Bluetooth GPS Receiver

HI-405BT

USER Manual

Bluetooth GPS Receiver

Table of Contents

1. Overview

1.1 Introductions

Haicom HI-405BT is a GPS (Global Positioning System) receiver in wireless Bluetooth interface. With HI-405BT, your mobile devices, such as PocketPC, laptopPC, tabletPC, etc. can receive GPS data wirelessly.

The advantages of HI-405BT:

1. Bigger battery pack (1600mA) for longer continue working without changing or charging battery during navigation.
2. Bigger antenna reflective ground for better GPS satellite reception and electrical interference.
3. Bigger BT GPS unit for more stable placement in car
4. By connecting the optional mini-1394 to PS/II connecting cable, HI-405BT can be used as a regular PS/II GPS receiver.
5. By using the inclusive charger sets, HI-405BT can be charged from DC (car cigarette lighter), AC (home AC power outlet), and the USB port from laptopPC.

1.2 Main Features

12 Channels "All-In-View" Tracking

10 meters 2D RMS Position Accuracy

0.1 seconds Reacquisition

MMCX RF External Antenna Connector

Support Standard NMEA 0183 Protocol at 4800 bps buad rate

Support Trickle Power and Power Saving Mode

1.3 Setting up:

STEP 1:

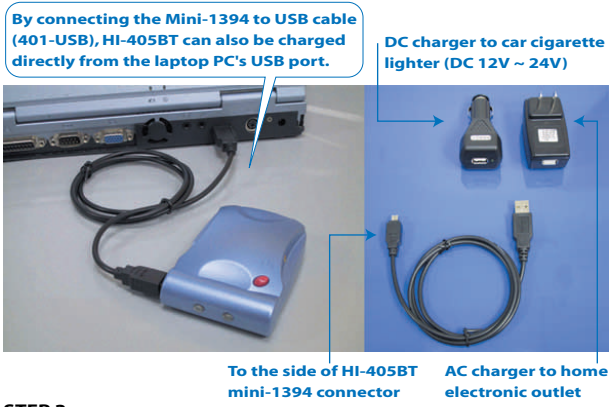
Unpack the inclusive battery transparent wrap. Put the battery (401-BTT) in the HI-405BT battery cabinet.

Tear off the transparent Wrap before using

Changeable Battery

STEP 2:

Connect the inclusive AC charger to home electronic outlet or connect the inclusive DC charger to the car cigarette lighter. As soon as they connected, the solid red light turned on (stay on) meaning the battery charging.



STEP 3:

As soon as the battery fully charged, the red light will changed to green, then, up-plug the charger.

STEP 4:

By pressing the power button on the top of HI-405BT (Keep push the power button for 2~3 seconds, the power will turned on), the red light on the side of HI-405BT stay on (the GPS not get 3D fixed yet) and the GPS receiver start searching the satellite data. Please make sure place the HI-405BT outdoor open space without blocking so that it can get the proper satellite signal. After the receiver get enough satellite data, the receiver is in 3D fixed and the red light start blinking.

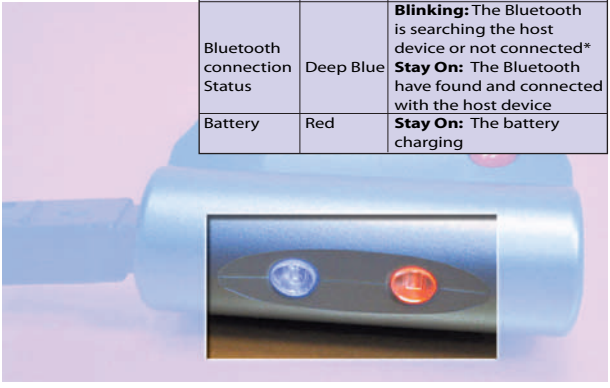
Stay on: HI-405BT searching satellites
Blinking: HI-405BT lock on more than 4 satellites and in 3D fix

Keep pressing for power turn on or turn off

STEP 5:

By the time you press the power button, the blue light in front of HI-405BT will also blinking (meaning the HI-405BT Bluetooth device is searching the host device and not get paired yet) Please consult the Bluetooth step by step connection guides from this manual section 5. The pin code is "0000" when asked the pin code. After the Bluetooth paired and connected, the blue light will be steady on.

