

TAPR GPS Kit USER'S GUIDE



GPS Kit parts derived from the original Synergy Systems, LLC
SynPaQ/E M12+ version

Shipped as-is without Warranty

These GPS Kit parts were previously used in a timing application and returned to Synergy Systems, LLC by its customer for disposal. Rather than scrap these parts, Synergy has made them available to TAPR for “second use” as a GPS educational tool for Hams, students, experimenters, etc.

GPS KIT DESCRIPTION

This GPS Experimenters Kit Includes the following items:

1. GPS Kit motherboard supplying reverse polarity and over-voltage protection, power regulation and 3 Volt logic level to RS-232 level conversion.
2. Motorola M12+ Oncore GPS timing receiver (installed on motherboard).
3. DB-9 to motherboard cable assembly (non-standard serial wiring)
4. GPS Kit Housing, black powder coat with mounting flange
5. Panel mount BNC to MMCX coax cable assembly
6. Motorola GPS antenna

User supplies the GPS Kit to PC cable assembly, front and rear panels, 9 – 32 VDC power supply and PC computer.

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

Power/Data:	DB-9M
Mating Conn:	DB-9F
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

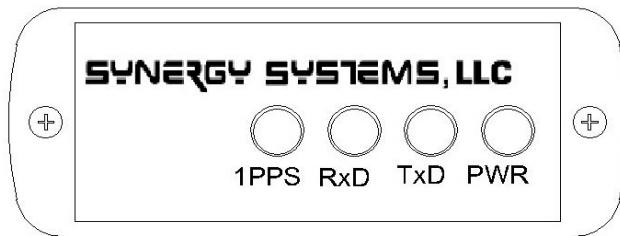
POWER

The GPS Kit's motherboard 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.

Resettable fuses are contained in the GPS Kit motherboard 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.

FRONT PANEL INDICATORS

(as originally shipped)



The front panel of the GPS Kit Motherboard contains four LEDs for status display. Details are as follows:

PWR—This LED should always be GREEN when power is applied to the GPS Kit.

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 GPS Kit 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 user defined Modes of operation for the **1PPS** LED indicator:

In Mode-1, the default mode, the **1PPS** indicator 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** indicator will only flash if satellites are being actively tracked and the receiver has developed a position fix.

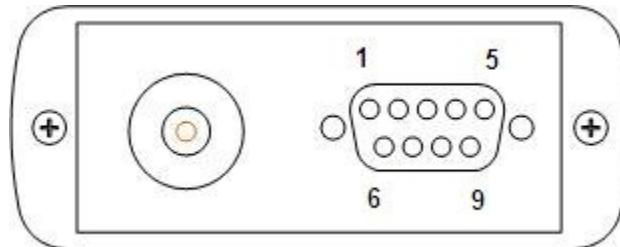
Using the **1PPS CONTROL MESSAGE (@@Gc)** the Mode is determined by the user as shown on pages 144 and 145 of the M12+ User's Guide here:

<http://www.synergy-gps.com/images/stories/guides/m12+userguide.pdf>

In default mode, 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).

TYPICAL REAR PANEL CONNECTORS

(Emulating the original Motorola XT OncoreTM)



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. This is NOT a standard DB-9 serial interface (Don't use port isolators)

This version of the short I/O cable assembly provided with the GPS Kit was first shipped in 2002 and emulates the non-standard DB-9 electrical interface of the original Motorola "XT" Oncore™ and Synergy's "XTS/II" OEM GPS Sensors. The special DB-9 I/O wiring was retained for backward compatibility for Motorola LMPS, and many other customers, who wanted a single connector for data I/O and power.

A standard DB-9 Serial interface can be achieved by removing the Main power wire from Pin 8 and directing it, and a ground connection from pin 7, to a separate power input connector. The 5 volt input wire from pin 6 also needs to be removed to achieve a standard RS-232 serial port.

GPS KIT OPERATION

With power applied, the GPS Kit is ready for immediate operation. Communications with the unit may be established with windows based GPS programs, or a host device using a different operating system. Windows based WinOncore12 or SiRF Oncore software is available here (Scroll down):

http://www.synergy-gps.com/index.php?option=com_content&task=view&id=185&Itemid=196

Receiver parameters, such as message output rate, antenna mask angle, etc. are saved in battery backed RAM. The motherboard needs to be powered on for 24 hours to charge the on-board backup battery. A full charge will keep receiver setup data saved in RAM for 60-90 days depending on battery condition, temperature, number of charge cycles, etc.

