



PROFESSIONAL TIMING

TIMING IMPULSE AND DATA TRANSMISSION BY RADIO – TAG HEUER HL 620

Instruction Manual

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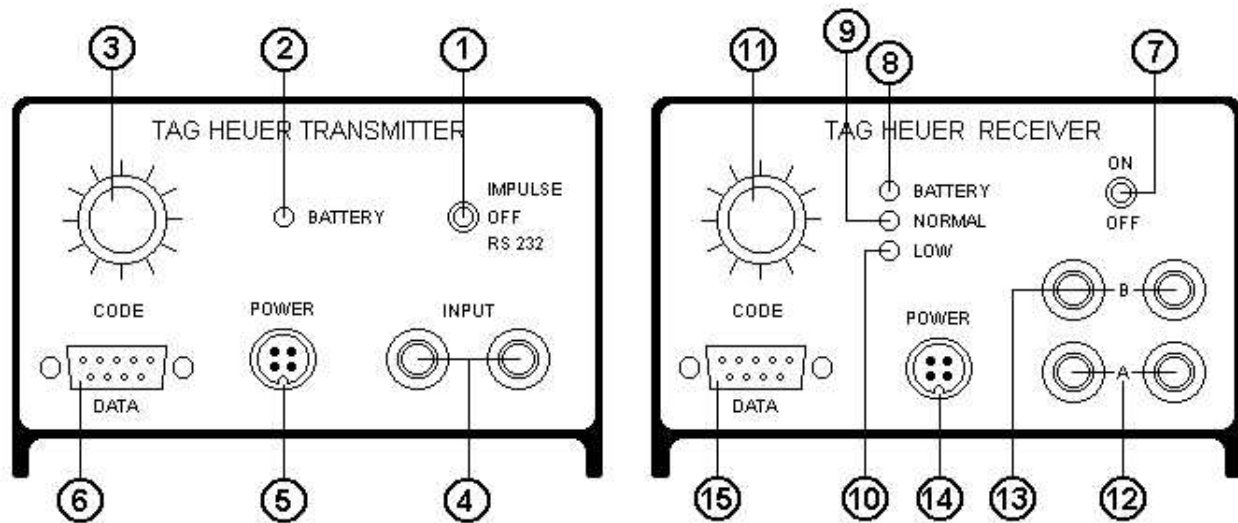
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Introduction To The HL620 Radio Transmission System

The HL 620 is a radio transmission system adapted for the specialized use in sports timing applications to replace typical hard-wire connections from timing sensors (photocells, start gates, tape switches etc...) or for serial data transmissions. Using the very latest wireless transmission technologies, in optimal conditions the HL 602 can achieve impressive long-distance performance of up to 35 km (yes...that's correct, over 20 miles!) Certified for use in many different countries due to the availability of various operating frequencies, you will find the HL 620 responds to your every need in terms of precise and dependable performance even in difficult conditions.

The HL620 allows for the digital transmission of timing impulses on any of 12 selectable channels. A special channel is reserved for the transmission of serial DATA (RS232) for short message transmission to display boards or other peripheral devices. In the timing impulse transmission mode, a fixed delay of 0.1/sec. Is guaranteed by a deviation resolution of less than 1/10,000th of a second from pulse to pulse. In the data transmission mode, whatever serial data is sent to the transmitter appears at the outputs of the receiver. Additionally, the receiver can function in either impulse or data modes simultaneously, allowing it to be operated in the presence of both types of signals from multiple transmitters.



Transmitter (Tx)

1. Rotary Switch: IMPULSE / OFF / RS232
2. LED for Battery State Monitoring
3. Rotary Switch: CODE channel selection (1 – 12)
4. INPUT jacks for connection to working contact (photocells, start gate, hand switch...)
5. POWER jack for connection to external power supply for operation and battery charging
6. DATA DB 9 male connector for serial data RS232

A beep tone is emitted whenever the a transmission is effected

Receiver (Rx)

7. Switch ON / OFF
8. LED for Battery State Monitoring
9. LED to indicate OPTIMUM receiving state (green)
10. LED to indicate SUFFICIENT receiving state (Red)
11. Rotary Switch: CODE channel selection (1 – 12)
12. OUTPUT A jacks for timing impulse triggering
13. OUTPUT B jacks for timing impulse triggering from an additional Transmitter
14. POWER jack for connection to external power supply for operation and battery charging
15. DATA DB 9 female connector for serial data RS232 and for access to additional impulse channels C-F

A beep tone is emitted whenever the a transmission is received

IMPORTANT CONCEPTS TO REMEMBER

- Always charge the receiver and transmitter units for 24 hours before use
- Never use a transmitter without the antenna connected
- Always turn all units OFF after use
- If the units are used in extreme cold, take care when moving them to warmer conditions to avoid the build up of condensation

SYSTEM TESTING (basic)

- Connect antennas to all units
- Select the same channel CODE using switches 3 and 11
- Turn on the transmitter to IMPULSE (Switch 1), and turn the receiver to ON (Switch 7)
- Check that LED (8) comes on
- Make certain the units are at least 3 meters apart
- Send a timing impulse on INPUT (4) using an external button or by shorting the contacts
- A beep from the transmitter will confirm transmission circuit operation
- The receiver will light up LED's 9 and 10 and emit a beep on receipt of each impulse signal.