Symble	LED Color	Light Indication
Bluetooth connection Status	Deep Blue	**Blinking:** The Bluetooth is searching the host device or not connected* **Stay On:** The Bluetooth have found and connected with the host device
Battery	Red	**Stay On:** The battery charging



STEP 6:

Open the mapping software from your mobile device, select the corresponding COM port and start GPS.

STEP 7:

Enjoy the state of the art wireless GPS navigation.

Unit: mm

2. Dimensions

Top View:

Button View:

Front View

Back View

Side View

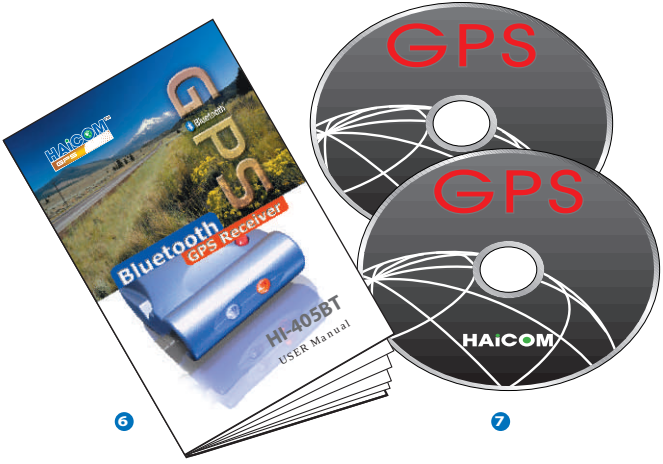
3. Packaging

3.1 Standard Packaging:

Model Name	Model#
1. Bluetooth GPS receiver	HI-405BT
2. Rechargeable Li-Polymer 3.7V 1600mAh Battery	401-BTT
3. Mini-1394 to USB cable	401-USB
4. AC Power adaptor with USB female plug	USB-ACC
5. Cigarette Lighter Adaptor with USB female plug	USB-DCC
6. HI-405BT User Manual	MAU-405
7. Mini CD	CDR-01

4

5



6

7

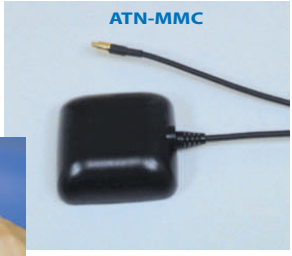
3.2 Optional Accessories:

Model Name	Model#
1. Magnetic Car Holder	HOD-001
2. MMCX External Antenna	ATN-MMC
3. Mini-1394 to PS/II Connecting Cable	PS2-1394

Inside the battery cap, there is a metal plate for using with magnetic car holder to fix HI-405BT on the car front or back windows

HOD-001

ATN-MMC



Under blocking area, the external antenna can extend the signal reception from HI-405BT

By connecting to different optional connecting cables, HI-405BT can be a wired PS/II GPS receiver and used with all kinds of mobile devices.

By counecting different optional counecting cables, HI-405 can be all kinds of wired GPS receiver solutions.

4. System Specifications:

4.1 Bluetooth Slipper Specifications:

Bluetooth V1.1 Compliances

Frequency Range:	2.4 ~ 2.4835 GHz
	unlicensed ISM band
Interface:	USB/UART/SPI
Receiver Sensetivity:	-80 dBm @ 0.1% BER
Transmitting Power:	Class 2 -6 dBm ~ +4 dBm
RF Input Impedance:	50 ohms
Frequency hopping:	1600hops/sec.
Baseband Crystal OSC:	16MHz
Data Rate:	Up to 723Kb/s
Operating Temperature:	-20°C ~ +80°C
Storage Temperature:	-30°C ~ +90°C
Supply Voltage:	Build-in Rechargeable Bettery
	(3.7V 1500mAh)
Operation Time:	8 hrs after fully charged
	in continue mode
Transmitting Range:	10 meters (Typical)
Power Consumption:	45 mA (Typical)

