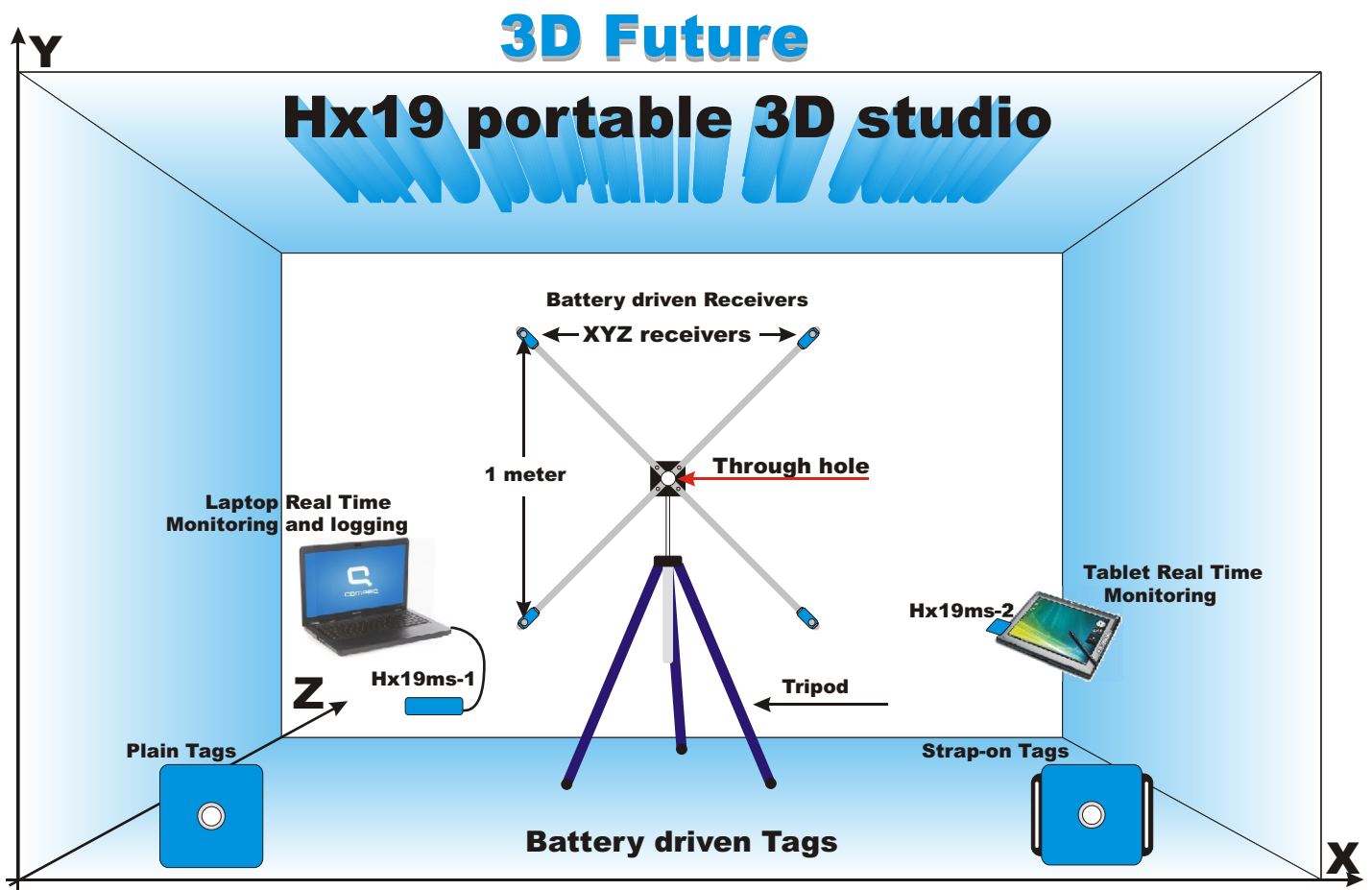


XYZ LABORATORY 3D STUDIO

The illustration below, shows a minimum portable setup for 3D real time monitoring and logging. Here X and Y coordinate precision is better than 9mm, with spatial coverage approximately 5 x 5 meters. The Z coordinates precision is about 1mm, and range in the Z direction is from 0 to 14m. This setup can be expanded to form many separate XYZ systems within the space. In fact, receiver frames can be placed on all 6 boundary planes of the 3D space. Such setup will ensure successful 3D positioning no matter which direction the tagged object is facing.



The Hx19 system comes with two acquisition programs, HX19ACCESS and HX19xyzDDE. Both programs interface with the HX19MS through a USB port of a computer. The HX19ACCESS is explained in the manual, and is supplied to the customer with source code free of charge.

HX19xyzDDE on the other hand, computes the 3D Cartesian coordinates for multiple receivers and tags. It time stamps the xyz coordinates, and stores in terms of millimeters on a file. Like the HX19ACCESS; the HX19xyzDDE provides direct access to the 2.4Ghz hx19 RF network, allowing the hx19 system to be dynamically configured.

The Hx19xyzDDE converts data pertinent to a single tag, from up to 20 receivers to a 3D Cartesian system. Considering; that three receivers are adequate to construct 9mm precision in XY directions, and 1mm precision in the Z direction; 20 receivers will improve, an already good precision significantly. Receiver spatial density around a single tag, is rarely higher than 20. The Hx19xyzDDE; delivers coordinates for up to 1024 unique transmitters, and thousands of distributed receivers. If a system gets this large, it is advisable to use several high speed servers each with its own hx19ms. A large system at high sampling rates, would require a few 2.4Ghz frequency channels as well.