INSTALLATION OF THE TRANSMITTER

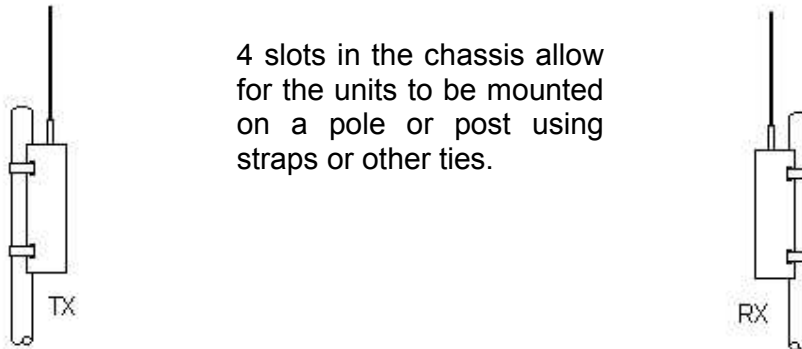
- This device must be installed in an open environment for best signal transmission. If installed in a building made of cement or metal, the transmitter **MUST** be placed outside, or you must use the optional coaxial cable antenna extension and place the antenna outside, preferably in the highest possible location.

- **Installation methods:**

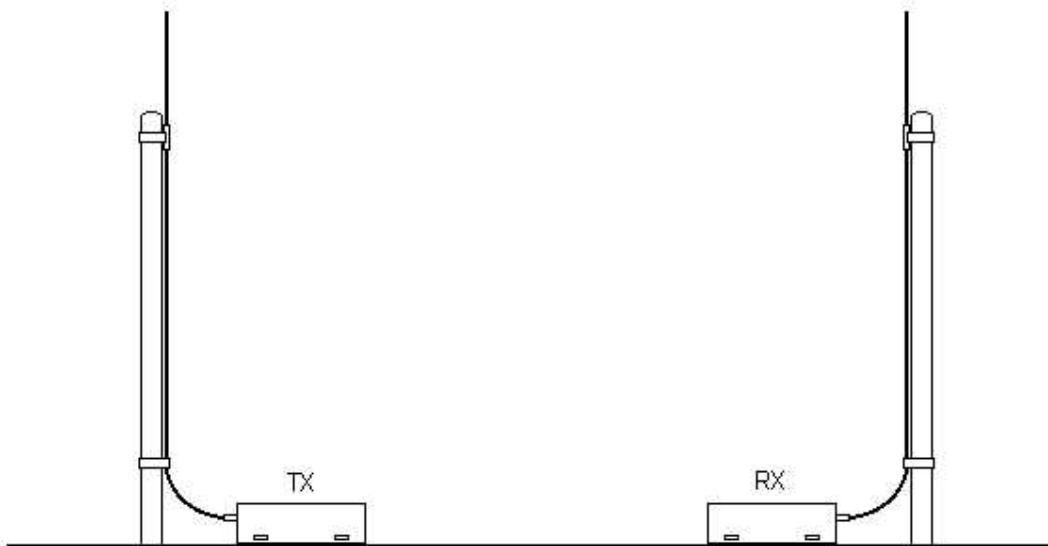
a) Short distances



b) If the units are to be used outdoors (Transmitter or Receiver)



c) When optimal transmission distances are required :



- Now connect the timing sensor (Start Gate, Photocell, etc) to the transmitter's INPUT (4) jacks. If present, respect the signal connection polarity (Green : Signal / Black : Ground)

Installing the Receiver

- This device must be installed in an open environment for best signal reception. If installed in a building made of cement or metal, the receiver **MUST** be placed outside, or you must use the optional coaxial cable antenna extension and place the antenna outside, preferably in the highest possible location.
- When working at the extreme limits of transmission quality, it may be necessary to experiment with placing the receiver in a variety of locations around the reception area (within 10 to 20 meters), to determine the best possible position for the receiver unit or its antenna. Much like the performance of your car's radio receiver, often a small change in position can yield much better reception. To this end, the two LED's (9 and 10) on the receiver unit allow you to monitor the quality of the signals being received depending on their state. You may likewise have to perform this procedure if the nature of the terrain in your operating area requires it. Distance is not the only consideration in radio signal quality. Other radio signals, electromagnetic interference, trees and changing weather conditions can all affect transmission quality.
- Once the optimal receiver location has been found, connect your timing device to the signal OUTPUT (12) jacks. It is important in this case to respect the connection polarity. (Green : Signal. / Black : Ground)

