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DATE: JANUARY 30, 2012

CSAC GPSDO RELEASE NOTES Rev. 1.2

Document Number: 80200505

ITEM 1: - Automatic Initialization of Position Hold, Auto-Survey Mode

Issue: The CSAC GPSDO supports automatic Position Survey and Position Hold mode for the GPS. Position Hold mode requires the GPS antenna to be stationary.

The unit will not work properly if the GPS antenna is moved while Position Hold mode is enabled. This mode is enabled by default when the unit is shipped from the factory as the GPS is able to provide better timing stability, and operation with only a single Satellite in Position Hold mode.

Solution: If the GPS antenna is to be moved in a mobile application, the user needs to disable Position Hold mode with the following SCPI command (this command only needs to be issued once):

```
GPS:TMODE OFF
```

The unit can then be set to Automatic Dynamic mode which will adjust the GPS Kalman filter parameters based on vehicle velocity. To enable Automatic Dynamic mode, send the following command:

```
GPS:DYNAMIC:MODE 8
```

Please note that the syntax for this command has change slightly in revision 0.48 and later firmware releases.

Automatic Dynamic mode is explained in detail in section 3.3.11 in the CSAC GPSDO user manual.

To re-enable Auto Survey mode after power-on, send the following command:

```
GPS:TMODE RSTSURV
```

This is described in further detail in section 3.3.17 in the CSAC GPSDO user manual.

ITEM 2: - 1PPS output leakage into 10MHz signals

Issue: the 1PPS output signal can leak into the 10MHz output signals if the CSAC GPSDO 1PPS output is not properly connected to external equipment.

The CSAC GPSDO uses a common 5V power supply rail for the 1PPS output driver chip as well as the 10MHz output driver chips. Connecting a 50 Ohm end-terminated cable to the 1PPS output connector will cause a current surge with up to 50mA to flow out of the 1PPS connector, and this can cause 1PPS signal leakage into the 10MHz outputs through power supply voltage modulation, creating higher phase noise at 10Hz to 100Hz+ offsets, and potential phase instability in the 10MHz signal.

Solution: To reduce power consumption to a minimum, CMOS outputs such as the 1PPS and 5MHz outputs on the CSAC GPSDO are designed to drive 50Ohm open-ended coax or PCB transmission lines without resistive end-termination. CMOS outputs are not designed to drive 50 Ohm resistive terminated inputs, and connecting a 50Ohms resistive termination will cause a DC short circuit current to flow in the output driver chip.

CMOS outputs are designed to drive 50 Ohm transmission lines and coax cables with 1M Ohms or higher end terminations. Signals will travel down the coax cable, be reflected by the open ended cable, and then return to the CSAC GPSDO where they are properly terminated by a 50 Ohms series termination, and thus the receiver connected to the coax cable will see a very well shaped rising or falling edge without excessive ringing or over/undershoot. The principle of series-terminating coax cables, transmission lines, or micro-strip lines driven by CMOS outputs is explained in detail in the literature; see for example the PCI bus system specification.