Engineering Change Request ECR20120402

The first series of Callisto eC00 – eC56 were built with a 2nd intermediate frequency local oscillator (IF LO) of 27.000 MHz due to cost reasons of the crystal quartz. In Europe 27 MHz is a standard frequency for Citizen Band Radio Amateurs, so 27 MHz quartz are very cheap and available on the shelf. The 27 MHz LO frequency plus 10.7 MHz 2nd IF led to a 1st intermediate frequency of 37.70 MHz which is still inside of the tuner IF-bandwidth (about 7 MHz). Recently, after 10 years of operation W. R. found out that Callisto operates at the wrong frequency because the standard center-IF of the Philips tuner is 36.13 MHz and NOT 37.70 MHz which is 1.57 MHz lower than Callisto is currently operating at. If Callisto will be used as a single frequency down-converter for software defined radios like SDR-IQ, SDR-14, SDR-NET etc. we get a frequency error of 1.57 MHz. For solar spectroscopy this error is not an issue because absolute errors in this range are of no interest. Only frequency drift over time is of intererst derived typically from type II bursts.

Decision March 2012:
For future production of Callisto the LO quartz shall be changed from 27.00 MHz down to 25.43 MHz which unfortunately needs special production leading to extra cost. However, we think it´s important to supply the right frequency conversion in view of SDR-applications.

Consequences:

1. The firmware needs an update for internal frequency conversion for the manual command FRxxx
   frequency = ((float)(db1*256+db2)*0.0625)-if_init; // 02.03.2012/cm
   where
   eeprom float if_init=(RX_IF); and for RX_IF we have: #define RX_IF (10.70+25.43)

2. The PC-software needs a similar upgrade to calculate the automatic tuner command FE,ch,db1,db2,cb,bb
   divider = (unsigned int)((frequency[adr] + if_init)/synthesizer_resolution);
   where
   float if_init = (10.70+27.0); // for old Callisto eC00 – eC56
   if (strstr(rx,"$CRX:V1.8")) // response prooves new firmware 25MHz for eC > 56
   {
   Logging("$HST:Found LO=25.43 MHz");
   if_init = (10.70+25.43); // 25.43 MHz LO for firmware >= 1.8
   }

Future Production:
For future production the firmware version must be V1.8 or greater and the PC software must be V116 or greater. Otherwise a new frequency error of 1.57 MHz will be introduced into the frequency conversion scheme of Callisto.

Earlier Versions:
Earlier Callistos can be modified by installing firmware V1.8 but the 2nd IF LO quartz must be replaced at the same time with 25.43 MHz (V1.8 or greater firmware is only compatible with 25.43 MHz LO). V116 or later PC software is backward compatible with all firmware versions.