PTP TRANSLATOR

USER MANUAL

TEKRON

Contents

1 Introduction

Welcome to the PTP Translator user manual! This document contains everything you need to know about the key features, hardware, and installation process of the PTP Translator.

Product Overview

The PTP Translator converts IEEE 1588-2008 (PTPv2) messages into legacy time codes including IRIG-B, DCF77, user defined pulses and serial strings, as well as NTP server messages. The PTP Translator also supports SNTP client.

The PTP Translator clips onto a standard DIN rail. Its rugged compact design is suitable for noisy electrical environments, while built in electrical isolation combined with strong push pull drives on outputs simplifying wiring schemes and enhancing reliability. Refer to Figure 1.

Figure 1 - PTP Translator Front View

2 LED Indicators

The top of the PTP Translator features two LED indicators. The **SYN LED** shows synchronization status of the unit, while the **ALM LED** shows the alarm status of the unit.

Outputs are synchronized to UTC time only when the SYN LED is fully illuminated.

Table 1, Table 2 and Table 3 below provide information regarding the interpretation of the LEDs.

SYN LED	Meaning
Off	The PTP Translator has no power.
Slow Flash (1x flash per second)	The PTP Translator is operating in the "holdover" state (holdover timer is running) or is operating in the "tuning" state (time server is gaining synchronization).
Fast Flash (5x flashes per second)	The PTP Translator is not synchronized (out of sync and not in holdover).
On	The PTP Translator is synchronized.

Table 1 - SYN LED Functionality

ALM LED	Meaning
Off	The PTP Translator is operating normally and has no alarms.
Fast Flash	At least one alarm is active. Refer to the alarm window in the Clock tab of the Configuration Tool to find the name of the active alarm(s). Refer to the Alarm Specification table below for the details on each alarm by name.

Table 2 - ALM LED Functi0nality

Alarm Name	Specification
No Sync	The PTP Translator is not synchronized to an external time source, or the holdover period has expired and/or the maximum inaccuracy threshold has been reached.
Holdover	The PTP Translator has lost synchronization to an external time source and is now in holdover.
Factory Reset Armed	This alarm is generated if the Forgotten Password Reset (Factory Reset Process) is enabled and has been initiated by the user.
ADMIN/ETH1 Address Fault	This alarm comes up when the DHCP server is unavailable or when the IP address is assigned to some other node in the network and cannot be assigned to the PTP Translator's Ethernet port. Under such situations the Ethernet port defaults to a link local address.
Sync Forced	This alarm is generated when the "Never leave Sync (Test Mode)" option has been selected.

Table 3 - Alarm Specification

3 Inputs and Outputs

ETH: Ethernet Port (ST Fiber / RJ-45)

PTP Translator units are fitted with either an RJ-45 10/100 Mbps Ethernet interface or an ST multi-mode Fiber 100BASE-FX Ethernet interface. The unit can be configured over the LAN (Local Area Network) and can be loaded with an NTP / SNTP License.

Next to the Ethernet connector are two LEDs: The green "**LNK**" LED (above), and the yellow "**ACT**" LED (below). The LNK LED will be on when the unit is connected to a valid Ethernet port whilst the ACT LED will be on/flashing when there is activity on either the transmit or receive pair on the Ethernet port.

TX: Fiber Output

This port transmits an IRIG-B (B00x or B22x), programmable pulse or DCF77 signal over fiber, that may be configured to output in either inverted or non-inverted polarity. The fiber transmitter is compatible with 50/125 µm, 62.5/125 µm and 100/140 µm multimode glass fiber.

TTL: TTL Output

The TTL output is a high drive, non-isolated TTL level driver which can be configured using Tekron's Configuration Tool. This port transmits an IRIG-B (B00x or B22x), programmable pulse, or DCF77 signal using 0 – 5 Vdc TTL level on pins "+" and "-" of the screw terminal connector. The default output is an un-modulated IRIG-B signal (IRIG-B004 with C37.118.1 extensions). It can be used as the master source signal to drive one or many slave devices. The IRIG-B timing pulses (both leading and trailing edges) from this port is typically to within 100 ns of UTC.

