



PROFESSIONAL TIMING

PRECISION TIME BASE - PTB 606

For PTB version 14 – November 2006

USER'S MANUAL AND TECHNICAL DESCRIPTION

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1. INTRODUCTION

The **PRECISION TIME BASE (PTB) 606** 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 $1/10,000^{\text{th}}$ / second (.0001) although the PC port allows for full access to the $1/250,000^{\text{th}}$ / 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 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 606 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 606 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!

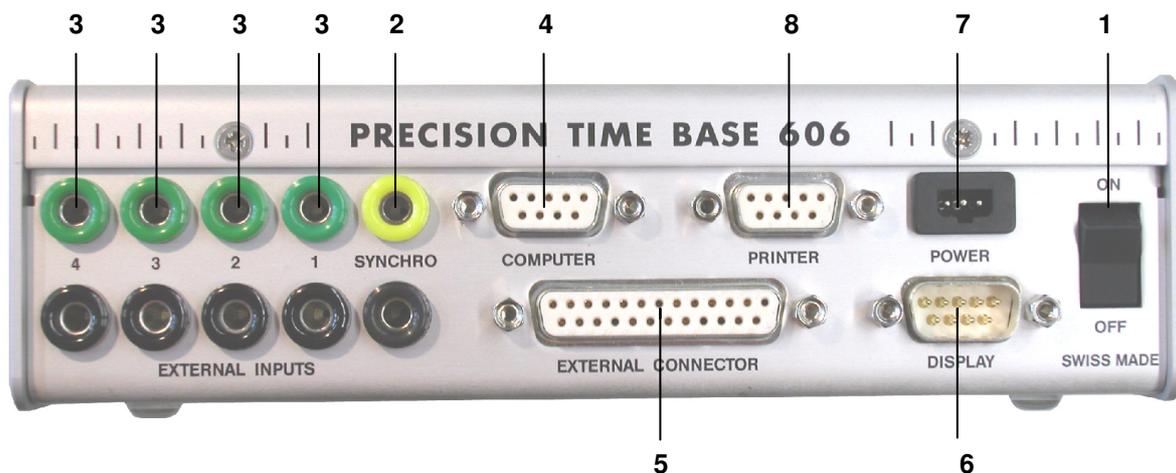
2. TECHNICAL DESCRIPTION

The PTB 606 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
8. 1 x "PRINTER" 9 pin RS 232 Serial data connector for connection to a printer

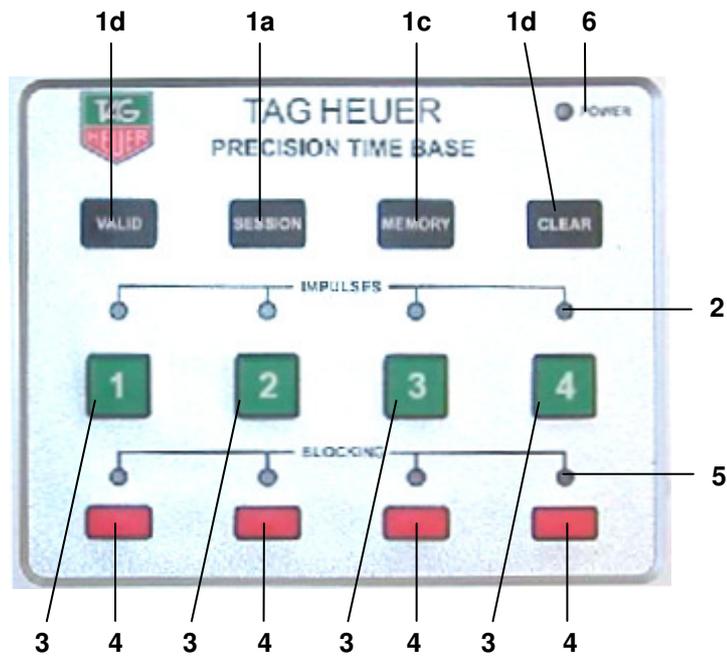
Rear View



On the top of the PTB 606, 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 606

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

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 606 is switched to the ON position, the following information is printed after the TAG Heuer Logo and likewise sent to the Computer port (example):

```
PTB 606 – V13 No 1234
26.07.04
SESSION 4
MEMORY FREE 12 447
```

Line 1 indicates the ID Nr 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 4th 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 606 is 18,687 times (1 time for each memory line).

