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# SynPaQ/E GPS Sensor

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## USER'S GUIDE



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## **GPS PERFORMANCE**

The Global Positioning System (GPS) is operated and supported by the U.S. Department of Defense and is made available for civilian use solely at its discretion. The GPS is subject to degradation of position and velocity accuracies by the Department of Defense. Synergy Systems does not warrant or control GPS availability or performance.

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## PRODUCT DESCRIPTION

The SynPaQ/E is a self contained GPS Sensor comprising a GPS receiver and required support electronics in a robust, IP68 rated extruded aluminum housing. The support electronics include ESD tolerant RS-232 compatible communications links, input power regulation and filtering, and Power/Data display LEDs.

The GPS receiver can be selected from several types depending on the users requirements. This document does not cover the differences in the available receivers; it is only intended as a User Guide for the SynPaQ/E regardless of receiver installed.

The “Standard” SynPaQ/E uses a water resistant circular connector for all I/O functions and a TNC connector for the antenna. The circular connector is an IP68 rated SwitchCraft EN3.

The “XTS” version of the SynPaQ/E, first shipped in 2002, emulates the non-standard DB-9 electrical interface of the original Motorola “XT” Oncore™ and Synergy’s “XTS/II” OEM GPS Sensors delivered between 1994 and 2002. The special DB-9 I/O wiring has been retained for backward compatibility for Motorola LMPS and many other customers. This version of the SynPaQ/E uses a BNC for the GPS antenna connector. With the increased convenience of using a DB-9 connector, there is a resultant drop in water and dust resistance. Care should be taken when deciding where to mount the unit.

The “USB” version provides for a connection where a DB9 UART does not exist. The 1PPS output is provided by a SMA connector. This version is also NOT as water resistant as the standard version and care should be taken when deciding where to mount the unit.

## PHYSICAL CHARACTERISTICS

Size: Less connectors and mounting plate.

3.22" W x 5.21"L x 1.26"H      82mm x 132mm x 32mm  
Weight:                      10 oz (0.28 kg)  
Housing:                      Black Powder-Coated Aluminum

## ELECTRICAL INTERFACE (Standard)

Power/Data:                      SwitchCraft EN3P8M - 8 Pin  
Mating Conn:                      SwitchCraft EN3C8F - 8 Pin  
GPS Antenna:                      TNC Jack (Others optional)

## ELECTRICAL INTERFACE (XTS)

Power/Data:                      DB-9M  
Mating Conn:                      DB-9F  
GPS Antenna:                      BNC Jack

## ELECTRICAL INTERFACE (USB)

Power/Data:                      USB  
Mating Conn:                      USB  
1PPS                                  SMA  
GPS Antenna:                      BNC Jack

## ENVIRONMENTAL CONDITIONS

Operating Temp:    w/o Batt                      -40°C to +85°C  
Storage Temp:        w/o Batt                      -40°C to +85°C  
Operating Temp:    w/Batt                         -20°C to +60°C  
Storage Temp:        w/Batt                         -20°C to +60°C  
Relative Humidity:                      10% to 90%, non-condensing

## POWER REQUIREMENTS

+9 to +30VDC (200 mA max)  
Constant 1.6W max

## POWER

**Standard Version:** Power is supplied through Pins 8 (+) and 6 (-) of the SwitchCraft EN3 Data/Power connector. Allowable input voltage range is 9-30VDC. Regulation of the input power is not required as voltage regulation, reverse voltage, over-current and over-voltage protection circuitry is provided by the SynPaQ/E internal electronics. Optionally, a regulated +5V may be supplied to pin 7. Maximum power consumption of the SynPaQ/E is approximately 1.6W (0.7W with M12 receiver).

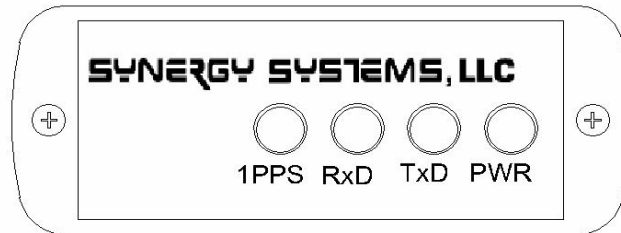
**Note:** Only one power source may be connected at a time

**XTS Version:** The XTS version can accept an unregulated 9-30 Vdc through pin 8 or a regulated 5 Vdc through pin 6 of the DB-9. Power/Data common is on pin 7. All other characteristics are identical to those of the standard version.

**USB Version:** The USB version is powered by the USB-VCC. All other characteristics are identical to those of the standard version.

Resettable fuses are contained in the SynPaQ/E assembly. Since a resettable fuse is a thermally activated device, if it opens due to application of excessive input voltage, the unit should be allowed to cool for several minutes before power is re-applied. Repeated opening of this device under conditions of proper input power indicate a probable internal problem, and the SynPaQ/E should be returned to Synergy Systems for repair.