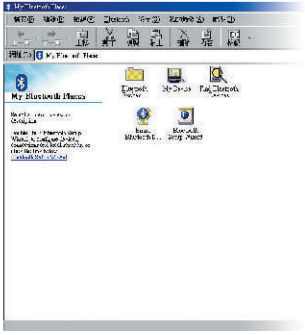
4.2 GPS receiver Specifications:

Protocol:	NMEA0183 GGA, GSA, GSV, RMC, VTG, GLL
Baud Rate:	1 Hz
Datum:	WGS84
Channel:	12 channel all-in-view tracking
Frequency:	L1, 1575.42MHz
Hot Start:	8 sec. Average
Warm Start:	38 sec. Average
Cold Start:	48 sec. Average
Reacquisition Time:	100 ms
Position Accuracy:	15m 2D RMS, SA off
Maximum Altitude:	18,000m
Maximum Velocity:	515m/s
Voltage:	DC 3.3V+-10%
Antenna Type:	Built-in active antenna
External Antenna	MMCX (Optional)
Connector:	
LED Indicator:	3D Positioning (blinking) or Searching GPS (on)
Operating Temperature:	-10° to +70°
Storage Temperature:	-40° to +85°
Operation Humidity:	95%, Non-Condensing

5. Get Connected; Installation Guide

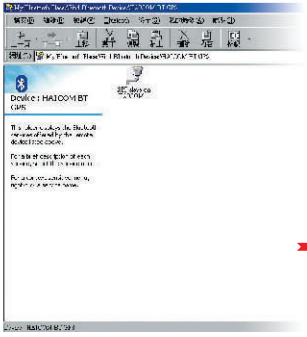
5.1 Laptop PC Installations

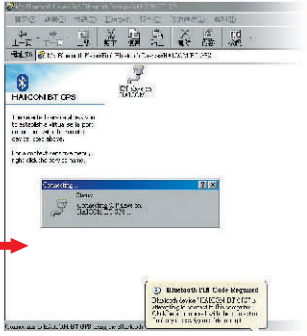
Run "My Bluetooth Places" and Double Click the "Find Bluetooth Devices " icon



Double Click "HAICOM BT GPS"

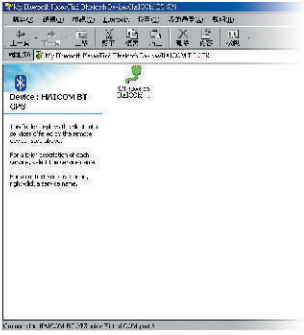
Double Click "SPP on HAICOM BT GPS"





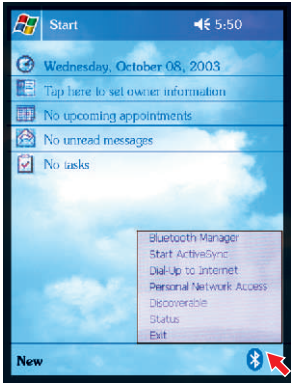
Key in pin code: “0000”

Connected

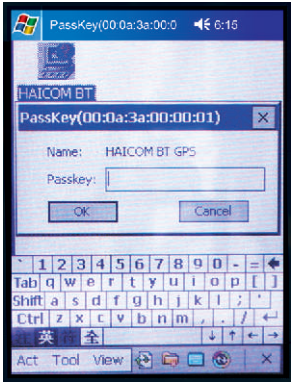


5.2 PDA Installations

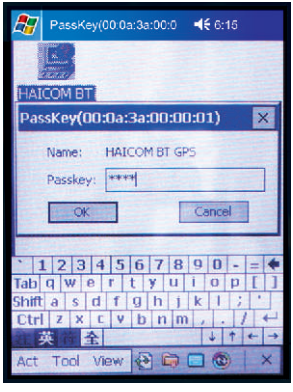
Double Click the Bluetooth icon



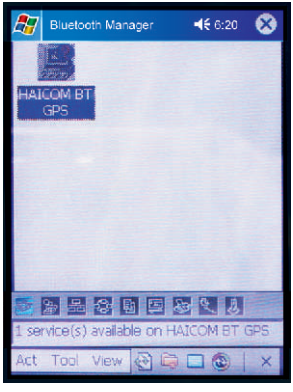
Double click "HAICOM BT GPS"



