



PROFESSIONAL TIMING

**PRECISION TIME BASE - PTB 605**

For PTB version 13 – 28<sup>th</sup> November 2001

**USER'S MANUAL AND TECHNICAL DESCRIPTION**

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## 1. INTRODUCTION

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The **PRECISION TIME BASE (PTB) 605** is a compact 16 channel timer that allows for the recording and storage of more than 18,600 times. Controlled by a highly precise laboratory grade thermo-compensated quartz oscillator, the 16 input channels and 3 data output channels (one of them being bi-directional) makes this device the ideal choice for many demanding sports-timing applications in conjunction with PC's and other downstream systems. The timing resolution on the printer port is expressed to 1/10,000<sup>th</sup> / second (.0001) although the PC port allows for full access to the 1/250,000<sup>th</sup> / second (0.00001) The PTB can be triggered from zero or from a pre-selectable time-of-day in the 24 hour format.

The PTB Timer has 3 RS 232 serial data ports, and can be connected directly to a PC (with bi-directional data communications), to a serial printer, and to an information display board, all simultaneously. Through the use of a connected PC, timing calculations and/or results can be channeled back through the PTB to a printer and a display board, all without using more than one serial (COM) port on the PC- a very practical solution for most laptop systems.

The operator can choose to operate the system in ON-LINE or OFF-LINE mode, transferring time data immediately as it is produced or after the timing session is completed. An extensive memory in the PTB stores all times (over 18,600 of them) in a sequential FIFO method with each timing session being assigned a different number. New times generated in a new timing session always start with #1. Up to 128 different timing sessions can be individually stored and recalled.

Each PTB has a unit ID number that is engraved on the unit's chassis and likewise stored in the memory of the device. This ID number is carried on the data stream from the output ports to allow for the use and identification of many separate PTB's if all connected to a networked PC system.

The PTB has minimal hardware controls with all operating parameters adjustable through simple ASCII software commands introduced via the bi-directional RS 232 I/O port. Function keys on the PTB allow for the simple creation of new timing sessions, the clearing of available memory, or to send stored data to a connected printer.

Sophisticated power management allows for the use of on-board alkaline or rechargeable Ni-Cad batteries, or external secondary sources. Power alarms in the form of flashing LED's and messages on the printer and computer data ports warn of approaching battery exhaustion. In the worst case scenario, the PTB automatically shuts itself off and memorizes all times recorded before the batteries completely fail.

TAG Heuer has specifically developed the unique PTB 605 to take full advantage of use with a computerized timing system solution using an attached PC running appropriate timing software. Many specific software systems are available for the PTB, developed either by us or by independent software suppliers for many sports and other applications. Please contact us for a complete list of recent software resources for your PTB 605 or see chapter 4

For the programmers wishing to develop their own applications, we keep at your disposal a file PTB.dll which allows the management of the computer datas sent to the PTB-Printer. Do not hesitate to ask us this file, it will make life much easier for all software programmers !

## 2. TECHNICAL DESCRIPTION

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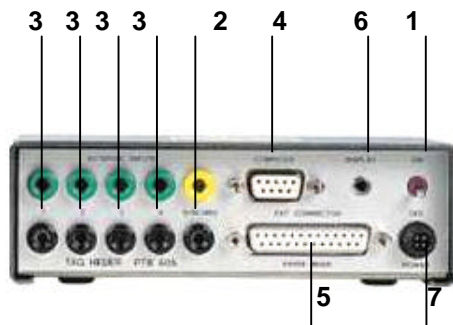
The PTB 605 has the following components :

### On the rear panel:

1. 1x ON-OFF Switch
2. 1x "Banana" jack for synchronization
3. 4x "Banana" jacks for inputs 1 to 4
4. 1x "COMPUTER" 9 Pin Serial RS232 DB-9 connector for data connection to a Computer
5. 1x "MULTI" 25 Pin DB 25 connector making available all 16 inputs and keypad functions

- 6. 1x "DISPLAY" 3.5mm jack for Serial RS 232 data output to a display board
- 7. 1x External POWER and battery charger jack

Rear View



**On the right side of the PTB 605:**

- 1 "PRINTER" 9 pin RS 232 Serial data connector for connection to a printer

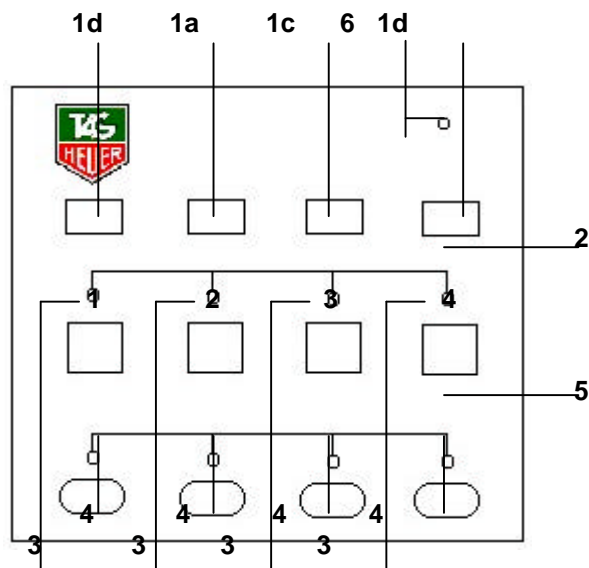
Lateral view



**On the top of the PTB 605, a sealed-membrane keyboard featuring:**

- 1. Function Keys:
  - a. SESSION Creates a new timing session
  - b. CLEAR Clears the memory
  - c. MEMORY Outputs memory to a computer and/or Printer
  - d. VALID A safety key - confirms the selection of the preceding keys
- 2. 4x Green LED's that serve as indicators for the activation of inputs 1 to 4
- 3. 4x Keys to manually trigger inputs 1 to 4.
- 4. 4x Keys to block and unblock external inputs 1 to 4
- 5. 4x Red LED's to indicate the blocking status of inputs 1 to 4
- 6. 1x LED to indicate the status of ON mode and the state of the batteries  
Green LED = power from batteries, Red LED = External Power

View from Above



### 3. ON and OFF MODES

#### PTB only

Primary power to the PTB is provided by the internal batteries. When the PTB is first turned on, with no external power connected the POWER LED should be **green**. If it flashes, the batteries must be replaced, or if they are rechargeable batteries, recharged. Whenever an external power supply is connected to the PTB, the POWER LED turns **red**.

