

**MANUAL SECTION XXVIII  
PTTI INTERFACE OPTION**

**10.0 INTRODUCTION AND SPECIFICATIONS**

The PTTI Interface Option adds the capability to transmit time and status information using the PTTI BCD time code format. Included with the PTTI Option is a Time Synchronizing Signal (1 PPM @ 10V) and a Time Rollover Pulse (1 PPS @ 10V) at PTTI specified levels and rates.

**BCD Time Code Differential Output**

**Data** 40 bit serial BCD output containing seconds through day of year plus TFOM. TFOM and DOY may be deleted by placement of a jumper.

**Output Levels** Differential Output  
Non-inverting output  
Logic 1 +2V min +3V max  
Logic 0 -2V min -3V max  
Inverting output  
Logic 0 +2V min +3V max  
Logic 1 -2V min -3V max

**Connector** MS3470L8-33S.

**1PPS Time Rollover Pulse**

**Pulse Width** 20 usec  $\pm$  1 usec  
**Rise Time** 20 nsec max.  
**Fall Time** 1 usec max.  
**Connector** BNC

**1PPM Time Synchronization Pulse**

**Pulse Width** 20 usec  $\pm$  1 usec  
**Rise Time** 20 nsec max.  
**Fall Time** 1 usec max.  
**Connector** BNC

**10.1 GENERAL**

The 86-700 PTTI Option PCB consists of one channel of PTTI BCD Time Code supported by a Time Synchronizing Signal and Time Rollover Pulse. All signals conform to PTTI specification ICD-GPS-060. A second set of outputs is optionally available, which adds an additional PTTI BCD Time Code output with its supporting Time Synchronizing Signal and Time Rollover Pulse outputs.

**10.2**

The PTTI BCD Time Code output port transmits UTC time of day, day of year, and TFOM (Time Figure Of Merit) once per second using a BCD format. A jumper selectable abbreviated format is also available. When in place, DOY and TFOM information is suppressed, allowing compatibility with older PTTI BCD equipment.

### 10.3

The Time Synchronizing Signal is output via a BNC connector. The signal is a positive going pulse 20 usec in duration and 9-11 volts in amplitude.

**10.4** The Time Rollover Pulse is output via a BNC connector. This signal is also a positive going pulse 20 usec in duration and 9-11 volts in amplitude.

### 10.5

A TTL FAULT output is available as a special option. This output goes to a zero with antenna loss or loss of communications with the Trimble receiver. A 1 hour delay occurs before this line goes to a zero. This output is used to indicate a failure within the GPS interface. Normally the host clock fault indicators are used for health and status.

### 10.6 DIFFERENTIAL PTTI BCD TIME CODE OUTPUT PORT

The PTTI port uses a 3 pin connector with pins labeled A, B, and C.

**TABLE 10.6**

<u>pin</u>	<u>Signal</u>
A	Transmit data
B	Transmit data Inverted
C	Ground

Data transmitted on the A pin varies between +2V and +3V for a logic 1, and -2V to -3V volts for a logic 0, per PTTI specification. Data on the B pin is inverted from the A pin and varies accordingly.

### 10.7 BCD DATA CONTENT

BCD TIME CODE OUTPUT includes: UTC hours, minutes, and seconds, Day of Year, and Time Figure of Merit, TFOM.

### 10.8 TIME FIGURE OF MERIT, TFOM

Per PTTI specifications, TFOM is a 4 bit BCD value ranging from 0 - 9 with a non-BCD value of 15, all bits high.

**TABLE 10.8**

TFOM INTEGER	ESTIMATED ACCURACY (WITH RESPECT TO UTC)
All Bits High	No information available
9	Greater than 10 ms or Fault
8	1 ms - 10 ms
7	100 us - 1 ms
6	10 us - 100 us
5	1 us - 10 us
4	100 ns - 1 us
3	10 ns - 100 ns
2	1 ns - 10 ns
1	better than 1 ns
0	Proper/Nominal Operation (unable to calculate TFOM)

Immediately after a power-up, and until first lock, TFOM will be set to all 1's. After locking to satellites, the TFOM will be set to 4, 100 ns - 1us until such time as an unlock occurs. During unlock, an error estimator is monitored and TFOM is adjusted as indicated in Table 10.8.

