Præcis Cfr II

Time & Frequency Reference

The Præcis Cfr II is a 19-inch rack-mounted, 1U system that provides a high-performance, high-value time and frequency reference for instrumentation equipment. A built-in dual-band CDMA time receiver disciplines the internal reference clock. Using CDMA, rather than a traditional GPS-based timing system, frees you from the need to install a roof-mounted antenna because CDMA signals can be received inside buildings.

CDMA Timing and Frequency Control

Præcis Cfr II harnesses the reliability and accuracy of the GPS satellite system via the CDMA cellular mobile telecommunications network used by many digital cellular telephones. For time and frequency applications, the CDMA basestations act as GPS repeaters, boosting the signal level and making indoor reception possible. Præcis Cfr II uses the CDMA wireless infrastructure to precisely synchronize itself to UTC. It aligns its 1PPS and phase locks its internal 10 MHz oscillator to the PseudoNoise (PN) spreading code waveform that modulates the CDMA basestation carrier transmissions.

Præcis Cfr II can establish UTC time to the 10-microsecond level of accuracy and provide a frequency output that matches that of UTC to less than 10^{-11}. There is no lengthy site survey required and transmissions from a single basestation are all that is needed. Præcis Cfr II is up and running quickly and can be relocated to a new location without concern.

Reliability

CDMA system time and frequency synchronization must be reliably maintained in order for the mobile telecommunications system to operate properly. This makes it a very dependable source of precise timing information. In most locations there are normally several CDMA basestations that Præcis Cfr II can use. In the unlikely event that one station should become unavailable, the Præcis Cfr II will automatically switch to another. In addition, Præcis Cfr II is not susceptible to rooftop antenna failures caused by adverse weather conditions or maintenance activities.

Where Used

Præcis Cfr II has a proprietary dual-band CDMA receiver capable of operating with both cellular (800 MHz) and PCS (1900 MHz) frequencies. This allows for operation throughout North America, Australia, Korea and other parts of the world. In addition, an alternate model permits operation with the Japanese frequencies for operation in Japan.

Features

Præcis Cfr II provides a precision 1 PPS timing, and a 10 MPPS frequency signal, it also provides an ASCII time-of-day output string on the RS-232 port.

Simple Installation

Since CDMA signals at cellular frequencies can be received inside buildings, Præcis Cfr II saves installation, labor and leasing costs inherent in traditional GPS timing systems. No costly rooftop antenna, window-mount antenna, or cable installation is required. Therefore, Præcis Cfr II can be easily located wherever it is needed.

High Value

The Præcis Cfr II is a highly manufacturable design. Each component is specifically selected for technical excellence, reliability and low cost. Software is field-uploadable to simplify maintenance and to allow you to upgrade to new capabilities. Firmware enhancements are available at no cost.

Præcis Cfr II
Specifications

CDMA Receiver:
AMPS Mobile Receive Band – 869-894 MHz
PCS Mobile Receive Band - 1930-1990 MHz.
J-CDMA Mobile Receive Band - 832-870 MHz (option).
TIA/EIA IS-95 CDMA Pilot and Sync Channels

Antenna:
TNC jack on rear panel, Z_{in} = 50Ω
Dual-Band, 824-896 MHz/1850-1990 MHz, magnetic-base with integral 12 ft. RG-58/U cable and TNC plug

Local Oscillator:	TCXO or OCXO (option).
Time to Lock:	**<** 5 min, typical TCXO
	<10 min, typical OCXO

Time/Frequency Outputs (rear panel BNC jacks)**:**
- **1 PPS:** 1 ms wide positive TTL pulse into 50Ω
- **10 MPPS:** TTL squarewave into 50Ω

1 PPS Timing Characteristics:
- **Accuracy**: < 10 microseconds to UTC typical when locked. Fringe area reception may degrade the absolute timing accuracy due to increased propagation delay
- **Stability:** TDEV < 50 ns, $\tau < 10^4$ seconds

10 MPPS Frequency Characteristics:
- **Accuracy:** $< 10^{-11}$ to UTC for 24-hour averaging times when locked
- **Stability** (Allan Deviation):

Tau in Seconds	TCXO Cell	TCXO PCS	OCXO Cell	OCXO PCS
1	$1x10^{-9}$	$1x10^{-9}$	$7x10^{-12}$	$7x10^{-12}$
10	$1x10^{-9}$	$1x10^{-9}$	$1x10^{-11}$	$2x10^{-11}$
100	$3x10^{-10}$	$5x10^{-10}$	$3x10^{-11}$	$1x10^{-10}$
1000	$3x10^{-11}$	$5x10^{-11}$	$1x10^{-11}$	$2x10^{-11}$
10000	$9x10^{-12}$	$1x10^{-11}$	$7x10^{-12}$	$8x10^{-12}$
100000	$3x10^{-12}$	$3x10^{-12}$	$3x10^{-12}$	$3x10^{-12}$

System Status Indicators (front panel)**:**
- **Alarm LED:** Red indicator that illuminates when a serious fault condition occurs.
- **Lock LED:** Green indicator that pulses to indicate the current acquisition and lock status.
- **Network LED:** There is no network interface for this product so this LED is always off.

RS-232 I/O Signals (rear panel DB9M jack)**:**
- **Serial I/O:** RXD, TXD at RS-232 levels. 9600 to 57600 baud; 7 or 8 data bits; odd, even or no parity; 1 or 2 stop bits.
- **Time-of-Day:** ASCII string via Serial I/O port. Seconds through years in GPS, UTC or Local Time.

Power:
- 85-270 VAC, 47-63 Hz, 0.5A Max. @ 120 VAC
- 110-370 VDC, 0.5A Max @ 120 VDC
- 3-Pin IEC 320 on rear panel, 2 m. cord included

Size:
- **Chassis:**   1.75”H x 17”W x 10.75”D
- **Antenna:**   3.75”H x 1.125” dia. at base

Weight: Less than 5 pounds

Environmental:
- **Temperature:**   0° to +70°C (TCXO)
   0° to +50°C (OCXO)
- **Humidity:**   0 to 95%, non-condensing

Compliance: CE, FCC

Options:
- OCXO
- Japanese CDMA Operation.
- Time Code Output (IRIG-B, NASA36, 2137)

Time Code Characteristics (option)**:**
- **Signal:** Amplitude-modulated (AM), 3:1 ratio, 1 kHz carrier.
- **Drive:** 1 Vrms into 50Ω.
- **User-Selectable Formats:**   IRIG-B (122, 123, IEEE-1344), NASA-36, or 2137.