#### PTB 605 + TAG Heuer PTB Printer

**External power for BOTH the attached printer and the PTB is furnished via the POWER input jack on the PTB Printer.**

**It is important to first check the condition of the internal batteries in the PTB using the POWER LED BEFORE connecting the External AC/DC adaptor ! These batteries must be in good state, even if you use the external power supply.**

**When the PTB 605 is switched to the ON position**, the following information is printed after the TAG Heuer Logo and likewise sent to the Computer port:

```
PTB 605 – V13 No 1234
22.01.99
SESSION 4
MEMORY FREE 12 447
```

Line 1 indicates the ID no.of the device( which corresponds to the chassis serial number) and its version

Line 2 is the date dd.mm.yy

Line 3 indicates the timing session number.

**When the PTB is switched on, it creates a new timing session in each case. If 3 previous sessions were resident in the memory, a 4<sup>th</sup> session is created.**

Line 4 indicates the number of lines of memory available for new timing data to be recorded. The total capacity of the PTB 605 is 18,687 times (1 time for each memory line).

#### 4. SOFTWARE CONTROL FOR PTB605

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The PTB605 is usually delivered with a software program allowing the management of sport competitions. This program allows to communicate with the PTB605 and to enter or modify its parameters. You can download the following software programs on the internet homepages [www.tagheuer-timing.com](http://www.tagheuer-timing.com) or [www.soft-control.com](http://www.soft-control.com) :

Msports	Multi-Sports, universal software
Ski	For the management of ski races (FIS, FFS, FSS,OSV, etc..)
Circuit	For races on circuit (motorsports)
Jumping	For equestrian sports (national and International)
Mlap	For races in circuit, universal software
Test F1	For private tests of motorsports teams (F1, F3, F3000, etc..)
SC Excel	Freeware allowing to receive the datas of the PTB605 on an Excel Spreadsheet

Each PTB 605 is likewise provided with a computer connection cable. We keep at your disposal a program **ptb605.exe** which will allow you to interface with the timer and control all functions from your PC or Laptop even if you do not have application specific software. Do not hesitate to ask us this application in sending an e-mail to [info@tagheuer-timing.com](mailto:info@tagheuer-timing.com).

#### 4. HYPER TERMINAL™ (Found in Windows 95 and followers)

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Most users of Windows™ products will know that your computer probably has this useful communications application on your hard drive. **Hyper Terminal** may be a limited and rudimentary communications program, but most people have it on their modern PC's and in a pinch it will allow you to communicate and control the PTB 605 from any PC or Laptop even if the ptb605.exe control program we provide is not available to you. Note also that **any** basic communications program (Procom, Xtalk...) will allow you to work with the PTB to control settings and operating parameters using the ASCII codes described in the **Adjusting Parameters** and **Serial String Data Format** sections of this manual.

Once in Hyper Terminal, use the following commands in the pull-down menus to connect to and control the PTB:

To set the transfer Protocol:

```
FILE
  PROPERTIES
    PHONE NUMBER
      CONNECT USING
        DIRECT TO COM1
          CONFIGURE
            9600
            8
            None
            1
            xon / xoff
```

To make it easy to see the text on the screen as it comes in at the selected port:

```
FILE
  SETTINGS
    ASCII SETUP
      ASCII RECEIVING
        Append Line Feeds
        Wrap Line Feeds
```

To save the incoming ASCII data to a specific text file for use later with another program:

```
TRANSFER
  CAPTURE TEXT
```

FILE

(Specify here a path and file name you wish to use)

START

Explore the features of HyperTerminal and you will see that you can route data to a printer, and do some formatting that might be helpful in your timing application.

## 5. SYNCHRONIZATION - "TOP" OF THE MINUTE

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When the PTB is first turned on, it defaults to its internal Time of Day as taken from the RTC circuit and is immediately ready for synchronization and then subsequent timing operations. Normally, the first input triggering will occur on the synchronization inputs (yellow/black banana jacks) marked **SYNCHRO**. This causes the internal clock of the PTB to begin running from the preset Time of Day (seconds always start from zero)

```
SYNCHRO          13:12:00.0000
```

The degree of timing precision (here in this example: 1/10,000<sup>th</sup>) on the attached printer is selectable in the set-up parameters of the PTB. After synchronization, the SYNCHRO input jacks become disabled. Only if a new timing session is created is a new synchronization possible. Note that one may select a new timing session and retain the previous session's synchronization by starting the new session with an impulse received on any of the external inputs 1 to 16. Synchronization is lost when the PTB is turned off (OFF Mode).

If it is necessary to record the synchronization signal on any of the other inputs from 1 to 16, one can (as our example here uses input #4 ) connect the input in parallel with the SYNCHRO plugs. On the printer, we would get:

```
SYNCHRO          13:12:00.0000
                1  4 13:12:00.0000
```

Although the PTB uses the date and time-of-day stored in its RTC clock memory as the default synchronization point, it is of course possible to select **any time of day**, including zero, from which to synchronize the internal clock. To access this feature, the attached computer sends the **SET DATE** command and the operator then introduces the selected time.