Key in pin code: "0000"



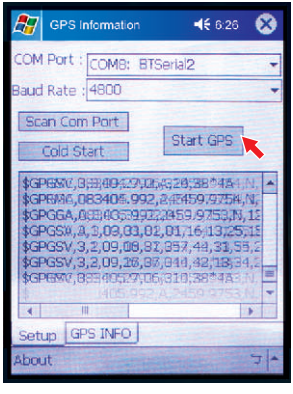
Found the host device



For Connected with device

Select the correct com port

Start GPS, NMEA message inflow



More satellites info

6. GPS Technical Data

6.1 ONE-PULSE-PER-SECOND (1PPS) OUTPUT

The one-pulse-per-second output is provided for applications requiring precise timing measurements. The output pulse is 1usec in duration. Rising edge of the output pulse is accurate to +/-1usec with respect to the start of each GPS second. Accuracy of the one-pulse-per-second output is maintained only when the GPS receiver has valid position fix.

The 1PPS output is always generated when the GPS receiver is powered-on. Proper adjustment of the 1PPS output to align with the GPS second requires calculation of the receiver clock offset and clock drift-rate as part of the position-velocity-time (PVT) solution. When enough satellite signals are received to generate valid position fixes, the 1PPS output is adjusted to align with the GPS second in several seconds. When the 1PPS output is brought in sync with the GPS second, the 1PPS Valid Signal on the I/O pin becomes active (HIGH); when the 1PPS output is not yet in sync with the GPS second, the 1PPS Valid Signal remains inactive (LOW).

As long as enough satellite signals are received to generate valid position fixes, the 1PPS output remains synchronized to the GPS second, and the 1PPS Valid Signal remains active. If signal blockage prevents the receiver from generating valid position fix, the 1PPS output will drift away from the GPS second and the 1PPS Valid Signal will become inactive. Upon re-acquiring enough satellites to generate consecutive valid position fixes, the 1PPS Valid Signal will become active again, signaling that the 1PPS output is again synchronized with the GPS second.

For best stable operation of the 1PPS signal, it is to be operated in static environment having clear view of the sky.

SOFTWARE INTERFACE

This section describes the details of the serial port commands through which the HI-405BT GPS module is controlled and monitored. The serial port commands allow users to set the receiver parameters, configure output message type, and retrieve status information. The baud rate and protocol of the host COM port must match the baud rate and protocol of the GPS receiver serial port for commands and data to be successfully transmitted and received. The default receiver protocol is 4800bps, 8 data bits, 1 stop bit, and none parity.

6.2 NMEA OUTPUT MESSAGE SPECIFICATIONS

The HI-405BT supports NMEA-0183 output format as defined by the National Marine Electronics Association (http://www.nmea.org). The currently supported NMEA messages for GPS applications are:

GGA	Global Positioning System Fix Data
GLL	Geographic Position Latitude / Longitude
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
RMC	Recommended Minimum Specific GNSS Data
VTG	Course Over Ground and Ground Speed

NMEA Messages

The serial interface protocol is based on the National Marine Electronics Association's NMEA 0183 ASCII interface specification. This standard is fully define in "NMEA 0183, Version 3.01" The standard may be obtained from NMEA, www.nmea.org

GGA - GPS FIX DATA

Time, position and position-fix related data (number of satellites in use, HDOP, etc.).