## FRONT PANEL INDICATORS



The front panel of the SynPaQ/E contains four LEDs for status display. Details are as follows:

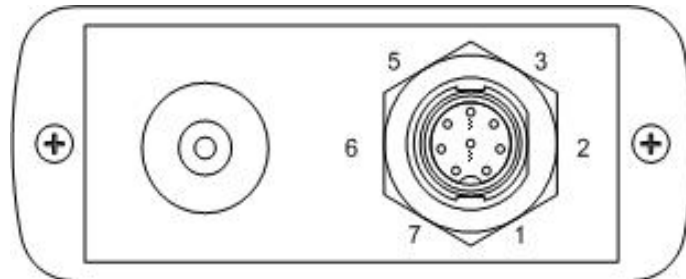
**PWR**—This LED should always be GREEN when power is applied to the SynPaQ/E.

**TxD**—The **TxD** indicator provides the user with visual feedback concerning data output from the receiver. The **TxD** LED will momentarily flash RED whenever the SynPaQ/E is sending GPS data to the host.

**RxD**—The **RxD** indicator will flash RED whenever commands are received from the host computer.

**1PPS**—The **1PPS** indicator will flash RED whenever a **1PPS** pulse is output from the GPS receiver. There are 2 Modes of operation for the **1PPS** flashing. In Mode-1 the **1PPS** will start to flash whether satellites are being actively tracked and the receiver has developed a position fix or not. In Mode-2 the **1PPS** will only flash if satellites are being actively tracked and the receiver has developed a position fix. The Mode is determined by the Receiver selected at time of purchase. This indicator also serves as a “happy light”, giving the user visual feedback that the receiver’s processor is powered up and accomplishing normal housekeeping routines, unless the user has previously disabled the **1PPS** output through software control of the receiver.

## REAR PANEL CONNECTORS



### Standard Interface

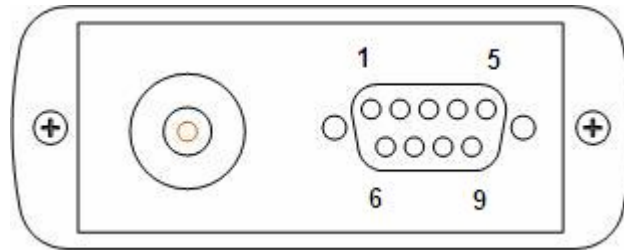
The rear panel of the Standard SynPaQ/E contains both a TNC connector for antenna connection and an 8 pin combination Power/Data connector. Pin functions are as follows:

| <u>PIN</u> | <u>FUNCTION</u>                    |
|------------|------------------------------------|
| 1          | 1PPS Out, TTL levels               |
| 2          | Commands In, RS-232 levels         |
| 3          | Data Out, RS-232 levels            |
| 4          | RTCM Corrections In, RS-232 levels |
| 5          | Common (Data)                      |
| 6          | Common (Power)                     |
| 7          | Power In (+5V regulated)           |
| 8          | Power In (9-30 VDC)                |

**Note: Only one power source may be connected at a time**

## “XTS” Interface

(Emulating the original Motorola XT Oncore™)



The “XTS” version of the SynPaQ/E uses a standard DB-9M connector for data and power.

**This is NOT a standard DB-9 serial interface  
(Do not use RS-232 port isolators)**

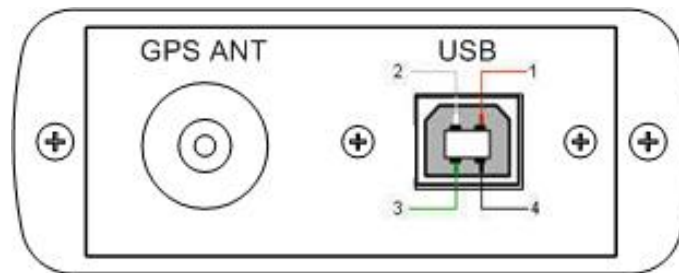
Pin functions are as follows:

| <u>PIN</u> | <u>FUNCTION</u>            |
|------------|----------------------------|
| 1          | RTCM In, RS-232 levels     |
| 2          | Commands In, RS-232 levels |
| 3          | Data Out, RS-232 levels    |
| 4          | N/C                        |
| 5          | Common (1PPS)              |
| 6          | Power In (+5V regulated)   |
| 7          | Common (power and data)    |
| 8          | Power In (9-30 VDC)        |
| 9          | 1PPS Out (TTL levels)      |

**Note: Only one power source may be connected at a time**



## USB Interface



The “USB” version of the SynPaQ/E uses a standard USB Type B connector for data and power. Pin functions are as follows:

| <u>PIN</u> | <u>FUNCTION</u>                 |
|------------|---------------------------------|
| 1          | Red: +5V / Voltage + / VCC      |
| 2          | White: D - / Data - / USB -     |
| 3          | Green: D + / Data + / USB +     |
| 4          | Black: GND / Voltage - / Ground |

## **SYNPAQ/E OPERATION**

With power applied, the SynPaQ/E is ready for immediate operation. Communications with the unit may be established with windows based GPS programs, the SW included with the kit is dependent on the receiver ordered with the SynPaQ/E. Communication SW may also be downloaded from Synergy's website at [www.synergy-gps.com](http://www.synergy-gps.com): Home - Tech Support - Software.

## **ANTENNA INSTALLATION**

The standard SynPaQ/E allows for connection to a GPS antenna through a standard TNC or a BNC jack on the housing endplate.

Synergy provides several types of antennas depending on the customer requirements.

Synergy can provide various cable types with different lengths and connectors based on the customer's requirements.

XT Oncore is a copyright of Motorola, Inc.  
SynPaQ/E is a trademark of Synergy Systems, LLC