

TIME MACHINE Data Formats

(Sep 1. 2014 jkuo: extracted from the TIME MACHINE user manual)

RS232 DATA FORMATS

The TIME MACHINE transmits data in ASCII format Each word transmitted consists of a start bit, a parity bit (if selected) and two stop bits. The baud rate, word size, parity, handshake line and XOFF timeout are user programmable. Their ranges are as follows:

Baud Rate - 1200, 2400, 4800, or 9600
Word Size - 7 bits or 8 bits
Parity - odd, even, or none
Handshake line - enabled or disabled
XOFF Timeput - 1 to 99 seconds when enabled

The data is transmitted as a line. Each line begins with a code byte and is terminated with a carriage return (CR) and a line feed (LF). The code byte identifies the type of data line being transmitted. There are six (6) different types of data lines. Four are used in the Cross-Country mode and three are used in the Lap Tuning mode.

CROSS-COUNTRY MODE DATA LINES

The following data lines are transmitted in the Cross-Country mode. The code bytes are shown in hexadecimal code. The ASCII (hex Codes) of the characters are also shown for your convenience.

CHAR #	START LINE	EVENT LINE	PRIMARY TIME LINE	SELECT TIME LINE
1	19H	00H	17H	14H
2	"X" (58H)	"E" (45H)	10's CHUTE	10's CHUTE
3	"C" (43H)	"V" (56H)	1's CHUTE	1's CHUTE
4	Space (20H)	"E" (45H)	Space (20H)	Space (20H)
5	10's HOURS	"N" (4EH)	100's PL in Lane	100's PL in Lane
6	1's HOURS	"T" (54H)	10's PL in Lane	10's PL in Lane
7	":" (3AH)	Space (20H)	1's PL in Lane	1's PL in Lane
8	10's MINS	100's EVENT	Space (20H)	Space (20H)
9	1's MINS	10's EVENT	1000's Overall PL	1000's Overall PL
10	":" (3AH)	1's EVENT	100's Overall PL	100's Overall PL

11	10's SECS	CR	10's Overall PL	10's Overall PL
12	1's SECS	LF	1's Overall PL	1's Overall PL
13	"." (2EH)		Space (20H)	Space (20H)
14	10th SECS		10's HOURS	10's HOURS
15	100ths SECS		1's HOURS	1's HOURS
16	Space (20H)		":" (3AH)	":" (3AH)
17	CR (0DH)		10's MINS	10's MINS
18	LF (0AH)		1's MINS	1's MINS
19			":" (3AH)	":" (3AH)
20			10's SECS	10's SECS
21			1's SECS	1's SECS
22			"." (2EH)	"." (2EH)
23			10th SECS	10th SECS
24			100ths SECS	100ths SECS
25			Space (20H)	Space (20H)
26			CR (0DH)	Space (20H)
27			LF (0AH)	Space (20H)
28				10000's RACE #
29				1000's RACE #
30				100's RACE #
31				10's RACE #
32				1's RACE #
33				CR
34				LF

A typical transmission would begin with a START LINE when the TIME MACHINE is started. Next would be an Event line indicating the event number of the data which is to follow. After this, PRIMARY TIME and SELECT TIME lines would be transmitted. If the event number was changed during the race, then another EVENT LINE would be transmitted to indicate the new event #. If the data is re-transmitted (either during or after the race), an event line would initially be transmitted and followed by the PRIMARY and SELECT TIME lines.

If the event number changed during the retransmit, then another EVENT line would be transmitted to indicate it. A retransmit can be easily detected during a race because a "START OF RETRANSMIT" line is transmitted prior to the sending of "retransmit" data. After the retransmit data is finished being sent, a "END OF RETRANSMIT" line is sent. The data from the race will then continue where it left off prior to the retransmission.

LAP TIMING MODE DATA LINES

The following data lines are transmitted in the Lap Timing Mode:

CHAR #	START LINE	EVENT LINE	LAP TIME LINE
1	19H	00H	16H
2	"L" (4CH)	"E" (45H)	10's LANE
3	"T" (54H)	"V" (56H)	1's LANE
4	Space (20H)	"E" (45H)	Space (20H)
5	10's HOURS	"N" (4EH)	Space (20H)
6	1's HOURS	"T" (54H)	Space (20H)
7	":" (3AH)	Space (20H)	10's LAP #
8	10's MINS	100's EVENT	1's LAP #
9	1's MINS	10's EVENT	Space (20H)
10	":" (3AH)	1's EVENT	10's HOURS
11	10's SECS	CR	1's HOURS
12	1's SECS	LF	":" (3AH)
13	"." (2EH)		10's MINS
14	10th SECS		1's MINS
15	100ths SECS		":" (3AH)
16	Space (20H)		10's SECS
17	CR (0DH)		1's SECS
18	LF (0AH)		"." (2EH)
19			10th SECS
20			100ths SECS
21			Space (20H)
22			Space (20H)
23			10's MINS
24			1's MINS
25			":" (3AH)
26			10's SECS
27			1's SECS
28			"." (2EH)
29			10th SECS
30			100ths SECS

31			CR (0DH)
32			LF (0AH)

Transmissions in the Lap Timing Mode are identical in nature to those of the Cross-Country mode with the exception that LAP TIME lines are transmitted instead of PRIMARY TIME and SELECT TIME lines.

EXTERNAL TIME CLOCK DATA LINE

The following data line is transmitted out of the External Clock port:

CHAR #	EXTERNAL CLOCK LINE
1	80H, 82H, OR 84H
2	1's SECS
3	10's SECS
4	1's MINS
5	10's MINS
6	1's HOURS
7	10's HOURS
8	CR
9	LF

The first character transmitted is an ID code whose value depends on the status of the TIME MACHINE's internal "Time Clock." When the Time Clock is "set" to some value, a data line is transmitted with an ID code of 80H. If the Time Clock is counting up, then a data line with an ID code of 82H is transmitted once each second. The timing is aligned such that the last character (linefeed) is sent when the Time Clock's "seconds digit" changes. Its accuracy is within 1/100th of a second and this is independent of the baud rate. If the Time Clock is counting down, then a data line with an ID code of 84H is transmitted once each second.

START/END OF RETRANSMIT DATA LINE

When a "retransmit" operation occurs (or is commanded over an RS232 link), a "START OF RETRANSMIT" line is initially transmitted. This is followed by an "EVENT LINE", and then the data consisting of "TIME LINES". After all of the Time Lines have been sent, an "END OF RETRANSMIT" line is transmitted. The "START OF RETRANSMIT" and "END OF RETRANSMIT" lines are sent regardless if any data is available in the specified "retransmit area." The format for the data line is as follows:

CHAR #	START OF RETRANSMIT LINE	END OF RETRANSMIT LINE
1	01H	04H
2	"S"	"E"
3	"T"	"N"
4	"A"	"D"
5	"R"	Space
6	"T"	"O"
7	Space	"F"
8	"O"	Space
9	"F"	"R"
10	Space	"E"
11	"R"	"T"
12	"E"	"R"
13	"T"	"A"
14	"R"	"N"
15	"A"	"S"
16	"N"	"M"
17	"S"	"I"
18	"M"	"T"
19	"I"	CR
20	"T"	LF
21	CR	
22	LF	

<https://docs.google.com/spreadsheets/d/1ND9G0onboQVGRKX-KjFmFVt62JB1pV8SiAnC9kqesO4/pub/html>

CONTROL OF THE TRANSMITTED DATA

The host computer may control the transmission of data by pausing and continuing the data flow at any desired time. This can be accomplished by either a software command (XON/XOFF) or by a hardware handshake line. When the TIME MACHINE receives a "transmit off" command (XOFF = 13H or CTRL-S), it will suspend the data transmission until it receives a "transmit on" command (XON = 11H or CTRL-Q). The hardware handshake line may also be used to accomplish this. When it is held high (2.4v

to 25v), the data transmission will continue. If it is pulled low (0.8v to -25v), the transmission will be paused. The handshake line may also be used to detect a disconnected RS232 cable by halting the transmission if a "break" occurs in the link, since the handshake line is pulled low when not connected. This feature may be bypassed, if the host is not capable of holding it high. The handshake line can be disabled via the RS232 menu in the TIME MACHINE. The XOFF command may be time limited if the "XOFF Timeout" is enabled. In this case, if an XON doesn't occur, then data will only be suspended until the XOFF Timeout period has expired. This capability is provided for situations where the transmission "hangs up" because the Time Machine is not "seeing" an XON command.

A "Transmit Status" window" can be displayed on the TIME MACHINE's LCD display. It shows the data records being transmitted, the XON/XOFF commands being received and the state of the hardware handshake line. This is particularly useful when trouble shooting transmission problems.

NOTE - Both the Primary Time line and Select Time data lines are identical to the Chronomix 737 timer.

###