Transmission Tests

- Once the units are set up, send some test impulses to ensure that all is functioning normally.
- LED's 9 and 10 on the receiver allow you to monitor the signal quality of the transmissions being received.
- Both Green and Red LEDs light ⇒ NORMAL signal reception
- Only Red LED Lights ⇒ LOW RECEPTION signal strength (but still perfectly accurate)
- No LED's Light but Beep Tone is still heard and OUTPUTS trigger ⇒ System is working at the absolute limits of its capabilities. Timing impulse reception cannot be guaranteed.

Charging and Monitoring Battery Condition

Battery control LEDs 2 and 8 are lit up when battery condition is adequate. If they begin to flash, battery failure is imminent and you should take immediate steps to correct the problem,

Reminder : Always make certain you charge the units before your timing sessions

Both the transmitter and receiver units have rechargeable Ni-Mh (nickel metal hydride) batteries that provide exceptional performance even in low temperature conditions. The units are both provided with a high quality rapid charge charger.

Using the Charger

- Connect the charger to a normal household ac current receptacle
- CAREFULLY attach the bayonet type plug to the POWER (5 or 14) jack. Once inserted in the jack, lock the plug in place by GENTLY turning the outer housing of the plug a $\frac{1}{4}$ turn. DO NOT FORCE.
- On the charger unit itself an LED indicator will begin to glow to indicate that the batteries are now charging.

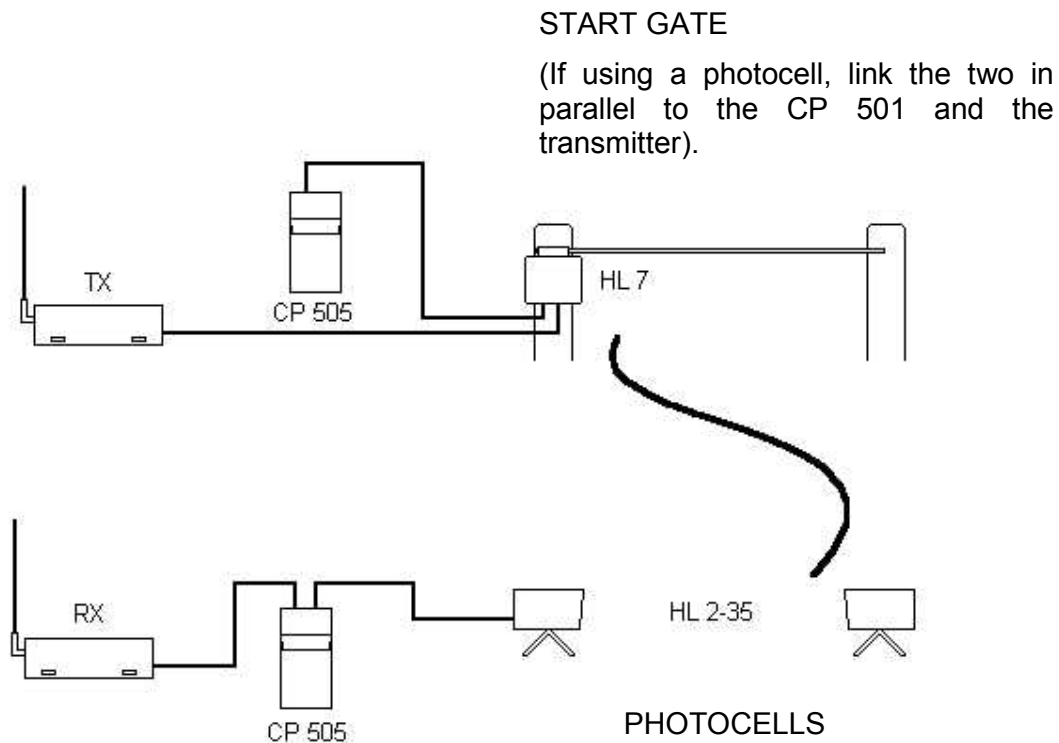
Charger LED Indications

- **RED LED Flashing Very fast** ⇒ The red led is flashing faster than one flash per second.
Batteries are totally DISCHARGED
- **RED LED ON** ⇒ The led is continually red
Batteries are CHARGING
- **RED LED Flashing** ⇒ The red led is flashing every second.
Batteries are totally CHARGED

Back Up Timing Recommendations

Any radio system is vulnerable to transmission disturbances from a variety of sources and causes. We highly recommend that regardless of the outstanding quality of this device that you use Back Up timing techniques to protect your timing operations whenever the competition is important enough to warrant such steps. Synchronized Time-of-day printing timers such as the TAG Heuer CP 501 allow you to protect your timing operations at the start and the finish lines.

