TSC TCT

Configurable Time and Frequency Outputs

KEY BENEFITS

- Fully Automatic Operation
- Advances the Time to Remove Synchronization Delay
- Can Produce Any Output Signal Needed:
    - Dual RS-232 Time Code
    - PB-1 Time Code
    - Parallel BCD Time Code
    - 5- or 10-MHz Signal
    - IRIG-B and NASA 36-bit Serial Time Code
    - Configurable Pulse Rate (1PPS -1MPPS)
- Additional Output Types Available on Request

TheTime CodeTranslator (TCT), housed in a 1U 19-inch rack-mount chassis, receives all of the timing signals from the UTCG via fiberoptic cable and constructs and synchronizes the resulting output signals.The customer can configure every TCT with up to four different time and frequency outputs by selecting plugin modules.

Additional TCTs can be added to the system to expand signals as well as to provide redundancy. Another important TCT feature is the incorporation of "advance" capability, which compensates for fiberoptic path delays from the UTCG. TheTCT includes a front-panel time display and panel alarm indicator for ease of monitoring.

If a fault interrupts the timing signal from the UTCG, then an internal holdover oscillator continues to maintain all output signals. When the signal returns, the TCT automatically resynchronizes itself to match the timing signal from the UTCG.

OPERATION

The TCT phase locks to the optical signal from the UTCG, reads the serial time code, and generates all of the electrical output signals. The frequency of the input reference is recovered by phase locking a VCXO to the received signal. The recovered clock is then used to determine the start of frame, which is the position of the 1PPS, and to decode the data, which contains the epoch of each second. If the input signal is lost, the TCT will go into flywheel mode, continuing to provide signals at the output module. An advance can be set so that the TCT removes the delay introduced by the optical fiber.

The recovered 100 MHz,1PPS, and time code are transmitted to each of the four output module slots. Each plug-in module synthesizes an output signal. Pulse rates are created by dividing and synchronizing with the 1PPS, frequencies are created by direct digital synthesis, and time codes are calculated from the internal time base.The modular architecture makes it easy for Symmetricom to add new signal types as users request them.

The TCT displays the time and its internal status on the front panel. The status includes loss of signal, time-code CRC error, internal error, resynchronization of the internal time base, PLL out of lock, VCXO control voltage near end of range, leap year, and leap second occurring today. In addition, the TCT produces an optical 1PPS, which may optionally be monitored by the upstream equipment. This 1 PPS is suppressed when there is a TCT failure, and transmits the failure event to the upstream equipment. The returned 1PPS may also be used to monitor the performance of the TCT. Transmission of detailed status information, in addition to the return PPS, is an optional feature.

TSC TCT Time Code Translator

TSC TCT Specifications

GENERAL SPECIFICATIONS

- Fiberoptic Input (from UTG or FEC)

Input connector:	LC
Optical fiber:	Multi-mode up to 2 km
	Single-mode up to 30 km

- Display:

  Year (two-digit), day, hour, minute, second
  Leap second +
  Leap second –
  Leap year
  Internal fault
  Loss of input signal
  VCXO unlock
  Rate re-sync
  Serial time code CRC error
  Electronic frequency control out of range

- Holdover

Maximum shift:	3.5×10^{-9} on loss of input signal
Long term drift:	$\pm 3.7 \times 10^{-7}$ over 24 hours
Thermal stability:	± 10 ppm/C

PHYSICAL & ENVIRONMENTAL SPECIFICATIONS

• Size:	19-inch EIA rack chassis,
	1U high x 16.75" (42.5 cm) deep
• Weight:	12 lb (5.5 kg)
• Temperature range:	0°C – 50°C (operating)
• Humidity:	0 – 90% non-condensing (operating)
• Altitude:	3,048 m maximum (10,000 feet)

- Input power

Voltage range:	90 – 240 V~
Frequency:	45 – 65 Hz
Current (max):	0.20 A (90 V~)

OUTPUT MODULES

- Configurable pulse rate (1,10,100 and 1 kPPS, or quad 1PPS – 1M PPS)

Height:	1TCT module slot
	Four outputs per module
Connector:	50Ω TNC female
Skew:	<±2 ns
Jitter:	<200 ps

- RF (1, 5, or 10 MHz)

Height:	1TCT module slot
	Four outputs per module
Impedance:	50Ω
Connector:	TNC female
Output level:	1 V RMS (13 ±1dBm)
Output Isolation:	>100 dB
Harmonic distortion:	<-40 dBc
Phase noise:	

1Hz	-115 dBc
10 Hz	-125 dBc
100 Hz	-125 dBc
1kHz	-135 dBc
10 kHz	-140 dBc
100 kHz	-150 dBc

- Parallel BCD time code

Height:	1 TCT module slot
Connector:	DB-62 female
Output format:	Parallel BCD ms load
TTL Compatible	
Leap second:	subtract or add
Transition times:	All bits settle within 100 ns

- Dual time code (IRIG-B and NASA 36)

Height:	1TCT module slot
Connectors:	4 TNC female, 2 each code type
Modulated code outputs	

Frequency:	1 kHz
Level:	Fixed, 5 ±0.5 Vpp into 50Ω
Modulation ratio:	Fixed 3.3:1
Impedance:	50Ω
TTL Compatible	

- Parallel PB-1 code

Height:	1TCT module slot
Connector:	DB-62 female
Format:	Parallel Binary PB-1 (IRIG STD 205-87)
	27-bit binary ms of the day;
	9-bit binary day;
	parity bits P1 and P2;
	and read enable pulse
TTL Compatible	
Transition times:	All bits settle within 100 ns
	(one hundred nanoseconds)

- Dual RS-232 time code

Height:	1TCT module slot
Connectors:	Two DB-9 female
Time output:	Once per second
Time encoded:	Binary-coded decimal
Character format:	Start bit, 7 data bits, odd parity bit, Stop bit
Baud rates:	9,600 and 19,200 baud (selectable)
Four-digit year:	Jumper-configurable option

Rear View
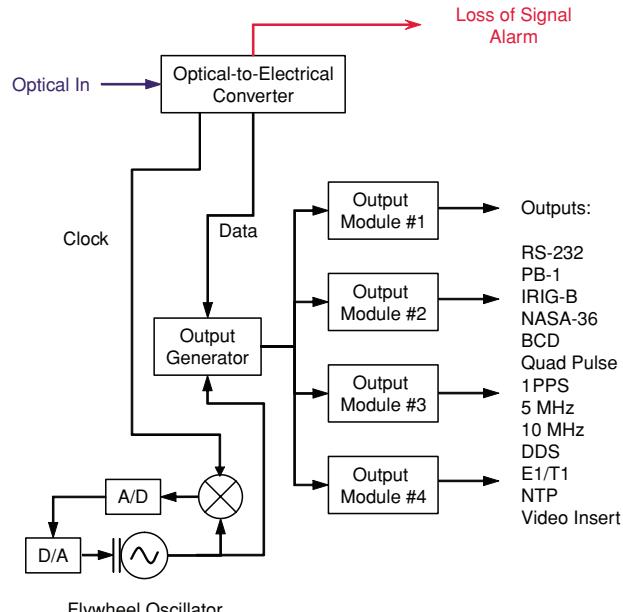
TSC TCT Block Diagram

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