Format:

$GPGGA,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,
M,<10>,M,<11>,<12>,*<13><CR><LF>

Example:

$GPGGA,104549.04,2447.2038,N,12100.4990,E,1,06,
01.7,00078.8,M,0016.3,M,,*5C<CR><LF>

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	2447.2038	Latitude in ddmm.mmmm format Leading zeros transmitted
3	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
4	12100.4990	Longitude in dddmm.mmmm format Leading zeros transmitted
5	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
6	1	Position fix quality indicator 0: position fix unavailable 1: valid position fix, SPS mode 2: valid position fix, differential GPS mode
7	06	Number of satellites in use, 00 ~ 12
8	01.7	Horizontal dilution of precision, 00.0 ~ 99.9
9	00078.8	Antenna height above/below mean sea level, -9999.9 ~ 17999.9
10	0016.3	Geoidal height, -999.9 ~ 9999.9
11		Age of DGPS data since last valid RTCM transmission in xxx format (seconds) NULL when DGPS not used
12		Differential reference station ID, 0000 ~ 1023 NULL when DGPS not used
13	5C	Checksum

Note: The checksum field starts with a '*' and consists of 2 characters representing a hex number. The checksum is the exclusive OR of all characters between '$' and '*'.

GLL - LATITUDE AND LONGITUDE, WITH TIME OF POSITION FIX AND STATUS

Latitude and longitude of current position, time, and status.

Format:

$GPGLL,<1>,<2>,<3>,<4>,<5>,<6>,<7>*<8><CR><LF>

Example:

$GPGLL,2447.2073,N,12100.5022,E,104548.04,A,
A*65<CR><LF>

Field	Example	Description
1	2447.2073	Latitude in ddmm.mmmm format Leading zeros transmitted
2	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
3	12100.5022	Longitude in dddmm.mmmm format Leading zeros transmitted
4	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
5	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
6	A	Status, 'A' = valid position, 'V' = navigation receiver warning
7	A	Mode indicator 'N' = Data invalid 'D' = Differential 'A' = Autonomous 'E' = Estimated
8	65	Checksum

GSA - GPS DOP AND ACTIVE SATELLITES

GPS receiver operating mode, satellites used for navigation, and DOP values.

Format:

$GPGSA,<1>,<2>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<4>,<5>,<6>*<7><CR><LF>

Example:

$GPGSA,A,3,26,21,,,09,17,,,,,,10.8,02.1,10.6*07<CR><LF>

Field	Example	Description
1	A	Mode, 'M' = Manual, 'A' = Automatic
2	3	Fix type, 1 = not available, 2 = 2D fix, 3 = 3D fix
3	26,21,,,09, 17,,,,,,	PRN number, 01 to 32, of satellite used in solution, up to 12 transmitted
4	10.8	Position dilution of precision, 00.0 to 99.9
5	02.1	Horizontal dilution of precision, 00.0 to 99.9
6	10.6	Vertical dilution of precision, 00.0 to 99.9
7	07	Checksum

GSV - GPS SATELLITE IN VIEW

Number of satellites in view, PRN number, elevation angle, azimuth angle, and C/No. Only up to four satellite details are transmitted per message. Additional satellite in view information is sent in subsequent GSV messages.

Format:

$GPGSV,<1>,<2>,<3>,<4>,<5>,<6>,<7>, ... ,
<4>,<5>,<6>,<7> *<8><CR><LF>

Example:

$GPGSV,2,1,08,26,50,016,40,09,50,173,39,21,43,316,
38,17,41,144,42*7C<CR><LF>
$GPGSV,2,2,08,29,38,029,37,10,27,082,32,18,22,309,
24,24,09,145,*7B<CR><LF>

Field	Example	Description
1	2	Total number of GSV messages to be transmitted
2	1	Number of current GSV message
3	08	Total number of satellites in view, 00 ~ 12
4	26	Satellite PRN number, GPS: 01 ~ 32, SBAS: 33 ~ 64 (33 = PRN120)
5	50	Satellite elevation number, 00 ~ 90 degrees
6	016	Satellite azimuth angle, 000 ~ 359 degrees
7	40	C/No, 00 ~ 99 dBNull when not tracking
8	7C	Checksum

RMC - RECOMMANDED MINIMUM SPECIFIC GPS/TRANSIT DATA

Time, date, position, course and speed data.