This port is a programmable TTL level output that may be configured to output in either inverted or non-inverted polarity:

- A configurable number of pulses per second, minute, hour, day with adjustable pulse-width and offset.
- IRIG-B time code (Un-modulated DCLS or Modified Manchester) with option C37.118.1 or AFNOR extensions.
- Simulated DCF77 receiver time code.

ALM: Alarm Output

The alarm output is a type "A" (normally open) dry contact type. Additionally, it is a high voltage isolated contact capable of switching up to 300 V at 100 mA.

Note: The "Normally-Open" (NO) descriptor refers to the de-energized state of the relay.

The PTP Translator operates with the alarm relays energized during normal operation, and de-energized in the alarm state. It follows that, in the event of all power to the PTP Translator being lost, the alarm relay defaults to the "alarm" state (open contact). The "+" and "-" symbols are included for reference purposes only, as the alarm contacts are not polarized.

The “ALM” output is a synchronization fail alarm. This alarm is active (contact open) when the unit is not synchronized and is not in the holdover state.

OPT: Optional Output

The PTP Translator has a slot for one IO card to allow a variety of user interfaces. Each card is limited to one additional port with at least 3 kV isolation from the rest of the system to avoid current loops. Refer to Table 5 for the list of orderable options.

4 Software

Configuration Tool

The PTP Translator can be configured via Ethernet. The configuration tool can be downloaded from the Tekron Support website: www.support.tekon.com. By default, the unit is shipped with DHCP enabled for automatic IP address assignment, with a fall back to link local addressing (169.254.xxx.xxx) if no DHCP server is present.

Default Username: admin

Default Password: Password

Note:
The user is required to change the default password on first login.

5 Installation

Identification

Each PTP Translator unit is shipped with an identification label on the side of the case. The label provides details of the optional output (if any) and power supply fitted to the unit, and the unit's serial number.

Check the identification label on the side of the unit to ensure that the correct order code and voltage range has been supplied before proceeding with the installation.

The label on the side of PTP Translator contains the voltage range: Do not apply power outside of this range!

Location

WARNING

The unit is intended for installation in restricted access areas. A restricted access area can be accessed only using a lock and key or other means of security. Installation is to be done by suitably qualified personnel.

Power Supply

DC power should be applied to the '+' and '-' screw clamp terminals above the "PWR" input. The DC polarity is not critical. As shown in Figure 2, the input voltage range can be found on the side of the unit, above the power input screw clamp terminals.

***Note**: The Power supply has polarity protection built in to prevent damage.*

The input voltage range is marked on the product label on the side of the unit, and on a label above the "+' and '-" screw clamp terminals on the power input. Do not apply voltage outside the range noted.

The label on the side of TTM 01-G indicates the type of output Option Card fitted: Do not apply voltages to output only interfaces!

Figure 2 - Power supply voltage input label above PWR screw clamps

Hazardous Voltage

Up to 300 V may be present at the power input port “PWR”. Up to 275 V may be present at the alarm relay port “ALM” (in Figure 3). These voltages are supplied to the unit only, and not generated by the unit. However, the installer must exercise care in wiring the screw clamps to ensure bare copper is not accessible.

Figure 3 - PTP Translator ALM, TTL, GND, and PWR Terminals

Earthing

The GND connection is located next to the power supply input terminals (highlighted in Figure 3). This must be connected to earth for full protection of the PTP Translator.

The unit must be safety earthed whenever it is powered on, using the earth terminal as pictured in Figure 3. The cable cross section must be equal to or greater than 0.2 mm^2 (30 AWG).

Mounting the PTP Translator

The PTP Translator is designed to be mounted to a standard ‘Top Hat’ din rail mount using the supplied clips on the base (See Figure 3). The clips can also be used to screw mount the unit by extending them beyond the case edge.