**A synchronization pulse is required after a new time is selected via the computer to effect the time change.**

The PTB produces its own very useful **synchronization output reference pulse every minute** via the 25 pin connector. At the "top" of every minute, pins 22 and 23 output an opto-isolated impulse that can be used to trigger and synchronize other timing devices to the exact time of day as the PTB, or for other timing references or controls

Note : Whenever the PTB is turned on, it gets date and time information as permanently managed by its own internal RTC (Real Time Clock) circuit as in most PC's. This RTC circuit is not however anywhere nearly accurate enough to be used as the time-base for actual timing during the PTB's operations. No common RTC Circuit is. After synchronization, **the PTB uses its own highly precise thermally compensated quartz time-base for actual timing.**

## 6. TIMING

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Triggering impulses arriving at the different inputs of the PTB are all numbered sequentially up from 1 to a maximum of 49,999. All time-of-day times are identified along with the external input channel number on which they were generated, ranging from channel 1 to 16, or with M1 to M4 in the case of manual impulses generated by the keypad buttons. Example of printing output:

```
2      4 13:12:16.2345
18     M3 14:01:00.4693
49,999 1 23:59:59.9999
```

Sequential numbering (counting) of times from input channel triggering is increased by one sequential number for each **external** and each **manual** impulse received. A manual impulse for channel 3 (M3) will increase the sequential numbering of times counted for input 3 just the same as an external impulse will, and vice-versa.

## 7. NEW SESSION

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A new timing session is created by simultaneously pressing the keys VALID and SESSION, or by switching the PTB on. In the first case, the PTB will print:

**SESSION 5 27.02.99**

In the second scenario, the whole initial message is printed:

**PTB 605 - V13 No 1234  
27.02.99  
SESSION 5  
MEMORY FREE 12,477**

When a new session is created, it is possible to synchronize using the **SYNCHRO** input jacks, or to use the synchronization of the previous session (if the PTB has not been switched off) by triggering any of the timing input channels.

## 8. MEMORY MANAGEMENT

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The PTB can memorize up to 18,687 times. Before the memory becomes completely filled, (with 1000 positions still available) the following message is sent:

**MEMORY FULL**

If the memory is completely full, one can continue timing without problems, however new times will begin to overwrite the oldest times stored in the memory.

**Important : The CLEAR function will erase the entire memory (all times and sessions) and create a new timing session No. 1. Once this has happened, a new synchronization can be effected, or the old synchronization can be used immediately**

When a printer is attached to the PTB 605, one can select to print **the amount of available memory** still free **with a touch of the MEMORY key only** (*without* using the VALID key simultaneously).

## 9. CONTROL FUNCTIONS

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The PTB monitors the condition of its internal batteries and/or externally connected power supplies as well as the state of an attached printer. It can be powered by 6 alkaline batteries (for about 60 hours at +20C) or Ni-Cad or Ni-Mh rechargeable batteries (AA size). When the voltage of the installed batteries gets to the point that either charging or replacement is necessary, an indicator lamp (Green LED POWER) **begins to flash** and the following message is printed and sent on the PC port:

**BATTERY LOW**

Once this message is displayed, **the autonomy of the device is now limited to 2 hours at +20 C** if internal batteries are only being used. At the point of absolute battery failure, the device automatically shuts down when timing accuracy and subsequent timing data preservation can no longer be assured. Timing data collected to that point is memorized by the device due to another separate memory battery, and the data to that point is not at risk.

Likewise the PTB monitors the presence and activity of a connected printer, and sends the following messages to a computer:

**PRINTER ON or PRINTER OFF**

These software generated messages are always sent at the beginning of each timing session or during timing if the status at the printer port changes (printer disconnected, printer turned off, or paper out). In these cases, once the printer state is corrected, all data collected and memorized during the interruption of the printer is then sent to the device for printing.

## 10. ADJUSTING PARAMETERS

When connected to a PC, a dialogue between the PTB and the connected PC can be exchanged to manage the selectable parameters of the PTB 605. **The default parameters** expressed here can be selected/restored at any time by simply pressing **the VALID key as the PTB 605 is switched on.**

This operation (VALID+ON) is necessary to effect when the PTB has not been used for extended periods, or if the computer cannot send messages to the PTB due to some communications conflict (RS232 protocol, speed, parity...).

### Adjustable parameters of the PTB are by defaults :

▪ Date and time -	format of DD/MM/YY
▪ Printing Precision	thousandth/sec.
▪ Serial port speed	9,600 baud
▪ Input 1 lock-out time after impulse reception	1 second
▪ Input 4 lock-out time after impulse reception	0.5 second
▪ All other Inputs lock-out time after impulse reception	0.5 second
▪ Inputs 5 to 16 blocked	No
▪ DISPLAY ASCII running time 1/100 sec.	Disabled
▪ Buzzer	On

## 11. SERIAL DATA STRING FORMAT

The PTB has minimal keyboard controls and is intended to be controlled mostly from simple ASCII commands received on the COMPUTER connector port (DB9-M) on the rear panel. This COMPUTER port is bi-directional, thus the cable provided allows for data to be received by and transmitted to the PTB on this one PC COM port.

Connector DB9 **COMPUTER**:

Pin :	Function :
2	Transmit Data (TX)
3	Receive Data (RX)
5	Signal Ground
8	DTR (Data Terminal Ready)

Protocol RS232 : 9600 baud, No Parity, 8 data bits, 1 stop bit

The ASCII commands listed below allow you to control the functions of the PTB and adjust all parameters.