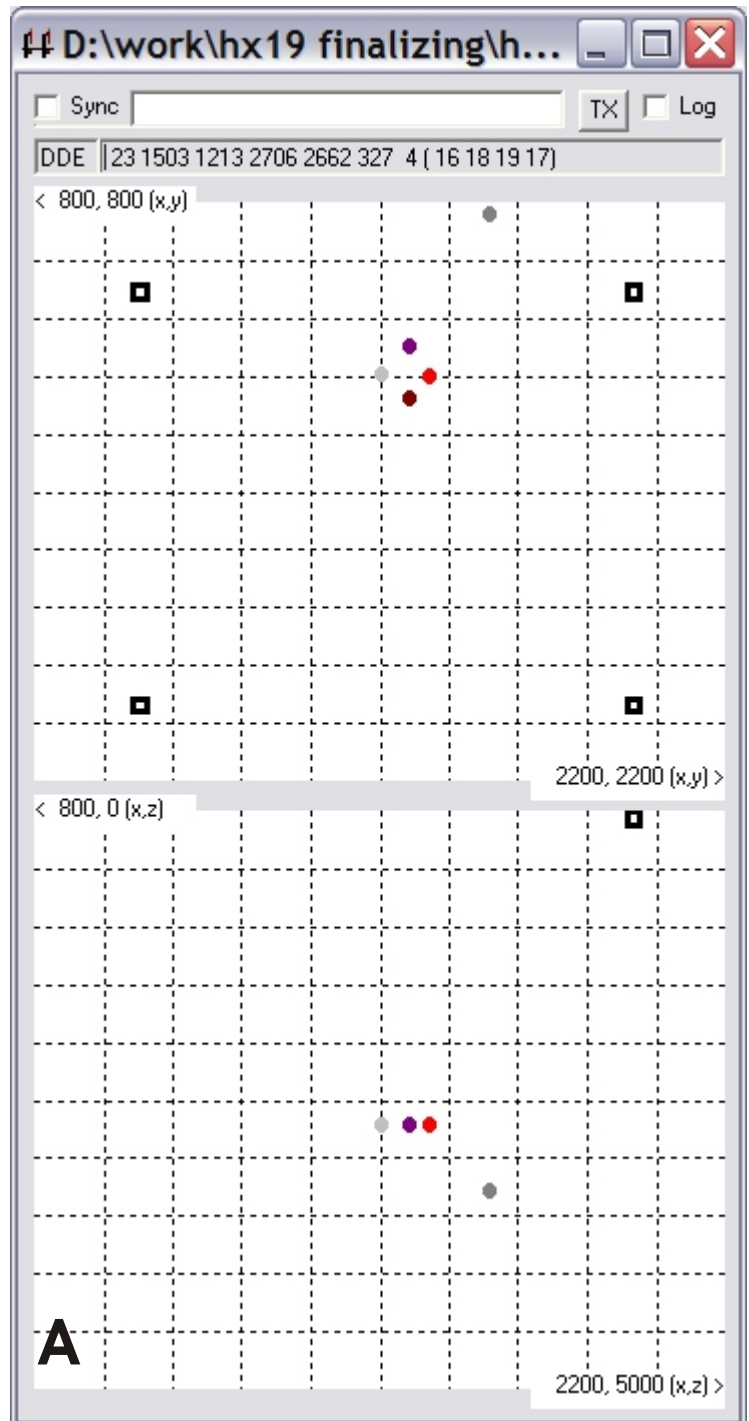
HX19xyzDDE upper window, is the XY plane; while the lower window presents the XZ plane. The colored dots, represent the tags; while the squares position the receivers relative to the tags. Upper left hand receiver corner, is the exact locus of the HX19R receiver head.

Hx19xyzDDE can be considered a real time server; as it computes Cartesian style coordinates, and publishes the results in the DDE window. Dynamic Data Exchange (DDE), allows many program applications running under windows, to share the 4D time-space information.

Please refer to the DDE window on the right.

“23 1503 1213 2706 2662 327 4(16 18 19 17)”

The above DDE real time string, claims that tag 23 is located at X=1503mm, Y=1213mm and Z=2706, 266.2 seconds from synchronization. This tag, has been logged 327 times. At this instance, the tag was detected by 4 receiver and these are 16, 18, 19 and 17. This DDE text is available to other applications. For parsing simplification, only integers are passed through this window. If the log option is selected; this data is stored on a file; under a directory called dataFiles. The name of the file, is the date and time at which it was created.



Setup for this application.

Four receivers 18, 16, 19 and 17 were placed in square XY formation; 1 meter apart, using a tripod. This configuration had no Z component; The 2D formation was entered into map.txt found in directory mapImages.

File: mapImages/map.txt

```
18 1000 1000 0
16 2000 1000 0
19 1000 2000 0
17 2000 2000 0
```

Transmitters 20,21,23 and 12 were placed on a tripod, at a fixed location. Transmitter 24 was placed at a different location.

Set in mode m7 receivers queue was by default; and the Hx19m synchronizer; was configured to activate transmitters 0 through 4; sequentially, using the command M&s4.

Transmitters were all running in m7 (T&m7 see manual). Finally the whole system was set to speed f2, by broadcasting !f2.

See user manual for support.

Hx19xyzDDE Parameters

The HX19xyzDDE program parameters, can be found in the master directory with the executive file; under the filename hx19xyzDDE.txt.

Configuration data for graph A and B below