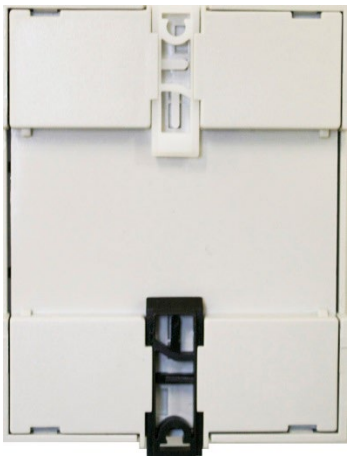

Figure 4 – Base of PTP Translator

Connecting the PTP Translator

The PTP Translator has a RJ-45/ 100Base FX connector and ST Fiber output on the top, and a row of rising clamp screw terminals on the bottom. Any connection not required may be left unterminated. The screw terminals are designed for the following cables:

• 0.2 - 4.0mm² (30 – 12 AWG) solid cable

• 0.2 - 2.5mm² (30 – 14 AWG) stranded cable

The Fiber PTP Translator has a dual ST Fiber connector for the Ethernet and is labeled **ETH** on the case whereas the IRIG-B fiber out is simply labeled **TX**.

The connections from left to right along the bottom are:

- Optional output (**OPT**) '+' and '-'
- Alarm (**ALM**) '+' and '-'
- TTL '+' and '-'
- Ground
- Power Supply Negative
- Power Supply Positive

If the optional output isn't fitted, then the unused terminals are covered.

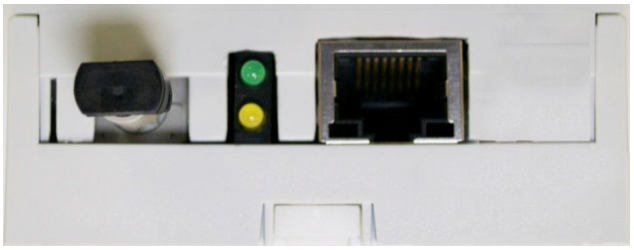

Figure 6 - PTP Translator Top Connectors

Figure 5 - PTP Translator Bottom Connectors

6 Factory Reset

The PTP Translator features the ability to reset to factory default settings if the administrator password is forgotten, or if the time server is rendered unreachable on the network due to incorrect settings, provided that physical access to the unit is available.

This feature is disabled by default to maximize security and must be enabled via the Tekron Configuration Tool before it can be used. When disabled, there is no method to gain full access to the unit without the administrator password, and if the administrator password is forgotten, the unit must be returned to Tekron for reprogramming at the customer's expense.

This feature may be permanently disabled by Tekron on request.

For further details on this feature, see the Configuration Tool Manual, which can be downloaded from the Tekron website at support.tekron.com

7 Factory Hardware Options

Power Supply Options

There are three different power supply options available for the PTP Translator, detailed in Table 4. Low, medium, or high voltage power supplies are available and feature similar maximum output ratings but different levels of isolation.

Power Supply	Input Voltage Ratings	Maximum Power Rating	Isolation
Low	14 – 36 Vdc.	4 W	1.6 kV
Medium	20 – 75 Vdc.	4 W	1.6 kV
High	90 – 300 Vdc.	4 W	3.75 kV

Table 4 - PTP Translator Orderable Power Supply Modules

Optional Output Cards

The PTP Translator has a slot for one I/O card, to allow a variety of user interfaces. Each card is limited to one additional port with at least 3 kV isolation from the rest of the system to avoid current loops.

Table 5 below shows the orderable options:

Output Type	Features
None	No optional output.
TTL	TTL (5 V, 150 mA) IRIG-B (B00x, B22x), DCF77 or user defined pulse output.
Serial	RS232 level (9 V, 10 mA) output supporting serial strings.
AM IRIG-B	Amplitude Modulated (AM) IRIG-B (B12x) signal, typically 8 V with 3:1 mark space ratio. Output Impedance 120 Ω. Requires a 100 – 180 Ω terminator.

