

# WHAT TIME IS IT?

## - Examining Time-of-Day on the DXD -

Time of Day (TOD) is an essential part of the Brainstorm DXD Universal Clocks. It is used in PTP synchronization for time-stamping events and all signals generated by the DXD are referenced to its internal TOD clock ('System Time').

This document examines different topics related to time such as the reliability of the different sources, how the DXD handles references that do not include any time information and how time is displayed on the DXD.

### WHAT ARE THE SOURCES OF TIME AVAILABLE TO THE DXD AND HOW RELIABLE ARE THEY?

- **GPS:** it is the most reliable source. Not only does it provide an accurate Time-of-Day, it also provides a very stable frequency to be used as a reference. The main drawback is that reception may be poor depending on the location.
- **NTP:** When supplied by a reliable server such as Apple and Microsoft or one of the various NTP pools, NTP is also a very good source of time. However, because time updates are relatively infrequent and accuracy somewhat variable, the DXD does not use NTP as a reference, but only as a source of TOD to transfer to the system time or to update the RT Clock.
- **PTP:** When following an external PTP Grandmaster, the DXD receives time-of-day information from the PTP Grandmaster. If that GM is not referenced to GPS, the information provided may or may not be accurate.
- **RTC:** The DXD secondary internal clock (Real Time Clock) is battery powered and constantly running (see below).

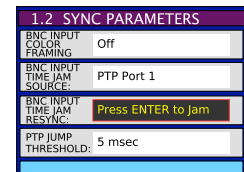
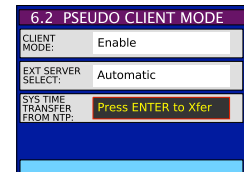
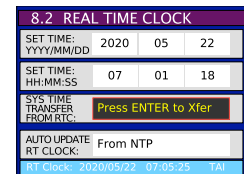
### WHAT HAPPENS WHEN THE DXD REFERENCE DOES NOT HAVE ANY TIME INFORMATION?

Just after power up, the DXD uses the date & time information from the internal RT Clock and transfers it to the main TOD (System Time). When locking to a new reference, if that reference does not have date & time, the TOD simply continues counting along its current time sequence; if it has date & time, then the internal TOD will be precisely synchronized to those values.

- ▶ References with Time-of-Day: GPS & PTP
- ▶ References without Time-of-Day: WC, AES, Video Sync, 10 MHz + internal crystal.

When using a reference without time-of-day, the DXD adds several options.

1. **RTC - Menu 8.2:** To manually transfer the RTC time to the System Time:
  - if required, set the RTC to a specific time and date
  - alternatively, if available, set NTP or GPS to update the RTC automatically
  - under 'System Time Transfer from RT Clock' select <Press ENTER to Xfer>
  - press ENTER.
2. **NTP - Menu 6.2:** To manually transfer the NTP time directly to the System Time:
  - enable the NTP client
  - under 'System Time Transfer from NTP' select <Press ENTER to Xfer>
  - press ENTER.
3. **Time Jam - Menu 1.2:** To receive TOD from a master source, while referenced to a BNC input:
  - under 'BNC Input Time Jam Source' select PTP or GPS
  - under 'BNC Time Jam Resync' select <Press ENTER to Jam>
  - press ENTER



**Note 1:** in # 1 & #2 above, the TOD is copied to the system time but in #3, the DXD syncs to the external TOD source before releasing to the BNC IN reference.

**Note 2:** All menus are per firmware 2.17 or later.

## DISPLAYING TIME ON THE DXD

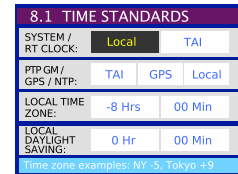
The following times that can be displayed on the DXD:

- **System:** main Time-of-Day clock at the heart of the DXD
- **RT Clock** (Real Time Clock): DXD internal backup clock, constantly running and battery powered
- **PTP GM:** time received on the Ethernet port from an external PTP Grandmaster
- **GPS:** time received from the optional GPS receiver
- **NTP:** time received on the Ethernet port from an external NTP Server
- **LTC:** With the DXD/LTC option, 2 time code streams are generated by the DXD (LTC is always in Local time)

## Time Standards

Several time standards are available in menu 8.1 for each of the times listed above. Local time adjustments are also defined in this menu. These settings are for display purposes only.

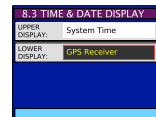
- **TAI:** International Atomic Time, an atomic coordinated time that has been measuring time continuously since 1955 with no leap seconds, used as a base by other standards.
- **UTC:** Coordinated Universal Time is the time zone '0' from which all other time zones are calculated. It is based on TAI and since 1972 has added leap seconds every year or so, depending on the earth's rotation. UTC is currently 37 seconds behind TAI.
- **GPS:** Global Positioning System time is used by the atomic clocks in the GPS satellites. It is continuous time (no leap seconds) measured from the GPS time zero point of midnight January 5, 1980. It is 19 seconds behind TAI.
- **Loran:** Long Range Navigation time based on atomic clocks. Like GPS, it is continuous time with no leap seconds measured from the time zero point of midnight January 1st, 1958. It is 10 seconds behind TAI.
- **Local:** Local time is based on UTC and adjusted for time zone and Daylight Saving.



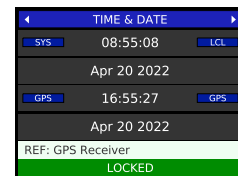
## Where is Time displayed?

- Main Rotation Display: TIME & DATE page

Menu 8.3 lets you select 2 different time sources to be displayed on the TIME & DATE main rotation page. On the TIME & DATE page, the small blue boxes to the right indicate the standards chosen in menu 8.1.



>



- Status Mode Display: TIMES page

While in status mode, the TIMES page displays all the different times, including the 2 LTC generators. The selected time standards are indicated in the right column for each time source.



## What if the time displayed is not what is expected?

Two different parameters should be checked:

1. What is the source of time and is it sending the correct time?
2. Is the display set to the proper standard or, if using Local Time, is it set properly in menu 8.1?