or servicing problem.

After 3 seconds the display shows the configuration of the previous experiment, saved in the internal memory of the microprocessor; which is fed by two watch-type batteries.

In case the caption **MEMORY LOSS!! BATTERIES?** appears on the display, please refer to paragraph 1.1.9.

4.1.2 Touch-Stimulator

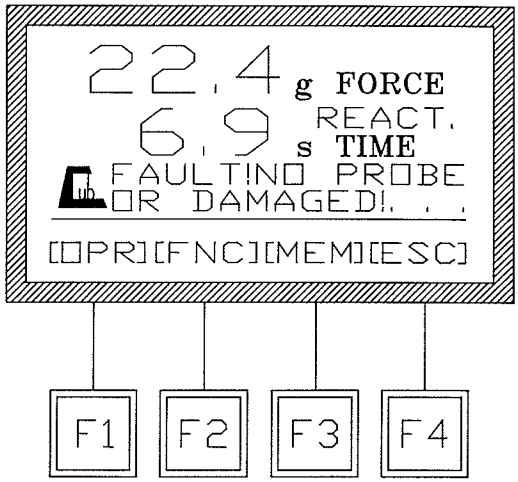
As soon the instrument is ON, the actuator exerts a downward force of about a gram which drives the probe to the starting line, followed by an upward force in steps of 20 mg at intervals of 100 ms.

This force, below the threshold of feeling, pushes the probe in contact with the plantar surface.

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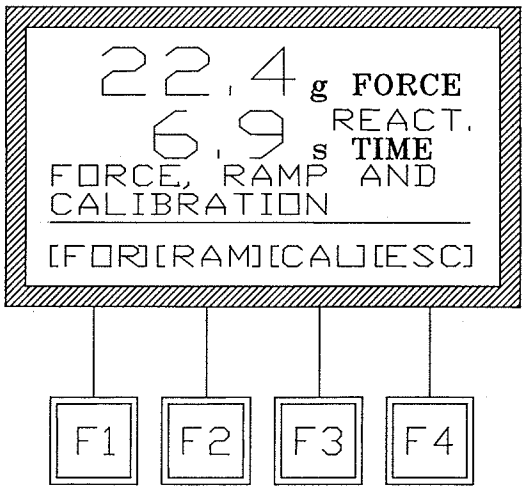
If the probe lifting mechanism happens to be accidentally jammed, as soon the upward force reaches one gram, the following message appears on the Electronic-unit display and disappears as soon the fault has been cleared.

See paragraph 8.4.



4.2 Setting the Force and Rate Application

Depress the F1 key **(OPR)** from the main menu. The display will show three different options:-



F1 **(FOR)** maximum value of force in grams

F2 **(RAM)** force increasing rate (ramp duration) in seconds

F3 **(CAL)** calibration procedure (see paragraph 0)

Depress the F1 **(FOR)**.

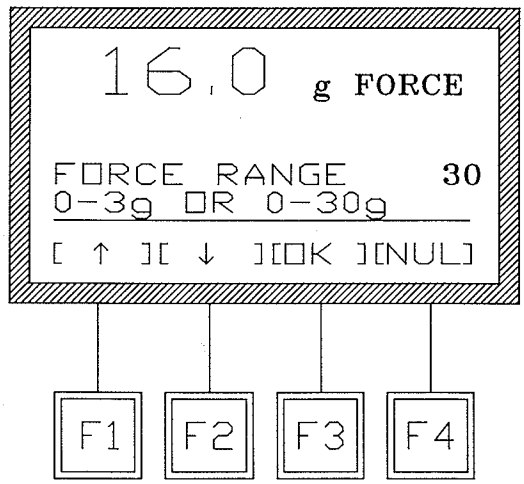
At this point you are asked to set two force parameters: range and intensity. The range may be selected, with the help of F1 **(↑)** or F2 **(↓)** keys, between:-

- 0 to 3 grams *(one integer, two decimals)*

and

- 0 to 30 grams *(two integers, one decimal)*

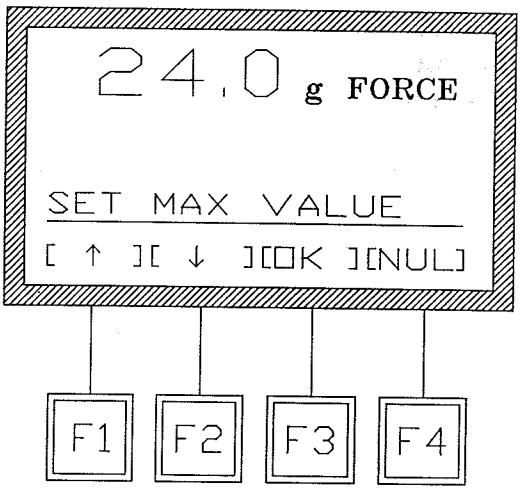
Confirm the selected range by the F3 **(OK)** key.