**The port is however controlled using the XON/XOFF protocol. The PTB605 is by default in position XON**

If the port is not initialized, use **ASCII Character #17, CTRL-Q**

Once initialized, the COMPUTER port will send you timing data and settings information as requested, and allow the PTB to accept further ASCII commands being sent by the connected PC. **To close the COMPUTER port, ASCII Character #19, CTRL-S, is used.**



## Data communication protocol of PTB605

A command from the PC always start with the control character <STX>, and always ends with the control character <ETX>.

All commands received and interpreted correctly by the PTB605 are validated by a control character <ACK> sent from the PTB605 to the PC.

If a command is not understood or contains errors, the PTB605 will send the control character <NAK> to the PC.

When the PTB605 is in "redirectional" mode (to display or to printer), commands are not interpreted by the PTB605, except, of course, the command for end of redirection (<LX>). This means that no control character (<ACK> nor <NAK>) exists in "redirectional" mode, except for a <ACK> which validates the end of the commutation.

If a command is incomplete or if the <ETX> character has expired, the PTB605 does not send any control character. To avoid a total blocking (infinite waiting), a "time-out" must be activated on the PC software.

There are 33 PC transmittable commands which are divided in 4 categories. There are QUERY commands, PARAMETERS commands, CONTROL commands and LINK commands (for redirection).

The following list presents all different command categories and their description.

**CTRL-Q**        **Opens the PTB COMPUTER port for serial communications (XON)**  
**CRTL-S**        **Closes the PTB COMPUTER port (XOFF)**

### QUERY commands

QP                    query parameters  
QM                    query memory  
QD                    query date

### PARAMETERS commands

PB                    buzzer on  
Pb                    buzzer off  
PE                    inputs 5 – 16 enable  
Pe                    inputs 5 – 16 disable  
PKxyzz                lock time  
                          *x: 1        channel 1*  
                          *x: 4        channel 4*  
                          *x: 0        other channels*  
                          *y: S        time in seconds*  
                          *y: D        time in 1/10<sup>th</sup> of a second*  
                          *zz:        times from 1 to 99*  
PPx                    printer accuracy  
                          *x: 0        second*  
                          *x: 1        1/10<sup>th</sup> of a second*  
                          *x: 2        1/100<sup>th</sup> of a second*  
                          *x: 3        1/1'000<sup>th</sup> of a second*  
                          *x: 4        1/10'000<sup>th</sup> of a second*

PL                    runtime on display is 1/10<sup>th</sup> of a second  
p1                    runtime on display is disabled  
PC                    serial port speed is 9'600 bds  
Pc                    serial port speed is 19'200 bds  
PNxxxx                set serial number of PTB to xxxx

PDddmmyyhhMM	set current date to European Format
	<i>dd: day</i>
	<i>mm: month</i>
	<i>yy: year</i>
	<i>hh: hours</i>
	<i>MM: minutes</i>
PdmmddyhhMM	set current date to US Format
	<i>mm: month</i>
	<i>dd: day</i>
	<i>yy: year</i>
	<i>hh: hours</i>
	<i>MM: minutes</i>

### CONTROL commands

CD	set all defaults
CS	new session
CU	upload memory
CA	upload memory and print it
CC	clear memory

### LINKS commands

LP	link PC to printer
LL	link Printer to line
LX	unlink PC

To add more solidity to the system, a CS (Check Sum) of 1 bit will be added to all command frames, following this format : <STX>xxxx<CS><ETX>. The CS is an addition of all bytes of the command modulo 256.

For example, to give 1/1'000<sup>th</sup> of a second precision to the printer, the command will be : <STX>PP3<CS><ETX>

which gives in hexadecimal code :

<0x02><0x50><0x50><0x33><0xD3><0x03>

As the PTB605 is mainly occupied for acquiring timing impulses, it does not have enough resources to treat all different errors and expiry problems provided by a PC. Though, the CRC together with the commands as described hereabove make transfer security very high.

**Please note that a more accurate computer protocol is available. You may download it from our homepage [www.tagheuer-timing.com](http://www.tagheuer-timing.com) under section "User Manuals and Protocols"**

### Input "lock-out" time settings.

All PTB timing inputs (1 - 16) can be controlled to ignore (lock-out) impulses that arrive at the inputs for specified periods of time *after* an original impulse is received. This allows you to ensure that only one (1) impulse per competitor is used when each sensor might send multiple impulses during timing line crossing. The adjustment of this lock-out period is crucial to proper time-keeping and varies from sport to sport due to speeds and sizes of the objects present at the timing sensor points (skiers, cars, horses...)

### Inputs are adjustable in 3 blocks:

<b>For Channel 1</b>	<b>using the command PK1...</b>
<b>For Channel 4</b>	<b>using the command PK4...</b>
<b>For Channels 2,3,5-16</b>	<b>using the command PK0...</b>

The selection of which inputs are used for which timing functions should be carefully considered based on

the way in which the PTB controls these channel lockout periods. **Only channels 1 and 4 can be controlled more extensively and independently from the other remaining channels (2,3,5-16).** Thus we recommend that channels 1 and 4 be reserved for use with starts and finishes, and that the other channels be used for intermediate or speed trap sensors.