## 10.9 BCD TIME CODE FORMAT SELECTION

The 86-700 allows the user to select between the two basic PTTI data formats, the standard format and the (earlier) abbreviated format. The abbreviated format may be selected by placing a jumper on jumper block 1 in location 1 (location 1 is that end of the jumper block closest to the motherboard mating connector). The jumper block is interrogated each second for jumpers. If a jumper is detected in position 1, then Day Of Year (DOY), and TFOM will not be transmitted and all bits associated with DOY and TFOM will be set to a high state.

## 10.10 PTTI OUTPUT DATA FORMAT

TIME TRANSMITTED DESCRIBES THE 1PPS THAT JUST OCCURRED.

Hours, Minutes and Seconds are always transmitted. DOY and TFOM are transmitted unless the abbreviated format jumper is detected on the PCB, otherwise they are set high. Each bit is 20 msec long.

bit #	msec	description	
0	0	8's of 10's of hours	
1	20	4's of 10's of hours	
2	40	2's of 10's of hours	
3	60	1's of 10's of hours	
4	80	8's of 1's of hours	
5	100	4's of 1's of hours	
6	120	2's of 1's of hours	
7	140	1's of 1's of hours	
8	160	8's of 10's of minutes	
9	180	4's of 10's of minutes	
10	200	2's of 10's of minutes	
11	220	1's of 1's of minutes	
12	240	8's of 1's of minutes	
13	260	4's of 1's of minutes	
14	280	2's of 1's of minutes	
15	300	1's of 1's of minutes	
16	320	8's of 10's of seconds	
17	340	4's of 10's of seconds	
18	360	2's of 10's of seconds	
19	380	1's of 10's of seconds	
20	400	8's of 1's of seconds	
21	420	4's of 1's of seconds	
22	440	2's of 1's of seconds	
23	460	1's of 1's of seconds	
24	480	8's of 100's of DOY	High if Abbreviated Format jumper detected
25	500	4's of 100's of DOY	"
26	520	2's of 100's of DOY	"
27	540	1's of 100's of DOY	"
28	560	8's of 10's of DOY	"
29	580	4's of 10's of DOY	"
30	600	2's of 10's of DOY	"
31	620	1's of 10's of DOY	"
32	640	8's of 1's of DOY	"

**PTTI OUTPUT DATA FORMAT, cont.**

33	660	4's of 1's	of DOY	“
34	680	2's of 1's	of DOY	“
35	700	1's of 1's	of DOY	“
36	720	8's of TFOM	High if Abbreviated Format jumper detected	
37	740	4's of TFOM		“
38	760	2's of TFOM		“
39	780	1's of TFOM		“
40-49	800-980	UNUSED, HIGH (1)		

**10.11 TIME ROLLOVER PULSE (1PPS OUTPUT)**

The Time Rollover Pulse output delivers a 20 usec pulse once per second. The pulse is 10 volts in amplitude, with a risetime of 20 nsec or less into 50 ohms. The leading (rising) edge of this pulse is on time within 40 nsec of the XL-DC 1PPS.

**10.12 TIME SYNCHRONIZATION PULSE (1PPM OUTPUT)**

The Time Synchronization Pulse output delivers a 20 usec pulse once per minute at second 00. The pulse is 10 volts in amplitude with a risetime of 20 nsec or less into 50 ohms. The leading (rising) edge of this pulse is on time within 40 nsec of the XL-DC 1PPS.

**10.13 FAULT OUTPUT**

The TTL level FAULT output is an indication of an actual hardware failure of either the clock or the antenna/cable system. FAULT is normally at a TTL logic level 1. If an antenna or satellite receiver fault is detected for more than one 1 hour, the FAULT output will go to a TTL logic level 0.

**10.14 reserved.**

**10.15 SCHEMATIC AND ASSEMBLY DRAWINGS**