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Now set the desired force intensity by acting on the F1 (↑) or F2 (↓) keys. A momentary action will increase the intensity of one step, corresponding to 0.4 g (or 0.04 g, depending on the selected range). The set force appears on the display.

By holding F1 or F2 depressed the operator can increase or decrease the set force the desired force (increasing or decreasing it) at higher speed.



Once the desired value is reached, depress the F3 **(OK)** key to confirm and go back to the OPR menu or the F4 **(ESC)** to go back to the main menu, leaving the value unaltered.

Depress the F2 **(RAM)** to set the force increase to the desired rate (*ramp)*, by acting on the F1 (↑) or F2 (↓) keys. Depress the F3 **(OK)** key.

NOTE: *the force and ramp values which appear at this point on the display (MAIN MENU) are not the set values, but they refer to the last test.*

*To see the set values, depress the F4 **(ESC)** key from the main menu, until you reach the set-force and ramp menu.*

4.3 Carrying out the Test on the Animal

Place the animals in their compartments positioned on the metal mesh surface and observe them! After a short period of time, in which the rodents demonstrate exploratory behaviour, they stay quietly in a resting position, with occasional bouts of grooming.

At this time the test can be started.

The situs is typically the plantar surface of the paw and, more preferably, the hind paw, since the animal tends to rest thereon.

With the help of the adjustable angled mirror, see also paragraphs 1.1.1-Touch Stimulator Unit & 3.5-Environment, place the Touch Stimulator beneath the hind paw of the rat to position the filament directly below the target area.

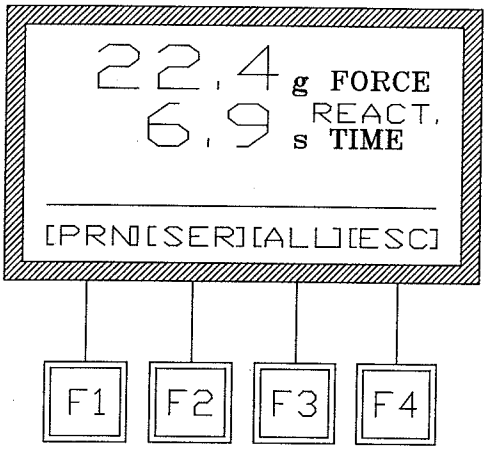
Pressing START invokes the following automatic sequence:

4.3.1 the electrodynamic actuator lifts the stainless steel filament;

4.3.2 the filament touches the plantar surface and begins to exert an upward force below the threshold of feeling;

4.3.3 the force increases (at your preset rate of application), until the animal removes its paw or until the point at which greatest preset force is met.

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The researcher can now select the data output path, see paragraph 5.1.

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 to check 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.

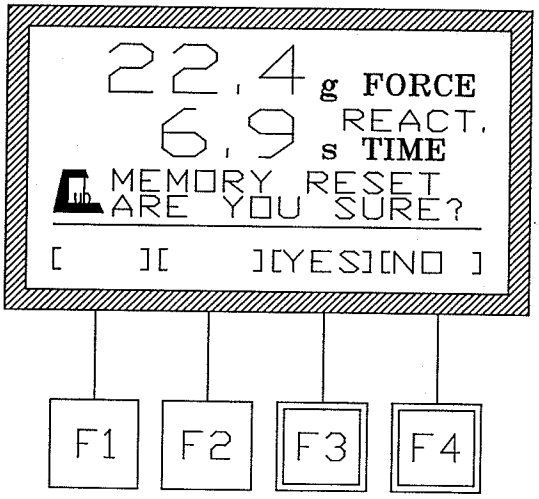
6.1 Memory Reset

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

This command can be useful, for instance, before starting a new experimental session, if the operator prefers to cancel the data saved from previous experiments.

The operator is now required to answer **(YES)** (**F3** key) or **(NO)** (**F4** key) to the question: "are you sure?". This further question has been added to avoid the accidental loss of all stored data.