Format:

$GPRMC,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>,
<11>,<12>*<13><CR><LF>

Example:

$GPRMC,104549.04,A,2447.2038,N,12100.4990,E,
016.0,221.0,250304,003.3,W,A*22<CR><LF>

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	A	Status, 'V' = navigation receiver warning, 'A' = valid position
3	2447.2038	Latitude in dddmm.mmmm format Leading zeros transmitted
4	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
5	12100.4990	Longitude in dddmm.mmmm format Leading zeros transmitted
6	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
7	016.0	Speed over ground, 000.0 ~ 999.9 knots
8	221.0	Course over ground, 000.0 ~ 359.9 degrees
9	250304	UTC date of position fix, ddmmyy format
10	003.3	Magnetic variation, 000.0 ~ 180.0 degrees
11	W	Magnetic variation direction, 'E' = East, 'W' = West
12	A	Mode indicator 'N' = Data invalid 'D' = Differential 'A' = Autonomous 'E' = Estimated
13	22	Checksum

VTG - COURSE OVER GROUND AND GROUND SPEED

Velocity is given as course over ground (COG) and speed over ground (SOG).

Format:

GPVTG,<1>,T,<2>,M,<3>,N,<4>,K,<5>*<6><CR><LF>

Example:

$GPVTG,221.0,T,224.3,M,016.0,N,0029.6,K,A*1F<CR><LF>

Field	Example	Description
1	221.0	True course over ground, 000.0 ~ 359.9 degrees
2	224.3	Magnetic course over ground, 000.0 ~ 359.9 degrees
3	016.0	Speed over ground, 000.0 ~ 999.9 knots
4	0029.6	Speed over ground, 0000.0 ~ 1800.0 kilometers per hour
5	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
6	1F	Checksum

ZDA TIME AND DATE

Format:

$GPZDA,<1>,<2>,<3>,<4>,<5>,<6>*<7><CR><LF>

Example:

$GPZDA,104548.04,25,03,2004,,*6C<CR><LF>

Field	Example	Description
1	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	25	UTC time: day (01 ... 31)
3	03	UTC time: month (01 ... 12)
4	2004	UTC time: year (4 digit year)
5		Local zone hour Not being output by the receiver (NULL)
6		Local zone minutes Not being output by the receiver (NULL)
7	6C	Checksum

Binary Messages

See Binary Message Protocol User's Guide for detailed descriptions.

6.3 DEFAULT VALUES

The product has the following factory preset default values:

Datum:	000 (WGS-84)
NMEA Enable Switch:	GGA ON
	GLL ON
	GSA ON
	GSV ON
	RMC ON
	VTG ON
	Checksum ON
Baud Rate:	4800 bps
Elevation Mask:	5 degrees
DOP Mask:	DOP Select: Auto
	GDOP: 20
	PDOP: 15
	HDOP: 8
Receiver Operating Mode:	Normal Mode (without 1PPS)

The new settings will remain effective on next power-on as long as the on-board rechargeable backup battery is not discharged. After the backup battery is discharged, factory preset default settings will be used.

6.4 TROUBLESHOOTING

Problem	Reasons	Solutions
No Position output but timer is counting	Weak or no GPS signal can be received at the place of HI-405BT unit	Place the HI-405BT under an open space, then, start GPS again.
	At outdoor space but GPS signal is blocked by building or car roof	To try again, go to outdoor and press 'Reset' or connect external antenna on the side of HI-405BT to improve the poor GPS signal
Execute Fail	Wrong CPU type	PocketPC support multiple typs of CPU. Make sure you download the correct testing (or mapping software). You can use the PDA smart menu's 'setting' function to see wether the CPU type is correct or not.
Can not find HI-405BT	The Bluetooth connection not set up correctly	Please consult the step by step installation guide and set up again.
No signal	No action for few minites may causes PocketPC into the power saving mode. It could close the COM port at the same time.	Close all applications and exacute it again to re-open the COM port
	Weak or no GPS signal when using HI-405BT indoor or inside the car.	Put HI-405BT to an open space or car roof, then, press the Reset button