**The 3 blocks of timing input channels have 2 possible ranges of lock-out adjustment:**

**0.1 to 9.9 Seconds using “PKxD” followed by a value  
1 to 99 Seconds using “PKxS” followed by a value**

**In addition, two fixed value lock-out times can be selected with the following commands followed by 00 :**

**.01 with the command : “PKxS00”  
No Lock Time with the command : “PKxD00”**

**Examples:**

PK1D00                    Input 1, no lock-out.  
PK1D01 to PK1D99      Input 1 locked out from 0.1 to 9.9 seconds.  
PK1S00                    Input 1 locked-out for 10 milliseconds (0.010)  
PK1S01 to PK1S99      Input 1 locked-out for 1 to 99 seconds

For input 4, replace PK1 by PK4

For inputs 2,3 and 5 to 16, PK1 is replaced by PK0

### **Supplementary Information**

On receipt of the command QP (request for list of parameters), the PTB in addition sends back to the connected computer an indication on the state of the internal batteries.

BATTERY OK                    Battery charge (state) sufficient (OK)  
BATTERY LOW                    Battery charge (state) insufficient, operation time is compromised.

As the memory approaches a full state (with space remaining for 1000 times), the PTB sends (on COMPUTER and PRINTER ports):

MEMORY FULL

## **12. PRINTER PORT INFORMATION**

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### **Description:**

The PRINTER port becomes active and data begins to flow when a Ready State is reached as Pin 8 - DTR (Data Terminal Ready) on the PTB is energized from a hardware handshake (cable connection) to, typically, a printer or other serial computer device. Since the PTB itself does not have a DSR (Data Set Ready) pin on its PRINTER port, the PRINTER Port **must** be controlled by a hardware handshake via an attached serial device. Look for a DSR pin on the printer serial port you wish to attach to the PTB, and connect this to Pin 8 (DTR) on the PTB printer port. Once this hardware handshake is accomplished, all timing data will flow to the printer automatically. **You may also send other data that originates from your computer to the PTB and route it to the printer with special commands that are described in the next section of this manual. (LP and LX)**

The RS232 data being produced by the PTB is then available on Pin 2 of the DB9, with signal ground on Pin 5. Thus, **a typical cable to access PTB data via the PRINTER port comprises 3 conductors.** The use of stranded, shielded, 22awg cable is recommended.

DB9 Port – PRINTER

Pin      Function

- 2 Data Signal (Tx)
- 5 Signal Ground
- 8 DTR (Data Terminal Ready)

RS232 Protocol : Speed 9600 Bauds, No Parity, 8 data bits, 1 stop bit  
 Note: **Set printer to GRAPHICS mode.**

Important : **The printer you use must be able to print in Graphics Mode. If this is not available or disabled, when the PTB tries to print the TAG Heuer Logo at the start of a new session, you will get a long list of random characters instead. If this happens, turn the printer off/on and normal characters will now flow to the printer. The TAG Heuer PTB printer enters Graphics Mode automatically.**

The advantage of this configuration is that the PTB only sends data when the printer is in a Ready State. Problems like paper out and power difficulties at the printer end cause the port to shut down and data destined for the printer to be held in a buffer memory until the printer problem is corrected. When the Ready State is restored, the printer port reopens and memorized data collected since the port was closed is released and printed.

### Connexion of the printer

PTB PRINTER PORT (DB9 Female)	PTB-Printer (DB9 Male)
Pin	Pin
2 Data Out (Tx)	2 Data in
5 Ground	5 Ground
8 DTR (Data Terminal Ready)	8 Busy

### 13. DISPLAY AND PRINTER PORT MESSAGES

**The PTB can be asked to accept data being sent from a connected computer and to route it to the dedicated PTB printer port or any attached display panels or other RS232 device via the display port jack.** Most importantly, these communications with multiple devices can be managed with only one serial COM port on your PC. This feature is most certainly a major advantage in creating a compact and versatile system since data logging of what the computer is doing with the times being received, or in fact any relevant data such as net time calculations or classified results, can be printed on the PTB's dedicated printer, thereby eliminating the need for a separate logging printer attached to the computer.

It also means that no other COM port on the Computer is needed in order to route information to a display or the printer, a major consideration for **most laptop PC owners who are faced with only 1 serial COM port as standard equipment.**

Data destined for a display or other RS232 device (TV character generator, Announcer Screens) can be sent to the PTB using the sole I/O COM port on your PC, and then routed out back out of the PTB using the 3.5mm RS232 jack provided for this purpose. **Note however that all serial data communications on all ports must operate at the same speed of 9600 baud and that this cannot be modified.**

Any message from the computer can be sent to the PTB in ASCII using the same COM port that accepts the time-of-day data from the PTB since the computer COM port is bi-directional. Protocol speeds must match. Control of what is printed or displayed is simply sent to the PTB in ASCII characters between the following commands :

- |    |                    |   |
|----|--------------------|---|
| LP | Link PC to printer | Beginning of message to be <b>printed</b> . |
| LL | Link PC to display | Beginning of message to be sent to display  |
| LX | Unlink PC          | End of message                              |

The maximum flow of characters accepted by the PTB-Printer is limited. It is the task of the PC software to manage the quantity of information sent to the PTB-Printer. This application requests from the software programmer to introduce "timeouts" at regular intervals.

In order to help you, TAG Heuer puts at your disposal a file PTB\_dll which allows an accurate management of these timeouts. Do not hesitate to ask us this file in sending an e-mail to [info@tagheuer-timing.com](mailto:info@tagheuer-timing.com). We will send it by e-mail free of charge and you will be able to integrate it in your software program.

### Running time on the DISPLAY output

The PTB605 can deliver on the display connector a running time (time-of-day) at a rate of 1/10<sup>th</sup> of a second. By default this option is not activated.

To **activate** the running time at a rate of every 10<sup>th</sup> of a second, use the **PL** command

To **inhibit** the running time, use the **P1** command.