Table 5 – PTP Translator Orderable Interface Modules

8 Isolation and Protection

The TTL output features an earthed, non-isolated driver and is designed for connection within the same rack. Since it is the only output with an earth reference, it is isolated from the power supply via the power supply isolation and from all other IO by their isolation. All the other outputs are galvanically isolated (including the optional TTL output card) from the internal electronics and power supply.

The Alarm port has a UL and VDE approved 3.75 kV AC isolated contact and is protected by a 600 V, 175 mA self-resetting fuse and a 350 V transient suppressor diode.

The Copper Ethernet port provides 1.5 kV isolation and includes ESD suppression on board.

All optional output cards feature at least 3 kV isolation from earth and have ESD suppression suitable for the interface type.

The power supply isolation varies from 1.6 kV for the low and medium voltage power supplies to 3 kV for the high voltage power supply. In addition, a varistor protects the power supply against transverse voltages and transient suppressor diodes protect the internal electronics from longitudinal events.

9 Appendix

PTP Translator Specifications

Physical Specifications				
UL94-V0 polycarbonate flame retardant DIN rail enclosure with IP40 compliance (Ingress Protection rating).				
Dimensions	Width Depth Height	72 mm 60 mm 90 mm		
Weight		0.15 kg		
Input and Output Specifications				
TTL		5 V (4.5 V at 150 mA)	2 Pin	< 100 ns to UTC
Fiber (λ = 820 nm)[1]		-19 dB optical power	ST	< 100 ns to UTC
Alarm		275 Vac / 275 Vdc, 100 mA	2 Pin	
Ethernet (Copper)			RJ-45	
Ethernet (Fiber)[2]		TX: -17 dB optical power RX: -33 dB sensitivity	Dual ST, ½ inch pitch	
Optional Output Specifications				
TTL		5 V (4.5 V at 150 mA)	2 Pin	< 100 ns to UTC
Serial (String)		± 9 V	2 Pin	< 1 ms to UTC
AM IRIG-B (modulated)		8 V	2 Pin	< 2 µs to UTC
Environmental Specifications				
Operating Temperature Range		-10 to +65° C		
Electrical Specifications				
Power Supply	Low Voltage	14 - 36 Vdc	2 Pin + common earth	
	Medium Voltage	20 - 75 Vdc	2 Pin + common earth	
	High Voltage	90 - 300 Vdc	2 Pin + common earth	
Power drain		4 W max		

[1] Fibre transmitter is compatible with 50/125 µm, 62.5/125 µm and 100/140 µm multimode glass fiber.

[2] Fibre Ethernet is compatible with 50/125 µm and 62.5/125 µm multimode glass fiber.

10 Serial Output String (Serial Output Option)

General Key to Fields

Fields between brackets ('<' and '>') represent ASCII character codes. The used codes are in Table 6 below:

Placeholder	HEX	Content
<SOH>	01	ASCII Start of Header character
<STX>	02	ASCII Start of Text character
<ETX>	03	ASCII End of Text character
<BEL>	07	ASCII BEL character
<LF>	0A	ASCII Line Feed character
<CR>	0D	ASCII Carriage Return character
<SPACE>	20	ASCII Space character

Table 6 - ASCII character codes

NGTS Time Code O/P

The NGTS time code is normally used in conjunction with a 10 ms pulse that finishes precisely on the second. Timing Transmitted once per minute. Sent during the last second before the minute rollover to which the data in the string refers. Table 7 details the NGTS serial string format and fields.