4. SOFTWARE CONTROL FOR PTB 606

The PTB 606 is usually delivered with a software program allowing the management of sport competitions. This program allows to communicate with the PTB 606 and to enter or modify its parameters. You can download the following software programs on the internet homepages www.tagheuer-timing.com or 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 PTB 606 on an Excel Spreadsheet

Each PTB 606 is likewise provided with a computer connection cable. We keep at your disposal a program **PTB 606.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.

5. SYNCHRONIZATION - "TOP" OF THE MINUTE

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: 1/10,000th) 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

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

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 606 - 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

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 606, 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

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 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 606. **The default parameters** expressed here can be selected/restored at any time by simply pressing **the VALID key as the PTB 606 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 PTB 606 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 PTB 606

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 PTB 606 are validated by a control character <ACK> sent from the PTB 606 to the PC.

If a command is not understood or contains errors, the PTB 606 will send the control character <NAK> to the PC.

When the PTB 606 is in "redirectional" mode (to display or to printer), commands are not interpreted by the PTB 606, 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 PTB 606 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)**
CTRL-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: O other channels
 y: S time in seconds
 y: D time in 1/10th of a second
 zz: times from 1 to 99

PPx printer accuracy
 x: 0 second
 x: 1 1/10th of a second
 x: 2 1/100th of a second
 x: 3 1/1'000th of a second
 x: 4 1/10'000th of a second

PL runtime on display is 1/10th 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
 dd: day
 mm: month
 yy: year
 hh: hours
 MM: minutes

PdmddyhhMM set current date to US Format

mm: month
dd: day
yy: year
hh: hours
MM: minutes

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 1/1'000th 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 PTB 606 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 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:

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

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

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)

Pin	
2	Data Out (Tx)
5	Ground
8	DTR (Data Terminal Ready)

PTB-Printer (DB9 Male)

Pin	
2	Data in
5	Ground
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 printed.
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. 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 PTB 606 can deliver on the display connector a running time (time-of-day) at a rate of 1/10th of a second. By default this option is not activated.

To **activate** the running time at a rate of every 10th 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
S= Synchronization

T= Timing Data
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

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 606 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.

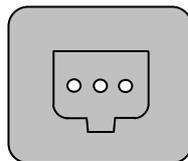
PIN #	FUNCTION	PIN #	FUNCTION
1	Timing Channel Input 1	15	Timing Channel Input 15
2	Timing Channel Input 2	16	Timing Channel Input 16
3	Timing Channel Input 3	17	Synchronization Input
4	Timing Channel Input 4	18	Timing, Sync and Trigger Ground
5	Timing Channel Input 5	19	SESSION
6	Timing Channel Input 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

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

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

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

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

1/10,000th / 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 Ni-Cad or Ni-Mh rechargeable batteries
 External: 12 to 18 Volts, DC.
 RTC : Independent battery recharged when PTB is ON.

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.

Annexe : Printer TAG Heuer « MARTEL »Description

The TAG Heuer "MARTEL" Printer allows all timing data to be recorded as it is produced or reprinted from the extensive memory of the PTB.

For the operations of the TAG Heuer "MARTEL" Printer, please refer to the user's manual of this printer.

Connecting the printer to the PTB 606 Timer

Connect the printer to the PTB with the cable delivered with the printer. Attach one of the two 9 pins connector to the plug situated on the right side of the PTB, and the other to the 9 pins connector of the MARTEL printer.

Printer Operation

Always turn on the printer BEFORE the PTB
 Now turn on the PTB timer. The following information will be printed (example):

```
PTB 606 – V 13 N° 1234
26.07.04
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.