## 14. SERIAL DATA OUTPUT STRING FORMATS

---

Information Type	(N,S or T)	1 ASCII Character(s)
Unit ID Number	4	
Separator (Space)	1	
Sequential Number (1 to 49,999)	5	
Separator (Space)	1	
Input Channel Number	2	
Separator (Space)	1	
Hours	2	
Separator ( : )	1	
Minutes	2	
Separator ( : )	1	
Seconds	2	
Separator ( . )	1	
1/100000 sec (.999999)	6	
End of String (CR)	1	

**N= New Session**      **T= Timing Data**  
**S= Synchronization**    **R= Running Time**

### Examples (Serial Data Strings - ASCII,)

New Session with Date:  
1234567890123456789012345678901 Total=31 characters  
N0000xS002xxxxx28.01.97xPrxOnx(CR)

At Synchronization:  
1234567890123456789012345678901 Total=31 characters  
S0000xxxxxxxxxx13:12:00.000000(CR)

During Timing:  
1234567890123456789012345678901 Total= 31 characters  
Txxxxx00008x04x13:12:16.234567(CR)  
Txxxxx00003x03x13:12:16.345678(CR)

Manual Time, Channel 2:  
1234567890123456789012345678901  
Txxxxx00001xM2x13:12:16.234567(CR) Total=31 characters

Serial ASCII Running Time - DISPLAY Output:  
1234567890123  
Rx12:32:08.4(CR) Total=13 Characters

## 15. DB 25 EXT. CONNECTOR PORT INFORMATION

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To simplify possibly complex set-up situations, an industry standard DB 25, 25 pin connector is provided on the PTB rear panel to access all inputs and control most functions.

Timing Input channels 1 to 4, and the SYNCHRO input channel are available as banana jack connections on the rear panel of the PTB. For applications where access to all of the PTB's 16 timing Input channels is required, use of the EXT CONNECTOR port is necessary.

A DB 25 connector on the rear panel of the PTB 605 provides for access to all of the 16 timing channels as well as the Synchronization port, Special function keys (SESSION, MEMORY, CLEAR), and other outputs like Top-of-Minute triggering and RS232 data as available on the DISPLAY port.

Pin 18 is the ground pin for all of the timing and sync. inputs, as well as the SESSION, MEMORY and CLEAR functions. Separate grounds are provided on isolated pins for Top-of-Minute triggering and the RS232 data from the DISPLAY port. Be careful to respect these three different ground functions for the correct operation of your connected devices.

Pins 24 and 25 allow you to connect a display board to the DB25 connector rather than via the 3.5mm DISPLAY jack.

Access to the SESSION, MEMORY and CLEAR functions as represented on the DB25 connector are made through shorting pins 19, 20 and 21 to pin 18 (ground). Under no circumstances can any voltage be applied to these pins.

<b>PIN #</b>	<b>FUNCTION</b>	<b>PIN #</b>	<b>FUNCTION</b>
1	Timing Channel Input 1	15	Timing Channel Input 15
2	Timing Channel Input 2	16	Timing Channel Input 16
3	Timing Channel Input 3	17	Synchronization Input
4	Timing Channel Input 4	18	Timing, Sync and Trigger <b>Ground</b>
5	Timing Channel Input 5	19	SESSION
6	Timing Channel Input 6	20	MEMORY
7	Timing Channel Input 7	21	CLEAR
8	Timing Channel Input 8	22	Top of Minute Output + (Isolated)
9	Timing Channel Input 9	23	Top of Minute Output - (Isolated)
10	Timing Channel Input 10	24	DISPLAY port RS232 Data output, Signal
11	Timing Channel Input 11	25	DISPLAY port RS232 Data output, Ground
12	Timing Channel Input 12		
13	Timing Channel Input 13		
14	Timing Channel Input 14		

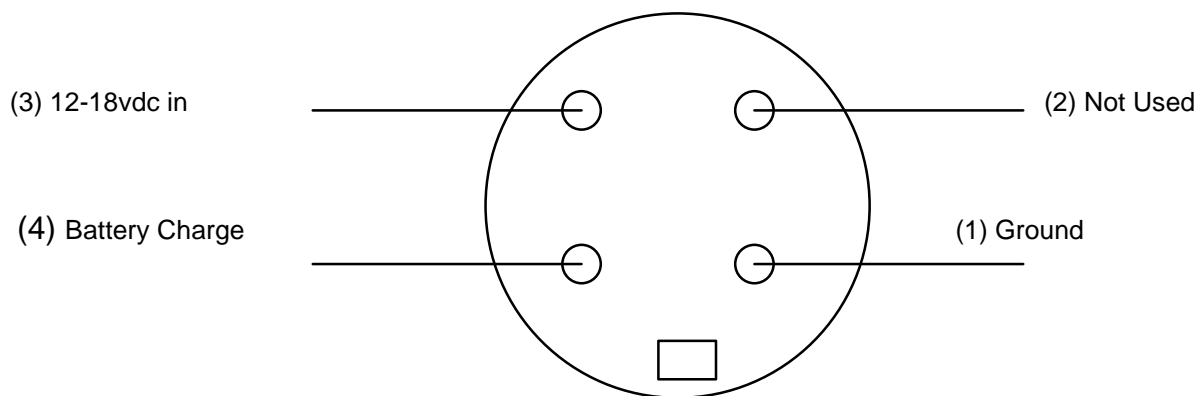
## 16. EXT. POWER CONNECTOR

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Located on the rear panel of the PTB, this 4 pin connector provides the following functions:

1. Ground
2. Not used
3. 12-18 Vdc in (Min. 100ma)
4. Ni-Cad or NI-MH Battery Charging only (9Vdc - 200ma)

When connected to pin 3, the PTB draws current from the external Vdc source only, bypassing the internal batteries. If this external power is disconnected or exhausted, the PTB continues operation on internal batteries automatically.