Set Up Example:



To ensure correct synchronization of the two systems, set up the components as described here. At the required moment, open the start gate or send a synchronization pulse. The two back up timers will be correctly synchronized and will incorporate the built in constant signal delay between the transmitter and the receiver.

IMPORTANT

A timing impulse received at the inputs of the transmitter appears at the outputs of the receiver exactly 0.1 seconds later (within 1/10,000 resolution)

For example, if a time of 1 minute 11 seconds and 312 thousandths were generated using the radio system, the actual real time on course would be 1 :11.212

This concept is crucial when considering relative performances for comparison or « records ».

Protecting the Equipment

Despite a very durable construction, take care to protect your electronic equipment from the effects of snow, rain, dust and condensation through the use of protective plastic covering or other kinds of reasonable protection.

Special Installation Methods

Up to 6 transmitters can be used with 1 receiver. Set Up Examples:

- Intermediate timing or speed traps
- Start and finish line impulse transmission (Show Jumping)

CODING the signal from each transmitter:

The CODE switches from each transmitter can be assigned different sequential positions. Where you start on the first transmitter of a series of sequentially coded transmitters is the key to how the receiver subsequently interprets the nature of the signals being received from the other transmitters in the series.

In the following example, the first transmitter being used is set to CODE 3, and the 5 other transmitters are progressively set up to CODE 8. Thus, the 6 transmitters in this series use codes 3 to 8.

At the sole Receiver, the CODE switch is set to position 3, corresponding to the CODE of the first transmitter in the series of 6 being monitored. Output signals from each of these separate transmitters then appear on the output channels of the receiver in an augmenting sequential series from output A through F as described below.

Transmitter CODE	Receiver OUTPUT Channel
3	A
4	B
5	C
6	D
7	E
8	F

OUTPUTS C through F are available on the DB 9 connector of the receiver. All OUTPUTS A – F are opto-isolated with a common signal ground.

NOTE: There are 12 CODE channels available, thus you can use all 12 available channels with 12 independent transmitters if you have 2 receivers. In this case, transmitters are successively coded 1 through 12. Receiver #1 sets code switch to position 1, Receiver #2 sets the CODE switch to position 7.

ATTENTION: A receiver CANNOT receive impulses from different transmitters at the same time. Transmissions must be separated by at least 200 milliseconds

Equipment List

- 1 Transmitter HL620-1
- 1 Receiver HL620-2
- 1 Charger 120Vac/6 Vdc HL620-3
- 2 Antennas, ½ wave HL620-4
- 1 Transport Case HL620-7

OPTION:

- 2 coaxial cables HL620-5 50 Ω (2 meters) to allow for remote installation of the antennas (3 meters ref. HL620-6)

Technical Specifications

<u>Mean Operating Frequencies GMSK Type</u>	433.800 MHz (Europe) 469.500 MHz (USA / Japan / Australia)	
<u>Codes</u>	12 available transmission codes/frequency	
<u>Radiated Power Output</u>	0.5W	
<u>Range</u>	30 Km under optimal conditions.	
<u>Antenna</u>	½ wave flexible	
<u>Options</u>	Coaxial Cables of 2 or 3 meters for remote installation of antennas. Ref. HL620-5 50 Ω (2 meters) (3m ref. HL620-6)	
<u>Timing Impulse Inputs</u>	Normally Open working Contact. 100ms input blocking	
<u>Timing Outputs</u>	6 fixed pulse width (50mSec) opto-isolated independent outputs	
<u>Transmission Limitations</u>	Maximum of 5 impulses or data strings / second.	
<u>Precision</u>	Fixed delay of 100ms +/- better than 1/10,000 th second.	
<u>Signal Transmission Evidence</u>	By audible tone	
<u>Signal Reception Monitoring</u>	By 2 LEDs giving relative signal strength and by audible tone.	
<u>Battery Condition Monitoring</u>	LED – On = Batteries OK / Flashing = Recharge Necessary	
<u>Power Supply</u>	Internal: 6V rechargeable (NI-MH) batteries External: 12-18V DC	
<u>Autonomy</u>	24 h at 20° C 18 h at 0° C 12 h at -20° C	With Impulse transmission every second
<u>Operating Temperature Range</u>	20 °C à + 60°C	
<u>Mounting</u>	Vertical mounting with straps possible	
<u>Dimensions</u>	90 x 62 x 191 mm (2x)	
<u>Weight</u>	Transmitter: 800 gr. Receiver: 800 gr.	