Timing	Transmitted once per minute. Sent during the last second before the minute rollover to which the data in the string refers.
Default Comms	9600 bps, 8-bit ASCII, no parity
Definition	TyyMMDDWhhmmx<CR><LF>
Placeholder	**Content**
T	"T"
yy	Last two digits of the year: e.g., “21” = the year 2021
MM	Month: “00” = January … “12” = December
DD	Day of Month: 01…31
W	Day of week: “1”= Monday … “7”= Sunday
hh	Two-digit hour
mm	Two-digit minute
x	Time mode: ”0” = Local time, “1” = UTC time
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A

Table 7 - NGTS String Time Code Format Fields

Example:	**Interpretation:**
T020422112340<CR><LF>	Monday 22 April 2002 – 12:34 local time

IRIG J-17 Time Code O/P

Table 8 details the IRIG-J17 serial string format and fields.

About	This code is compatible with IRIG Standard 212-00.
Timing	Transmitted once every second. The leading edge of the “start” bit of the first character <SOH> is exactly on the second that the message describes.
Default Comms	9600 bps, 7-bit ASCII, odd parity
Definition	<SOH>ddd:hh:mm:ss<CR><LF>
Placeholder	**Content**
<SOH>	Start Of Header: HEX 01
ddd	Day of year: range “001” – “366”
:	HEX 3A
hh	hour: “00” – ”23”
:	HEX 3A
mm	minute: “00” – “2”
:	HEX 3A
ss	Seconds: “00” – “59”
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A

Table 8 - IRIG-J17 String Time Code Format Fields

Example:	**Interpretation:**
<SOH>112:12:34:36<CR><LF>	day 112, time 12:34:36

String-A Time Code O/P

Table 9 details the String A serial string format and fields.

About	This code is very similar in data content to the IRIG J-17 code but adds a two-character field containing the year, and uses 8-bit ASCII, no parity data format.
Timing	Transmitted once every second. The leading edge of the “start” bit of the first character <SOH> is exactly on the second that the message describes.
Default Comms	9600 bps, 8-bit ASCII, no parity
Definition	<SOH>ddd:hh:mm:ss:yy<CR><LF>
Placeholder	**Content**
<SOH>	Start Of Header: HEX 01
ddd	Day of Year: range “001” – “366”
:	HEX 3A
hh	hour: “00” – ”23”
:	HEX 3A
mm	minute: “00” – “59”
:	HEX 3A
ss	seconds: “00” – “59”
:	HEX 3A
yy	year: “00” – “99” representing the last two digits of the year since 2000
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A

Table 9 - String A Time Code Format Fields

Example:	**Interpretation:**
<SOH>112:12:34:36:10<CR><LF>	day 112, time 12:34:36, year (20)10

String-B Time Code O/P

Table 10 details the String B serial string format and fields.

About	This code substitutes a “Quality” indicator byte for the year field, but otherwise is identical in form, function, and timing to String-A.
Timing	Transmitted once every second. The leading edge of the “start” bit of the first character <SOH> is exactly on the second that the message describes.
Default Comms	9600 bps, 8-bit ASCII, no parity
Definition	<SOH>ddd:hh:mm:ssQ<CR><LF>
Placeholder	**Content**
<SOH>	Start Of Header: HEX 01
ddd	Day of Year: range “001” – “366”
:	HEX 3A
hh	hour: “00” – ”23”
:	HEX 3A
mm	minute: “00” – “59”
:	HEX 3A
ss	seconds: “00” – “59”
Q	“Quality” Character (detailed in Table 11)
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A

Table 10 - String B Time Code Format Fields

“Quality” Character (Q)		Content
HEX	ASCII	
20	‘ ’ (space)	Clock is synchronized, timing accuracy is better than 60 ns
2E	‘.’ (full stop)	Clock is accurate to 1 µs
2A	‘*’	Clock is accurate to 10 µs
23	‘#’	Clock is accurate to 100 µs
3F	‘?’	Clock accuracy may be worse than 100 µs

Table 11 - String B Quality Character 'Q' Indicators

Example:	**Interpretation:**
<SOH>112:12:34:36?<CR><LF>	day 112, time: 12:34:36, >100 µs sync error

String-C Time Code O/P

Table 12 details the String C serial string format and fields.