ANTENNA CONNECTION

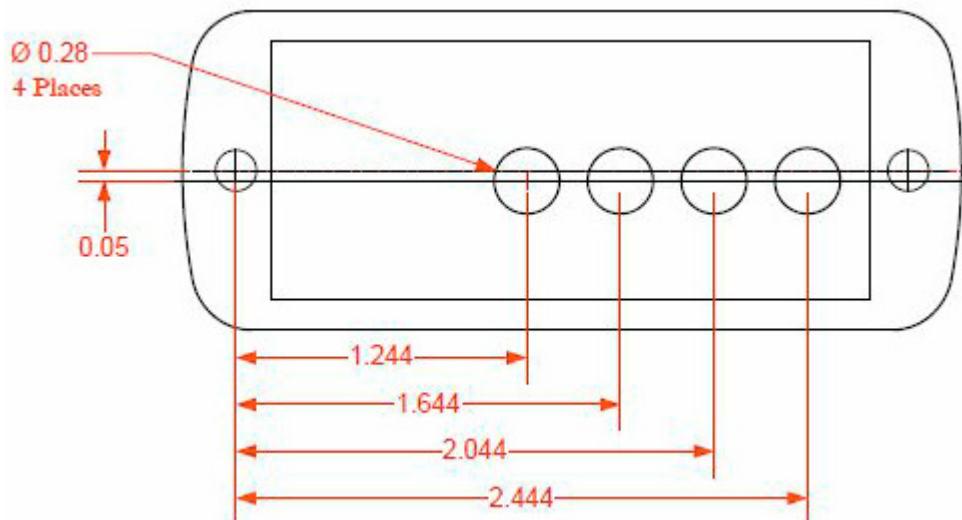
An MMCX to panel mount BNC cable assembly is supplied with the GPS kit. Other, panel mount RF connectors, including SMA, SMB, TNC, etc., can be mounted to the end plate. The choice is up to the user.

END PLATE PART NUMBER AND FABRICATION

The Cast Aluminum P/N ABD-800 end plates for the Aluminum enclosure are described here: <https://www.bopla.de/en/enclosure-technology/product/alubos/alubos-accessories/abd-800.html>. They are supplied with a gasket, assuring a dust-resistant final assembly, and mounting screws.

The front and rear end plate dimensions are attached. The end plate part number and the attached drawings are all that's needed to complete the housing assembly. Users can contact Candice Rincon at (301) 228-3111 to confirm end plate and gasket part numbers and obtain pricing. This information will be helpful for users wanting to make a complete enclosure for the GPS Kit housing.

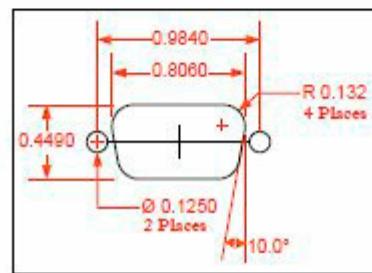
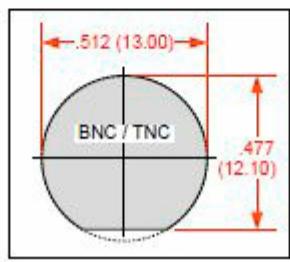
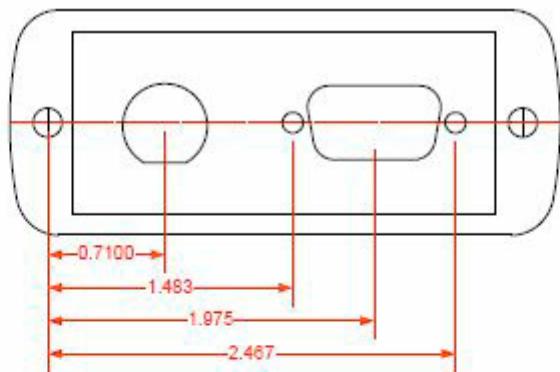
As an alternate, the end plates can be fabricated from a flat piece of Aluminum plate. In either case, the following dimensions can be used to accommodate the front panel LED status indicators:



The rear panel can accommodate a variety of RF, Power and Data connectors. The layout shown below is for a standard, panel mount BNC RF connector and DB-9 Male Power\Data connector.

Note: Using a power conductor in the DB-9M results in a non-standard serial interface that can cause damage to a host computer (or other device) that requires a standard serial connection.

Here are some reference dimensions for a typical rear panel



Oncore is a trademark of Motorola, Inc.