The Memory menu automatically appears also when the memory is fully loaded, which means it has reached its maximum capability of about 500 lines.



6.1.1 "Memory Full" Message

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

1) the researcher who is not interested in considering the data saved in the memory, may simply depress the **F3 (RES)** key and confirm the reset by answering **F3 (YES)** to the question "ARE YOU SURE?", see paragraph 6.1.

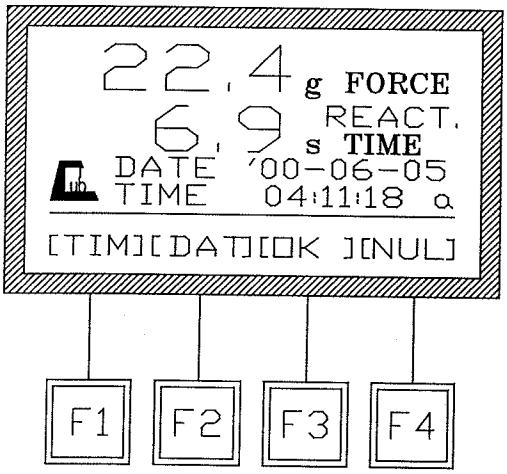
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2) in case the data previously saved in the memory are necessary, proceed in order to Print and/or send them to PC as previously explained (see paragraph 6-MEMORY MANAGEMENT)

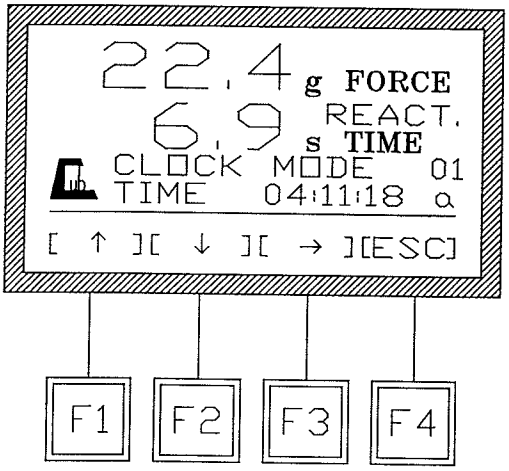
3) there is also the possibility to ignore the indication of "MEMORY FULL" and go on with the experiment by depressing the **F4 (ESC)** key. The data acquired onwards will not be saved. Consider that, in this case, the memory remains fully loaded and the display reminds it by showing the message "MEMORY FULL" each time the 37400 is switched ON.

6.2 Setting Time & Date

To set time and date, from the Main menu depress the **F2 (FNC)** key, followed again by the **F2 (CLK)** key.



Select F1 **(TIM)** to set TIME. Use the F3 horizontal arrow key to highlight, on the intermediate level of the display, the time section (hours, minutes, seconds, and mode) which has to be modified.



Now use the vertical-arrow keys F1 (↑) or F2 (↓) to set the correct time; a momentarily action on the keys will increase or decrease the numerical value of one step: depress the keys longer for higher speed selection.

Remind also to set the clock mode, selecting among the following possibilities:-

00 = 24-hour mode

01 = anti-meridian (a.m.) time

02 = post-meridian (p.m.) time

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9.1 Optional

2010	Win-DAS software package, version for Windows®
37400-324	Animal-Enclosure Partition, 4 spaces
37400-326	Animal-Enclosure Partition, 6 spaces
	Different partitions can be provided on request

9.2 Specifications

Commands	:	via "soft keys"
Read-out	:	multifunction graphic display
Print-out	:	by incorporated thermal printer
Starting	:	via keys on the Touch-Stimulator vessel
Force Range	:	0.1 to 3.0 grams, in 0.04 g steps or:- 1 to 30 grams, in 0.4 g steps
Force increasing rate (*ramp*)	:	adjustable in the interval 1 to 20 seconds, in 1 s steps
Latency Time	:	read-out on the graphic display, in 0.1 s steps
Connection to PC	:	through DELTA 9-pin connector. See paragraph 2.
Power Requirement	:	115 or 230 V, 50/60 Hz, 20 W max.
Operating Temperature	:	15° to 30° C
Sound Level	:	negligible
Dimensions		
- electronic unit	:	cm 26 (w) x 13 (d) x 12 (h)
- assembled platform	:	cm 50 (w) x 32 (d) x 40 (h)
Total Weight	:	10.20 Kg
Shipping Weight	:	20.00 Kg approx.
Packing Dimensions	:	80 x 60 x 44 cm

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