About	This code is effectively a combination of String-A and String B. It provides both year information and a sync indicator field.
Timing	Transmitted once every second. The leading edge of the “start” bit of the first character, <CR>, is exactly on the second to which the message data refers.
Default Comms	9600 bps, 8-bit ASCII, no parity
Definition	<CR><LF>Q<SPACE>yy<SPACE>ddd<SPACE>hh:mm:ss.000<SPACE><SPACE><SPACE>
Placeholder	**Content**
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A
Q	Quality indicator: ‘ ‘ = in-sync, ‘?’ = out-of-sync
<SPACE>	HEX 20 (space)
yy	Year: “00” – “99” representing the last two digits of the year
<SPACE>	HEX 20 (space)
ddd	Day of year: range “001” – “366”
<SPACE>	HEX 20 (space)
hh	hour: “00” – ”23”
:	HEX 3A
mm	minute: “00” – “59”
:	HEX 3A
ss	seconds: “00” – “59”
.000	ASCII “.000”
<SPACE>	HEX 20 (space)
<SPACE>	HEX 20 (space)
<SPACE>	HEX 20 (space)

Table 12 - String C Time Code Format Fields

Example:	**Interpretation:**
<CR><LF>? 02 112 12:34:36.000	day 112 of year (20)02, time: 12:34:36, out-of-sync

String-D Time Code O/P

String-D is IDENTICAL in content to String-B (in Table 10), but the second mark is at the leading edge of the start-bit of the (<CR>).

Example:	**Interpretation:**
<SOH>112:12:34:36?<CR><LF>	day 112, time: 12:34:36, >100 µs sync error

String-E Time Code O/P

Table 13 details the String E serial string format and fields.

About	This provides time, year information, and a sync indicator field.
Timing	The string is transmitted once every second, with the leading edge of the “start” bit of the <CR> exactly on the second.
Default Comms	9600 bps, 8-bit ASCII, no parity
Definition	<SOH>YYYY:ddd:hh:mm:ssQ<CR><LF>
Placeholder	**Content**
YYYY	4-digit current year
:	HEX 3A
ddd	Day of year: range “001” – “365”
:	HEX 3A
hh	hour: “00” – ”23”
:	HEX 3A
mm	minute: “00” – “59”
:	HEX 3A
ss	seconds: “00” – “59”
Q	Quality character, as defined in String B (refer to Table 11)
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A

Table 13 - String-E Time Code Format Fields

Example:	**Interpretation:**
<SOH>2004:112:12:34:36?<CR><LF>	2004, day 112, 12:34:36pm, >100us sync error

String-F Time Code O/P

Table 14 details the String F serial string format and fields.

About	This string complies with the protocol required to drive Vorne type Time Displays.
Timing	The string is transmitted once every second, with the leading edge of the “start” bit of the last <BEL> exactly on the second.
Default Comms	9600 bps, 8-bit ASCII, no parity
Definition	<CR><LF>1100<CR><LF>44hhmmss<CR><LF>54ddd<CR><LF><CR><LF>45HHMMss<CR><LF>55DDD<CR><LF><BEL>
Placeholder	**Content**
<BEL>	HEX 07
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A
1100	ASCII “1100”
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A
44	ASCII “44” (means local time follows)
hh	Local hour of day: “00” – ”23”
mm	Local minute of day: “00” – “60”
ss	seconds: “00” – “59”
54	ASCII “54” (means local day of year follows)
ddd	Local day of year: “001” – “365”
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A
45	ASCII “45” (means UTC time follows)
HH	UTC hour: “00” – ”23”
MM	UTC minute: “00” – “59”
ss	UTC seconds: “00” – “59”
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A
55	ASCII “55” (means UTC Day of year follows)
DDD	UTC Day of year: “001” – “365”
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A
<BEL>	HEX 07

Table 14 - String-F Time Code Format Fields

String-G Time Code O/P

Table 15 details the String G serial string format and fields.