View of POWER jack on rear panel

## 17. COMMAND MESSAGES SUMMARIES FOR COMPUTER

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### Commands :

Please refer to chapter 11

### Messages :

BATTERY OK	Battery condition OK
BATTERY LOW	Battery condition compromised - reduced capacity
MEMORY FULL	At any time during normal operation, when the memory capacity fills up to the extent that only 1000 more times can be memorized before the PTB begins to overwrite the oldest time data in memory this message will be sent to the PRINTER and COMPUTER ports
PRINTER ON	Whenever a printer is attached to the PTB and the "Ready" mode (DTR Pin 8 on the PTB PRINTER port) is activated, this message will appear.
PRINTER OFF	Likewise, if the attached printer goes off line, this message will appear

### PRINTER AND DISPLAY PORT MESSAGES

Any message from the computer can be sent to the PTB in ASCII using the same COM port that accepts the TOD data from the PTB. Messages destined for the display or printer attached to the PTB must be enclosed between the following commands:

**Printer :**

LP Beginning of message to be **printed**.  
LX End of message being **printed**.

Similarly, data destined for a device such as a display board attached to the PTB's DISPLAY port is sent between the following commands:

**Display :**

LL Beginning of message to be **displayed**.  
LX End of message being **displayed**.

**Consult Chapter 13 for a thorough description of the operation of these commands.**

**18. TECHNICAL SPECIFICATIONS**

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**General**

High precision Timing Device with 16 channels for up to 128 independent timing sessions. For each session, triggered times are recorded in time-of-day format and numbered in sequential order from 1 to 49,999.

**Precision**

1/250,000<sup>th</sup> / sec. Internal and available via **COMPUTER** data port.

1/10,000<sup>th</sup> / sec. Max. resolution via the **PRINTER** data port, adjustable from between one second to one ten-thousandth of a second.

**Inputs**

16 Timing Inputs operating in Split mode, identified from 1 to 16 on a DB 25 pin connector. Inputs 1 to 4 are also available on banana jacks with push-button blocking and unblocking control and manual triggering buttons on the keypad. There is one synchronization channel available on the DB 25 or as a banana jack.

**Outputs**

3 RS232 ports, default protocol speed: 9,600 baud, configured as follows:

- 1- **COMPUTER** bi-directional serial data port
- 1- **PRINTER** port
- 1- **DISPLAY** port with available running time in 10ths /second.

**Communication / Control**

Recording and display of times accomplished entirely by external devices using appropriate control and timing calculation software. (PC, printer, monitor, etc.)

**Function Adjustment Protocol**

All timer functions and parameters are adjustable via the serial COM port of a PC connected to the COMPUTER port of the PTB using simple ASCII instructions. (Setting Time-of-Day, precision of timing on printer tapes, session choice, memory discharge and printing, input delays and blocking, etc.) X-on/X-off flow control. The PTB likewise sends information back to a connected PC.

**Memory Capacity**

18,687 times in up to 128 different timing sessions.

**Electronic Construction**

Based on RISC processor.

**Time Base**

Thermally compensated quartz crystal at 16 MHz.

+/- 1ppm accuracy between 15 to 25°C. +/- 2.5ppm at -30 to +75°C.

**Temperature Operating Range (Nominal)**

-20° to +70° Celsius



**Date/Time**

Permanent storage and control of date and time by RTC processor, adjustable via PC.

**Controls**

By keys (push buttons), via the DB25 pin connector, or ASCII controls via **COMPUTER** port

SESSION + VALID	Creates a new timing session
CLEAR MEMORY + VALID	Clears the Memory
MEMORY + VALID	Prints or dumps memory to RS232 ports
MEMORY (alone)	Prints available memory left.

**Other**

OFF MODE, saves all recorded time data and operating parameters for up to 3 months

Adjustable signaling tone.

Direct Printer control and access if attached to PTB.

Battery condition monitoring with alarm.

"Top-of-Minute" output impulse via opto-coupled connector for external referencing and synchronization of other timing systems.

**Power**

Internal: 6 x AA Alkaline batteries, or Ni-Cad or Ni-Mh rechargeable

External: 12 to 18 Volts, DC.

RTC : Independent battery recharged when PTB is ON.

**Autonomy – Alkaline Batteries Only**

Better than 60 hours at + 20° C. (Ref.: Energizer AA x 6)

**Physical Dimensions**

163 x 142 x 45 mm

6.5 x 5.5 x 2 inches

Sealed Membrane Keyboard

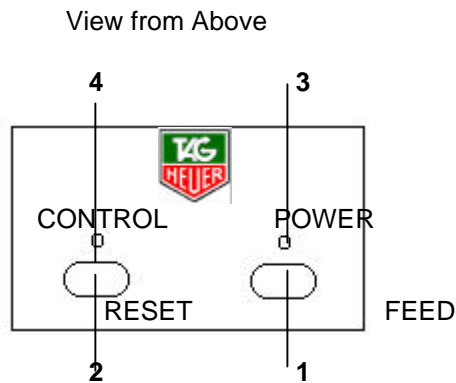
**Weight**

1,200 gr.

4 Ounces.

### 1. Description

The TAG Heuer PTB Printer was specifically designed for use with the PTB 605 as a dependable, quite and quick data preservation companion device. It allows all timing data to be recorded as it is produced or reprinted from the extensive memory of the PTB.