About	This general time string is used predominantly in Europe.
Timing	The string is transmitted once every second, with the leading edge of the “start” bit of the last <ETX> exactly on the second.
Default Comms	9600 bps, 8-bit ASCII, no parity
Definition	<STX>swhhmmssDDMMyy<LF><CR> <ETX>
Placeholder	**Content**
<STX>	Start of Text: HEX 02
S	Clock Status (refer to Table 16)
W	Day of Week (refer to Table 17)
Hh	hour of day: “00” – ”23”
Mm	minute of day: “00” – “60”
Ss	seconds: “00” – “59”
DD	day of month: “01” – “31”
MM	month of year: “01” – ”12”
yy	year: “10” – “99”
<LF>	Line Feed: HEX 0A
<CR>	Carriage Return: HEX 0D
<ETX>	End of Text: HEX 03

Table 15 - String-G Time Code Format Fields

Clock Status					
The s “Clock Status” is an ASCII character in the range 0-9, A-F representing a single hex digit (nibble)					
Bits	3	2	1	0	
				0	No announcement for time change
				1	Announcement for time change – active for an hour before
			0		Local Standard Time (LST)
			1		Daylight Saving Time (DST)
	0	0			Time/date invalid – clock is out of sync
	0	1			Hold-over mode – running on local Oscillator
	1	0			GPS / IRIGB controlled mode
	1	1			GPS / IRIGB controlled mode (high accuracy)

Table 16 - String-G Clock Status Indicators

Day of Week					
The w “Day of Week” is an ASCII character in the range 1-7, 9, A-F representing a single hex digit (nibble)					
Bits	3	2	1	0	
	0				Local Time
	1				UTC time
		0	0	1	Monday
		0	1	0	Tuesday
		0	1	1	Wednesday
		1	0	0	Thursday
		1	0	1	Friday
		1	1	0	Saturday
		1	1	1	Sunday

Table 17 - String-G Day of Week Indicators

Example:	**Interpretation:**
<STX>E3123456170410<LF><CR><ETX>	High Accuracy Mode, DST, Wed, 12:34:56, 17/4/2010

String-H Time Code O/P

Table 18 details the String H serial string format and fields.

About	This provides time and date information, and sync indicator fields.
Timing	Transmitted once every second. The leading edge of the “Start” bit of the first character <STX> is exactly on the second that the message describes.
Default Comms	9600 bps, 8-bit ASCII, no parity
Definition	<STX>D:dd.MM.yy;T:w;U:hh.mm.ss;uvxy<ETX>
Placeholder	**Content**
<STX>	Start of Text: HEX 02
D	ASCII “D”
:	HEX 3A
dd	Day of month: “01” - “31”
.	HEX 2E
MM	Month of year: “01” – “12”
.	HEX 2E
yy	Year: “10” – “99”
;	HEX 3B
T	ASCII “T”
:	HEX 3A
w	Day of week: “1” – “7””, where “1” = Monday
;	HEX 3B
U	ASCII “U”
:	HEX 3A
hh	Hour: “00” – “23”
.	HEX 2E
mm	Minute: “00” – “59”
.	HEX 2E
ss	Seconds: “00” – “59”
;	HEX 3B
u	ASCII ‘#’ if out of sync or <SPACE> (HEX 20) if in sync
v	ASCII ‘*’ if out of sync or <SPACE> (HEX 20) if in sync
x	ASCII ‘U’ if UTC time, ASCII “S” if DST, or <SPACE> (HEX 20) if standard time
y	ASCII “!” if DST change pending, ASCII “A” if leap second pending, or <SPACE> (HEX 20) otherwise
<ETX>	End of Text: HEX 03

Table 18 - String-H Time Code Format Fields

Example:	Interpretation:
<STX>D:17.04.10;T:6;U:12.34.56;#*S!<ETX>	17/4/2010, Sat, 12:34:56, out of sync, DST, DST change pending

NMEA ZDA Time Code O/P

Table 19 details the NMEA ZDA serial string format and fields.