#### Keyboard

- |    |             |  |
|----|-------------|--|
| 1. | FEED Key    | Advances the paper, either one line with a momentary touch, or continuously if held longer   |
| 2. | RESET Key   | Resumes printing activity if printing was stopped due to a problem or paper roll replacement |
| 3. | POWER LED   | Glowes if power is connected and/or sufficient. Flashes if batteries are compromised         |
| 4. | CONTROL LED | Indicates correct operation of the printer (adequate paper, temperature range, power...)     |

#### Rear View



#### Rear Panel

- |    |               |   |
|----|---------------|---|
| 5. | ON-OFF Switch | Turns printer on or off   |
| 6. | POWER Jack    | Accepts power from external supply for operation and battery charging if necessary. |

## 2. Power Supply

The PTB Printer has its own battery compartment separate to that of the PTB batteries for either alkaline or rechargeable AA cells. Although designed to operate from the battery source alone, it is highly recommended to use an external supply whenever possible due to the elevated power demands of a thermal printer.

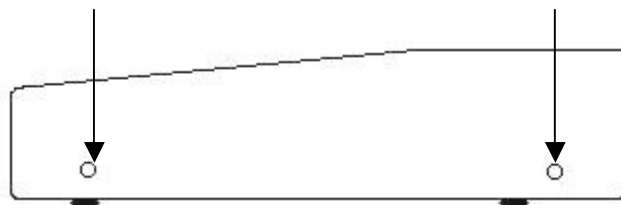
**When connected to the external power adapter HL605-1, the PTB printer also supplies external power to the PTB timer.**

In all cases when using external power sources with the PTB or the PTB Printer we urge you to always keep good batteries in both units at all times as a measure of system safety should any external power failure occur.

## 3. Connecting the PTB Printer to the PTB 605 Timer

The PTB Printer is designed to attach directly to the right side of the PTB 605 through the use of two recessed spring retention screws. This should be done with care. Make sure the Timer and printer are both OFF. When the two units are pressed together, use a small star screwdriver to fasten the two devices securely. Do not over tighten.

Lateral view of screws :



## 4. Printer Operation

Use the **On/Off Switch** on the rear of the printer to turn on the printer and the POWER LED should glow. If this is not the case, there is a power supply fault (dead or incorrectly inserted batteries, defective external power supply) or an electronics problem. If there is paper in the printer the CONTROL LED will likewise glow. The printer is now ready for immediate use.

Now turn on the PTB timer. The following information will be printed :

```
PTB 605 – V 13 N° 1234
28.01.98
SESSION 5
MEMORY FREE 12 477
```

If the printer is activated during a timing session in progress, all data memorized since the start of the session will be printed

## 5. Paper Replacement

The paper roll compartment is accessible by clicking open the cover by pressing down on the metal sides of the cover (not the plexiglas). The cover will pop up for removal. Unroll about 3 inches of paper from the new roll. Place the roll behind the printer and align the roll with the paper holder. Using both hands, feed a cleanly cut end of the roll into the entrance of the paper feeder. The printer will automatically detect the presence of the new edge and feed up to the print head (the CONTROL LED will glow). If the paper will not feed, cut a new clean edge and try again. The FEED key allows you to advance the paper roll further if necessary once the printer automatically senses the new paper roll edge being fed in.

Thermal Printer Paper Rolls: (Available through your TAG Heuer agent)

## 6. Changing Batteries

A battery compartment on the bottom of the printer is accessible by removing two screws. Insert new batteries and make certain that a good contact is established by rotating the batteries once they are installed. The compartment provides a tight fit and making a good contact for each battery when installing them is important. Check operation before reinstalling the compartment cover.

## 7. Battery Power Management

The POWER LED on the Printer monitors the condition of the batteries when the printer is **FIRST TURNED ON ONLY**. If the POWER LED flashes, batteries must be replaced or recharged. This feature does not function DURING printing however. Further battery condition assessment once timing operation have begun is provided during printing via the CONTROL LED. If the CONTROL LED goes out during operation, the batteries are insufficient to operate the printer and they must be replaced or external power supplied to the printer's Ext POWER connector. When using rechargeable Ni-Cad or Ni-Mh batteries, even with a full charge the POWER LED might flash on powering up due to the inherently lower voltage of these cells. In this case use the CONTROL LED as the power reference check during operation.

## 8. Notes on PC to PTB Printer Communications

The PRINTER connected to the PTB Timer provides a DTR high state on pin 8 to indicate that it is ready to receive data (READY Mode). This DTR pin voltage state is monitored by the PTB to correctly manage data destined for the printer. It allows the PTB to subsequently route software generated messages out the COMPUTER port such as PRINTER ON and PRINTER OFF to a PC.

This printer generated DTR signal is also routed directly out as an actual voltage state change on the PTB's COMPUTER port on pin 8. An attached PC can thus directly and immediately monitor the readiness of the printer by the voltage state of this pin 8 without having to wait for a software generated message to be sent by the PTB, a valuable data integrity consideration for software system developers who might be using the LP function.

When using WINDOWS applications, this DTR change generates 'EV\_CTS' (communication functions of WINDOWS 95 or NT - Kernel32.LIB / Winbase.h).

## 9. Technical Specifications

### Printer

Printing Module :	SEIKO LTP1245
Printer Type :	Thermal matrix
Resolution :	384 dpi
Printing Width :	48 mm.
Printing Speed :	50 mm / second

### Paper

30 mm Thermal Paper Roll. Standard

### Power Supply

Internal :	5 x AA Alkaline, Ni-Cad or Ni-Mh Batteries
External :	12 –18 VDC

### Autonomy

4500 Printed Lines at +20 C (Ref. : Energizer AA x 6)

### Dimensions – Construction

Thermally lacquered stainless steel. 104 x 142 x 45 mm.  
Sealed Membrane Keypad

### Weight

1,000 gr.