About	This string is defined by the NMEA-0183 standard and transmitted at 9600 bps.
Timing	Transmission is once every second. The leading edge of the “start” bit of the “$” is exactly on the second.
Default Comms	9600 bps, 8-bit ASCII, no parity
Definition	$GPZDA,hhmmss.00,dd,MM,YYYY,s,xx,yy*CC<CR><LF>
Placeholder	**Content**
$GPZDA	ASCII “$GPZDA”
,	ASCII “,” (comma)
hh	UTC hour of day: “00” – “23”
mm	UTC minute of day: “00” – “60”
ss	UTC seconds: “00” – “59”
.00	ASCII “.00”
,	ASCII “,” (comma)
dd	UTC day of month: “01” – “31” depending on which month
,	ASCII “,” (comma)
MM	UTC month: “01” – “12”, “01” = January
,	ASCII “,” (comma)
YYYY	UTC year, 4 digits.
,	ASCII “,” (comma)
s	Local time zone offset sign (positive means local time leads UTC)
,	ASCII “,” (comma)
xx	Local time zone offset from UTC in hours
,	ASCII “,” (comma)
yy	Local time zone offset from UTC in minutes
*	ASCII “*”
CC	2-digit hex representation of the result of XORing the 8 data bits of each character between, but not including the "$" and "*". (00-FF)
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A

Table 19 - NMEA-ZDA Time Code Format Fields

Example:	**Interpretation:**
$GPZDA,123456.0023042010+1200*	UTC time is 12:34:56, 23 April 2010, the local time offset is +12:00

NMEA RMC Time Code O/P

Table 20 details the NMEA ZDA serial string format and fields.

About	This string is defined by the NMEA-0183 standard and transmitted at 9600 bps.
Timing	Transmission is once every second. The leading edge of the “start” bit of the “$” is exactly on the second.
Comms	9600 bps, 8-bit ASCII, no parity
Definition	$GPRMC,hhmmss.00,a,tttt.tttt,N,ggggg.gggg,W,0.0,0.0,ddmmyy,0.0,E*CC<CR><LF >
Placeholder	**Content**
$GPRMC	ASCII “$GPRMC”
,	ASCII “,” (comma)
hh	UTC hour of day: “00” – “23”
mm	UTC minute of day: “00” – “60”
ss	UTC seconds: “00” – “59”
.00	ASCII “.00”
,	ASCII “,” (comma)
a	Status: “A” = valid, “V” = invalid
,	ASCII “,” (comma)
tttt.tttt	Latitude (degrees, minutes): “00” – “89” degrees; “00.0000” – “59.9999” minutes
,	ASCII “,” (comma)
N	Latitude (north/south): “N” = north, “S” = south
,	ASCII “,” (comma)
ggggg,gggg	Longitude (degrees, minutes): “000” – “180” degrees; “00.0000” – “59.9999” minutes
,	ASCII “,” (comma)
W	Longitude (east/west): “E” = east, “W” = west
,	ASCII “,” (comma)
0.0	ASCII “0.0”
,	ASCII “,” (comma)
0.0	ASCII “0.0”
,	ASCII “,” (comma)
dd	UTC day of month
mm	UTC month
yy	2-digit UTC year
,	ASCII “,” (comma)
0.0	ASCII “0.0”
,	ASCII “,” (comma)
E*	ASCII “E*”
CC	2-digit hex representation of the result of XORing the 8 data bits of each character between, but not including the "$" and "*".
<CR>	Carriage Return: HEX 0D
<LF>	Line Feed: HEX 0A

Table 20 - NMEA-RMC Time Code Format Fields

11 Warranty

For terms and conditions of Tekron's Warranty see the website

http://tekron.com/about-tekron/warranty

WARNING
This product has been designed to comply with the limits for a Class A digital device pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against such interference when operating in a commercial environment.

Notes
The information in this manual may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this manual.

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